Applicability of decision support algorithm in perineal assessment for childbirth

Aplicabilidade de algoritmo de apoio à decisão na avaliação perineal para o parto

Aplicabilidad de algoritmo para respaldar la decisión en la evaluación perineal para el parto

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Abstract

Objective: To develop an algorithm for perineal assessment in childbirth care and assess its applicability and accuracy using a decision support system prototype.

Methods: This is applied research of technological development, consisting of the construction of an algorithm, assessment by professionals with expertise in the area, creation of a Decision Support System prototype using online tools and assessment of its applicability and accuracy during care for 305 childbirths performed by nurses. Data were analyzed using descriptive statistics, chi-square and Fisher's exact tests, in addition to the Kappa coefficient to assess the agreement between the procedure indicated by the system and that performed by professionals.

Results: There was agreement between the algorithm's suggestion and professional decision in 93.1% of childbirths. In 6.9%, professionals decided opposite paths to the recommended one. The professionals who chose to follow the algorithm's suggestion had perineal integrity or the occurrence of first degree tear as an outcome. Those who chose not to follow the recommendation had second- or third-degree tears in 28.6% of parturient women. In the accuracy analysis, the algorithm suggested that episiotomy should be performed in 45 of the 305 assisted childbirths. There was an association between divergences in conduct and the number of adverse events (p=0.001).

Conclusion: The algorithm proved to be a useful tool for perineal assessment in childbirth care.

Resumo

Objetivo: Desenvolver um algoritmo para avaliação perineal na assistência ao parto e aferir sua aplicabilidade e acurácia utilizando um protótipo de sistema de suporte à decisão.

Métodos: Pesquisa aplicada de desenvolvimento tecnológico, constituída pela construção de algoritmo, avaliação por profissionais com expertise na área, criação de um protótipo de Sistema de Apoio à Decisão usando ferramentas on-line e avaliação de sua aplicabilidade e acurácia durante a assistência a 305 partos realizados por enfermeiros. Os dados foram analisados por estatística descritiva, teste Qui-quadrado e exato de Fisher além do coeficiente de Kappa para avaliar a concordância entre o procedimento indicado pelo sistema e o realizado pelo profissional.

Resultados: Houve concordância entre a sugestão do algoritmo e a decisão do profissional em 93,1% dos partos; em 6,9% o profissional decidiu caminhos opostos ao recomendado. Os profissionais que optaram por seguir a sugestão do algoritmo obtiveram como desfecho a integridade perineal ou a ocorrência de lacerações de 1°grau. Os que optaram por não seguir a recomendação houve ocorrência de lacerações de 2º ou 3º graus em 28,6% das parturientes. Já na análise de acurácia, o algoritmo sugeriu que a episiotomia deveria ser realizada em 45 dos 305 partos assistidos. Verificou-se associação entre divergências de conduta e número de eventos adversos (p=0,001).

Conclusão: O algoritmo mostrou-se ferramenta útil para a avaliação perineal na assistência ao parto.

Resumen

Objetivo: Desarrollar un algoritmo para la evaluación perineal en la asistencia al parto y determinar su aplicabilidad y precisión utilizando un prototipo de sistema para respaldar la decisión.

Métodos: Investigación aplicada de desarrollo tecnológico, constituida mediante la construcción del algoritmo, evaluación de profesionales con experiencia en el área, creación de un prototipo de Sistema para Respaldar la Decisión usando herramientas en línea y evaluación de su aplicabilidad y precisión durante la atención a 305 partos realizados por enfermeros. Los datos fueron analizados mediante estadística descriptiva, prueba χ² de Pearson y prueba exacta de Fisher, además del coeficiente Kappa para evaluar la concordancia entre el procedimiento indicado por el sistema y el realizado por el profesional.

