

Use of the Surgical Safety Checklist in a maternity teaching hospital in the state of Ceará, Brazil

Uso do checklist de cirurgia segura em uma maternidade-escola cearense

Uso de la lista de verificación de cirugía segura en una escuela de maternidad de Ceará

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ABSTRACT: Objective: To identify the use and completion effectiveness of the Surgical Safety Checklist in a maternity teaching hospital school in the state of Ceará, Brazil. **Method:** This is a documentary and retrospective study, with a quantitative approach. Data were collected based on the records of 816 Surgical Safety Checklists (SSC) from procedures performed between 2018 and 2021. The SSC is organized in three stages, and a comprehensive analysis of the overall completion and completion by stage was carried out. Two indicators were listed: completion of the items rate and completeness of the SSC rate. The latter indicator considered only the checklists that were fully completed. The study was approved by the Research Ethics Committee. **Results:** The completion of the items rate was 98.1%, indicating that the lack of completion of a few items made total completion unfeasible. The first stage (Sign In) had the highest completion rate, with 98.8% of items checked. However, the completeness percentage, that is, fully completed checklists, was 64.7%, ranging from 38.2% in 2018 to 76% in 2021, with a decrease to 72% in 2020 compared to 2019 (73%). **Conclusion:** Over the four studied years, we observed that the fully completed checklists rate fluctuated, considering that we did not observe a constant growth, demonstrating weaknesses in the completion. The incompleteness of the checklists demands implementing training strategies for teams regarding this activity.

Keywords: Patient safety. Checklist. Quality indicators, health care. Surgicenters. Unified Health System.

RESUMO: Objetivo: Identificar o uso e a eficácia do preenchimento da lista de verificação de cirurgia segura em uma maternidade-escola cearense. **Método:** Estudo documental, retrospectivo e de abordagem quantitativa. A coleta ocorreu a partir dos registros de 816 Listas de Verificação da Segurança Cirúrgica (LVSC) de procedimentos realizados entre 2018 e 2021. A LVSC é organizada em três etapas, e foi feita análise do preenchimento total e por etapa. Foram elencados dois indicadores: taxa de preenchimento dos itens e taxa de completude das LVSC. Esse último indicador considera apenas as listas que estavam totalmente preenchidas. O estudo foi aprovado pelo Comitê de Ética da instituição. **Resultados:** A taxa de preenchimento dos itens foi de 98,1%, evidenciando que o não preenchimento de poucos itens inviabilizaram seu preenchimento total. A primeira etapa (*Sign In*) foi a que apresentou maior taxa de preenchimento, totalizando 98,8% dos itens assinalados. Já o percentual de completude, ou seja, listas totalmente preenchidas, foi de 64,7%, variando entre 38,2% em 2018 e 76% em 2021, com redução para 72% em 2020 em relação a 2019 (73%). **Conclusão:** Observou-se, ao longo dos quatro anos estudados, que a taxa de listas completamente preenchidas apresentou oscilações, visto que não se observou um crescimento constante, demonstrando fragilidades do preenchimento. A incompletude das listas demanda a criação de estratégias de treinamento das equipes no que se refere a essa atividade. **Palavras-chave:** Segurança do paciente. Lista de verificação. Indicadores de qualidade em assistência à saúde. Centros cirúrgicos. Sistema Único de Saúde.

RESUMEN: Objetivo: Identificar el uso y la efectividad de completar la lista de verificación de cirugía segura en una maternidad universitaria de Ceará. **Método:** Estudio documental, retrospectivo, con enfoque cuantitativo. La recolección se realizó a partir de los registros de 816 Listas de Verificación de Seguridad Quirúrgica (LVSQ) de procedimientos realizados entre 2018 y 2021. La LVSQ está organizada en três etapas y se realizó un análisis de la

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realización total y por etapa. Se enumeraron dos indicadores: tasa de finalización del ítem y tasa de finalización del LVSQ. Este último indicador considera sólo las listas que se llenaron por completo. El estudio fue aprobado por el Comité de Ética de la institución. **Resultados:** La tasa de llenado de los ítems fue del 98,1%, lo que demuestra que la falta de llenado de algunos ítems imposibilitó su llenado completo. La primera etapa (iniciar sesión) fue la que tuvo mayor tasa de finalización, totalizando el 98,8% de los ítems marcados. El porcentaje de completitud, es decir, listas totalmente cumplimentadas, fue del 64,7%, variando entre el 38,2% en 2018 y el 76% en 2021, con una reducción al 72% en 2020 respecto a 2019 (73%). **Conclusión:** Se observó que, a lo largo de los cuatro años estudiados, la tasa de listas completas presentó fluctuaciones, ya que no hubo un crecimiento constante, demostrando debilidades en el llenado. Lo incompleto de las listas exige la creación de estrategias de capacitación de los equipos en esta actividad.

