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Which level of risk justifies routine induction of labor for healthy women?

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ABSTRACT

Although induction of labor can be crucial for preventing morbidity and mortality, more and more women (and their offspring) are being exposed to the disadvantages of this intervention while the benefit is at best small or even uncertain. Characteristics such as an advanced maternal age, a non-native ethnicity, a high Body Mass Index, an artificially assisted conception, and even nulliparity are increasingly considered an indication for induction of labor. Because induction of labor has many disadvantages, a debate is urgently needed on which level of risk justifies routine induction of labor for healthy women, only based on characteristics that are associated with statistically significant small absolute risk differences, compared to others without these characteristics. Inductions for medical indications or at women's request fall outside the scope of this commentary.

Disadvantages of induction

In some countries, such as Australia, several hospitals have already implemented policies of routine induction of labor for women aged 35 years or older, born in India, with a high Body Mass Index, or women who had an artificially assisted conception. Since the publication of the ARRIVE trial\cite{3}, the discussion on such policy changes has extended to inducing all nulliparous women between 39 and 39+4 weeks with the justification that the trial showed that induction was associated with a reduction in the caesarean section rate, but it did not reduce stillbirth rates. However, there are alternative strategies, such as continuous support during labor, for reducing caesarean section rates, even more
than the ARRIVE trial, with good evidence on a wide range of other benefits and few risks [4].

More and more women are being exposed to the discomfort and disadvantages of an induction of labor worldwide [5], while their risk of antepartum stillbirth is very low. Induction of labor reduces women’s disadvantages of an induction worldwide [5], while their risk of absolute risk of stillbirth outweigh the harms of induction [13].

Nowadays, the choice for or against a treatment strategy is increasingly being shifted to women. At first sight, this seems reasonable, because through shared decision making women are offered a choice whether or not to accept the disadvantages of an induction to reduce the risk of stillbirth. However, shared decision making is not offered consistently. For instance, the stillbirth rate among nulliparous women is 0.12% and 0.13% among multiparous women who have given birth twice or more, and 0.14% for a group of women of low socioeconomic status (Table 1 and Box 1). Routine induction is not offered to for instance nulliparous women, multiparous women who have given birth twice or more, and women of lower socioeconomic status in the Netherlands, but it is increasingly offered to women aged 35–39 years, despite the stillbirth rate among this group of women being 0.12%. Hence, the threshold for shared decision making is not equally applied.

Care providers are obliged to inform women about the risks of interventions [1], because interventions are accompanied with iatrogenic side effects. The EU Convention on human rights and biomedicine states that informed consent is mandatory before applying an intervention (see Box 2) [1]. This implies that women should always be offered the choice whether they want to be exposed to disadvantages of induction of labor or not. Informed consent is the cornerstone of the relationship of patients with health care providers. However, it is a misunderstanding that healthy women should be informed about every relationship of patients with health care providers. However, it is a misunderstanding that healthy women should be informed about every small absolute increase of risk of a certain characteristic, or about all risks of pregnancy itself. This is simply not achievable nor desirable. Neither is it compulsory by law.

### Too much, too soon

Interventions during childbirth are crucial for preventing mortality and other adverse outcomes. However, safety is not limited to clinical outcomes. Psychosocial factors are also very important for women to feel safe [15]. Ignoring this can have unintended consequences. For example, studies indicate that the care provider’s pressure to induce labor is one of the reasons women avoid mainstream systems of birth

### Shared decision making

Offering an induction of labor is the response of care providers to the increased risk of stillbirth for women aged 35 years or older. Nowadays, the choice for or against a treatment strategy is increasingly being shifted to women. At first sight, this seems reasonable, because through shared decision making women are offered a choice whether or not to accept the disadvantages of an induction to reduce the risk of stillbirth. However, shared decision making is not offered consistently. For instance, the stillbirth rate among nulliparous women is 0.12% and 0.13% among multiparous women who have given birth twice or more, and 0.14% for a group of women of low socioeconomic status (Table 1 and Box 1). Routine induction is not offered to for instance nulliparous women, multiparous women who have given birth twice or more, and women of lower socioeconomic status in the Netherlands, but it is increasingly offered to women aged 35–39 years, despite the stillbirth rate among this group of women being 0.12%. Hence, the threshold for shared decision making is not equally applied.