Resultados: Hubo concordancia entre la sugerencia del algoritmo y la decisión del profesional en el 93,1 % de los partos, en el 6,9 % el profesional decidió un camino opuesto al recomendado. Los profesionales que optaron por seguir la sugerencia del algoritmo obtuvieron como resultado la integridad perineal o episodios de desgarro de primer grado. Los que optaron por no seguir la recomendación, tuvieron episodios de desgarros de segundo y tercer grado en el 28,6 % de las parturientas. Por otro lado, en el análisis de precisión, el algoritmo sugirió que la episiotomía debería ser realizada en 45 de los 305 partos atendidos. Se verificó relación entre divergencias de conducta y número de eventos adversos (p=0,001).

Conclusión: El algoritmo demostró ser una herramienta útil para la evaluación perineal en la atención a partos.

Introduction

Of the approximately three million births performed annually in Brazil, 1.4 million are vaginal childbirths. Most women who undergo this type of childbirth suffer some type of perineal trauma, either by episiotomy or spontaneous tears, being subject to the morbidity associated with this trauma, a problem commonly found in the world. [1-3]

An important portion of all complications that may occur during childbirth labor and at the time of childbirth can be reduced with appropriate obstetric care. Perineal trauma can happen during childbirth, when the perineum faces extreme pressure and strain. Even though it is a short-term experience, it can leave scars and sequelae and this is also a concern for professionals in the field. [4-6]

Episiotomy is defined as the injury resulting from the surgical enlargement of the vaginal orifice by means of an incision in the perineum in normal childbirth care, and the ideal frequency of its use as a health policy is not fully established. [3]

The Ministry of Health (MoH) recommends selective use and cites an ideal frequency of between 10 and 30% of total childbirths. [1] The World Health Organization (WHO) recommends an ideal rate of around 10%, a reality found in many European countries. [2]

It is noteworthy that even restricting the indications, there is no consensus on when to perform an episiotomy, requiring further studies. [5,6] It is noteworthy that, in the literature, there is no recommendation to abolish episiotomy, but to restrict it to patients in which the cost-benefit ratio is evident. [4-6]

In childbirth care, professionals feel uncomfortable when there is a need to repair tears in the vaginal canal and perineal region or when an episiotomy is indicated. [7,8]

In this context and in the face of a computerized world, it is necessary to seek new learning strategies. The use of digital educational technological tools is indicated due to the complexity of information used in decision-making processes and the fact that their development and use are possible, as Decision Support Systems (DSS), based on algorithms, which constitute sequences of reasoning, instructions or operations to achieve a goal. [9-11] The algorithm shows, step by step, the necessary procedures for the proper execution of a given task. It does not answer the question "what to do", but "how to do it". [10,11]

Technological advances allow nurses to improve daily practice, integration with emerging trends in healthcare and opportunities for career growth, combining the use of technology with professional practice. [12]

The use of technological tools in the health area is increasing, since it is a type of support that can provide professionals with greater precision and agility in their work. Mobile computing, with the use of computers, notebooks, tablets and smartphones, with the help of the internet, has brought many benefits and speed for the improvement of care, allowing professionals to have access, at any place or time, to a vast amount of information. Among these applications, diagnostic support and decision-making support regarding best clinical practices can be highlighted. [12,13]

This study is justified by the scientific gap, lack of consensus and difficulty in performing perineal assessment in normal childbirth care. Difficulties exist in relation to the standardization of conducts and adequate registration, requiring strategies that facilitate the health team's work. Therefore, a decision support system, using mobile devices and based on an algorithm, is a tool that can bring countless benefits to professionals and qualify the care provided.

The present study aimed to develop an algorithm for perineal assessment in childbirth care and to assess its applicability and accuracy using a decision support system prototype.

Methods

This is applied research of technological development, constituted by the stages of decision support algorithm construction, assessment by experienced professionals, creation of a DSS prototype using an online tool, pilot testing and applicability assessment by nurses and analysis of its accuracy.[14]

The algorithm construction by the authors was carried out after an integrative literature review on the following topics: perineal assessment and perineal outcomes in normal childbirth care as well as on the use of technology and informatics in health education, being essential for constructing the algorithm and DSS prototype.

