Original Article

doi: https://doi.org/10.1590/1983-1447.2022.202100348.en

☑ Knowledge translation and advances in health and nursing practices

Multiprofessional round with checklist: association with the improvement in patient safety in intensive care

Round multiprofissional com checklist: associação com a melhoria na segurança do paciente em terapia intensiva

Ronda multiprofesional con checklist: asociación con la mejora en la seguridad del paciente en cuidados intensivos

Edilaine Maran[a,b]
Laura Misue Matsuda[a]
Ana Maria Muller de Magalhães[c]
Sonia Silva Marcon[a]
João Lucas Campos de Oliveira[c]
Alexandre Biasi Cavalcanti[d,e]
Maria do Carmo Fernandez Lourenço Haddad[f]
Gislene Aparecida Xavier dos Reis[a]

How to cite this article:
Maran E, Matsuda LM, Magalhães AMM, Marcon SS, Oliveira JLC, Cavalcanti AB, Haddad MCFL, Reis GAX. Multiprofessional round with checklist: association with the improvement in patient safety in intensive care. Rev Gaúcha Enferm. 2022;43(spe):e20210348. doi: https://doi.org/10.1590/1983-1447.2022.202100348.en

ABSTRACT

Objective: To verify the association between a multiprofessional round with the use of checklists and patient safety practices by health professionals in an intensive care unit.

Method: Mixed-method study, delineated by the sequential explanatory approach, conducted in a hospital in southern Brazil. Quantitative data were analyzed using Poisson regression, and qualitative data, using content analysis. The integrated analysis was performed through the explained/connected combination.

Results: In the post-implementation period of the rounds with systematic use of the checklist, there was a significant improvement in the prophylaxis of venous thromboembolism, light sedation, reduction in the days of use of mechanical ventilation, central venous catheter and indwelling urinary catheter.

Conclusion: The multiprofessional round with the systematic use of checklist, associated with the improvement in patient safety practices, was considered as a strategy that ensures better care in intensive care and favors job satisfaction.

Keywords: Checklist. Teaching rounds. Intensive care units. Patient safety. Patient care team.

RESUMO

Objetivo: Verificar a associação entre *round* multiprofissional com uso de *checklist* e práticas de segurança do paciente por profissionais de saúde de uma unidade de terapia intensiva.

Método: Estudo de método misto, delineado pela abordagem sequencial explanatória, realizado em um hospital do sul do Brasil. Os dados quantitativos foram analisados por meio de regressão de Poisson e os dados qualitativos, pela análise de conteúdo. Fez-se a análise integrada por meio da combinação explicada/conectada.

Resultados: No período pós-implementação dos *rounds* com uso sistemático de *checklist* houve melhora significativa da profilaxia de tromboembolia venosa, sedação leve, redução dos dias de uso de ventilação mecânica, cateter venoso central e de sonda vesical de demora.

Conclusão: O *round* multiprofissional com uso sistemático de *checklist*, associado com a melhoria nas práticas de segurança do paciente, foi considerado como uma estratégia que assegura melhores cuidados em terapia intensiva e favorece a satisfação no trabalho.

Palavras-chave: Lista de checagem. Visitas com preceptor. Unidades de terapia intensiva. Segurança do paciente. Equipe de assistência ao paciente.

RESUMEN

Objetivo: Verificar la asociación entre una ronda multiprofesional con el uso de listas de verificación y prácticas de seguridad del paciente por profesionales de la salud en una unidad de cuidados intensivos.

Método: Estudio de método mixto, delineado por el enfoque explicativo secuencial, realizado en un hospital del sur de Brasil. Los datos cuantitativos se analizaron mediante regresión de Poisson, y los datos cualitativos, mediante análisis de contenido. El análisis integrado se realizo através de la combinación explicada/conectada.

Resultados: En el período de post-implementación de las rondas con uso sistemático del checklist, hubo una mejora significativa en la profilaxis del tromboembolismo venoso, sedación leve, reducción de los días de uso de ventilación mecánica, catéter venoso central y catéter urinario permanente.

Conclusión: La ronda multiprofesional con el uso sistemático de la lista de verificación, asociada a la mejora en las prácticas de seguridad del paciente, fue considerada como una estrategia que asegura una mejor atención en cuidados intensivos y favorece la satisfacción laboral.

Palabras clave: Lista de verificación. Rondas de enseñanza. Unidades de cuidados intensivos. Seguridad del paciente. Grupo de atención al paciente.

[a] Universidade Estadual de Maringá (UEM), Departamento de Enfermagem, Programa de Pós-Graduação em Enfermagem. Maringá, Paraná, Brasil.

[b] Universidade Estadual do Paraná (Unespar), Programa de Pós-Graduação em Enfermagem, Colegiado de Enfermagem. Paranavaí, Paraná, Brasil.

[c] Universidade Federal do Rio Grande do Sul (UFRGS), Escola de Enfermagem, Programa de Pós-Graduação em Enfermagem. Porto Alegre, Rio Grande do Sul, Brasil.

[d] Hcor, Instituto de Pesquisa. São Paulo, São Paulo, Brasil.

[e] Universidade de São Paulo (USP), Faculdade de Medicina. São Paulo, São Paulo, Brasil.

[f] Universidade Estadual de Londrina (UEL), Centro de Ciências da Saúde, Programa de Pós-Graduação em Enfermagem. Londrina, Paraná, Brasil.