Palabras clave: Seguridad del paciente. Lista de verificación. Indicadores de calidad de la atención de salud. Centros quirúrgicos. Sistema Único de Salud.

INTRODUCTION

Surgical procedures are recognized worldwide as the treatment of various pathologies, and are highly valued due to the possibility of treating illnesses, curing diseases, and reducing morbidity and mortality¹. In the obstetric context, cesarean sections are absolutely essential to save lives in situations where vaginal births pose risks². In gynecology, for surgical procedures, the importance of medical education is emphasized so that the best type of approach can be adopted in an increasing and safe way³.

In Brazil, researchers of a study identified a gradual increase in surgical procedures performed by the Brazilian Unified Health System (SUS) between 2008 and 2016, demonstrating an increase of 9.6% in this interval. The authors also found a surgical mortality rate of 1.63% in the country, with an increasing trend in all Brazilian regions⁴.

Regarding cesarean sections, Brazil registered 873,945 procedures in 2022⁵. Even pointing out the negative outcomes of cesarean sections deemed unnecessary, such as increased maternal morbidity and mortality, prematurity, fetal deaths and placental abnormalities, problems with breastfeeding and the development of the newborn's immune system, when discussing surgical obstetric care, Brazil still has the second highest percentage of cesarean sections in the world, at 56%⁶. Although most of these procedures are performed in the private network, this is also a reality in public maternity hospitals with tertiary care, as a result of the very profile of the seen patients, as evidenced in a study that identified a higher cesarean section rate in patients with a Robson classification above five, that is, patients with greater complexity⁷.

In this context, the damage related to surgical care in general is pointed out, which is frequently observed in the routine of several hospitals and present a high frequency of complications in the intra-, trans- and postoperative periods⁸. In a cross-sectional and retrospective study conducted

in southern Brazil, it was verified that, out of a sample of 192 surgical patients, 21.8% progressed to adverse events (AE), which are characterized by incidents that resulted in harm to the patient — 11 of them had more than one AE, totaling 60 events in total. Of these events, 90% were classified as preventable⁹. This datum confirms the results obtained in a study that observed that the majority of AEs were classified as potentially preventable, demonstrating an avoidability categorized between moderate and strong¹⁰.

Within the context of mother-child care, AEs are directly associated with maternal and neonatal morbidity and mortality and are still present in a considerable number of births. A study that evaluated the occurrence of AE in two high-risk maternity hospitals located in two northeastern Brazilian states identified an incidence of 7.4% of AE related to the surgical procedure. Of these, 41.7% caused temporary harm with the need for hospitalization or extension of the length of stay, and 8.3% resulted in permanent damage¹¹.

Understanding that surgical complications account for a large proportion of preventable deaths and medical injuries worldwide, surgical safety emerges as a significant global public health concern¹². As a result of the incidence of failures involving surgical procedures, in 2004, the World Health Organization (WHO) created the World Alliance for Patient Safety, which aimed to stimulate and promote, on an international level, the awareness of professionals and the accountability of countries to improve safe health care⁸. One of the proposed challenges was: "Safe Surgeries Save Lives," launched in 2009, focused on the quality and safety in surgical interventions. To better achieve this objective, the WHO adopted an instrument in the form of a checklist called the Surgical Safety Checklist (SSC), in order to achieve 10 essential objectives for surgical safety (Chart 1), such as operating on the right patient and the right surgical site, the team communicating effectively and exchanging critical information, the team recognizing and being effectively prepared for the

Chart 1. Ten essential objectives for surgical safety⁸.

