The decision to perform Caesarean section in Russia

KIRILL DANISHEVSKI1, MARTIN MCKEE2, FRANCO SASSI3 AND VICTOR MAL TCEV4

1Open Health Institute, Moscow, Russian Federation, 2European Centre on Health of Societies in Transition, London School of Hygiene and Tropical Medicine, London, UK, 3London School of Economics and Political Science, London, UK, and 4Higher School of Economics, Moscow, Russian Federation

Abstract

Background. Clinical practice in Russia is set out in a series of centralized guidelines. However, many of these guidelines are not supported by evidence and, despite their existence, there is considerable unexplained variation in practice. This study examines the decision to recommend a Caesarean section, an intervention for which there is a solid evidence base, but whose use varies considerably among facilities in Russia.

Aim. To identify the factors that Russian obstetricians take into account when recommending a Caesarean section.

Methods. Conjoint analysis. Ninety-two obstetricians from three regions were asked to state whether they would recommend a Caesarean section in each of 30 vignettes (including three for validation) combining 10 medical, social and organizational factors previously identified as contributing to the decision to intervene, including some absolute indications to intervene or not to, on the basis of international evidence.

Results. Checks for consistency within ratings by individuals gave no cause for concern. However, there was a wide variation in the probability of intervening among obstetricians, with six recommending intervention in only one scenario and one in 27 scenarios. Some factors were consistent with evidence but others were not, such as myopia or previous abortions. Intervention was more likely at 11 p.m. than at noon. Male obstetricians were more likely to intervene than females.

Conclusion. This study highlights the importance of understanding clinical decision-making in Russia as a prelude to changing it.

Keywords: Caesarean section, decision-making, obstetrics, Russia

Introduction

Medical practice in the Soviet Union was isolated from developments elsewhere. Access to international scientific journals was extremely limited and there was little understanding of the western concept of evidence; career advancement in science was dependent on adherence to the principles of Communist ideology rather than innovation [1]. This has created a legacy whereby many practices observed in contemporary Russia are unsupported by evidence, exemplified by the widespread use of ineffective therapies using diverse sources of electromagnetic radiation [2], or by a recent paper backing exposure to coloured light as a treatment for hypertension [3]. Furthermore, even when conventional treatments are employed, the indications are often inconsistent with the available evidence, as in the widespread use of low sensitivity screening tests [4] or the overuse of antibiotics [5]. Yet much of what is known internationally about clinical practice in Russia is based on accounts from visitors [6], with little real understanding of how clinical decisions are actually made.

This paper builds on our earlier work on obstetric care in Russian health facilities [7]. This is an area where there is a sound international evidence base but where initial work had suggested that Russian practice was inconsistent with that evidence, based on a reading of official Russian guidance, set out in prikazi or decrees developed by national experts [8]. For example, absolute indications for Caesarean section in Russia (which accounted for 14.3% of births in Russia in 2000) [9] include ones without a basis in evidence such as ‘history of infertility’, a previous Caesarean section, and multiple pregnancy. Myopia and maternal age over 30 were listed in an earlier prikaz as absolute inductions; however, currently they are listed as relative indications, at the discretion of the obstetrician. Considerable attention is given to any sign of heart disease or other conditions collectively labelled as ‘extragenital pathology’ when deciding on the mode of delivery [10].
More generally, the most recent prikaz, issued in 1998, recommends interventions known to be either without benefit or even harmful, such as routine enemas and shaving, recumbent bed position in labour, routine foetal monitoring and use of opiates. The decree does not mention the use of corticosteroids in premature amniotic rupture, which is widely used in western countries [12, 13], and also in Russia. Although some elements of the decree are consistent with the available evidence, such as monitoring blood pressure and urinary protein, use of antibiotics after Caesarean section and antihistamines for management of nausea and vomiting, many other aspects reflect a high degree of medicalization, such as dietary restrictions and repeated blood tests.

However, to complicate the situation further, our research had identified extensive variation in intervention rates, seemingly unexplained by differences in those patient characteristics that we could assess from available data [7].

It is important to understand the factors influencing obstetricians to recommend Caesarean section in Russia. Unnecessary intervention leads to both greater risk and discomfort for the mother and to increased costs. To understand this phenomenon better, we have applied conjoint analysis to elicit the role of patient and physician characteristics in recommending the use of Caesarean section.