INTRODUCTION

In the Intensive Care Unit (ICU), despite the complexity of the patient's clinical condition, frequent exposures to care failures result in adverse events (AE) and iatrogenic events not foreseen in the natural history of the disease[1]. This reality, tied to the dynamism of work in the ICU, justifies the use of strategies and tools that qualify care and, in some way, reduce the chance of events that impact the insecurity of critical patients[2].

The rounds permeate a safety strategy in the care for hospitalized patients, as it consists of an interactive and deliberate process of communication and decision-making about multidisciplinary care, including in the ICU[3]. In this unit, the round is a time when health professionals assess the health conditions of critically ill patients, their treatment, discuss the need to (re)plan care with a view to its greater effectiveness[4] and therefore, it is considered associated to the patient safety culture, as it values communication and collegiate deliberation on good practices in intensive care settings[2–4].

During multiprofessional rounds, the use of a checklist contributes to increasing adherence to evidence-based practices[5] and, therefore, can increase the quality of care and patient safety. In the ICU, this tool, which consists of a checklist, is a means to ensure that workers observe and comply with elements of direct relation in the safety of critically ill patients, such as: reduction of days of exposure to invasive devices such as mechanical ventilation (MV), central venous catheter (CVC) and indwelling urinary catheter (IDC), venous thromboembolism prophylaxis (VTE) and gastric ulcer, spontaneous breathing trial (SBT), maintenance of the head of bed position at 30º, light sedation, among others[6,7].

The use of checklists during multiprofessional rounds is recommended by researchers[7] who conducted a multicenter study in 34 ICUs in countries on five continents and found better therapeutic results, such as reduced mortality rate, length of hospital stay, in AE, and healthcare-associated Infections (HAI). Researchers[8] from a randomized clinical trial conducted in 118 Brazilian ICUs, state that the applicability of the checklist, the adherence of the multidisciplinary team to the proposed guidelines for the care provided and the establishment of goals in the rounds facilitate the team communication process, the immediate initiation of appropriate therapy, improvement of patient clinical outcomes and the ICU safety culture.

Despite the favorable results mentioned, the literature[9] points out that one of the difficulties in implementing checklists during the rounds is the professionals' perception of considering them as useless or as excessive work and even irrelevant to the care needs of the ICU. This perception reinforces the importance of rigorous studies towards improving the understanding of this topic, and therefore, it is postulated that elucidating the phenomenon of association of rounds with the use of checklist in the patient safety in intensive care, through a robust method, it is a social need and also a potential technical-scientific contribution that meets concrete improvements in complex health care delivery scenarios.

Based on the premises above, the question is: Is the round with the use of checklist in the ICU associated with the adherence of the health team and patient safety practices? To answer this question, the objective of this study is to verify the association between round with the use of checklist and patient safety practices by health professionals in an ICU.

METHOD

Mixed-method study, delineated in the sequential explanatory approach, according to internationally consolidated methodological framework[10]. It was conducted by a quantitative stage of greater emphasis (QUAN) – stage 1, connected to a qualitative stage, of less preponderance (qual) – stage 2. The research was conducted in the Adult ICU of a philanthropic hospital, located in southern Brazil. Although the referred sector is classified as "Adult ICU", it treats patients from 16 years of age.

Stage 1 consisted of a quasi-experimental study, of the *non-equivalent control group only afterwards* type. In this research design, there is no randomization of the medical records of critically ill patients, but it is assumed that the pre-intervention group is comparable with the post-intervention groups, even if they are not equal. It is noteworthy that all eligible medical records for each investigation period were assessed. A formal sample size calculation was not performed. The sample was defined by convenience, that is, it included all patients admitted to the ICU during the study periods.

The study was divided into three investigation periods: **1st period:** Pre-implementation of the round (February and March 2018); **2nd period:** Post-implementation of the round with non-systematic use of Checklist 1 (February and March 2019) and **3rd period:** Post-implementation of the round with systematic use of Checklist 2 (February and March 2021). The expression 'non-systematic' refers to the completion of the checklist on alternate days and 'systematic', to the daily completion. It is noteworthy that the standardized selection of dates about the pre- and post-intervention phases was due to the possibility of comparing patient safety practices before the implementation of the rounds, after the implementation of the rounds with the non-systematic use of a

checklist; and after the implementation of the rounds, with the systematic use of a validated checklist, since the interventions of the second and third periods started in February 2019 and February 2021, respectively.

In the ICU under study, no rounds with the use of checklists were performed in the first period of the investigation. In the second period, daily rounds were performed and, on interspersed days, the completion of checklist 1- 'Suspicion for Good'[11]. This intervention lasted for two years. Regarding the third period, the rounds were performed daily and checklist 2- 'Multidisciplinary'[12], validated by one of the authors, was completed. In this last period, the researcher together with the coordinator responsible for the ICU proposed the systematic use of the validated checklist[12] during the rounds and this strategy of multidisciplinary care remains in the ICU, even with the end of this study.

In the 2nd and 3rd periods of investigation, the rounds were performed in the afternoon, with an average duration of 60 minutes, by a team composed of seven permanent professionals: an intensive care physician, an infectious disease physician, an ICU nurse, two nurses from the Hospital Infection Control Committee (HICC), a physical therapist and a nutritionist. The printed completion of checklists 1 and 2 during the round was performed by the ICU nurse and/or intensive care physician.

Checklists 1 and 2 consist of 16 and 12 intervention/care items, respectively, based on best healthcare practices. From these interventions, 11 care practices were evaluated in this study and are common to both checklists: Elevation of the headboard 30º, adequate analgesia, light sedation/RASS -3 to 0, VTE prophylaxis, gastric ulcer prophylaxis, proper nutrition (patient who reached the prescribed caloric goal), days of use of MV, CVC, IDC, glycemic control and suspension/adjustment of antimicrobial doses[11,12].