Objective 1	The team will operate on the right patient and the right surgical site.
Objective 2	The team will use known methods to prevent harm in the administration of anesthetics, while protecting the patient from pain.
Objective 3	The team will recognize and be effectively prepared for life-threatening airway or respiratory function loss.
Objective 4	The team will recognize and be effectively prepared for the risk of major blood loss.
Objective 5	The team will avoid inducing an adverse drug reaction or allergic reaction known to pose a risk to the patient.
Objective 6	The team will systematically use known methods to minimize the risk of surgical site infection.
Objective 7	The team will prevent the inadvertent retention of compresses or instruments on surgical wounds.
Objective 8	The team will keep all surgical specimens safe and accurately identified.
Objective 9	The team will communicate effectively and exchange information critical to the safe conduct of the operation.
Objective 10	Hospitals and public health systems will establish routine surveillance of surgical capacity, volume, and outcomes.

risk of major blood loss, among other objectives; and once this instrument is properly completed, there is a reduction in AE in surgical care⁸.

In Brazil, studies conducted to analyze the adherence and the correct use of the checklist are still scarce^{13,14}, demonstrating the need to research the topic and its importance in surgical settings, as it is qualified as an instrument for inspecting the quality of the provided care and for diagnosing actions aimed at patient safety.

OBJECTIVE

To identify the use and completion effectiveness of the SSC in a maternity teaching hospital in the state of Ceará, Brazil.

METHOD

This is a cross-sectional, retrospective, quantitative, documentary study conducted at a maternity teaching hospital in Ceará. The institution has 184 beds and provides specialized care in obstetrics, gynecology, mastology, and neonatology, with surgical procedures performed in these specialties and some general procedures. The surgical center has six operating rooms and five post-anesthetic recovery beds. Among the specialties, there are two priority rooms for urgent and emergency procedures and one for videosurgery.

In 2022, 4,664 surgeries were performed, with a monthly average of 388, being: 76.1% obstetric; 14.6% gynecological; 5.9% mastology-related; 2.1% neonatal; and 1.3% other surgeries. Among the procedures, the most frequent in obstetrics was the cesarean section; in gynecology, the hysteroscopy;

in mastology, the sectionectomy; and in neonatology, the exploratory laparotomy.

The SSC was implemented in the maternity operating room in 2016, undergoing some updates, as needed for the service. Upon patients' admission to the operating room, the printed SSC form is added to every patient's medical record. Currently, the circulating nurse is in charge of the instrument. At the end of the procedure, the form is attached to the medical record.

This checklist consists of a verification system consisting of three checking stages that assist in the safety of the surgical procedure, namely: before induction of anesthesia (Sign In), before skin incision (Time Out) and before the patient leaves the operating room (Sign Out), at the end of surgery¹².

At the first stage of verification (Sign In), the person responsible for leading the completion of the checklist must confirm, preferably directly with the patient, the patient's identity, consent to perform the surgical intervention, and the surgical site. This professional should also visually confirm that the site is actually demarcated, when necessary, verify anesthetic safety and pulse oximetry monitoring, check the existence of allergies previously known to the patient, review with the team the airway difficulty and the risk of aspiration, ascertain the risk of blood loss above 500 mL, the patency of vascular access, blood group testing, and the availability of blood for surgery¹².

The next step (Time Out) is performed before the surgeon initiates the skin incision. In this stage, each member of the team must introduce themselves, aloud, by name and inform their role. The team must reconfirm the patient's identification, the surgical site, and the procedure to be performed. It should also discuss the possible critical events of the procedure, duration and expected blood loss, verification of

the sterilization of materials, and the existence of problems with equipment and devices. At this stage, it should also be verified if the antimicrobial prophylaxis was performed 60 minutes before the incision and also whether imaging tests are available¹².

At the third and last stage (Sign Out), the team must, before leaving the operating room, review the procedure, check that the number of compresses and surgical instruments are correct, that the samples for laboratory tests are properly identified, if there are any defects in the machines and/or equipment, and that the surgical records were made. It should be noted that, in addition to the minimum items, institutions can enter other items. Each stage of the SSC is expected to be carried out in about 1 minute¹².

Data collection, conducted between October 2022 and February 2023, covered SSC of surgeries performed between 2018 and 2021. During this period, 8,287 surgeries were performed in the operating room.