The guiding questions that guided the search in the literature were: How to maintain perineal integrity during vaginal childbirth care? Which criteria allow the maintenance of perineal integrity and which ones indicate an intervention?

Realizou-se pesquisa nas bases de dados LILACS (Literatura Latino Americana e do Caribe em Ciências da Saúde), SciELO (Scientific Eletronic Library Online) e MEDLINE (National Library of Medicine). Systematic reviews from the Cochrane Library, Ministry of Health Manuals with the current Brazilian National Guidelines for Normal Childbirth Care World Health Organization recommendations, published between 2014 and 2019, were also used.

For the algorithm's graphical representation (Figure 1), basis for the DSS prototype development, specific programming logic books were consulted and relevant items or topics were listed and the possibilities were listed following Boolean logic. Boolean logic is the basis of all information technology, which directs thinking based on objective assumptions, generating accurate reasoning and not open to second interpretation.[15]
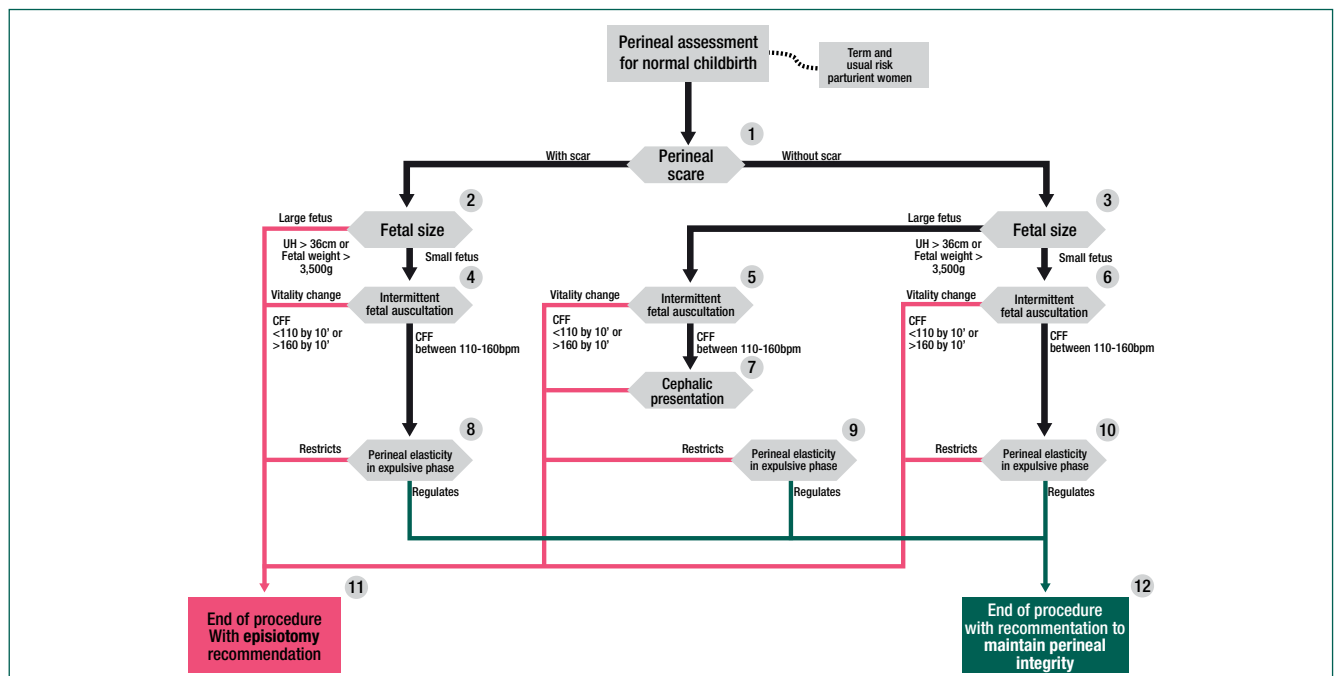

Figure 1. Decision support algorithm, perineal assessment in parturient with usual obstetric risk

The algorithm was assessed by 13 professionals with expertise in the area, including physicians (3) and obstetric nurses (10). It was based on clarity and understanding of the sequence, description of decision items, content regarding the information capable of supporting their decision during the perineal assessment to choose the most appropriate procedure, whose opinions were analyzed and implemented.