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### Table 1

<table>
<thead>
<tr>
<th>Gestational age at birth in weeks</th>
<th>Total pregnant women</th>
<th>Total stillbirths</th>
<th>&lt;20 years</th>
<th>20–24 years</th>
<th>25–29 years</th>
<th>30–34 years</th>
<th>35–39 years</th>
<th>≥40 years</th>
<th>Ethnicity</th>
<th>Parity</th>
<th>Socioeconomic status</th>
<th>Conception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>631,437</td>
<td>690</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.05</td>
<td>0.08</td>
<td>0.11</td>
<td>0.13</td>
<td>0.11</td>
</tr>
<tr>
<td>n</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
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<td>%</td>
<td>%</td>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Nulliparous</td>
<td>330</td>
<td>0.12</td>
<td>40.2</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.05</td>
<td>0.10</td>
<td>0.12</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>Multiparous (para 1)</td>
<td>198</td>
<td>0.08</td>
<td>28.0</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.05</td>
<td>0.06</td>
<td>0.11</td>
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<td>0.13</td>
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<tr>
<td>Multiparous (≥ para 2)</td>
<td>162</td>
<td>0.13</td>
<td>35.0</td>
<td>0.03</td>
<td>0.05</td>
<td>0.03</td>
<td>0.05</td>
<td>0.06</td>
<td>0.04</td>
<td>0.07</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>Maternal age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20 years</td>
<td>4</td>
<td>0.06</td>
<td>1.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>20–24 years</td>
<td>58</td>
<td>0.10</td>
<td>12.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.05</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>25–29 years</td>
<td>199</td>
<td>0.10</td>
<td>26.0</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.05</td>
<td>0.05</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
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<tr>
<td>30–34 years</td>
<td>259</td>
<td>0.11</td>
<td>38.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.04</td>
<td>0.04</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>35–39 years</td>
<td>133</td>
<td>0.12</td>
<td>24.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.05</td>
<td>0.05</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>≥40 years</td>
<td>37</td>
<td>0.19</td>
<td>4.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
<td>0.05</td>
<td>0.11</td>
<td>0.17</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Dutch</td>
<td>511</td>
<td>0.10</td>
<td>81.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.04</td>
<td>0.07</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Non-Dutch</td>
<td>179</td>
<td>0.14</td>
<td>24.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.04</td>
<td>0.07</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Low</td>
<td>99</td>
<td>0.14</td>
<td>11.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.04</td>
<td>0.08</td>
<td>0.10</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Medium</td>
<td>536</td>
<td>0.11</td>
<td>91.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.04</td>
<td>0.07</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>High</td>
<td>44</td>
<td>0.08</td>
<td>1.0</td>
<td>0.00</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
<td>0.04</td>
<td>0.07</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Spontaneous</td>
<td>641</td>
<td>0.11</td>
<td>100.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.04</td>
<td>0.04</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Artificially assisted</td>
<td>49</td>
<td>0.23</td>
<td>5.0</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.01</td>
<td>0.06</td>
<td>0.15</td>
<td>0.11</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Women highly value a positive birth experience and therefore choose to have unattended births or high risk homebirths [16]. Methods of data analyses (Table 1).

We analysed data from the Dutch Perinatal Data register (Perined) of 824,653 births \( \geq 37 \) weeks from the years 2012 to 2016. The exclusion criteria were: missing information on maternal age, gestational age, perinatal mortality, or parity, and birth before \( \geq 37 \) weeks of gestation. The following risk factors for stillbirth were also excluded from the analyses: lethal fetal congenital disorders, maternal disease, hypertensive disorders, diabetes, intra-uterine growth restriction, suspected macrosomia or polyhydramnios, and other problems such as infection (apart from urinary tract infections), use of medication, drugs or alcohol, blood group incompatibility, placenta previa, lack of antenatal care and fetal heart arrhythmia.

Maternal age categories of 40–44 and \( \geq 45 \) years were combined, because of the low number in the category of \( \geq 45 \) years. To calculate the mortality rates at each week of gestation, we estimated the incidence of stillbirths that occurred during that week among all women that were still pregnant at the beginning of that week.

The registered gestational age was based on the moment of birth and not the moment of death, but we assumed that the time period between death and birth was limited to a few days. A limitation of Perined data is that risk factors are not very well registered in this database. The population without known risk factors will, therefore, contain a proportion of women with existing risk factors that were not registered.

In the Dutch Perinatal register, different non-native ethnic groups are inaccurately registered and therefore we only classified women into Dutch or non-Dutch ethnicity. A woman was assigned to a socioeconomic status category based on the education, employment, and income level of her residential postal code area.

**Textbox 1**

Methods of data analyses (Table 1).

The perinatal mortality rate has decreased substantially in the past century. On the other hand, the rate of many childbirth interventions, including induction of labor, is rising. After the ‘point of optimality’, an increase in the use of interventions will lead to more harm than benefits at a population level [18]. Interventions are potentially harmful and costly when used inappropriately or routinely [8]. They call for a reduction in the overuse of interventions, with a clear understanding of the best small or even uncertain. Induction of labor should only be offered exposed to the disadvantages of this intervention while the benefit is at best small or even uncertain. Induction of labor support is also more likely to be associated with spontaneous vaginal birth, less need for pharmacological pain relief, shorter labors, and fewer women reporting a negative childbirth experience [4].

**Conclusion**

Although induction of labor can be crucial for preventing morbidity and mortality, more and more women (and their offspring) are being exposed to the disadvantages of this intervention while the benefit is at best small or even uncertain. Induction of labor should only be offered to individual women if there is a medical necessity. Moreover, induction should not be offered, until there is sufficient evidence that it has the best clinical and psychosocial outcomes for women and their babies in both the short and longer term, compared to expectant management. Care providers should be aware of groups of women that have higher rates of stillbirth, including those over 35 years of age, and use this information in clinical decision making towards individual women. However, we argue that a small absolute increase in risk on its own, without any other medical risks or complications during pregnancy, does not justify a policy of routinely offering induction of labor without strong evidence of the benefits of that policy.

**Author’s contributions**

AESS, BG, MB, MP, MS, HD, SD, and AdJ conceived the idea of this opinion article. AESS conducted the literature search and wrote the paper, and LLP, BG, MB, MP, MS, HD, SD, AF, and AdJ contributed to the debate and formation of the opinion, and critically revised earlier drafts of the article. AESS and LLP analysed the data and created the table, with supervision of AdJ.

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Ethics approval and consent to participate

Ethical approval was not required for this article and there were no participants involved.

Consent for publication

Not applicable.

Declaration of Competing Interest

The authors declare that they have no competing interests.

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References


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