For the three periods of investigation, all medical records of patients admitted to the ICU, aged 16 years or older, hospitalized for 48 hours or more were eligible. Medical records of patients who died within 48 hours of hospitalization and/or with a confirmed medical diagnosis of brain death were excluded. The exclusion of medical records of patients with brain death is justified because this study is part of a doctoral thesis that analyzed the effects of rounds with the use of checklist on health indicators of critically ill patients. Therefore, for these patients there is no prognosis of survival, and therefore they were not included in the analysis.

Data collection in Stage 1 was conducted between the months of September 2020 to April 2021. From September to December 2020, retrospective data related to the first and second periods were collected. From February to April 2021, prospective data collection was performed, which represents the third period of investigation.

Regarding the prospective data collection of stage 1, the multiprofessional team was instructed to stop the use of checklist 1 and implement checklist 2 during the rounds. It is noteworthy that the non-systematic and systematic completion of checklists 1 and 2, respectively, does not ensure that the care practices discussed in these instruments during the rounds are later performed on patients.

For data collection, it was used an instrument developed by the corresponding author, based on the instrument model applied in a randomized clinical trial study in Brazil[8], on data from the patient's medical records and also on checklists (version 1 and 2) used in the ICU under study.

The data were organized in a Microsoft Excel® spreadsheet and analyzed in the computer software: Statistica Single User version 13.2 and R version 4.0.2. The description of the data was performed through tables with the presentation of absolute numbers and percentages. The numerical and non-numerical characteristics of the sample of groups related to good care practices were compared between the different periods of investigation.

To measure the proportion and compare patient safety practices between the pre-intervention period (period 1) with the intervention periods (periods 2 and 3), it was applied the Poisson regression model. To estimate the effects of the round associated with the use of checklists in good care practices performed by health professionals, the relative risk (RR) and their respective confidence intervals (CI) were used, considering a significance level of 5% ($\alpha = 0.05$).

The percentage of patient safety practices was calculated based on the days of device use or intervention, divided by the patient's total days in the ICU, multiplied by 100. Except for VTE, which was calculated on the total eligible days (for VTE) and also for light sedation, which was calculated on the total days of the patient on MV, multiplied by 100, respectively.

The stage 2 of the mixed study was conducted in July and August 2021, after a preliminary analysis of the preponderant data from the Quantitative Stage (QUAN). The eligibility criteria to participate in this stage consisted of being an effective member of the multiprofessional rounds in the third period of stage 1 (QUAN), of the ICU under study. As an exclusion criterion it was established the absence of the professional during the data collection period, either because they were on vacation, leave or absence. All eligible professionals (seven) participated, without any loss, withdrawal, exclusion, or refusal.

For data collection in stage 2, a semi-structured questionnaire was applied, prepared by the researcher, as constituted:

sociodemographic data of health professionals and a guiding question: *Tell me about the multidisciplinary visit and checklist, in the promotion of patient safety of this ICU.* Additionally, eight support questions were created in case the participant had any difficulty in answering the main question. The interviews started right after the presentation of the quantitative results of stage 1.

Interviews with the participants were scheduled according to the availability of each professional; were recorded in audio and performed individually, in a private place, at the institution. The mean time of each interview was 35 minutes. It is highlighted that the interviewer who has no connection with the researched institution explained to the participants the objectives of the study, the type of participation desired and the ethical aspects that involve research with human beings. Still at this stage, a field diary was used for notes observed by the researcher at the time of the interview.

The statements were transcribed in full, with the support of a word processor (Microsoft Word) and were conducted preferably on the same day of the interviews. From the corpus acquired, it was applied the technique of content analysis, thematic modality, following the steps[13] of pre-analysis; exploration of the material and treatment and interpretation of the results obtained.

The integrated analysis of quantitative and qualitative data was achieved by connection. In this sense, the convergences/similarities, the complementarities and the possible divergences of the qualitative data explained and deepened the understanding of the quantitative data[10]. To reinforce the mixed characteristic of this study, a joint display matrix was designed, which illustrates the quantitative and qualitative results[14], in addition to the author's inferences about the joint density of the data.

All ethical and legal precepts related to research with human beings were complied and the registration of this study is in the Research Ethics Committee under Opinion No.4,155,452. To preserve anonymity, the participants were named by the letter "P" followed by an Arabic numeral, referring to the Professional and the order of the interviews. The excerpts/parts were edited, but without changing the meaning.

RESULTS

134 medical records of patients admitted to the ICU in the three periods of investigation, with similar characteristics were analyzed. This is because the groups presented a predominance of men, white, fifty-year-old, in clinical hospitalization, due to impairment of the neurological system. Heart failure and renal failure were the most prevalent comorbidities, with a mean score of the severity of disease classification system – APACHE II between 16.9 and 20.2 between the groups evaluated.

The good care practices that prevailed in the pre-intervention period compared to the intervention periods were gastric ulcer prophylaxis and analgesia. In the 2nd period, the safe care that prevailed compared to the other periods investigated was the shortest time of antimicrobial use. In the 3rd period, compared with the 1st and 2nd periods, the safety practices that prevailed were fewer days of MV, CVC and IDC use, proper nutrition, VTE prophylaxis, light sedation, and control of blood glucose (Table 1).

Table 1 shows nine safe care practices that prevailed in the intervention periods and from these, seven were in the period when health professionals performed the rounds with systematic use of Checklist 2.

