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Association between non-invasive nursing care technologies during childbirth and neonatal vitality: a cross-sectional study

Associação entre tecnologias não invasivas de cuidado no parto e vitalidade do recém-nascido: estudo transversal

Asociación entre tecnologías no-invasivas de cuidado en el parto y la vitalidad neonatal: estudio transversal

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Abstract

Objective: to compare the use of non-invasive midwifery care technologies (TNICEO) with the use of traditional care model practices, having as parameters the presence of meconium in the amniotic fluid and its repercussion on the newborn's vitality. **Method:** a cross-sectional study with secondary data of 10,219 parturients who delivered by midwives between September 2004 and October 2016. Logistic regression was used to assess Apgar> 8 Odds Ratio in exposure to noninvasive midwifery care technologies when compared to traditional care. **Results:** there were higher percentages of light amniotic fluid and neonates with good vitality in parturients who used only TNICEO compared with those exposed only to traditional care. **Conclusion:** nurse midwives' provision of TNICEO and its use by women are efficient strategies to reduce unfavorable neonatal outcomes. **Implications of practice:** investments in the performance of these experts is important, as their know-how to make them not medicalized through TNICEO confirms a process of humanized, safe and quality care that meets official recommendations and contributes to the change in the care model.

Keywords: Enfermagem Obstétrica; Humanização da Assistência; Recém-Nascido; Índice de Apgar; Líquido Amniótico.

Resumo

Objetivo: comparar o uso de tecnologias não invasivas de cuidado de enfermagem obstétrica (TNICEO) com o emprego de práticas do modelo de assistência tradicional, tendo como parâmetros a presença de mecônio no líquido amniótico e sua repercussão sobre a vitalidade do recém-nascido. **Método:** estudo transversal, com dados secundários, de 10.219 parturientes que tiveram parto acompanhado por enfermeiras obstétricas entre setembro/2004 e outubro/2016. Utilizou-se a regressão logística para avaliar a chance de Apgar >8 na exposição às tecnologias não invasivas de cuidado de enfermagem obstétrica quando comparada à assistência tradicional. **Resultados:** constataram-se maiores percentuais de líquido amniótico claro e neonatos com boa vitalidade nas parturientes que utilizaram somente TNICEO, em comparação com aquelas expostas, apenas, à assistência tradicional. **Conclusão:** o oferecimento das TNICEO pelas enfermeiras obstétricas e o seu uso pelas mulheres se configuram como estratégias eficientes para reduzir desfechos neonatais desfavoráveis. **Implicações para a prática:** destaca-se a importância de investimentos na atuação dessas especialistas, pois seu saber fazer desmedicalizado, por meio das TNICEO, confirma um processo de cuidar humanizado, seguro e de qualidade, que atende às recomendações oficiais e contribui para a mudança do modelo assistencial.

Palavras-chave: Enfermagem Obstétrica; Humanização da Assistência; Recém-Nascido; Índice de Apgar; Líquido Amniótico.

Resumen

Objetivo: comparar el uso de tecnologías no invasivas de cuidado de enfermería obstétrica (TNICEO) con el uso de prácticas del modelo tradicional de cuidado, con la presencia de meconio en el líquido amniótico y su repercusión en la vitalidad del recién nacido. **Método:** estudio transversal, com datos secundários, de 10.219 parturientas, asistidas por enfermeras obstétricas entre septiembre de 2004 y octubre de 2016. Se utilizó la regresión logística para evaluar la probabilidad de Apgar> 8 en la exposición a TNICEO en comparación con la atención tradicional. **Resultados:** se observaron porcentajes más altos de líquido amniótico claro y recién nacido con buena vitalidad en las parturientas que solo usaron TNICEO en comparación con las expuestas solo a la atención tradicional. **Conclusión:** la oferta de TNICEO por las enfermeras obstétricas y su uso por las mujeres es una estrategia eficaz para reducir los resultados neonatales desfavorables. **Implicaciones para la práctica:** enfatizase la importancia de los inwvestimentos en el desempeño de estos especialistas, ya que su experiencia, a través del TNICEO, constituye un proceso de atención humanizada, segura y de alta calidad, que cumple con las recomendaciones oficiales y contribuye para cambiar el modelo de atención.