The main objective of using a DSS is to provide significant assistance to the decision-making process.

The DSS prototype was developed from the revised algorithm, coding the steps so that it could be used on mobile devices such as tablets, smartphones, computers and notebooks. As it is an instrument to be used via the Internet, aiming at good accessibility and low cost, it was decided to develop it in Google Forms™, being possible to allow logical deviations in the algorithm's decision tree, presentation of questions, based on the answers provided by users to a certain point (logic branching). This approach allowed its rapid implementation, without the need for explicit programming in traditional languages.

A pilot test was carried out by one of the researchers using DSS in perineal assessment of ten parturient women admitted to an in-hospital childbirth center. These women were accompanied labor and childbirth. In this way, it was possible to assess relevant data from childbirth care and present in the algorithm, such as: Uterine Height (UH), fetal weight (when there was a gestational USG), fetal vitality (cardiotocography and intermittent auscultation), inspection (scar from previous episiorrhaphy or not) and perineal assessment, regarding elasticity during vaginal examination and at the end of the second period of childbirth (bulging, crowning, tilting and detachment of fetal cephalic and breech poles).

The assessments as well as their responses were automatically stored in a spreadsheet in the Google Drive™ system. At the end of the pilot test, the necessary adjustments were implemented in a new version of the DSS.

The applicability assessment was carried out by obstetric nurses during the care of 305 parturient women, for a period of two months in an in-hospital childbirth center located in southern São Paulo, which has a teaching and care profile, where obstetric nurses perform childbirths with usual obstetric risk. Professionals were introduced to the DSS and, later, trained to use it on a mobile device in order to assess the algorithm applicability to support the decision on the conduct to be followed during childbirth care.

As the system consists of an online tool, there was no software to be installed on professionals' mobile devices, simply accessing the link they received by email. The information collected in this assessment, referring to perineal scar, fetal size, intermittent auscultation, presentation and perineal elasticity in the expulsive period (Figure 1) (yellow and numbered decision boxes) were grouped in an online Google Drive™ data sheet, enabling analysis descriptive statistics, considering the trend and variability.

In data treatment and analysis, a descriptive analysis was initially carried out, with absolute and relative frequencies being presented for the categorical variables. The existence of correlation between categorical variables was verified using the chi-square test, or alternatively, in cases of small samples, Fisher's exact test. To assess the agreement between the procedure indicated by the DSS and the one performed by professionals and also between newborns' fetal size classification assessment and birth weight, the Kappa coefficient was used. Statistical analyzes were performed using SPSS 20.0 and STATA 12, considering a significance level of $p \leq 0.05$.

Regarding the ethical aspects, in line with the determinations of Resolution 466/2012 of the Brazilian National Health Council (*Conselho Nacional de Saúde*), this study, before its beginning, was submitted to the Medical and Nursing Board of the hospital institution involved, where it was approved. The study only began after approval by the Research Ethics Committee of the educational institution linked to the project, under Opinion 2,602,934 and CAAE (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration) 83567418.4.0000.5505.

The professionals who agreed to participate in the study signed the Informed Consent Form (ICF).