When verifying the association between rounds with the use of checklists and patient safety practices, there was an improvement in the professionals' adherence to good care practices in the intervention periods (2nd and 3rd periods), namely: significant reduction in the usage time of MV, CVC and IDC; significant improvement in VTE prophylaxis and light sedation (RASS -3 to 0) in mechanically ventilated patients. However, analgesia had a protective effect in the first period, as shown in Table 2.

Table 2 shows that the pre-intervention period was associated with a patient safety practice, while the round with non-systematic use of Checklist 1, and round with systematic use of Checklist 2 were associated with one and five care practices, respectively.

In stage 2 (qual), all the members of the multiprofessional ICU team (07) who perform the rounds in the afternoon participated in the study. From these, three were nurses, two were doctors, one physical therapist and one nutritionist, with a mean age of 38 years old. Six professionals had three years or more experience in the ICU with the title of specialists; five were women and five were married.

Two categories emerged from the professionals' statements: Daily round with the use of checklist: Practice that ensures the best care for critically ill patients and; Round with use of checklist: Care strategy that increases the work satisfaction of the multidisciplinary team. The categories are presented with the integration of quantitative and qualitative data in the joint display (Chart 1), below.

Table 1 – Patient safety practices (N=134) by health professionals in the Intensive Care Unit, in the three investigation periods. Maringá, Paraná, Brazil, 2021

Patient safety practices*	1st Period (n=36) No checklist	2nd Period (n=45) Checklist 1 Systematic use	3rd Period (n=53) Checklist 2 Non-systematic use
	n intervention days /n ICU days (%)	n intervention days /n ICU days (%)	n intervention days /n ICU days (%)
Decubitus at 30º	453/472 (96.0)	455/455 (100.0)	454/454 (100.0)
MV usage time	344/472 (72.9)	274/455 (60.2)	240/454 (52.9)
CVC usage time	415/472 (87.9)	400/455 (87.9)	335/454 (73.8)
IDC usage time	465/472 (98.5)	392/455 (86.2)	260/454 (57.3)
VTE prophylaxis	254/410 (62.0)	190/348 (54.6)	253/309 (83.8)
Gastric ulcer prophylaxis	452/472 (95.8)	435/455 (95.6)	422/454 (93.0)
Proper nutrition	342/472 (72.5)	316/455 (69.5)	357/454 (78.6)
Analgesia	379/472 (80.3)	293/455 (64.4)	364/454 (80.2)
Antimicrobial	386/472 (81.8)	324/455 (71.2)	340/454 (74.9)
Light sedation	37/344 (10.8)	27/274 (9.9)	91/240 (37.9)
Blood glucose control	469/472 (99.4)	446/455 (98.0)	454/454 (100.0)

Source: Research data, 2021.
* Calculation based on days of device use or intervention/total ICU patient days x 100, except: VTE prophylaxis/No. eligible days of VTE x 100; and No. of patient days light sedation (RASS -3 to 0)/no. patient days on MV x 100

Table 2 – Association between rounds with the use of checklists and patient safety practices by health professionals in the Intensive Care Unit. Maringá, Paraná, Brazil, 2021

Patient Safety Practices	Period 2 *versus* 1	*p*-value*	Period 3 *versus* 1	*p*-value*
	effect estimate RR (95% CI)		effect estimate RR (95% CI)	
Decubitus at 30º	1.04 (0.91; 1.19)	0.5360	1.02 (0.95; 1.09)	0.5360
MV usage time	0.83 (0.70; 0.97)	**0.0184**	0.85 (0.78; 0.92)	**0.0001**
CVC usage time	0.99 (0.87; 1.15)	0.9980	0.92 (0.85; 0.98)	**0.0170**
IDC usage time	0.87 (0.76; 1.00)	0.0505	0.76 (0.71; 0.82)	**0.0001**
VTE prophylaxis	0.88 (0.73; 1.06)	0.1800	1.14 (1.05; 1.25)	**0.0017**
Gastric ulcer prophylaxis	0.99 (0.87; 1.14)	0.9800	0.99 (0.92; 1.05)	0.6600
Proper nutrition	0.96 (0.82; 1.12)	0.5870	1.04 (0.97; 1.12)	0.2800
Analgesia	0.80 (0.69; 0.93)	**0.0046**	0.99 (0.93; 1.07)	0.9837
Antimicrobial	0.87 (0.75; 1.01)	0.0662	0.96 (0.89; 1.03)	0.2367
Light sedation	0.81 (0.49; 1.33)	0.4130	1.58 (1.31; 1.92)	**0.0001**
Blood glucose control	0.98 (0.87; 1.12)	0.8370	0.01 (0.94; 1.07)	0.9230

Source: Research data, 2021.
*p-value <0.05 significant considering 95% confidence level