INTRODUCTION

Elimination of meconium in amniotic fluid is a relatively common finding during parity in women classified as having a habitual obstetric risk. However, considering that the mechanism by which the fetus eliminates it may be associated with several pathophysiological factors, assessment of amniotic fluid characteristics during labor has been shown to be an important component for the assessment of fetal and neonatal vitality.[1,2]

There is consensus that the presence of meconium in the amniotic fluid does not, by itself, characterize fetal distress and is a warning sign for surveillance of maternal and fetal well-being, as well as for the risk of aspiration by the newborn at birth.[3,4] In some cases, this may have a negative impact on women's health and newborn vitality.[4,5] Unfavorable outcomes are found by decreasing fetal heartbeat, Apgar score less than 8, or by reducing blood pH at birth, with significant impacts on perinatal morbidity and mortality indicators.[1,5-9]

In obstetric practice, according to the traditional care (TC) model, it is observed that the presence of meconium in the amniotic fluid drives the adoption of interventional conducts or is a consequence of procedures based on outdated scientific evidence. Thus, this type of care does not always represent safety or is a protective factor for maternal and perinatal health, adding more risks than benefits to women, fetuses and newborns.[1,10-12] This close correlation is revealed, for example, in the association between the routine use of oxytocin and the higher incidence of meconium elimination by the fetus, as well as caesarean sections.[3-5]

On the other hand, nurse midwives, inserted in the not medicalized model of care at childbirth and birth, have shown concern about the characteristics of amniotic fluid as an important indicator for their professional performance. These experts understand that the higher incidence of light amniotic fluid with missing meconium and lower risks to maternal and perinatal health are related to a care process. This care is humanized and respects the physiology of parity and uses obstetric practices recommended by the World Health Organization and the Brazilian Ministry of Health.[13,14]

It is noteworthy that nurses, by redirecting women's care to a not medicalized perspective, re-signified the official recommendations of "best practices" from the construction of specific knowledge called non-invasive midwifery care technologies (TNICEO - *tecnologias não-invasivas de cuidado de enfermagem obstétrica*). TNICEO are a technological breakthrough as they are soft and relational technologies that have incorporated new meanings in childbirth and birth care.[15,16]

Corroborating the broadening of the conception of nursing care, in its different dimensions, TNICEO can be seen as a structured knowledge, applied with intentionality and justification, which produces results that meet the objective and subjective needs of human beings.[17] In the nursing field, TNICEO are defined as a set of techniques, procedures, knowledge and knowledge developed and used by nurse midwives in caring for women.[15]

In this context, besides being configured as a strategy for parity de-medicalization[18], the use of these technologies seems to be related to the decrease in the rates of fluid meconium amniotic fluid and the risk of tracheal aspiration at birth.[12] In this sense, it is believed that with the use of TNICEO there is a lower risk of newborns being bathed in meconium amniotic fluid and greater odds of having good vitality at birth (Apgar ≥8).

Given the above, this study aimed to compare the use of non-invasive technologies of midwifery care with the use of practices of the traditional care model. The presence of meconium in the amniotic fluid and its repercussion on the newborn's vitality were parameters used.

METHOD

A cross-sectional study with secondary data, performed at a maternity hospital in the city of Rio de Janeiro. This institution is a reference for pregnant women at usual risk and lives with a hybrid model of care at birth and birth. There is a coexistence of professionals who use humanized practices to encourage normal childbirth and the protagonism of women, as well as adherents of the traditional obstetric care model. This model is characterized by the predominance of biomedical knowledge, often determining interventionist and medicalized behaviors.[11]

The study population initially consisted of 10,675 records of vaginal births. All were followedup by nurse midwives from 2004 to October 2016. Of this total, 456 records were excluded due to lack of data on the use of TNICEO, TC or both, ultimately totaling 10,219 births for the study.

In the research field institution, nurse midwives only follow births without any complications. Therefore, the use of any procedure related to traditional care was the decision of the nurse midwife, considering the circumstances of the moment of childbirth. It is also worth mentioning that this is an institution where there is hegemony of the medicalized model and TC. Thus, this environment can influence the decisions of nurse midwives by adopting procedures related to this care model.

The data collection source was the book called "*Livro de Registros de Partos*" (Birth Records Book). This is an institutional form designed to document information regarding care provided by nurse midwives during labor and childbirth at the obstetric center of the maternity ward. Data were stored in Epi-Info software, version 6.04D, 2001.

For the purposes of this research, we considered the following information recorded in this form: interventions and/or care to which parturients were exposed during labor and childbirth; presence of meconium amniotic fluid identified and clinically assessed by the nurse midwife during parity; Apgar (clinical assessment of the newborn in the first and fifth minute of extrauterine life) determined by pediatrician or neonatologist.