Results

DSS applicability in the perineal assessment process during childbirth care

The 12 nurses who assessed the DSS applicability are experts in obstetric nursing (100%). The training time ranged from one to eight years, while the average number of childbirths performed by professionals ranged from seven to 50 childbirths/month. The items assessed were DSS recommendation to co-workers, assessment objectivity, perineal assessment standardization by less experienced professionals, ease of use, need or not to change the care routine, DSS use in all childbirths and the need for improvements. Of these professionals, 10 (83.3%) fully agreed with the aspects assessed and 2 (16.7%) had doubts. In recording additional comments and suggestions on DSS applicability in the perineal assessment process during childbirth care, two professionals addressed its applicability, and other four addressed technical and infrastructure aspects of the place, such as the Wi-Fi™ network not available at the institution. With the continued use of this online tool, professionals mentioned increased familiarity with decision-making items and the incorporation of this assessment as a routine in parturient woman care. In this way, the step-by-step recommendations of the items for assessment were followed, facilitating the decision made by professionals with less experience. With DSS use, perineal assessment became more objective and homogeneous over time and among the different teams.

Algorithm accuracy analysis

The algorithm accuracy study used as the basis for the DSS was carried out due to the need to verify the existence of a statistical correlation between the suggestion provided by the system, professional nurses' conduct and final outcome.

During the completion of the answers to the applicability questionnaire, the system recorded, at each use, both the data from the childbirth process and the suggestions presented. In this way, we used these already available data and added to them the corresponding data collected directly in the childbirths book on parity, position adopted at childbirth, infant's weight and 1-and-5-minute Apgar score.

In the data statistical analysis, the observed (0.93), expected (0.80) and Kappa coefficient (0.66) agreements were presented for the procedure recommended by the DSS and the one performed by a professional, obtaining a substantial agreement (κ = 0.66, p<0.001).

There was agreement between DSS' suggestion and professional decision in 93.1% of childbirths; in 6.9% of childbirths, professionals decided on the opposite path to that recommended by the DSS.

Within the scope of the algorithm accuracy analysis, it was suggested by the DSS that episiotomy should be performed in 45 of the 305 assisted childbirths. Indications were aimed at preventing unfavorable maternal outcomes, such as second- or third-degree tear, and fetal related 5-minute Apgar less than 7, under the following conditions:

- 21 with perineal scar and large fetus;
- 4 with perineal scar and small fetuses, but with alteration of fetal vitality;
- 2 without perineal scar and large fetus, with alteration of fetal vitality;
- 1 without perineal scar and large fetus, in variety of occiptosacral (OS) position;
- 1 without perineal scar and large fetus, with perineal restriction in the expulsive period;
- 8 without perineal scar and small fetus, with alteration of fetal vitality;
- 8 without perineal scar and small fetus, with perineal restriction in the expulsive period.

Next, the relationship between three variables was investigated: "agreement between DSS' suggestion and professional action", "perineal tear conditions" and "5-minute Apgar".

In table 1, it is observed that, in cases where there was agreement among professionals and the action recommended by the system, the results were favorable to puerperal women and newborns, i.e., perineal integrity or first-degree tear and 5-minute Apgar higher than 7. Cases unfavorable to pu-

erperal women, such as a second- or third-degree tear, remained at 13.4% when DSS recommendation was followed. The frequency increased to 28.6% when professionals chose not to follow the recommendation.

Cases unfavorable to newborns, such as 5-minute Apgar lower than 7, occurred in only 0.4% when there was agreement between professionals' choice and DSS recommendation; however, the score was 9.5% when professionals chose a procedure contrary to DSS recommendation.

There was a correlation between cases where professionals decided not to follow DSS recommendation and an unfavorable 5-minute Apgar score (p=0.013), i.e., less than 7.

Table 1. Distribution of parturient women and newborns by occurrence of tear and 5-minute Apgar classification according to agreement or not between DSS recommendation and professional decision

Agreement between DSS recommendation and professional decision				
Occurrences	Yes n(%)	No n(%)	Total n(%)	p-value
Perineal outcome	284(100.0)	21(100.0)	305(100.0)	0.129
First-degree tear	124(43.7)	9(42.9)	133(43.6)	
Second- or third-degree tear	38(13.4)	6(28.6)	44(14.4)	
Intact	122 (43.0)	6(28.6)	128(42.0)	
5-minute Apgar	284(100.0)	21(100.0)	305(100.0)	0.013
≥ 7	283(99.6)	19(90.5)	302(99.0)	
<7	1(0.4)	2(9.5)	3(1.0)	

p-value - descriptive level of chi-square or Fisher's exact tests

It is observed in table 2 correlations between DSS agreement and professional performance, fetal size (p<0.001) and perineal elasticity (p<0.001). It was verified among the cases where professionals chose not to follow DSS recommendation higher percentage of large fetuses (70.6% versus 13.0%) and restrictive perineal elasticity (23.8% versus 1.4%).

