

## Compliance with the Cesarean Surgical Safety Checklist\*

Adesão de conformidade ao *Checklist* de Segurança Cirúrgica na Cesárea

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### Special Call 1 - Maternal and Obstetric Health

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### ABSTRACT

**Objective:** to verify compliance with the procedures of health teams in cesarean surgery. **Methods:** cross-sectional, descriptive and analytical study, performed in an Obstetric Center of a public hospital, with 220 cesarean surgeries. The Tukey test and the Analysis of Variance were used, considering a significance of 5%. **Results:** the mean age of the patients was 28.8 years ( $\pm 6.06$ ). The main indications for cesarean surgery were: fetal distress (12.8%), gestational diabetes (9.5%), interactivity (9.2%), previous cesarean surgery (8.2%) and severe pre-eclampsia (5.9 %). There was an absence of unified conduct and incipient communication among professionals. The compliance rates of the teams' compliance with the items in the Checklist for Dimensions A, B and C were, respectively, 36.0%, 11.1% and 50.0%. **Conclusion:** there was a low compliance of teams to surgical safety procedures in cesarean surgeries.

**Descriptors:** Patient Safety; Cesarean Section; Checklist; Obstetric Nursing.

### RESUMO

**Objetivo:** verificar a adesão de conformidade aos procedimentos de equipes de saúde em cesáreas. **Métodos:** estudo transversal, descritivo e analítico, realizado em Centro Obstétrico de hospital público, com 220 cesáreas. Empregaram-se o teste *Tukey* e a Análise de Variância, considerando significância de 5%. **Resultados:** a idade média das pacientes foi de 28,8 anos ( $\pm 6,06$ ). As principais indicações para cesárea foram: sofrimento fetal (12,8%), diabetes gestacional (9,5%), iteratividade (9,2%), cesárea prévia (8,2%) e pré-eclâmpsia grave (5,9%). Constataram-se ausência de condutas unificadas e incipiente comunicação entre os profissionais. As taxas de adesão de conformidade das equipes aos itens do *Checklist* das Dimensões A, B e C foram, respectivamente, 36,0%, 11,1% e 50,0%. **Conclusão:** evidenciou-se baixa adesão das equipes aos procedimentos de segurança cirúrgica em cesáreas.

**Descritores:** Segurança do Paciente; Cesárea; Lista de Verificação; Enfermagem Obstétrica.

## Introduction

In Brazil, data show the occurrence of about 1.6 million cesarean surgeries per year, reaching 56.0% of births in the country<sup>(1)</sup>. This trend is also growing worldwide, with higher rates in Latin America and the Caribbean (40.5%), followed by North America (32.3%), Oceania (31.1%), Europe (25 %), Asia (19.2%) and Africa (7.3%), when the guidance of the World Health Organization (WHO) is that the total should not exceed 10.0%<sup>(1-2)</sup>. When properly indicated, cesarean surgery saves lives; however, the procedure may increase maternal morbidity and mortality, associated with an increased risk of infection, uterine rupture, abnormal placentation, premature birth, among others<sup>(3-4)</sup>.

In order to prevent complications and incidents, in 2008, Brazil complied with the WHO Safe Surgery Protocol and Checklist. Compliance with this instrument has proven to be effective in several countries, by encouraging surgical teams globally to standardize safety procedures, based on the best scientific evidence and to reduce complications and incidents to patients<sup>(5)</sup>. With a view to following the WHO recommendation for adapting the Checklist to the various existing locations, it was adjusted and validated for cesarean surgeries in Brazil, as it is a frequently performed surgery that raises the risks of maternal morbidity and mortality<sup>(6)</sup>. When considering the importance that the Surgical Safety Checklist in Cesarean surgery<sup>(6)</sup> represents for the Brazilian reality, it was intended with this study to verify the application of this instrument, in order to show in detail the situation of the investigated health unit, guided by the question: what is the compliance of the teams with the Checklist items? Thus, the objective was to verify compliance with the procedures of health teams in cesarean surgeries.

## Methods

Cross-sectional, descriptive and analytical study performed in an Obstetric Center of a public hospital,

in the Federal District, Brazil. The sample was random, whose calculation considered a 95% Confidence Interval (CI), resulting in 220 cesarean surgeries. Data were obtained from March to June 2015.