These data were entered into an electronic bank and, using statistical resources, three exposure variables were established: a) TNICEO, which included parturients who used only these technologies, regardless of type and quantity such as: stimulation of ambulation, use of obstetric bench, warm water spray bath, relaxing massage, stimulation of pelvic movements, aromatherapy, breathing exercises, use of physioball, encouragement of the participation of the companion, lateral decubitus, squatting position supported, option for the position of four supports; b) Tc, with the inclusion of parturients exposed exclusively to the procedures commonly used in the biomedical care model, regardless of the type and quantity used, namely: intravenous infusion of exogenous oxytocin, amniotomy, episiotomy and reduction of the cervix; c) TNICEO + traditional care, covering parturients exposed to both forms of obstetric care, regardless of the type and quantity of technologies and/or procedures used.

Regarding outcomes, Apgar was considered in the first and fifth minutes of life, attributed by pediatricians who served neonates after birth. This index is obtained by observing five objective clinical signs: heart rate, muscle tone, reflex irritability, skin coloration and respiration that can receive 0, 1 or 2 points each. Total score ranges from 0 to 10 points.[19,20] These indexes were registered in the electronic bank and were later divided with the resources of the statistical package into two groups, from 0 to 7 and from 8 to 10.[8,9,21] The group with Apgar score between 8 and 10 showed good vitality at birth (first minute Apgar) and good extrauterine adaptation (fifth minute Apgar).

The confounding variables included in the analysis were those recorded in the book "*Livro de Registros de Partos*": risk classification, number of pregnancies, parity, amniotic fluid characteristics, and newborn birth weight. Data not filled in or not informed were considered as information losses for each variable studied, which can be verified by the total of each variable in the results.

Statistical treatment involved the use of descriptive statistics and logistic regression. Chi-square test was used considering significant p values less than 0.05.

For each outcome two logistic regression models were constructed. In the first model, all statistically significant confounding variables were included in the bivariate analysis results. In the final model, only the statistically significant variables observed in the results of the first model were included. In both models, odds ratio (OR) cross-product were estimated with 95% confidence intervals (95% CI) and p value <0.05.

The study was submitted to the Research Ethics Committee of the Municipal Health Office - RJ, with approval under Protocol 189/09, CAAE (*Certificado de Apresentação para Apreciação* **Ética** - Certificate of Presentation for Ethical Consideration) 0221.0.314.000-09.

RESULTS

Regarding the characterization of parturients, of the 10,219 childbirths followed up by nurse midwives in the maternity hospital studied, 27.4% were adolescents aged 10-19 years. 39.1% were primiparous, 42.9% primiparous and 72.6% served six or more prenatal consultations.

Regarding the types of care provided by nurse midwives and used by women during parity, 97.2% of parturients used some form of TNICEO. Of this percentage, 43.9% used only these technologies, 53.3% made use of TNICEO and also underwent traditional care practices. On the other hand, we highlight the percentage of parturients assisted by nurse midwives who, alone (2.8%) or associated with TNICEO (56.1%) were exposed to at least one TC-related procedure.

Table 1 lists some of the techniques and resources that make up the TNICEO group most used by parturients during labor and/or childbirth. It is noteworthy that a parturient may have used one or more of the technologies provided by the nurse midwife.

Regarding the procedures that make up the traditional obstetric care, intravenous infusion of oxytocin solution was the most employed (44.9%), followed by amniotomy (22.6%) and episiotomy (14.9%).

In this study, the record of amniotic fluid characteristics was found in 9,817 parturients. the presence of meconium was identified in 14.9%, being 13.9% of fluid meconium amniotic fluid and 1.0% thick meconium. When amniotic fluid characteristic was assessed by the type of care used by parturients, higher percentages of the presence of meconium (fluid meconium and thick meconium) were found in the group of women undergoing traditional care alone (20.8%) or in association with TNICEO (15.3%). On the other hand, when only TNICEO was used, these percentages dropped to 14.0% (Table 2).

When comparing Apgar variables and amniotic fluid characteristics in relation to the use of TNICEO or TC, it was found that in the first minute of life of newborns whose mothers used only TNICEO, 94.5% had Apgar> 8 (good vitality) at birth. It was a significantly higher percentage than the 80.9% found for the group of newborns whose parturients underwent only TC (Table 3).

Table 1. Distribution of TNICEO used during labor and/or childbirth followed up by nurse midwives in a municipal maternity hospital in Rio de Janeiro. Rio de Janeiro, 2004-2016.

Type ofTNICEO (n = 9933)	%
Breathing exercise practice	74.7
Encouraging the presence and active participation of companions	71.0
Stimulation of ambulation	38.7
Encouragement of pelvic movements	36.2
Use of warm water in sprinkler bath	27.5
Stimulation of the adoption of left lateral decubitus	25.8
Relaxing massage	16.4

Source: childbirths record book followed up by nurse midwives.

