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. This commentary contributes to this debate by arguing why induction of labour should not routinely be offered to all women where there is a small increase in absolute risk, and no any other medical risks or complications during pregnancy. To underpin our statement, national data from the Netherlands were used reporting stillbirth rates in groups of women based on their characteristics, for each gestational week from 37 weeks of gestation onwards.

Keywords

Labor, Induced; Risk; Pregnant Women; Medical Overuse; Population Characteristics

Maternal age is increasingly considered an indication for induction of labor. Adverse pregnancy outcomes, including antepartum stillbirth, occur more frequently, and increase exponentially with increasing gestation, in women aged 35 years and older.[2] Whilst the risk of stillbirth has considerably decreased over the last decades, the risk threshold for induction of labor continues to fall too. Logically, if ever smaller differences in absolute risk between older and younger women justify induction of labor, a potential next step will be that other maternal characteristics, with similar small differences in absolute risk, will become indications for induction. Examples of such characteristics are: a non-native ethnicity, a low socioeconomic status, a high body mass index, smoking, an artificially assisted conception, and even nulliparity. A debate is urgently needed on which level of risk justifies *routinely offering* 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,[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 choices in care provider and birth place, restricts mobility and is generally experienced as being more painful than labor with a spontaneous onset.[6] Women who are induced use more pharmacological pain relief than they intended, with associated potential harms for themselves and their fetus.[7] Furthermore, induction of labor increases the risk of complications of labor and delivery, including uterine hyperstimulation, uterine rupture, perineal lacerations, severe postpartum hemorrhage, and uterine prolapse.[7,8] These adverse clinical outcomes are likely to contribute to a negative birth experience. To reveal this and enhance value based birth care, we advocate to systematically measure not only clinical outcomes but also patient reported outcomes and birth experiences in individual women, as defined in the outcome set for evaluating and improving perinatal care, proposed by the International Consortium for Health Outcomes Measurement (ICHOM).[9,10]

Although in some countries prostaglandins or misoprostol are used for induction of labor, many women still receive oxytocin when labor is induced. Emerging evidence suggests that exogenous oxytocin has potential side effects regarding postpartum maternal physical and psychological health.[11,12] The longer term health consequences for children are not yet fully elucidated. There are studies suggesting that exogenous oxytocin has an adverse impact on the fetal preparation for the extra-uterine environment and on longer term health problems.[11,13,14] Based on the Hippocratic principle of 'first do no harm' widespread use induction of labor

should not be introduced for healthy populations of pregnant women until the potential longer term harms have been thoroughly investigated, and a clear benefit of a reduction of absolute risk of stillbirth outweigh the harms of induction.[13]

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 Textbox 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 to 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 Textbox 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 small absolute increase of risk of a certain characteristic, or

Textbox 1: Methods of data analyses (Table 1)

We analysed data from the Dutch Perinatal Data register (Perined) of 824,653 births ≥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 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 ≥45 years were combined, because of the low number in the category of ≥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 2: Convention on Human Rights and Biomedicine[1]

"Chapter II – Consent
Article 5 – General rule

An intervention in the health field may only be carried out after the person concerned has given free and informed consent to it.

This person shall beforehand be given appropriate information as to the purpose and nature of the intervention as well as on its consequences and risks."

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 care and choose to have unattended births or high risk homebirths[16], or travel long distances to avoid interventions.[17] The majority of women highly value a positive birth experience and to give birth without medical interventions.[15]

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] The Lancet Series on Maternal Health identifies high rates of induction of labor as care that is provided "too much, too soon".[8] Experts at the World Health Organization and authors of the Lancet Series on Caesarean Section, have recently also warned against excessive use of obstetric interventions.[8,19,20] They call for a reduction in the overuse of interventions, since it causes avoidable harm and interventions can increase the need for further interventions, with a risk of an exponential increase in harm.[8,19,20] Inducing women to prevent small absolute risks based on trials undertaken with very discrete populations neglects these warnings. Besides, a small increase in absolute risk does not necessarily mean that outcomes will be improved if labor is induced. Without the full picture of longer term outcomes from single and multiple cumulative interventions, and in the absence of a clear understanding of the compiled morbidity that may eventuate over a woman's life time of reproduction, it is not possible to achieve fully informed judgements.