QUAN Data	QUAN Period (P) % P1; % P2 (p-value) % P1; % P3 (p-value)	Qual Categories	Statements – qual Similarity (S) Complementarity (C)
Decubitus at 30º	96.0; 100.0 (0.5360) 96.0; 100.0 (0.5360)	Daily round with the use of checklist: Practice that ensures the best care for critically ill patients	**S** – [...] *when you prevent, which is the issue of the 30° head of bed elevation, it reduces the risk of the patient evolving (death, pneumonia).* (P5)
MV usage time	72.9; 60.2 (**0.0184**) 72.9; 52.9 (**0.0001**)		**S** – *With the round and checklist filled out daily, you observe the parameters (clinical conditions) of the patient and schedule the removal of invasive devices (MV, CVC, IDC).* (P1) **S** – *The main reason for reducing the usage time of invasive devices is the daily checklist, as we were 'forced' to check all the items in the instrument and assess the need to maintain it.* (P4) **S** – *In the round, when checking if the patient had good renal function, good balanced fluid and was free of vasoactive drugs, we removed the IDC, the CVC and placed a peripheral venous catheter.* (P5) **S** – *In the past (before the round was implemented) we had a lot of resistance from the (nursing) team to remove IDC.* (P6) **C** – [...] (*before the implementation of the round) sometimes we were worried about the general condition of the patient and if he had a central venous access, which had no phlogistic sign, we kept it (CVC).* (P4) **C** – *The Hospital Infection Control Committee – HICC (nurse and infectious disease specialist) in the round disclosed the rates of infections associated with the device (mechanical ventilation-associated pneumonia, catheter-associated bloodstream infection and urinary tract infection). So, we were able to ground that the less we used the device, the lower the risk of infection and the better for the patient.* (P6)
CVC usage time	87.9; 87.9 (0.9980) 87.9; 73.8 (**0.0170**)		
IDC usage time	98.5; 86.2 (0.0505) 98.5; 57.3 (**0.0001**)		
VTE prophylaxis	62.0; 54.6 (0.1800) 62.0; 83.8 (**0.0017**)		**S** – *The decrease in VTE prophylaxis in the second period is a combo: 1st – human error went unnoticed and we have to be humble to talk about it; 2nd – perhaps a period when we have more neurocritical patients, because in the initial phase prophylaxis is not performed, and ends up being forgotten; 3rd – filling out the checklist only three times a week.* (P7) **C** – *When you noticed that VTE prophylaxis was not being performed, during the round (in the 3rd period of the study) you already asked: what about enoxaparin? Then what was wrong was corrected.* (P5)

Chart 1 – Synthesis of statements guided by patient safety practices with their respective % (*p*-value) and round and checklists. Maringá, Paraná, Brazil, 2021

QUAN Data	QUAN Period (P) % P1; % P2 (p-value) % P1; % P3 (p-value)	Qual Categories	Statements – qual Similarity (S) Complementarity (C)
Gastric ulcer prophylaxis	95.8; 95.6 (0.9800) 95.8; 93.0 (0.6600)		**S** – *The slight reduction in gastric ulcer prophylaxis may be a failure to readjust the medical prescription according to the items and goals listed in the checklist during the round.* (P6) **S** – *If the patient is targeting an appropriate diet and has reached the caloric goal, the pump inhibitor may not be necessary. But the decrease in prophylaxis can be due to the human factor, for forgetfulness.* (P7) **C** – *About the reduction of gastric ulcer prophylaxis I don't know how to answer.* (P2, P4)
Proper nutrition	72.5; 69.5 (0.5870) 72.5; 78.6 (0.2800)		**S** – *Nutrition is the first therapeutic item of the medical prescription, it is not an ornament, it has to be started as early as possible. But the decrease in nutrition in the second period can be for three reasons: 1st – the surgeon (for surgical patients) understands that has to start a little later; 2nd – forgetfulness; 3rd – suspension of the diet after return of gastric residue through the nasogastric tube.* (P7) **S** – *The daily checklist is very important, because I observe if the diet is going to be started early, if the caloric goal is being reached, if it is being tolerated well, if the patient is not opening the tube (nasogastric) and this brings a huge benefit.* (P3)
Analgesia	80.3; 64.4 **(0.0046)** 80.3; 80.2 **(**0.9837)		**S** – *In the ICU, the patient cannot feel pain, but if I am able to assess by pain scale that he/she does not need to use the analgesic, he/she will not use the analgesic.* (P7) **C** – *When there was no analgesic prescribed, I would talk to the intensivist and he would say that in the physical examination, if the patient did not have expression of pain, he chose not to prescribe it.* (P4)
Antimicrobial	81.8; 71.2 (0.0662) 81.8; 74.9 (0.2367)		**S** – *Nowadays we do not use antibiotic period for the pathology. I need to assess daily whether another day is needed or not and this has reduced indiscriminate use.* (P6) **S** – [...] *joining forces, you have the intensivist, the HICC, all on evidence-based medicine. You rationalize the use of antibiotics.* (P7) **S** – [...]*if the patient is progressing well and without fever, I will safely de-escalate the antibiotic, so as not to select microbial flora.* (P5) **S** – *Before the round, we noticed the indiscriminate use of polymyxin (P2); [...] the use of broad-spectrum antibiotics, such as polymyxin, was like 'water' here.* (P7) **C** – *The professionals did not have the patience to count the days of antibiotic usage, to check the culture, to observe if there was already 48 hours without fever to suspend. The proposal for the participation of the HICC in the round was very good.* (P5) **C** – *It was a 'fight' about antibiotics. One physician started in the morning, the other changed in the afternoon, but it improved with the presence of the infectious diseases specialist in the round.* (P2)

Chart 1 – Cont.