In cases where there was divergence of conduct, there was an association of two decision-making factors established with the algorithm creation and validated by experienced professionals, fetus size and perineal elasticity. Fisher's exact test shows the significance of the association between two variables. It was used due to the fact that the size of the two independent samples is small and consists of determining the exact probability of occurrence of an observed frequency or more extreme values (p<0.001).

Table 2. Correlation between auscultation variables, fetal size and perineal elasticity and professional decision

Variables	Professional agreed n(%)	Professional did not agree n(%)	Total n(%)	p-value
Fetal auscultation	284(100.0)	21(100.0)	305(100.0)	0.063
Normal	273(96.1)	18(85.7)	291(95.4)	
Altered	11(3.9)	3(14.3)	14(4.6)	
Fetal size*	253(100.0)	17(100.0)	270(100.0)	<0.001
Not large	220(87.0)	5(29.4)	225(83.3)	
Large	33(13.0)	12(70.6)	45(16.7)	
Perineal elasticity	284(100.0)	21(100.0)	305(100.0)	<0.001
Models	280(98.6)	16(76.2)	296(97.0)	
Restricts	4(1.4)	5(23.8)	9(3.0)	

*Only for concordant cases of birth weight and fetal size (n=225 and 45, respectively, for large and non-large sizes); p-value - descriptive level of Fisher's exact test

Considering adverse events, such as second- and third-degree tears, 5-minute Apgar less than 7 and fetal auscultation, the number of these occurrences and the agreement between DSS recommendation and professional decision in table 3 were assessed. In this same table, there was a correlation between cases where professionals chose and did not agree with DSS recommendation and the number of occurrences of adverse events (p=0.001). Considering childbirths with three adverse events this occurred when professionals chose not to agree with DSS recommendation.

Table 3. Distribution of professional conduct by number of adverse events

No adverse events*	Professional agreed n(%)	Professional did not agree n(%)	Total n(%)	p-value
Total	284(93.1)	21(6.9)	305(100.0)	0.001
0	235(94.4)	14(5.6)	249(100.0)	
1	48(92.3)	4(7.7)	52(100.0)	
2	1(33.3)	2(66.7)	3(100.0)	
3	0(0.0)	1(100.0)	1(100.0)	

*Adverse events - altered fetal auscultation; 5-minute Apgar < 7; 20- or 30-degree tears; p-value - descriptive level of Fisher's exact test

Discussion

Few are the algorithms built in the health area, they are relatively simple, direct and easily accessible instruments that provide a complete view of the clinical process. They are indispensable tools in the standardization of techniques and in quality of care management. Furthermore, they organize processes and serve as a guide for decision-making. Among these studies, we have the construction and validation of algorithms for laser therapy in wounds, prevention and treatment of friction injuries, guid-

ance of professionals in the correct use of PPE and preventive measures related to facial skin injuries caused by the inappropriate use of PPE during the pandemic of SARS-CoV-2 and primary care nurses' decision-making to identify people in psychological distress and their intervention. [11,16-18]

Algorithms are the basis for the creation of DSS; however, DSS are not always developed. In this study, we chose to create a simple DSS prototype for the algorithm validation, accessible via the internet, eliminating the need to install an application on mobile devices, replacing the use of an algorithm printed on paper.