Table 2. Amniotic fluid characteristic according to the type of care used by parturients in a maternity hospital in the city of Rio de Janeiro. Rio de Janeiro, 2004-2016.

Type of Care X Amniotic Fluid Characteristics	TNICEO		TNICEO + TC		TC	
	N	%	n	%	n	%
Light with and without lumps	3701	86.0	4446	84.7	209	79.2
Fluid meconium	562	13.0	756	14.4	47	17.8
Thick meconium	41	1.0	47	0.9	8	3.0
Total	4304	100.0	5249	100.0	264	100.0

TNICEO: Non-Invasive Midwifery Care Technology; TC: Traditional Care.

Table 3. Apgar score in the first and fifth minutes of extrauterine life according to amniotic fluid characteristic and the type of care of parturients who had their childbirths followed up by nurse midwives in a maternity hospital in Rio de Janeiro. Rio de Janeiro, 2004-2016.

Amniotic fluid characteristics	TNICEO only						TC only					
	Apgar < 8		Apgar ≥8		Total		Apgar <8		Apgar ≥8		Total	
	n	%	n	%	n	%	n	%	n	%	N	%
Light	181	4.3	3425	81.8	3606	86.1	23	10.4	145	65.9	168	76.4
Fluid meconium	45	1.1	506	12.1	551	13.2	12	5.5	27	12.3	39	17.7
Thick meconium	6	0.1	25	0.6	31	0.7	7	3.2	6	2.7	13	5.9
Total	232	5.5	3956	94.5	4188	100.0	42	19.1	178	80.9	220	100.0
Apgar by group 5'x												
Amniotic fluid characteristics	25	0.6	3594	85.4	3619	86.0	9	4.1	158	72.1	167	76.3
Light	7	0.2	551	13.1	558	13.3	2	0.9	37	16.9	39	17.8
Fluid meconium	1	0.0	30	0.7	31	0.7	0	0.0	13	6.0	13	5.9
Thick meconium	33	0.8	4175	99.2	4208	100.0	11	5.0	208	95.0	219	100.0
Total												

TNICEO: Non-Invasive Midwifery Care Technology; TC: Traditional Care.

Analyzing the results related to the fifth minute of life of newborns (adaptation of the extrauterine environment), there was also a higher incidence of Apgar> 8 in the parturient group. They used only of the TNICEO provided by nurse midwives when compared to the group that used only the conducts related to traditional care, 99.2% versus 95.0% (Table 3).

After controlling for confounding variables, it was found that the results of the second regression model or adjusted final model (OR 3.650; 95% CI 1.633 - 8.159; p value 0.0016) showed that Apgar OR in the fifth minute of life is equal to or greater than 8 is increased for the group of newborns whose women used only TNICEO during parity. This occurred when compared to parturient newborns who underwent traditional care procedures (Table 4).

As for the evidence of light amniotic fluid compared with fluid of meconium fluid (OR 1.573; 95% CI 1.005 - 2.462; p value 0.0472) and thick meconium fluid (OR 3.031; 95% CI 1.061 - 8.654; p value 0.0383). There were increased odds ratio for good neonate vitality (Apgar> 8) presenting light amniotic fluid.

DISCUSSION

Regarding the characterization of women followed by nurse midwives during parity and birth, the results of this research revealed the significant incidence of adolescents (27.4%), primiparous (39.1%) and primiparous (42.9%), which are similar to those found in other studies[22-24]. These findings are commonly associated with early hospitalization and the adoption of interventional approaches, such as intravenous infusion of synthetic oxytocin, amniotomy and episiotomy, indication for cesarean section, among others described in the TC model.[23,25]

Regarding the records of prenatal care, it was found that 72.6% of parturients served six or more consultations, meeting the official recommendations and approaching the percentages presented in studies conducted in different regions of Brazil[23,24,26-31]. This data points to the expansion of access and coverage. However, the significant drop in prenatal care adequacy rates, as well as the persistence of regional inequalities related to quantitative health care indicators, should be considered.[23,24,27,28]

The commitment of nurse midwives with de-medicalization of childbirth and birth was evidenced, despite their performance in an environment strongly influenced by the hegemonic medicalized model. 97.2% of parturients used some TNICEO alone (43.9%) or associated with some procedure of the traditional obstetric care model (53.3%). In this perspective, the practice of these experts in hospital care is proving to be an efficient strategy for qualifying care for women at usual risk, as well as for reducing interventions in risk situations, when the institution adopts a collaborative professional model of obstetric care.[18,30,32]