The study included pregnant women who underwent cesarean surgery, from 18 years of age, with any medical diagnosis, extraction or not of anatomical pieces, and/or secondary complications. *Post-mortem* cesarean surgeries and procedures were excluded without the consent of members of the surgical teams and/or pregnant women.

The Cesarean Surgical Safety Checklist was applied, from methodological research, with data triangulation. 43 professionals were involved, eight judges for content and apparent validation, using the Delphi technique. For semantic validation, another 35 participated in the surgical team of a public hospital Brasília, Brazil. The instrument's reliability coefficient was used, showing validity and reliability with a general content validity index of 0.9 and inter-rater agreement of 1. The total Cronbach's alpha coefficient was 0.86<sup>(6)</sup>.

Variables related to age and indication for cesarean surgery were researched, and the 26 items of the Cesarean Surgical Safety Checklist, distributed in three dimensions that deal with the intraoperative, namely: items A1 to A11 (Dimension A) refer to actions performed before anesthetic induction and pre-operative planning; items B12 to B20 (Dimension B), to the procedures performed before the surgical incision and include checking the items from the previous phase; and items C21 to C26 (Dimension C) consider actions on post-anesthetic planning, before the patient leaves the operating room<sup>(5-6)</sup>.

One of the researchers applied the instrument using the non-participant observation technique, according to the WHO recommendation, in which a single person must execute the Surgical Safety Checklist<sup>(5)</sup>. C-sections were monitored during the three work shifts and on all days of the week. Observation of the professionals' practices was performed and the Checklist procedures were checked by the researcher who interacted only to explain the study and present

the consent terms.

The three dimensions of analysis were compared by an average of the items that were properly fulfilled. A rate of at least 80.0% compliance was considered. Compliance indicators for the three dimensions were calculated separately for each of the instruments. Conformity indicators and respective averages were found for dimensions A, B and C. In this way, it was possible to relate the days of the week, numbered from 1 to 7 (from Sunday to Saturday), and periods of the day from 1 to 3 (morning, afternoon and night, respectively), with the performance of the teams.

At the time of data collection, it was observed that the teams worked on a fixed shift basis, distributed on weekdays and day and night periods. Thus, there was an interest in researching possible associations between the days of the week and periods of the day, in relation to the compliance of teams with the Checklist, based on the indicators of the three dimensions of analysis. The data were analyzed using the software The R Project for Statistical Computing, version 3.1, and Statistical Package for the Social Science, version 22. The significance level was set at 5% and 95% CI. From the compliance indicators, the results

were compared, using the Analysis of Variance (ANOVA) and the Tukey test. The Research Ethics Committee, of the Health Sciences Teaching and Research Foundation, of Brasilia, Brazil, agreed to the study, according to the opinion No. 901,713/2014, Presentation Certificate for Ethical Appreciation No. 38102614.3.0000.5553, the research being conducted according with the required ethical standards.

## Results

220 cesarean surgeries were observed for women with a mean age of 28.8 years ( $\pm 6.06$ ). The procedures were recommended for 46 different reasons and performed by obstetric indication, the main five being: fetal distress, 39 (12.8%); Gestational diabetes mellitus, 29 (9.5%); interactivity, 28 (9.2%); previous cesarean surgery, 25 (8.2%); and severe pre-eclampsia, 18 (5.9%). The rest, 81 (54.4%), corresponded to: cephalopelvic disproportion, failures in inducing labor, post-term pregnancy, breech presentation, among others. As for the application of the Checklist, there was evidence of conformity and non-conformity of the surgical teams (Tables 1 and 2).

**Table 1** – Percentage distribution of items in compliance and non-compliance of Dimension A of the Checklist (n=220). Brasília, DF, Brazil, 2015

*Items	Dimension A	†IC	‡NC
A1	Patient confirmed identity (identification bracelet and medical record).	0	100.0
A2	Patient confirmed procedure.	100.0	0
A3	Patient confirmed surgical site.	0	100.0
A4	The Informed Consent Terms (delivery and anesthesia) were signed by the patient.	0	100.0
A5	The equipment: gas sources, anesthesia equipment, multi-parameter monitor, electric scalpel, aspirator and focus were checked, tested and/or replaced.	14.5	85.5
A6	Medicines and materials were checked, checked and/or replaced.	58.6	41.4
A7	The anesthetic safety check has been completed.	17.3	82.7
A8	Does the patient have a known allergy?	98.6	1.4
A9	Did the anesthesiologist assess if there is a difficult airway/risk of aspiration? And requested available equipment/assistance?	5.5	94.5
A10	Adequate venous access was verified.	100.0	0
A11	There is a significant risk of blood loss, and planning for fluids and/or blood components and/or derivatives.	87.5	12.5