QUAN Data	QUAN Period (P) % P1; % P2 (p-value) % P1; % P3 (p-value)	Qual Categories	Statements – qual Similarity (S) Complementarity (C)
Light sedation	10.8; 9.9 (0.4130) 10.8; 37.9 (**0.0001**)		**S** – *Light sedation is the goal I've been looking for since I took over the ICU (April 2018) and to maintain cooperative sedation, it must be a very well trained team.* (P7)
Blood glucose control	99.4; 98.0 (0.8370) 99.4; 100.0 (0.9230)		**S** – *The slight decrease in blood glucose control in the second period refers to the higher knowledge curve. There is a protocol, but many colleagues (physicians) do not pay attention. In the third period, we started NPH insulin and this changed the blood glucose profile.* (P7)
Round and checklists	-	Round with use of checklist: Care strategy that increases the work satisfaction of the multidisciplinary team	**S** – *The round together with the checklist was a dream for me [...], I realized that there was a lack of empowerment from other professions. So, I believe this is the opportunity to express an opinion and have the power of action.* (P1) **S** – *We like to have the round because we stay updated on all patients. The focus is not only on our area, so we learn a lot.* (P2) **S** – *It is the moment (round) when all professionals are together, exchange information and enlight the conduct of each one.* (P4) **S** – *I see that every professional becomes happy, satisfied to be there (round), to give the best they can and assist the patient so that he/she has a quick recovery. This teamwork adds a lot.* (P3) **S** – *When we fill in the checklist during the visit, you feel safer, because all items have been checked, such as medication, nutrition, and physical therapy. This brings satisfaction and safety.* (P2) **C** – *In our case, the physician (intensivist in charge) liked it a lot and therefore implemented the round with the checklist.* (P2)

Chart 1 – Cont.
Source: Research data, 2021.

DISCUSSION

Among the 11 patient safety practices evaluated in this study, nine (81.8%) showed improvement in the intervention periods, that is, greater adherence by health professionals, especially in the period of performing the rounds with systematic use of the validated checklist (3rd period). The percentage of increase in adherence to good care practices, after the implementation of the rounds, is similar to the result of a study conducted in a pediatric ICU in Buenos Aires[5], which, after application of a checklist, found an improvement of 90% in the team's adherence to evidence-based practices.

The overall mean of the increase in adherence to safety practices evaluated between the pre-intervention period (1st period) and the intervention periods (2nd and 3rd periods) was 3.6% in the second period and 12.9% in the third period. The overall mean of the increase in adherence to safety practices in the third period is similar to the result of a study[15] conducted in a teaching hospital in the United States that observed an increase in adherence to the checklist items filled out daily in the rounds, in approximately 11%.

When verifying the association between the intervention and the care practices performed in the patients, the shorter length of stay of MV, CVC, IDC, the increase in VTE prophylaxis and light sedation, were the safety practices that showed significance ($p<0.05$). In the perception of health professionals, the significant increase in compliance with patient safety practices in the third period is mainly due to

the daily applicability of the checklist during the rounds, since the systematic filling enables to check all the items listed in the checklist, reducing the omission of care due to forgetfulness. Thus, the daily practice of the round with the use of a checklist, possibly, results in a work strategy that ensures better care for critically ill patients.

Regarding the significant reduction in days of MV, CVC and IDC usage, similar results were observed in a study[6] developed in eight ICU in five countries and found a positive effect of the checklist during the rounds in diverse care processes, among them, the significant decrease in patient exposure on MV, CVC and IDC days. In this aspect, the statement of P6 was forceful in affirming that the lower the use of invasive devices, the lower the risk of infections related to health care. Researchers[16] also reinforce that knowledge about care, the understanding of risks and injuries, are essential to guide the work process and implement harm prevention strategies.

The health team attributed the decrease in days of MV, CVC and IDC usage to the daily assessment of the patient's clinical condition at the time of the multiprofessional round, since renal function, use of vasoactive drugs and other parameters are used to schedule the removal of these invasive devices. The professionals mentioned about the resistance of nursing in removing the IDC and CVC in the absence of phlogistic signs in the period preceding the implementation of the round, but that after the implementation of this practice, the culture of objection to the removal of invasive devices was resolved through the participation of the Hospital Infection Control Committee (HICC) and the grounding/argumentation about the lower risk of ventilator-associated pneumonia (VAP), catheter-associated bloodstream infections (CA-BSI) and urinary tract infection (UTI) for the patient.

It is plausible to consider that the resistance mentioned may be related to the high workload of the intensive care nursing team, which deals daily with complex demands in a scenario that is often unfavorable to their professional practice[17]. Therefore, despite the prolonged use of devices (CVC and IDC) exposing the patient to risks, this use can also ease the nursing performance to make some infusions and control diuresis better and faster. Such aspects do not justify the non-implementation of safe care but reinforce the need for a systemic view regarding the means and instruments that qualify care, as these are not exempt or dissociated from the work dynamics and its barriers.

With regard to VTE prophylaxis, which is a safety practice for critically ill patients recommended by researchers[6,8,11,12] it was observed non-compliance with this recommendation in the second period, but with a significant increase from the first to the third period (p=0.0017). For the multidisciplinary team, the reasons for not complying with this guideline in the second period would be related to human error, to the greater number of neurocritical patients, as it was a practice that was initially contraindicated and that possibly remained forgotten by professionals. The checklist only three times a week was also considered. This reinforces the importance of multidisciplinary teamwork to promote safety strategies, as such cooperation is essential to the adherence and success of safe practices established in clinical guidelines.

Regarding gastric ulcer prophylaxis, there was a slight reduction in adherence in the intervention periods (2nd and 3rd), while proper nutrition and blood glucose control practices showed a slight decrease in the second period, with improvement in compliance with these actions in the third period. The main reasons for these results point out to the possible failure to readjust the medical prescription according to the goals established in the checklist during the round and the failure to observe existing protocols in the ICU. According to the literature[18,19], to optimize work in highly complex settings, it is necessary to develop strategies to cope with work adversities, such as continuing health education and wide dissemination of protocols for good conduct in the face of patient, in an incisive and dynamic way. According to the authors, these minimize existing care gaps.