Comparing the practices used by nurse midwives in this research with the results of other studies, it is clear that experts offer women different options for parity. There is a highlight for stimulating breathing exercises; encouraging the active participation of the companion; stimulation of free movement; use of warm water in the sprinkler bath; and massage.[11,25,29,30]

These resources, when used from the perspective of respect for the physiology and female autonomy of non-invasion and protagonism, characterize TNICEO. TNICEO converge on shared construction of a not medicalized, woman-centered care that predominantly uses light technologies and meets the World Health Organization and the Ministry of Health recommendations.[12-14,18]

On the other hand, the association of the use of TNICEO with typical traditional obstetric care procedures and procedures in 56.1% of parturients reveals that, despite the institutional commitment and effective participation of nurse midwives in childbirth rooms, the model still persists. hybrid of attention to childbirth and birth. There is a coexistence of not medicalized and interventionist practices.[11,12,27,30,32]

As an effect of this configuration, the performance of amniotomy (22.6%) and episiotomy (14.9%) appear as part of the assistance of nurse midwives to women at usual risk, with oscillating percentages compared to those presented in other studies.[18, 29,30,32] Regarding the intravenous infusion of exogenous oxytocin, administered in 44.9% of parturients, the present study shows a result lower than 57.7% of a study conducted in maternity hospitals in Belo Horizonte. However, this percentage is higher when compared to the 30.8% found in a normal childbirth center in the same city[19], as well as the 40.0%, 41.8%, and 18.9% of studies conducted, respectively, born in Brazil25 maternity hospitals in the states of Rio Grande do Sul and Ceará.[29,30]

Table 4. Logistic regression, with the response variable as the fifth minute Apgar score (final model).

Variables	*Odds Ratio (OR)*	95% Confidence Index	P value
Type of Care			
TNICEO + TC/TNICEO	1.950	1.287 – 2.954	0.0016
TC/TNICEO	3.650	1.633 – 8.159	0.0016
Amniotic fluid characteristics			
Thick/light meconium with and without lumps	3.031	1.061 – 8.654	0.0383
Fluid meconium/light with and without lumps	1.573	1.005 – 2.462	0.0472

TNICEO: Non-Invasive Midwifery Care Technology; TC: Traditional Care.

Although it is common to have no records on the indication for oxytocin use, such conduct, in most cases, comes from medical interference in the field of practice of nurse midwives.[30] In addition, it should be considered that such procedure, regardless of indication, may cause iatrogenesis and, when used routinely, is associated with the elimination of meconium in the amniotic fluid.[1,4] Therefore, it is recommended that the prescription of oxytocin be careful and avoided in cases of meconium amniotic fluid and fetuses with evidence of hypoxia.[13,14]

Regarding the correlation between amniotic fluid characteristics and type of care, the presence of meconium (fluid or thick) was found in 14.9% of childbirths followed by nurse midwives. It was a percentage within the range of 10 to 16% cited by other authors, but higher than 8.1%, from a survey conducted in a maternity in the Northeast region.[29] The 11.9%, found in a study that had as scenario a normal childbirth center of the Southeast region.[3]

For the nurse midwives in this study, the presence of meconium amniotic fluid alone was not a hindrance to follow-up of parity and birth. For decision-making, they consider joint analysis of other factors such as fetal static, labor evolution conditions (uterine dynamics, uterine cervix changes, and fetal progression in the pelvis) important, as well as monitoring fetal vitality.

It was possible to evidence lower indices of the presence of meconium in the amniotic fluid of parturients who used only TNICEO (14.0% versus 20.8%). The type of care used affects amniotic fluid characteristics. Both in fluid form (13.0% versus 17.8%) and in thick form (1.0% versus 3.0%), the effects of TNICEO use are more beneficial when compared to the use of procedures of the traditional obstetric care model.

This finding, besides reinforcing the importance of cautious use and the adoption of precise indications related to interventional obstetric practices, reveals that the use of TNICEO translates into safe and quality care. TNICEO uses the best available scientific evidence and meets current care guidelines for improving maternal and perinatal indicators.[2,4,13,14]

Regardless the cause of meconium clearance, data in Table 3 show that their presence in amniotic fluid is associated with Apgar scores less than 8 in the first and fifth minutes of newborn life. This result is consistent with the findings of a study conducted with women of full-term and usual-risk pregnancy. It demonstrates that the presence of meconium in the amniotic fluid showed higher rates of adverse perinatal outcomes[33,34]. In this correlation, the influence of the type of care available to the parturient during parity stands out. When women are exposed only to traditional obstetric care practices, the percentage of infants born with meconium bathing and with poorer vitality (45.2%) is more than double that of newborns of those who used only TNICEO (22.0%).