\*Items A1 to A11 belong to Dimension A - before anesthetic induction; †IC: accordingly; ‡NC: non-compliance

**Table 2** – Percentage distribution of items in compliance and non-compliance with Dimensions B and C of the Checklist (n=220). Brasília, DF, Brazil, 2015

*Items	Dimensions B and C	†IC	‡NC
B12	All team members introduce themselves by name and function.	0	100.0
B13	Obstetricians, anesthesiologists and the nursing staff verbally confirm: identification, surgical site and procedure.	0	100.0
B14	Obstetricians review whether there are critical stages and duration of cesarean section.	1.4	98.6
B15	The anesthesiology team reviews whether there are any specific concerns regarding the patient.	8.6	91.4
B16	Nursing reviews whether materials, instruments and compresses are present and within the sterilization period, including the result of the indicator.	0	100.0
B17	Are there any equipment issues or concerns?	91.8	8.2
B18	Was the scalpel plate placed and communicated to the team?	48.6	51.4
B19	Nursing counts the compresses, checks the number of instruments and needles before the incision.	0	100.0
B20	Antimicrobial prophylaxis was performed 1 hour before cesarean delivery.	0	100.0
C21	The identification bracelets of the mother and the newborn were placed and checked, according to the service standard.	100.0	0
C22	The surgical team professional verbally confirms the surgical procedure performed.	7.3	92.7
C23	The nursing professional or obstetrician verbally confirms that the counts of surgical instruments, compresses and needles are correct.	0	100.0
C24	Was there a sample for pathological anatomy from cesarean section? If so, was it stored and labeled according to the service's rules?	100.0	0
C25	Does nursing identify if there is a problem with equipment to be solved?	94.5	5.5
C26	The surgical team reviews essential concerns for the recovery and management of the patient in the postpartum period.	2.7	97.3

\*Items B12 to B20 belong to Dimension B - before the surgical incision, and items C21 to C26 belong to Dimension C - before the patient leaves the operating room; †IC: accordingly; ‡NC: non-compliance

Regarding the confirmation of the patient's identity, it was found that all pregnant women did not have an identification bracelet. The procedures were confirmed, unlike the surgical site and the signatures of the consent terms. The checking of equipment and anesthetic safety were mostly limited to testing gas sources and the multiparametric monitor, with the pulse oximeter being checked in all procedures. As for medicines and materials, these resources were provided in more than half of cesarean surgeries.

The investigation of known allergy was performed in almost all cesarean surgeries; however, the assessment of the airway prior to anesthesia was verified in a few patients. Venous punctures were carried out properly and without incident. Regarding the management of the risk of blood loss, with the planning for red blood cell fluids and concentrates, compliance was considered for almost all cases.

It was found that the professionals did not present themselves and did not verbally check the patient's identification, the procedure to be performed and the surgical site. There was also no agreement with what was recommended about the review of critical stages, duration of cesarean surgery and the anesthesiologist's review of any specific concern, this item being accomplished in a few cesarean surgeries.

The non-compliance of the entire sample was found, regarding the review of materials, instruments and compresses, as well as for the validity and sterilization terms, including results of the indicator, such items being partially evaluated. Concerning the care in placing the scalpel plate, the compliance was partial, as it was fixed; however, the action was not informed. Also, the workers did not perform the calculation of compresses, instruments and needles before and after cesarean surgeries. Regarding antibiotic therapy, in all

cases, it was administered minutes before the surgical incision or shortly after anesthesia; therefore, it did not occur as recommended.

Concerning the identification of the mother and the newborn, in all patients, the bracelets were checked and placed. Regarding the confirmation of the procedure performed at the end, this happened in a few cesarean surgeries. Concerning the storage of specimens, compliance was verified. Also, problems with equipment and/or materials were appropriately reported by the teams, in contrast to the review of essential concerns in the postpartum period, which, in most cesarean surgeries, revealed precarious guidance to the team and the patient.

When considering the percentage of at least 80.0% compliance, it was found that the teams performed 36.0% of the items in Dimension A, 11.1% in B and 50.0% in C. Thus, a result was obtained not favorable to the compliance of teams with the Checklist items.