Conjoint analysis is a method developed in market research to elicit preferences, subsequently used to understand the factors involved in clinical decision-making [14]. Conjoint analysis is based on the identification of key characteristics of a decision problem that may influence the outcome of a decision. Individuals may have preferences for certain combinations of such characteristics over other combinations, and those preferences will guide their decisions. In a conjoint analysis study, a sample of potential decision makers is asked to evaluate a selection of scenarios in which key characteristics of a decision problem are combined in different ways. Responses elicited from the subjects interviewed are used to extrapolate the relative preferences attached by the same subjects to different characteristics. This approach has been used before in a maternal health setting, although as far as we could ascertain, only once [15]. However, that example examined preferences of pregnant women rather than providers, as in the present study. Until now, there has been no attempt to assess the weight given by practicing Russian obstetricians to various indications for Caesarean section.

### Methods

The findings presented here are part of a larger programme of research on obstetric practice in Russia. Obstetric practice was selected as a lens through which to study clinical decision-making more generally; as it is an area where there is a solid evidence base concerning effective practices [16]. This study is set in three areas in European Russia, the regions of Tula and Tver, located ~200 km south and north of Moscow, respectively, and the city of Dubna, located within the Moscow region on the border with Tver. Tula and Tver are typical regions of central Russia, whereas Dubna is a university city.

The background information to inform the study was obtained from an in-depth study in the Tula region, including an analysis of data on all births in 2000 [7, 17], followed by detailed interviews, in 2004, with 52 practicing obstetricians. This was supplemented by a review of the Russian and international literature to identify relevant recommendations and their basis in evidence.

Conjoint analysis, in this context, is based on the concept that each time an obstetrician must decide whether to perform a Caesarean section, he or she must consider a combination of potential attributes (such as aspects of maternal or foetal health). Each obstetrician attached a relative preference score to each attribute so that the combination of the scores for all attributes provided a measure of the obstetrician’s overall attitude towards performing the procedure.

On the basis of this preliminary work, a series of 10 attributes identified as a relative indication either in the Russian or international literature, or inferred from studying the data (time of day) were included. Each was divided into two or three levels. These were used to generate vignettes using the SPSS Orthogonal design facility in which the probability of selecting each level within an attribute is equal; levels of different attributes are not correlated; and variation of levels within the vignettes is maximized. The number of vignettes required for the study was calculated using the SPSS Orthogonal procedure, which generates a fractional factorial design, i.e. a subset of all possible combinations of relevant factors and levels. The result is an orthogonal array of factor combinations based on the assumption that no interactions between factors exist. This minimizes the effort required to the respondent and allows the estimation of the main effect of each factor through survey responses.

Three more vignettes were added for validation purposes; one with features agreed in both Russian and international literature as an absolute indication for Caesarean section, one with no features considered to be an indication in either literature, and one that repeats one of the initial 27 vignettes. Information was collected about the participants [age, gender, workplace, postgraduate qualification (including where obtained)] and after receiving an explanation of the process they were presented with a typical case history (so called ‘paper patient’) and asked whether they would recommend a Caesarean section in each scenario if they were to decide now (Box 1 provides an example of one such scenario). Respondents were also asked to provide a rating of the likelihood of recommending a Caesarean section on a visual analogue scale from 0 to 100. The baseline scenario was:

- First delivery, singleton, no uterus scaring, normal (head) presentation of the infant, no placenta presentation, no foetal hypoxia, no previous miscarriages or infertility history.

To minimize bias arising from prior beliefs, participants were asked to assume that only the characteristics used in the conjoint analysis could vary. Participants were also asked to
assume that complication rates at their own hospital are in line with the national average.

A binary response (logistic) model was applied to obstetricians’ recommendations (Caesarean section vs. natural birth) for the 27 main scenarios. The model was based on a multilevel random intercept design, using individual obstetricians as the upper level and recommendations on individual scenarios as the lower level. This model yields the odds that a Caesarean section will be recommended in the presence of different values of each parameter relative to baseline, adjusting for other parameters. The model assumes that individual attitudes towards Caesarean section will influence all the responses given by an obstetrician, and that the impact of such individual attitudes on the odds of recommending a Caesarean section is randomly distributed (hence the random intercept component). A preliminary, constant only, version of the model revealed that a large component of the total variance of the response variable (over one quarter) was explained by differences between individual obstetricians, supporting the choice of a multilevel design. Thus, a fuller version of the model was developed, including the 10 attributes of the conjoint analysis as covariates as well as a selection of obstetrician characteristics. All analyses were undertaken using Stata 9.0.