As shown in Table 4, odds ratios of newborns showing good vitality in the fifth minute of life (Apgar greater than or equal to 8) are higher when nurse midwives resort only to TNICEO for the parturient care process, as well as the presence of meconium in the amniotic fluid reduces such odds.

Corroborating with similar results, other studies describe that although the presence of meconium in amniotic fluid is not a determinant of fetal distress, this finding is related to traditional obstetric care, lower Apgar score, and unfavorable neonatal outcomes.[2,4,12,24]

Given the results of adopting interventionist practices in childbirth and birth care, the benefits of using TNICEO are reiterated. These are essential care for women's care demedicalization that contribute to reduce the incidence of meconium elimination by the fetus in the amniotic fluid, as well as associated with the birth of neonates with good vitality (Apgar> 8) in the first and in the fifth minute of extrauterine life.[11,12,15,18,30]

CONCLUSION

It is concluded that the availability of TNICEO by nurse midwives and their use by parturients during parity and birth are efficient strategies to reduce unfavorable neonatal outcomes. Compared with the use of traditional care model practices, they present better perinatal results regarding the parameters presence of meconium in the amniotic fluid and its repercussion on newborn vitality.

However, the present research also pointed out that, despite the transformation of the obstetric care model underway in Brazilian public institutions, there are still practices not consistent with the proposal of humanization of care. Conducts considered harmful or inappropriate were evidenced to the detriment of those recommended by official guidelines and recommendations that are based on the best available scientific evidence.

Even though some nurse midwives still include procedures related to traditional care in their practices, these professionals are among the main drivers of public policies aimed at promoting changes in health services. The results of this study reaffirm the importance of investments in the performance of these experts in childbirth and birth care. The not medicalized know-how through TNICEO conforms to a humanized, safe and quality care.

Regarding the limitations of the study, the most important are related to the fact that it is a cross-sectional study with secondary data whose data collection tool was elaborated from existing information records. However, the fact that the newborn Apgar score was always recorded by the pediatricians who served them was an important reliability indicator of these results.

In light of the above, we suggest further studies on the effectiveness of the use of TNICEO in women's health care. Especially prospective studies should be conducted, with a view to aggregating scientific evidence to support these technologies, giving greater visibility to midwifery practices in the health field and enabling overcoming the limitations found here.