The decision items presented by DSS allow for reflection and clinical reasoning by professionals. They help and under no circumstances intend to replace them.[19]

DSS contribute to patient safety, as they ensure that relevant information is not forgotten, minimizing incorrect decisions. They support professionals and make them assess specific information, increasing confidence in their professional judgment and improving quality of care. Thus, they allow the contextualization of different scenarios and individualization of care.[20]

The few existing studies in the literature, with regard to the construction and validation of algorithms and the lack of these in the obstetric area, made it difficult to perform a comparative analysis of the data presented here, constituting a limitation of this study. However, it is understood that the identification and dissemination of knowledge regarding the aspects discussed herein encourage practice based on scientific evidence in decision-making with immediate and effective behaviors, in order to minimize the consequences and negative outcomes, ensuring the quality of obstetric care provided to parturient women.

From this perspective, the discussion will be presented under two aspects, firstly related to the applicability of DSS in the process of perineal assessment during childbirth care and then related to the algorithm accuracy.

Applicability of DSS in the process of perineal assessment during childbirth care

After assessing DSS, professionals suggested the inclusion of parity, childbirth position, the technique used during the second stage of labor and the presence of perineal edema.

In terms of parity, primiparity is still a factor that has a greater association with the performance of episiotomy. The absence of previous vaginal childbirth also proved to be a risk factor for performing the procedure, suggesting that the perineum, due to its elasticity, may be more apt for vaginal childbirth after the second birth.[7,21-23]

Hands on techniques consist of manual protection of the perineum, flexing the fetal head or hands off with hands outside the perineum and fetal head, but close and ready, and can be used to protect the perineum in the birth. There is limited evidence that women with perineal protection or hands on reported less postpartum pain compared with those without perineal protection.[1,5,8] The rates of perineal trauma, including episiotomy, are similar using both techniques, but the occurrence was higher in women with perineal protection.[5,8]

In the childbirth position, it was noticed that the vertical position in relation to the horizontal one constitutes a factor to shorten the expulsive period.[1] The woman must conduct her own childbirth process, supported by informed guidelines about the possible benefits, to maternal and fetal well-being, of the different maternal positions adopted during the expulsive period.[1,5,24]

The tear caused by vulvar edema seems to happen due to the accumulation of fluids, making the tissues more friable. This fact facilitates the occurrence of extensive and jagged tear. [5,8]

The above items raised by professionals in the DSS applicability in the process of perineal assessment during childbirth care, in future research, may be included as decision boxes (Figure 1) and enable improving the constructed algorithm.

Algorithm accuracy analysis

DSS suggested that episiotomy should be performed in 45 of the 305 deliveries studied. Therefore, it is essential to address the relationship of perineal scar, its elasticity, fetal weight, the variety of fetal position and fetal vitality, considering that these items constituted important decision boxes in the algorithm (Figure 1).

Perineal scar, represented by an anterior episiotomy, can make the perineum less distensible and with a greater risk of rupture, since many women have suffered some type of perineal trauma during normal childbirth, due to spontaneous perineal tear or episiotomy. In episiotomy, in addition to the skin and mucosa, the superficial transverse perineal and bulbocavernosus muscles are usually sectioned.[7,21] The use of episiotomy in the first childbirth, a very common practice, significantly increases the risks in subsequent deliveries of tear and of being submitted to a new episiotomy.[21] An elastic perineum or a "good perineum" is characterized by an increase in the stretching capacity or elasticity of the musculature and rapid reconstitution of muscle contracture to maintain its tensile strength. On the other hand, a perineum that is rigid or that "restricts" does not stretch easily, and often a muscular ring can be felt, making it difficult to touch and prevent the fetus from performing pelvic tilt. The insufficient progression of childbirth and the threat of third-degree tear can be noticed.[5-7] Maternal factors such as ethnicity, age, tissue characteristics and nutritional status interfere with muscle contractility and elasticity.[5-7]

Fetal weight is associated with a higher frequency of perineal trauma and deliveries with fetuses weighing more than 3,500 grams, associated with the performance of episiotomy. It was found that, for every 500 grams of increase in fetal weight, parturient women are 30% more likely to have a perineal tear.[22]

However, fetal weight, in these cases, large fetuses, and perineal elasticity restriction were not considered relevant information by professionals who used DSS, although they are present in studies on the subject.[7,8,21] The variety of fetal occiptosacral position can prolong the expulsive period and worsen the conditions of birth of a fetus with changes in vitality; in some cases, an episiotomy is performed. The procedure is performed to increase the pelvic outlet diameter and shorten expulsion time in suspected cases of fetal compromise.[7,22,23]

As for fetal vitality, the non-reassuring state, translated by abnormality in the heartbeat pattern, can lead professionals to perform an episiotomy to shorten the expulsive period of childbirth.