Results

Sample characteristics

Participants were practicing obstetricians. The final sample included 92 respondents, 39 (of 54 in post, 72% response) from Tula region, 49 (50 in post, 98% response) from Tver region and 4 (of 5 in post, 80% response) from Dubna city. The total number of vignettes scored was thus 2760. Seventy respondents (76%) were female (consistent with the preponderance of women among Russian obstetricians); the mean age of respondents was 42 years. The lower response in Tula is likely to have reflected research fatigue, as each obstetrician had already participated in two earlier interviews.

Consistency and validity testing

The three vignettes added to the 27 retrieved from the orthogonal plan made it possible to check for consistency, understanding and face validity of replies. Vignette #28 included several indications normally considered absolute for Caesarean section, i.e. very large foetus and anatomically narrow pelvis and heart diseases history with pregnancy related complications. In these circumstances, 92.5% of respondents would intervene (82.8% were 100% likely to do so). With vignette #29 (no indication for Caesarean section), 95.7% of respondents would prescribe a normal delivery, with 68.8% being 100% likely to do so and an additional 25.8% being 90% likely. No respondents recommended both normal delivery for vignette #28 (multiple indications) and Caesarean for vignette #29 (no indication) suggesting that there was no systematic misunderstanding of the information presented. Indeed, other responses indicated that obstetricians taking an aberrant view were on the extremes of the attitude spectrum. Those who recommended normal delivery in vignette #28 (multiple indications) on average rated just five out of all 30 vignettes as requiring Caesarean section, compared with an average of 14 among those recommending Caesarean section for the same scenario. Those who recommended Caesarean delivery in the case of vignette #29 (no indication) did so in 18 out of 30 cases on average, compared with an average of 13 among those who recommended normal delivery for the same scenario.

The same vignette was presented as #1 and #30. This produced discordant decisions in 12 cases, 10 of whom recommended intervention when the vignette first appeared. However, among these 10, the scores assigned to the two vignettes on the visual analogue scale were not significantly different.

Summary statistics

Across the entire sample, the average number of vignettes, for which a Caesarean section was recommended, was close to 14 out of 30 (mean = 13.3; median = 14.5). Six respondents rated only one scenario (vignette #28) as demanding a Caesarean section on the dichotomous scale, whereas one respondent recommended a Caesarean section in 27 scenarios.

Factors influencing the decision to recommend a Caesarean section

The output from the random intercept multilevel logistic model is shown in Table 1. Birth weight was a major factor in deciding to intervene. Compared with an expected birth-weight of 2500 g, an expected birth weight of 3500 g increased the odds of recommending intervention by 40% whereas an expected birthweight of 4200 g increased the odds of intervening more than 7-fold. Both gestation of over 42 weeks and maternal age of 32 years also increased the likelihood of deciding in favour of a Caesarean section, all other things being equal.

Although a pelvic outlet of 9.5 cm or less is considered an absolute indication in most Russian obstetrics textbooks, when preparing the vignettes those interviewed advised setting the threshold at 10 cm, a decision justified by the ratings.

Cardiac valvular disease also increased the likelihood of intervening very markedly, with mitral incompetence increasing the likelihood over 10-fold and stenosis almost 7-fold. A mother with myopia (-6 dioptres) or with four or more previous abortions was almost twice as likely to be advised to have a Caesarean section. Maternal socio-economic and smoking status were not significant factors, although smoking 20/day or more came close to a significant reduction in the likelihood of recommending intervention, perhaps because of the known link between smoking and low birthweight. Consistent with observations in Western Europe, intervention was more likely at 11 p.m. than at noon [18].