Limited resources

An associated unintended consequence of overuse of induction of labor is the pressure put on health care resources, which are already constrained. Overuse of interventions for women at very marginal risk of adverse outcomes will reduce the availability of resources for those with high-risk factors and complications, and for prevention.[8,19] It also limits resources for the implementation of evidence-based non-medical interventions, such as continuous support during labor, which has been shown to reduce the rate of caesarean section by 25%, and a low five-minute Apgar score by 38%, and may therefore also reduce perinatal mortality and morbidity if implemented on a large scale.[4] Continuous 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 together with 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.

Declarations

Declaration of interests

The authors declare that they have no competing interests.

Funding

This study was funded by Cooperative of Midwifery Practices Leiden and larger Leiden.

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

Acknowledgements

We thank Perined for the use of the national database.

Table 1. Stillbirth rates ≥37 weeks in a population of healthy pregnant women in the Netherlands specified for gestational age of birth (2012-2016).

			Gestational age at birth in weeks											
	Total		**37+0 - 37+6**		**38+0 - 38+6**		**39+0 - 39+6**		**40+0 - 40+6**		**41+0 - 41+6**		**≥42+0**	
Total pregnant women	*631,437*		*631,437*		*597,282*		*510,318*		*341,360*		*134,270*		*10,566*	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Total stillbirths	*690*	*0.11*	*105*	*0.02*	*137*	*0.02*	*166*	*0.03*	*161*	*0.05*	*107*	*0.08*	*12*	*0.11*
Parity														
Nulliparous	330	0.12	42	0.02	61	0.02	69	0.03	81	0.05	69	0.10	8	0.12
Multiparous (para 1)	198	0.08	28	0.01	41	0.02	54	0.03	43	0.03	29	0.06	3	0.13
Multiparous (≥ para 2)	162	0.13	35	0.03	35	0.03	43	0.05	37	0.06	9	0.04	1	0.07
Maternal age														
<20 years	4	0.06	1	0.02	2	0.03	1	0.02	0	0.00	0	0.00	0	0.00
20-24 years	58	0.10	12	0.02	9	0.02	14	0.03	15	0.05	7	0.06	1	0.11
25-29 years	199	0.10	26	0.01	42	0.02	45	0.03	50	0.05	32	0.08	4	0.14
30-34 years	259	0.11	38	0.02	57	0.02	66	0.03	57	0.04	40	0.08	1	0.02
35-39 years	133	0.12	24	0.02	21	0.02	33	0.04	28	0.05	21	0.09	4	0.19
≥40 years	37	0.19	4	0.02	6	0.03	7	0.05	11	0.11	7	0.17	2	0.49
Ethnicity														
Dutch	511	0.10	81	0.02	110	0.02	119	0.03	113	0.04	79	0.07	9	0.11
Non-Dutch	179	0.14	24	0.02	27	0.02	47	0.04	48	0.07	28	0.11	3	0.13
Socioeconomic status														
Low	99	0.14	11	0.02	16	0.02	24	0.04	27	0.08	20	0.15	1	0.10
Medium	536	0.11	91	0.02	112	0.02	126	0.03	119	0.04	77	0.07	9	0.11
High	44	0.08	1	0.00	8	0.01	12	0.03	13	0.04	9	0.07	1	0.11
Conception														
Spontaneous	641	0.11	100	0.02	126	0.02	157	0.03	145	0.04	100	0.08	11	0.11
Artificially assisted	49	0.23	5	0.02	11	0.05	9	0.06	16	0.15	7	0.15	1	0.22

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