Regarding analgesia, there was a significant reduction from the first to the second period. The justification for this can be understood from the statement of P7, who stated that despite the importance of the patient not feeling pain in the ICU environment, the clinical assessment through a pain measurement scale supports the physician's decision not to prescribe analgesics in unnecessary condition. The authors of the present study emphasize the importance of pain not being ignored for ethical and care reasons, but they also support the use of instruments such as the 'Behavioral Pain Scale' and the 'Critical-Care Pain Observation Tool' because they are valid and reliable for use in intubated patients[20]. The literature[20] shows that the higher the frequency of pain assessment using these instruments, the lower the use of analgesics in the ICU.

Regarding patient sedation, the significant improvement in keeping the patient mechanically ventilated under light sedation from the first to the third period can be attributed to the good training of the team. This is because both analgesia and light sedation are guidelines for best care practices recommended for critically ill patients[8,11,12].

Regarding the use of antimicrobials, the participants understood that the influent reasons for the decrease in the intervention periods (2nd and 3rd) are related to teamwork, the daily clinical assessment of the patient and the completion of

the round in the ICU. The professionals also mentioned that the presence of an infectious disease specialist was essential to improve the handling of this practice. In this way, it was possible to rationalize and de-escalate the antibiotic with safety, especially the broad-spectrum antibiotic. Similar results were observed in a study,[21] conducted in a pediatric ICU in Germany, which stated a significant reduction in antibiotic consumption, without compromising patient safety, after the implementation of an antimicrobial management program with prospective auditing and feedback during rounds led by infectious disease specialists.

In the perception of professionals, the round with the use of checklist consists of a care strategy that increases the satisfaction in the work of the multidisciplinary team, since the excerpts legitimize the constructive and decisive influence of this practice in the empowerment of professional categories; in the development and benefit of working together and, also, in the feeling of safety that the experience provides. In this aspect, researchers[22] state that the satisfaction of the ICU health team improves significantly with interprofessional rounds since there is greater understanding of the integrality of care, effective communication and a better sense of teamwork.

The mixed approach used in this study allowed to verify the association between rounds with the use of checklists and patient safety practices and to explain the improvement or not of adherence to good care practices by the multiprofessional team after the implementation of the multidisciplinary care strategy. The understanding and deepening of the quantitative data were possible through the similarities and complementarities obtained from the participants' statements. Finally, the absence of disagreements/divergences between the quantitative and qualitative data is highlighted because, according to the statements, the professionals appreciated the round with the use of checklist from the moment of its ideation in the investigated ICU.

In this study, it was not possible to verify the association of rounds with the use of checklists in the respective safety practices, listed in checklists 1 and 2: protective MV, SBT, ophthalmoprotection, cuff pressure and removing the patient from the bed. This is because, despite these precautions showing high compliance in completing the checklists, most of the time, they are not registered in the patients' records. Therefore, only the care/interventions that presented daily registers in the patients' medical records were analyzed, in all the investigation periods.

CONCLUSION

It is concluded that, in the period with the multiprofessional round with systematic use of checklist, there was a significant reduction in the number of days of use of mechanical ventilation, central venous catheter, indwelling urinary catheter and significant improvement in the prophylaxis of venous thromboembolism and light sedation. Data integration through mixed investigation showed that the daily round with the use of checklist is a strategy that ensures better patient care and increases the work satisfaction of the multidisciplinary team.

The limitations of this study are related to the analysis of data in a single ICU and the lack of formal sample size calculation. On the other hand, the association estimates were presented together with 95% confidence intervals, which allow us to assess how accurate the estimates are and, generally, the intervals have a moderate amplitude (up to 0.4), except for light sedation where the amplitudes are greater. Additionally, it is unwise to check an isolated correlation of the association of the round with the use of a checklist on safe care practices by nursing professionals because the association between the researched phenomena does not necessarily imply a causal effect, given the complexity of the work process in the ICU and the several variables that interfere in the assistance of the health professional.

Another limiting factor of the study was the possible Hawthorne effect, which may have contributed to the better outcomes in the third period of investigation. The professionals were aware of the objective of the study, but to control the possible Hawthorne effect, the researcher never directly observed the assistance provided by the multidisciplinary team, but observed the interventions and care registered in the patient's medical record. Based on these fragilities, further studies with a mixed approach, longer investigation time, a greater number of medical records and the inclusion of more ICU are recommended to expand and deepen knowledge about the investigated phenomenon.

Although the results of this study represent a local reality, the manuscript points out to the potential use of instrumental means linked to multiprofessional collaborative work as direct elements of contribution to safety in the care of critically ill patients. Therefore, the research signals the transversality of safety strategies in health training and work, as well as properly agreed between teams for their application in practice scenarios.