The conformity indicators for Dimensions A, B, and C were calculated for each instrument, that is, for each of the cesarean surgeries. 220 compliance indicators were found. The averages of the dimensions indicators were established: A (0.45), B (0.17) and C (0.51). Then, ANOVA and, later, the Tukey test were used. The ANOVA applied between the indicators (A, B and C) and the days of the week showed the values: A ( $p=0.007$ ), B ( $p=0.754$ ) and C ( $p=0.428$ ). Among the indicators, A, B and C and the periods of the day, the values were verified: A ( $p=0.013$ ), B ( $p=0.210$ ) and C ( $p=0.349$ ).

According to the p-values, there were significant differences for the Dimension A indicator and, in contrast, Dimensions B and C, which did not show statistical significance. The Tukey test compared all days of the week and periods related to morning, afternoon and night, related to compliance, using indicator A. Thus, the teams showed greater compliance on Fridays, compared to Tuesdays ( $p=0.009$ ). Also, it was found that cesarean surgeries performed at night showed less conformity than those performed in the afternoon ( $p=0.009$ ).

## Discussion

The characteristics of a cross-sectional study are considered as limitations of this study. The data were collected in a group of patients and in a single moment, with no results from the use of the Checklist, after implementing training for application, monitoring and evaluation regarding the use. In addition, all findings are not subject to generalization, however, they may contribute to reinforce the use of the Surgical Safety Checklist in Cesarean surgery, in the investigated service, and, perhaps, in other Brazilian hospitals.

As contributions, the results evidenced indicate that the use of the Checklist has utility and application in the field of public health, considering the quality and safety that the instrument can provide for the practice of assistance in obstetrics. In this way, this study brings to light reflection and discussion for institutional managers, in the sense of introducing the Surgical Safety Checklist in C-section as an essential tool for safe care. Therefore, the results presented are parameters for a situational diagnosis that can influence decision making, health planning, as well as the clinical practice of surgical teams. The evidence can contribute to the implementation of the Checklist in the service by the professionals involved, which will make it possible to compare future results that demonstrate improvements for patient safety.

Regarding the obstetric profile of the studied sample research on the indications for cesarean surgeries in Brazilian hospitals revealed findings similar to those of the present study; with greater proportions for fetal distress, interactivity, hypertensive syndromes and previous cesarean surgery<sup>(7)</sup>.

As for the application of the Checklist, in the step before anesthetic induction, the teams did not follow the recommendations to review with the patient the identification and the application of the terms of consent, diverging from the findings of a Brazilian study that presented 78.0% conformity in the identification, 58.2% on confirmation of identification

in medical records and 94.4% compliance for the application of the terms of consent. However, regarding the confirmation of the procedure, the results were similar with 94.9% compliance<sup>(8)</sup>.

Regarding the checking of anesthetic safety items, the non-compliance and partiality of the items reflected the teams' lack of appreciation for such practices. Similar findings were found with partial compliance of the Surgical Safety Checklist items below 95.0%, in the items related to the surgeons' check, a crucial step for the prevention of hemorrhages and the use of blood components, however, presented better results than at present study<sup>(9)</sup>.

At the time of the "surgical pause", according to the results presented, the check was partial or non-existent, regarding the conformity of the items, similarly to the results of a Brazilian research that evaluated the compliance of the execution of the Surgical Safety Checklist, in 431 pediatric surgeries. The checking of the items was nonexistent or partial for the critical steps. It was also found that the count of compresses and/or instruments were not verified in most surgeries, with only 13.2% of compliance, configuring a risky conduct for forgetting and retaining foreign bodies<sup>(10)</sup>. Another study<sup>(11)</sup>, which consulted 2,872 Brazilian surgeons, identified that 43.0% of them would have forgotten some foreign body in the cavity of patients, due to the omission of compliance with safety protocols. Such adverse events happened, mainly, in cesarean surgeries and cholecystectomies.

Regarding the performance of antimicrobial therapy, in all cesarean surgeries, scientific evidence was not considered, which shows that the risk is higher of developing infection after cesarean surgery. In contrast to this result, a Brazilian study revealed that compliance with the item occurred in 82.7% of the surgeries performed<sup>(10)</sup>.