Intermittent fetal auscultation should be a method of choice for assessing intrapartum fetal well-being and should be performed before, during and after a contraction, at 15-to-30-minute intervals during the first stage of labor and every 5 minutes in expulsive period. Normal baseline fetal heart rate ranges between 110 and 160 beats per minute (bpm), tachycardia above 160 bpm, and bradycardia below 110 bpm for more than 10 minutes.[24]

A low Apgar score is useful for identifying newborns who need additional care, even in the absence of laboratory data.[24-26]

In these cases, selective episiotomy may be indicated to shorten the expulsive period, in the presence of changes in fetal vitality. Some studies have already assessed the expulsive period duration and proved that there is an abbreviation of one to nine minutes, which may have a significant difference in the neonatal outcome.[7,22]

Fetal asphyxia is a condition characterized by metabolic or metabolic-respiratory acidemia with a pH lower than 7, which may be associated with neonatal neurological sequelae, such as seizures, coma or hypotonia or multiple organ failure. It is an important cause of neonatal morbidity and mortality that is often preventable.[25,26]

In deliveries where professionals followed DSS recommendations, the frequency of cases with two to three adverse events was 33.3%. This frequency doubled to 66.7% in deliveries where professionals chose not to follow DSS recommendations. In adverse events, second-, third- and fourth-degree tear, 5-minute Apgar less than 7 and altered fetal auscultation, as discussed above, were considered.

It is observed that, in the case of non-compliance with DSS recommendations with professional action, added to the three adverse events, it can be seen that there was a change in fetal heart rate, second-degree tear and 5 (1-min) and 6 (2-min) Apgar. The three adverse events added together resulted in maternal harm, but mainly, aggravation of newborns' hypoxia.

Adverse fetal and neonatal outcome refers to a newborn who has severe complications during the first days of life, who almost died, but survived during the neonatal period. The most used crite-

ria are those that present any of the risk conditions at birth, such as 5-minute Apgar score lower than 7, gestational age lower than 30 weeks and weight lower than 1,500 g and no death up to the 6th day of life.[26]

It is noteworthy that every pregnancy' goal is to have a healthy newborn with minimal maternal trauma as an outcome, this fact may not occur due to gestational complications, at childbirth or with the conceptus.[26]

Conclusion

After the construction and continued use of the algorithm in the form of a DSS using an online tool, professionals mentioned increased familiarity with decision-making items and incorporation of this assessment as a routine in the care provided to parturient women, a positive effect, especially in the case of those with less working time in the area. Perineal assessment has become less subjective and more homogeneous over time and among different professionals. As for algorithm accuracy preliminary analysis, it appears that there was substantial agreement between the procedure recommended by the DSS, the one performed by professionals and a favorable outcome for mothers and newborns. The lack of agreement between DSS recommendations and professional conduct doubled the number of adverse events. Thus, it appears that the adverse events considered, such as altered fetal auscultation, 5-minute Apgar < 7 and second- and third-degree tear, tended to be lower when DSS recommendations were followed. The algorithm proved to be an applicable and useful tool to guide professionals in perineal assessment during childbirth care. It is believed that the continuity of this study can lead to its significant improvement and usefulness.

Acknowledgments

Collaborations

Cesar MBN, Gabrielloni MC, Lara SRG and Barbieri M contributed to study design, data analysis and interpretation, article writing, relevant critical review of intellectual content and approval of the final version to be published.

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