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REFERENCES

1. Hutton EK, Thorpe J. Consequences of meconium stained amniotic fluid: What does the evidence tell us? 2014 [access 2017 dez 04]; 90: 333-9. DOI: http://dx.doi.org/10.1016/j.earlhumdev.2014.04.005
2. Almeida MFB, Guinsburg R. Reanimação do recém-nascido ≥34 semanas em sala de parto: Diretrizes 2016 da Sociedade Brasileira de Pediatria (SBP). 2016. [acess 2018 jan 18]: Available from: www.sbp.com.br/reanimacao.
3. Osava RH, Silva Flora MBS, Oliveira SJV, Tuesta EF, Amaral MCE. Meconium-stained amniotic fluid and maternal and neonatal factors associated**.** Rev. Saúde Pública [on line]. 2012; [access 2017 nov 29]: 46 (6): 1023-9. DOI: http://dx.doi.org/10.1590/S0034-89102013005000005
4. Vaghela HP, Deliwala K, Shah P. Fetal outcome in childbirths with meconium stained liquor. Int J Reprod Contracept Obstet Gynecol. 2014, dec [acess 2018 mai 23]; Dec: 3(4):909-12. DOI: https://doi.org/10.5455/2320-1770.ijrcog20141207
5. Mitchell S, Chandraharan E. Meconium-stained amniotic fluid. Obstetrics, Gynaecology and Reproductive Medicine. 2018, apr [acess 2018 jun 25]. 28(4): 120-4. Elsevier Ltd. DOI: https://doi.org/10.1016/j.ogrm.2018.02.004
6. Poggi SH, Ghidini A. Pathophysiology of meconium passage into the amniotic fluid. Early Human Development [on line] 2009. [acess 2018 jan 18]: 85(10): 607-10. DOI: https://doi.org/10.1016/j.earlhumdev.2009.09.011
7. Saldanha FAT, Araújo RAB, Araújo Filho JAB, Bezerra EM, Barreto BAB. Estudo da gestação entre 40 e 42 semanas: avaliação ultrassonográfica, dopplervelocimétrica e resultados neonatais. Revista Saúde & Ciência [on line]. 2011 jan/jun; [acess 2018 jan 18]: 2(1): 111-19. Available from: http://www.ufcg.edu.br/revistasaudeeciencia/index.php/RSC-UFCG/article/view/44
8. Ministério da Saúde (BR). Sistema de Informações sobre Nascidos Vivos – SINASC. Brasília (DF). Ministério da Saúde, (on line) 2017. [acess 20 mar 19]. Available from: http://www2.datasus.gov.br/DATASUS/index.php?area=0205
9. Schardosim JM, Rodrigues N LA, Rattner D. Parâmetros utilizados na avaliação do bem-estar do bebê no nascimento. Av Enferm. 2018; [acess 20 jan 19]: 36(2):197-208. DOI: https://doi: 10.15446/av.enferm.v36n2.67809
10. Souza JP, Pillegi-Castro C. On labor and childbirth: the importance of quaternary prevention. Cad. Saúde Pública [on live]. 2014 [access 2016 nov 08]; 30(Suppl 1):S11-3. DOI: http://dx.doi.org/10.1590/0102-311XPE02S114.
11. Vargens OMC, Silva ACV, Progianti JM. The contribution of nurse midwives to consolidating humanized childbirth in maternity hospitals in Rio de Janeiro-Brazil. Esc. Anna Nery [Internet]. 2017 [citado 2018 Out 22] ; 21(1): e20170015. DOI: http://dx.doi.org/10.5935/1414-8145.20170015.
12. Vargens OMC, Reis CSCR, Nogueira MFH, Prata JA, Silva CM, Progianti JM. Non-invasive technologies in obstetric nursing care: effects on newborn vitality. Rev enferm UERJ [on line]. 2017; [acess 2017 mai 30]; 25:e21717. DOI: http://dx.doi.org/10.12957/reuerj.2017.21717
13. World Health Organization. WHO recommendations intrapartum care for a positive childbirth experience. Geneva: WHO; 2018. Disponível em: http://www.who.int/reproductivehealth/publications/intrapartum-care-guidelines/en.
14. Ministério da Saúde (BR). Diretrizes nacionais de assistência ao parto normal. Brasília: Ministério da Saúde; 2017. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/diretrizes_nacionais_assistencia_parto_normal.pdf.
15. Progianti JM, Vargens OMC. The obstetrician nurses and the use of non-aggressive care technology as strategy in the non-medication of the childbirth. Esc. Anna Nery. Rev. Enferm, 2004 ago: 8(2) 194-7. [Access 2018 Abr 26]; 8(2) 194-7. Rio de Janeiro. Available from: http://www.redalyc.org/articulo.oa?id=127717713004
16. Merhy EE, Feuerwerker LCM. Novo olhar sobre as tecnologias de saúde: uma necessidade contemporânea. 58-72, in Merhy EE (org.) et al. Avaliação compartilhada do cuidado em saúde: surpreendendo o instituído nas redes. 1ed. Rio de Janeiro: Hexis, 2016. 448p
17. Nietsche EA, Leopardi MT. The knowledge of nursing as technology: the production of Brazilian nurses. Texto & context enferm. 2000. 9(1): 129-52.
18. Vargens OMC, Silva ACV, Progianti JM. Non-invasive nursing technologies for pain relief during childbirth: the Brazilian nurse midwives' view. Midwifery [on line]. 2013 nov; [Acess 2018 jul 18]: 29(11): e99-106. Available from: DOI: https://doi.org/10.1016/j.midw.2012.11.011
19. Marinov VG, Koleva-Georgieva1 DN, Sivkova NP, Krasteva MB. The 5-minute Apgar Score as a Prognostic Factor for Development and Progression of Retinopathy of Prematurity. Folia Medica. 2017 [acess 29 mar 2019] 59(1): 78-83. DOI: 10.1515/folmed-2017-0011
20. Dalili H, Nili F, Sheikh M, Hardani AK, Shariat M, Nayeri F. Comparison of the Four Proposed Apgar Scoring Systems in the Assessment of Birth Asphyxia and Adverse Early Neurologic Outcomes. PLoS One. 2015 [acess 29 mar 2019] 10(3): DOI:org/10.1371/journal.pone.0122116
21. Ferreira VA, Gomes NS, Pisseti CW, Silva SR, Ruiz MT. Perfil epidemiológico dos nascidos vivos em Belo Horizonte, MG, Brasil. 2018; [acess 2019 jan 19]; 8e2550. DOI: https://doi: 10.19175/recom.v8i0.2550
22. World Health Organization (WHO). Health topics - Adolescent health. [Internet Document] 2017 [access 2017 Jun 26] Available from: http://www.who.int/topics/adolescent_health/en/
23. Santos NCP, Vogt SE, Pimenta AM, Duarte ED, Madeira LM, Abreu MNS et al. Resultados maternos e neonatais no labor e parto de adolescentes admitidas em um Centro de Parto Normal brasileiro. Adolesc. Saúde. 2014 jul-set.11(3); [acess 2018 out 10]: 11(3) 35-50. Available from: http://www.adolescenciaesaude.com/detalhe_artigo.asp?id=459#
24. Dahlen HG, Dowling H, Tracy M, Schmied V, Tracy S. et al. Maternal and perinatal outcomes amongst low risk women giving birth in water compared to six birth positions on land. A descriptive cross sectional study in a birth centre over 12 years. Midwifery, Edinburgh. 2013 jul; [acess 2018 out 10]: 29(7): 759-64, 2013. DOI: https://doi.org/10.1016/j.midw.2012.07.002
25. Leal MC, Pereira APE, Domingues RMSM, Filha MMT, Dias MAB, Pereira MN, et al. Obstetric interventions during labor and childbirth in Brazilian low-risk women. Cad. Saúde Pública, Rio de Janeiro. 2014; [acess 20 mar 19]; 30 Sup:S17-S47, DOI: http://dx.doi.org/10.1590/0102-311X00151513
26. Ministério da Saúde (BR). Atenção ao pré-natal de baixo risco. Brasília (DF): Ministério da Saúde, (on line) 2012. [acess 2018 nov 18]. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/cadernos_atencao_basica_32_prenatal.pdf