The sample was defined based on the routine activity of the institution's Patient Safety Unit (*Unidade de Segurança do Paciente* – USEP). As required by the Brazilian Health Regulatory Agency (Anvisa), to assess the compliance with good patient safety practices by health institutions, USEP checks 17 medical records on a monthly basis, a number already defined by Anvisa. To select the medical records analyzed each month, the unit weekly performed the following steps:

1. Draw to define the day of the week (previous) on which the surgery was performed;
2. Draw to define the operating room;
3. Draw of the medical record to be evaluated.

Each week, between four and five medical records were drawn, covering different days of the week and shifts and different operating rooms, until a total of 17 records were reached each month. Thus, between 2018 and 2021, a total of 816 SSC were analyzed.

For this study, data were collected from the USEP records, as well as from the access to the SSC, whose copy is kept by the unit.

SSC of surgeries from all specialties were included. Exclusion criteria were not established, considering that all the medical records drawn by the USEP submitted the SSC. When the medical record does not contain the instrument, the unit considers it do be incomplete, but this situation was not found in the records consulted for this study.

In each SSC, the completion of the identification data of the patient, shift, and specialty of the surgery were evaluated, and simple statistics were presented for this information.

SSCs were also analyzed by checking the completed items. The following checklist completion indicators were listed:

- a. Completion of the SSC items rate: for this result, the total number of items to be completed at all stages of all checklists evaluated in the period was calculated. Subsequently, items that were effectively completed were identified. For the calculation of the indicator “Completion of the SSC items rate,” this formula was defined: $[\text{Total of completed items} / \text{Total of SSC items}] \times 100$.
- b. It was also possible to calculate the indicator “Completion of the SSC items rate per stage,” establishing the formula: $[\text{Total of items completed per stage} / \text{Total of items per stage}] \times 100$.
- c. Completeness of completion: for this calculation, from the total of checklists evaluated, those that were fully completed were identified — this being a goal, that is, that all SSC were fully completed, indicating that all items were checked by the surgical team. To calculate the indicator “Completeness percentage of SSC completion,” this formula was defined: $[\text{Total of Surgical Safety Checklists with all items completed} / \text{Total of Surgical Safety Checklists evaluated}] \times 100$.

The study was approved by the institution's Research Ethics Committee according to CAAE number 63186022.1.0000.5050 and opinion number 5.669.257.

RESULTS

Of the 816 medical records analyzed, all had the presence of the checklist. Regarding the predominant surgical specialty, we identified that the largest number of verified checklists were of obstetric surgeries, with 497 (60.9%) procedures; followed by gynecology, with 224 (27.4%) procedures. Most of the surgeries were performed in the morning shift, totaling 487 (59.7%) procedures, followed by the afternoon shift, with 183 (22.4%) procedures. There were 129 (15.8%) procedures in the night shift; they are characterized by urgent/emergency surgery, according to the institution's routine (Table 1).

Of the 816 instruments evaluated, 805 (98.7%) had completed patient's and procedure identification data (full name, date of birth, date of procedure, operating room, procedure

name, and patient’s record number), with 100% completion of these data in the years 2018 and 2020 (Graph 1).

Regarding the completion rate of SSC items (total of items completed in each checklist), the sum of items to be completed at all stages of all evaluated checklists was 41,525 items. We observed that, of these, 40,731 (98.1%) were completed during the entire period.

The completion, according to surgery stage, was greater during the first checking stage (before induction of anesthesia), namely the Sign In, totaling 16,670 (98.8%) completed items out of a total of 16,873, over the entire period. The stage with the lowest completion percentage was Sign Out (before the patient leaves the operating room), with 11,078 (96.7%) items verified out of a total of 11,451. Considering all the stages, 2021 was the year with the highest rate of completed items (98.9%), followed by 2019, when 98.8% of the items were completed (Table 2).

Considering the items recommended by the WHO in the composition of the SSC, the presence of allergies was not checked in 2% of the checklists, being the least completed

item in the Sign In stage. In the Time Out stage, the question of whether “antimicrobial prophylaxis was performed in the last 60 minutes” was the least adhered to, failing to be completed in 2.1% of the checklists. The item concerning the identification of anatomical specimens, from the Sign Out, was the least completed during this stage, and was not checked in 2% of the checklists. We highlight that in the latter there was the option “does not apply.”

Of the total number of verified checklists, 528 were fully completed, totaling 64.7% of completeness. Checklists with at least one unchecked item were excluded from this percentage. Of the analyzed years, the highest completeness was in 2019, totaling 73% of fully completed checklists, showing a large increase compared to 2018, which had only 38.2% of fully completed checklists (Graph 2).