In relation to checking the identification bracelets of the mother and the newborn, there was a total adherence of nursing professionals to this item. Similar results showed 93.4% of wristband conformity in pregnant and postpartum women; however, with

regard to the identification of the newborn, 69.0% conformity was identified<sup>(12)</sup>. It is noteworthy that the identification process involves placing the bracelet, checking the integrity, the legibility of the information and checking before procedures<sup>(13)</sup>.

Regarding the verbal confirmation of the surgery performed, the findings pointed out the teams' concern to confirm the procedure only when there was addition of ligation and oophorectomy, and confirmation is recommended in all situations. Regarding the identification and storage of extracted anatomical parts, another study<sup>(14)</sup> pointed out that 27.6% of them were not properly identified, which could have resulted in wrong diagnoses and/or delays in therapy. However, in the present study, no incidents related to this item were identified. The samples were properly identified, corroborating the evidence of compliance in 97.3% of Brazilian research that evaluated adherence to the items on the Surgical Safety Checklist<sup>(9)</sup>.

At the end of the cesarean surgery, it is recommended that the team report defective equipment, avoiding problems for the next surgeries, in which compliance was obtained in most of the sample, similarly to another Brazilian study conducted in the operating room<sup>(9)</sup>. However, regarding the review of essential concerns for recovery in the postpartum period, as well as the results evidenced low compliance, similarly, research<sup>(15)</sup>, in England, found only 21.0% compliance in the team's compliance surgical.

In view of the results, it was found that challenges remain for the adoption of the Checklist in health services. Poor communication was found between team members, crucial items were not in compliance, essential information was not shared and the absence of unified conduct, compromising the quality of care. Communication is essential for safe and effective passage of critical care between teams. Therefore, communication problems can be controlled with improvements in the work process and the use of checklists. Research results in 30 critical care units in England revealed that out of 23,818 incidents, around 1,694 (7.1%) were due to communication failures. Damage

incidents occurred mainly when patients were transferred and information was communicated to other teams<sup>(16)</sup>.

It is reiterated that, in all cesarean surgeries, there was a significant difficulty in communication between team members, in addition to the finding of non-assimilation of recommended practices. It is reinforced that the use of the checklist can stimulate communication and the work process in the surgical environment<sup>(17-18)</sup>, as well as in obstetric centers, since the use of these tools in obstetric care has proven an improvement in communication and a reduction in incidents<sup>(19)</sup>.

The statistical significance observed regarding the team's compliance with the Checklist items can lead to the construction of a new research hypothesis that investigates the lack of protocols and the use of checklists as factors that can influence adherence, given the absence of unified conduct of the teams. In addition, future studies may investigate other aspects that contribute to non-adherence to conformities, such as the effects of sleep deprivation among professionals who work at night.

A systematic review conducted in Ireland, which analyzed 33 studies, identified that sleep deprivation affected the technical ability of surgeons between 11.9% and 32.0%, with a negative impact on a simulated environment, standardized with probable clinical implications for patient safety<sup>(20)</sup>. Other factors interfere negatively in complying with the Checklist items, among them, the lack of training and assessments that can help to identify problems, and variations in the implementation and practice of professionals<sup>(15)</sup>.

It is important to note that effective communication between the team and proper implementation of the Checklist lead to a reduction in the possibility of errors. In view of the discussion of the results of this research with other studies presented, one can generalize the observation that incipient communication, coupled with low compliance by the surgical team, contribute to the occurrence of adverse events in obs-

tetric care. In this sense, the need for instruments in the format of checklists and strategies that promote standardized conduct and based on scientific evidence is reinforced to minimize risks, based on assistance focused on the quality and safety of patients and professionals, in the obstetric center.

## Conclusion

In general, there was an unfavorable result of compliance with the items of the Surgical Safety Checklist in Cesarean surgery, considering the rate of compliance of the teams to the items recommended in Dimensions A, B and C. The worst compliance was found in Dimension B, which it involves practices performed before the surgical incision.

Professional praxis was found that placed patients in a situation of insecurity. A favorable environment for the occurrence of incidents was identified, in an environment whose professionals expressed incipient ability to communicate. Thus, the vulnerabilities verified in the work process of the multi professional team and discussed in this study refer to the need for significant changes, in order to promote safety and quality of care in cesarean surgeries.

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## Collaborations

Boeckmann LMM, Rodrigues MCS and Oliveira CM participated in the elaboration of the project and/or analysis, data interpretation, writing of the article, relevant critical review of the intellectual content and final approval of the version to be published.

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