27. Tomasi E, Fernandes PAA, Fischer T, Siqueira FCV, Silveira DS, Thumé E, Duro SMS, Saes MO, Nunes BP, Fassa AG, Facchini LA. Qualidade da atenção pré-natal na rede básica de saúde do Brasil: indicadores e desigualdades sociais. Cad. Saúde Pública [on line]. 2017; [acess 2018 nov 18]: 33(3):e00195815. DOI: https://doi.org/10.1590/0102-311X00195815

28. Nunes JT, Gomes KRO, Rodrigues MTP, Mascarenhas MDM. Qualidade da assistência pré-natal no Brasil: revisão de artigos publicados de 2005 a 2015. Cad. Saúde Colet. [on line]. 2016; [acess 2018 nov 18]: 24(2): 252-61. DOI: https://doi.org/10.1590/1414-462X201600020171

29. Freire HSS, Campos FC, Castro RCMB, Costa CC, Mesquita VJ, Viana RAA. Parto normal assistido por enfermeira: experiência e satisfação de puérperas. Rev enferm UFPE on line. [on line]. 2017 jun; [acess 2018 nov 18]: 11(6):2357-67. DOI: https://doi.org/10.5205/1981-8963-v11i6a23398p2357-2367-2017

30. Reis TR, Zamberlan C, Quadros JS, Grasel JT, Moro ASS. Enfermagem obstétrica: contribuições às metas dos Objetivos de Desenvolvimento do Milênio. Rev Gaúcha Enferm. [on line]. 2015; [acess 2018 nov 18]: 36(esp): 94-101. DOI: http://dx.doi.org/10.1590/1983-1447.2015.esp.57393

31. Schettini NJC, Griboski RA, Faustino AM. Partos normais assistidos por enfermeiras obstétricas: posição materna e a relação com lacerações perineais espontâneas. Rev enferm UFPE on line. [on line]. 2017 fev; [acess 2018 nov 18]: 11(Supl. 2):932-40. DOI: https://doi.org/10.5205/1981-8963-v11i2a13462p932-940-2017

32. Vogt SE, Silva KS, Dias MAB. Comparison of childbirth care models in public hospitals, Brazil. Rev Saúde Pública. 2014; [acess 2018 out 16]; 48(2):304-13. DOI: https://doi.org/10.1590/S0034-8910.2014048004633

33. Hiersch L, Krispin E, Aviram A, Wiznitzer A, Yogev Y, Ashwal E. Effect of meconium-stained amniotic fluid on perinatal complications in low-risk pregnancies at term. Amer J Perinatol. 2016; [acess 26 mar 19]; 33(4): 378-84. DOI: https://doi:10.1055/s-0035-1565989

34. Hiersch L, Krispin E, Linder N, Aviram A, Gabbay-Benziv R, Yogev Y, Ashwal E. Meconium-Stained Amniotic Fluid and Neonatal Morbidity in Low-Risk Pregnancies at Term: The Effect of Gestational Age. Amer J Perinatol 2017 [acess 26 mar 19]; 34(02):183-90. DOI: https://doi:10.1055/s-0036-1585056