DISCUSSION

We observed that of the 816 verified checklists, 64.7% were fully completed, demonstrating a result similar to the investigations carried out in Ethiopia and southeastern Brazil, which showed completeness rates of 60.8 and 67.4%, respectively^{15,16}.

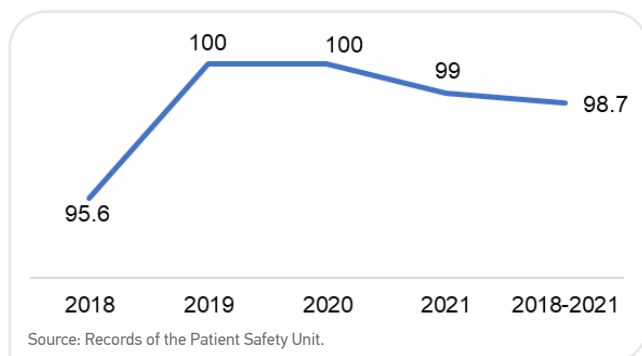
The data were better when compared to a study conducted in a small city of the state of São Paulo, in which 262 pediatric surgery checklists were analyzed and only 12.9% of the checklists containing items were fully completed¹⁷; and to the research conducted in the state of Minas Gerais, where, out of 303 analyzed checklists, no instrument was fully completed and incompleteness was verified at all three verification stages of the instrument¹⁸.

By observing a better result when analyzing the completion rate of the items, it should be noted that the checklists were completed for most of the items, but the unanswered items in the incomplete checklists had a direct impact on the completeness rate, which considers only the fully completed instruments. Thus, we can state that it is necessary to work with the teams to fully complete the instruments, stressing the importance of completing the items that were not marked. A slight difference was also verified between the percentage of the completion rates of the items from each verification stage.

Authors of a study conducted at a general hospital in Belo Horizonte (state of Minas Gerais, Brazil) found different results, as they verified a 95.5% completion rate in the items standardized by the WHO during the Sign Out stage, which was the one with the highest completion of the items

Table 1. Distribution of Surgical Safety Checklists according to specialty and shift. Fortaleza (state of Ceará), Brazil, 2018.

Variable	n	%
Specialty (n=816)		
Obstetrics	497	60.9
Gynecology	224	27.4
Mastology	92	11.3
Neonatology	3	0.4
Shift (n=799)		
Morning	487	59.7
Afternoon	183	22.4
Night	129	15.8

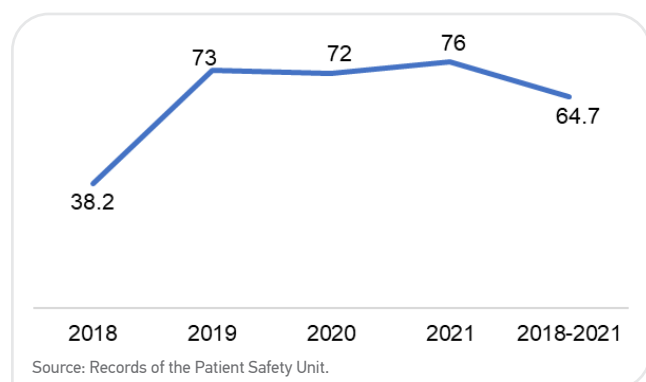


Graph 1. Completion (%) of patient identification and procedure data, per year. Fortaleza (state of Ceará), Brazil, 2018–2021.

Table 2. Completion rates (%) of Surgical Safety Checklist items, per year, Fortaleza (state of Ceará), Brazil, 2018–2021.

Stage/year	2018	2017	2020	2021	2018–2021
Sign In	97.7	99.0	99.0	99.3	98.8
Time Out	92.0	99.0	98.3	98.6	98.3
Sign Out	86.7	98.3	98.1	98.7	96.7
Overall	93.0	98.8	98.5	98.9	98.1

Source: Records of the Patient Safety Unit.

**Graph 2.** Completeness (%) of the Surgical Safety Checklists, per year. Fortaleza (state of Ceará), Brazil, 2018–2021.

from the study¹⁹. These data differ from Ethiopian and Indian studies, in which the highest adhesions per stage were found in the stage preceding anesthetic induction, with 100% completion found in the latter study^{20,21}.