The analytical model designed for this study allowed for the non-linearity of the probability of recommending a
Caesarean section in relation to the values of covariates (scenario attributes). Therefore, the impact of different attributes varied depending on the overall level of risk (probability) of Caesarean section associated with the other characteristics. In a low risk scenario, defined as one in which the estimated probability of recommending intervention is less than 20%, all attributes, individually, have a small influence on the likelihood of recommending intervention (Fig. 1). In contrast, in a relatively high-risk scenario, defined as a baseline probability of recommending intervention of around 60%, individual attributes may have a decisive importance in shifting the balance of probabilities either way. Characteristics that display the largest impact are the presence of mitral valvular disease, a high expected birthweight (4200 g) and a higher maternal age (32 years) (Fig. 2).

Turning to the characteristics of obstetricians, male obstetricians were almost three times more likely to recommend Caesarean section compared with their female colleagues. Each additional year of age increased the odds of recommending intervention by \( \frac{1}{24} \% \).

### Discussion

We explored obstetricians’ attitudes towards the use of Caesarean section using a stated preferences approach (conjoint analysis). We deemed the latter superior to a revealed preferences approach (e.g. based on medical records) in the context in which the study was undertaken, for at least three reasons. First, preliminary work indicated that it would be difficult to obtain medical records and those available to us were often of poor quality. Second, medical records do not always report information on all the factors that we thought would have an influence on obstetricians’ decisions. Finally, a retrospective review of medical records would not allow to adequately control for factors such as the decision by the mother to opt for a Caesarean section or the ease with which the physician could extract additional under the table fees from the mother. Informal incentives may distort the way decisions are made and the information reported in medical records.

The modest sample size and limited experience of conjoint analysis by the subjects interviewed should advise caution in interpreting the data. However, several validation mechanisms were incorporated, including non-orthogonal manually added vignettes and undertaking the study in three separate regions of Russia. The level of inconsistency was low and had a negligible effect on the overall preference scores.

Finally, the study examined only a few of the many possible indications for Caesarean section and, in particular, excluded some uncommon indications. It did, however, cover the entire spectrum from a very high to very low probability of intervention.

The inferred preferences for intervention demonstrate considerable variation among obstetricians, consistent with our observations of practice in Tula. However, this study also provides insights into the role of gender in determining practice. Males tended to be more interventionist.

### Table 1 Results from the random effects ordered probit model

<table>
<thead>
<tr>
<th></th>
<th>Odds ratio</th>
<th>P value</th>
<th>Lower CI</th>
<th>Upper CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected birthweight</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2500 g</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3500 g</td>
<td>1.41</td>
<td>0.012</td>
<td>1.08</td>
<td>1.84</td>
</tr>
<tr>
<td>4200 g</td>
<td>7.39</td>
<td>&lt;0.0001</td>
<td>5.58</td>
<td>9.80</td>
</tr>
<tr>
<td>Length of gestation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 weeks</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37 weeks</td>
<td>0.71</td>
<td>0.010</td>
<td>0.54</td>
<td>0.92</td>
</tr>
<tr>
<td>42 weeks</td>
<td>1.77</td>
<td>&lt;0.0001</td>
<td>1.37</td>
<td>2.29</td>
</tr>
<tr>
<td>Eyesight</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe myopia</td>
<td>1.92</td>
<td>&lt;0.0001</td>
<td>1.54</td>
<td>2.404</td>
</tr>
<tr>
<td>Hystory of abortions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four previous</td>
<td>1.95</td>
<td>&lt;0.0001</td>
<td>1.57</td>
<td>2.43</td>
</tr>
<tr>
<td>abortions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prolapsed valve</td>
<td>10.55</td>
<td>&lt;0.0001</td>
<td>7.84</td>
<td>14.20</td>
</tr>
<tr>
<td>Valvular stenosis</td>
<td>6.92</td>
<td>&lt;0.0001</td>
<td>5.20</td>
<td>9.23</td>
</tr>
<tr>
<td>Pelvic outlet size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 cm</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.5 cm</td>
<td>0.96</td>
<td>0.562</td>
<td>0.71</td>
<td>1.20</td>
</tr>
<tr>
<td>11 cm</td>
<td>0.62</td>
<td>&lt;0.0001</td>
<td>0.48</td>
<td>0.81</td>
</tr>
<tr>
<td>Time of the day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noon</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:00 PM</td>
<td>1.55</td>
<td>&lt;0.0001</td>
<td>1.24</td>
<td>1.94</td>
</tr>
<tr>
<td>Maternal age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 years</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 years</td>
<td>1.01</td>
<td>0.967</td>
<td>0.77</td>
<td>1.31</td>
</tr>
<tr>
<td>32 years</td>
<td>3.57</td>
<td>&lt;0.0001</td>
<td>2.71</td>
<td>4.70</td>
</tr>
<tr>
<td>Socio-economic factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single, low education</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married, educated</td>
<td>0.87</td>
<td>0.242</td>
<td>0.69</td>
<td>1.10</td>
</tr>
<tr>
<td>Maternal smoking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-smoker</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 20 cigarettes/day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender of physiciana</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2.737</td>
<td>0.015</td>
<td>1.22</td>
<td>6.17</td>
</tr>
<tr>
<td>Age of physiciana</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional year of age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*aEstimates based on a separate model, including all of the above attributes but fewer observations (84) due to missing data.
Perhaps the most important findings relate to the importance placed on factors that would not be considered as important elsewhere. An example is the presence of heart valve disease, even though, when specifying the vignettes, there was no mention of symptoms. Myopia was also viewed as important, despite a lack of evidence that of any increased risk in a normal delivery.

Some of the earliest research on variations in practice was in the area of obstetrics and, in particular, in relation to Caesarean section [19, 20]. Subsequent years have seen a growing awareness of the scale of variation in clinical decision-making, leading in turn to research on outcomes and the development of evidence-based guidelines [21]. As has been noted repeatedly by authors such as Vlassov [22], these developments have largely passed the countries of the former Soviet Union by. Yet paradoxically, even during the Soviet period, there was an extensive system of clinical guidelines, in the form of prikazes. However, these were rarely informed by evidence and, as this study, and our earlier work have shown, they were frequently disregarded.

To borrow a phrase from Lenin, what is to be done? First, there is a need to recognize that the high level of variation in practice and the widespread use of indications for treatment devoid of an evidence base is a problem that must be addressed. This remains a distant prospect, although studies such as this one can make a contribution to beginning a debate. Second, there is a need to achieve understanding, and acceptance, of the principles of evidence-based practice, beginning in medical schools. This is beginning to happen in some places but is still rare. A major obstacle is the still limited access to the internet (given the parlous state of library facilities) and, linked to that, the ability to read English. In the mean time, it will be important to ensure that relevant materials that are published in Russian, such as the text Effective Care in Pregnancy and Childbirth [23] are more widely known about and accessible. Third, while recognizing the specificities of the post-Soviet situation, there is much that can be learned from the experience of other middle income countries [24, 25].

Experience with retraining primary care physicians reveals the scale of the challenge ahead in a country that is as large as Russia, and where practitioners have been so isolated for so long [26]. This should not, however, be seen as a counsel of despair. The most important step is the first one to recognize that things must change.

![Figure 1](image-url)

Figure 1 Percentage points by which the level of each attribute would increase the probability of Caesarean section, relative to the baseline level for the same attribute (low-risk scenario).
You have admitted a woman, parity—one, singleton pregnancy, no scarring on the uterus, normal position of the foetus and placenta, no symptoms of foetal hypoxia. No previous infertility history or other indications for Caesarean section besides any that may appear below:

(i) Estimated birthweight 4200 g
(ii) Gestation term 35 weeks
(iii) Myopia-6, no deterioration of eye sight
(iv) No previous abortions
(v) Heart disease: mitral stenosis
(vi) Pelvis size: 10 cm.
(vii) Time 11 p.m.
(viii) Maternal age 17
(ix) Single, school education only
(x) Smokes over 20 cigarettes per day

If you would have to make a decision now what would it be?
☐ Perform Caesarean ☐ Do not perform Caesarean

Box 1 Example of a vignette: Patient 21

---

**Figure 2** Percentage points by which the level of each attribute would increase the probability of Caesarean section, relative to the baseline level for the same attribute (high-risk scenario).

---

**Funding**

UK Department for International Development’s Health Systems Development Programme; a grant from the UK Royal Society.

---

**References**


11. Ministry of Health of the Russian Federation. Decree #323 “Standards of obstetric and gynaecological care” from 05.11.98


Accepted for publication 15 November 2007