The SSC is qualified as a low-cost instrument for implementation in the surgical setting; however, it presents moderate difficulties in its application and barriers to its use in national and global contexts^{22,23}.

For the correct completion of the SSC, in each stage, the checklist coordinator must be allowed to confirm that the team has completed its tasks before proceeding. Thus, it is necessary that the entire surgical team be present in the operating room and that everyone participates in each response to the items, as these guide the conduct aimed at reducing risks and AE resulting from surgical procedures¹².

In the context of a maternity hospital, reinforcing that most of the procedures were obstetric, the correct conduct and completion of the checklist can contribute to a reduction in morbidity and mortality in this context, considering that, in Brazil, postpartum hemorrhage and infections are among the major causes of maternal death²⁴. Although SSC should not be considered in isolation, this tool includes items that may predict or reduce the risk of such situations, such as the prediction of bleeding and the institution of prophylactic antibiotics and the availability of appropriate materials for the procedure.

It is worth noting that effective communication between the surgical center professionals must be essential for the proper performance of the procedures and for the patient's well-being. Thus, as it is an instrument that requires adequate communication and that works based on dialogue, the checklist helps the team to secure their actions through a multidisciplinary checking, thus contributing to the safety of patient care, reducing unpleasant situations that may interfere with the flow of anesthetic-surgical procedures¹². Therefore, the need for all surgical team professionals to actively participate and understand the importance of each information requested during the use of the SSC becomes evident.

International studies^{23,25} show that good communication between professionals is developed and improved by using the checklist. Nonetheless, communication is also the major barrier to the effective application of the checklist, with interpersonal relationships and low team participation as causes mentioned by researchers as difficulties encountered during the implementation of the SSC.

In a study conducted in Pakistan²⁶, researchers identified that adherence to the checklist achieved significant improvement in the three stages of verification after carrying out an educational intervention about the instrument, highlighting the importance of continuous training and qualification with all members of the surgical teams.

This research helped to explain data and information about completing the checklist within the context of a maternity teaching hospital, whose care includes obstetrics, gynecology, mastology, and neonatology, representing the reality of a teaching hospital and contributing to future care audits aimed at establishing improvements in patient safety indicators in the country. It is also emphasized that identifying not only the completion rates, but also addressing the uncompleted items, responsible for the incompleteness of the checklists, directs actions that should emphasize new practices and behaviors in the conduct of the SSC.

It should be noted that this study was restricted to the quantitative approach of the collected data based on secondary data, with no *in loco* observation of the completion of

the checklists, and no questions were raised about the factors that contributed or hindered the result obtained from the completeness rate.

Hence, future investigations should be encouraged with a view to the qualitative analysis of the retrieved data.

CONCLUSIONS

This study enabled us to evaluate the completion rates of the Surgical Safety Checklist in a maternity teaching hospital in Ceará and showed information that evidences the overview of the implementation of the instrument in the institution, as recommended by the WHO.

The identification of gaps in completing the checklist, especially in the context of obstetric care, should guide the planning of training actions and strengthening surgical safety, contributing to the reduction of AE in surgical procedures, as well as to the reduction of maternal morbidity and mortality.

The data demonstrated that, although the completion rate of the items is high, the completeness rate, which considers the checklists that had all their items checked, was reduced, demonstrating a lack of surgical safety and pointing to the need for interventions with the teams, considering that all items are strategic in reducing risks to the patient in intraoperative care.

Thus, the data presented in this study may contribute to the formulation of new correction strategies, stressing the development of the safety culture related to the conduct

and completion of the SSC and the improvement of surgical care in the country.

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CONFLICT OF INTERESTS

The authors declare no conflicts of interest.

AUTHORS' CONTRIBUTIONS

ACSB: Formal analysis, Conceptualization, Investigation, Writing — original draft, Writing — review & editing. LCP: Formal analysis, Conceptualization, Investigation, Writing — original draft, Writing — review & editing. RMC: Formal analysis, Conceptualization, Data curation, Investigation, Writing — original draft, Writing — review & editing, Visualization. LMON: Writing — original draft, Writing — review & editing, Visualization. EML: Project administration, Formal analysis, Conceptualization, Data curation, Investigation, Methodology, Writing — original draft, Writing — review & editing, Supervision, Visualization, Validation.

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