REFERENCES

1. Sauro KM, Soo A, de Grood C, Yang MMH, Wierstra B, Benoit L, et al. Adverse events after transition from icu to hospital ward: a multicenter cohort study. Crit Care Med. 2020;48(7):946-53. doi: https://doi.org/10.1097/CCM.0000000000004327.
2. Artis KA, Bordley J, Mohan V, Gold JA. Data omission by physician trainees on ICU rounds. Crit Care Med. 2019;47(3):403-9. doi: https://doi.org/10.1097/CCM.0000000000003557.
3. Boydston J. Use of a standardized care communication checklist during multidisciplinary rounds in pediatric cardiac intensive care: a best practice implementation project. JBI Database System Rev Implement Rep. 2018;16(2):548-64. doi: https://doi.org/10.11124/JBISRIR-2017-003350.
4. Barbosa RV, Lopes MACP, Pacheco GM, Pinto JIS, Monteiro YFB, Pinto SC, et al. Benefícios do round multidisciplinar na unidade de terapia intensiva. Braz J Health Rev. 2020;3(6):17989-18001. doi: https://doi.org/10.34119/bjhrv3n6-203.
5. Eulmesekian P, Pérez A, Díaz S, Ferrero M. Implementación de una lista de cotejo para mejorar la adherencia a prácticas basadas en evidencia en una Unidad de Cuidados Intensivos Pediátricos. Arch Argent Pediatr 2017;115(5):446-52. doi: http://doi.org/10.5546/aap.2017.446.
6. Kashyap R, Murthy S, Arteaga GM, Dong Y, Cooper L, Kovacevic T, et al. Effectiveness of a daily rounding checklist on processes of care and outcomes in diverse pediatric Intensive Care Units across the world. J Trop Pediatr. 2021;67(3):fmaa058. doi: https://doi.org/10.1093/tropej/fmaa058.
7. Vukoja M, Dong Y, Adhikari NKJ, Schultz MJ, Arabi YM, Martin-Loeches I, et al. Checklist for early recognition and treatment of acute illness and injury: an exploratory multicenter international quality-improvement study in the ICUs with variable resources. Crit Care Med. 2021;49(6):e598-e612. doi: https://doi.org/10.1097/CCM.0000000000004937.
8. Writing Group for the CHECKLIST-ICU Investigators and the Brazilian Research in Intensive Care Network (BRICNet); Cavalcanti AB, Bozza FA, Machado FR, Salluh JI, Campagnucci VP, et al. Effect of a quality improvement intervention with daily round checklists, goal setting, and clinician prompting on mortality of critically ill patients: a randomized clinical trial. JAMA. 2016;315(14):1480-90. doi: https://doi.org/10.1001/jama.2016.3463.
9. Hallam BD, Kuza CC, Rak K, Fleck JC, Heuston MM, Saha D, et al. Perceptions of rounding checklists in the intensive care unit: a qualitative study. BMJ Qual Saf. 2018;27(10):836-43. doi: https://doi.org/10.1136/bmjqs-2017-007218.
10. Creswell JW, Creswell JD. Projeto de pesquisa: métodos qualitativo, quantitativo e misto. 5. ed. Porto Alegre: Artmed, 2021.
11. Caldeira Filho M, Westphal GA. Manual prático de medicina intensiva. 12. ed. Campo Belo, SP: Segmento Farma; 2017.
12. Maran E, Matsuda LM, Marcon SS, Haddad MCFL, Costa MAR, Magalhães AMM. Adaptation and validation of a multidisciplinary checklist for rounds in the Intensive Care Unit. Texto Contexto Enferm. 2022;31:e20210047. doi: https://doi.org/10.1590/1980-265X-TCE-2021-0047.
13. Bardin L. Análise de conteúdo. São Paulo: Edições 70; 2016.
14. Johnson RE, Grove AL, Clarke A. Pillar Integration process: a joint display technique to integrate data in mixed methods research. J Mix Methods Res. 2019;13(3):301-20. doi: https://doi.org/10.1177/1558689817743108.
15. Cifra CL, Houston M, Otto A, Kamath SS. Prompting rounding teams to address a daily best practice checklist in a Pediatric Intensive Care Unit. Jt Comm J Qual Patient Saf. 2019;45(8):543-551. doi: https://doi.org/10.1016/j.jcjq.2019.05.012.
16. Rosa GBO, Santos MR, Dellaroza MSG, Nogueira E, Rodrigues MKG, Trelha CS. Prevention of pneumonia in hospitalized elderly patients. Cienc Cuid Saude. 2020;19:e42795. doi: https://doi.org/10.4025/cienccuidsaude.v19i0.42795.
17. Silva RPL, Menegueti MG, Siqueira LDC, Araújo TR, Auxiliadora-Martins M, Andrade LMS, et al. Omission of nursing care, professional practice environment and workload in intensive care units. J Nurs Manag. 2020;28(8):1986-96. doi: https://doi.org/10.1111/jonm.13005.
18. Silva SM, Baptista PCP, Silva FJ, Almeida MCS, Soares RAQ. Resilience factors in nursing workers in the hospital context. Rev Esc Enferm USP. 2020;54:e03550. doi: http://doi.org/10.1590/S1980-220X2018041003550.
19. Silva MMM, Oliveira-Figueirêdo DST, Cavalcanti AC, Nascimento LC. Bloodstream infections related to central catheters: understanding and practice of the nursing team. Rev Fun Care Online. 2021 [cited 2021 Jun 10];13:640-5. Available from: http://seer.unirio.br/cuidadofundamental/article/view/9376/pdf.
20. Pinheiro ARPQ, Marques RMD. Behavioral pain scale and critical care pain observation tool for pain evaluation in orotracheally tubed critical patients. a systematic review of the literature. Rev Bras Ter Intensiva. 2019;31(4):571-81. doi: https://doi.org/10.5935/0103-507X.20190070.
21. Renk H, Sarmisak E, Spott C, Kumpf M, Hofbeck M, Hölzl F. Antibiotic stewardship in the PICU: impact of ward rounds led by paediatric infectious diseases specialists on antibiotic consumption. Sci Rep. 2020;10:8826. doi: https://doi.org/10.1038/s41598-020-65671-0.
22. Sharma S, Hashmi MF, Friede R. Interprofessional Rounds in the ICU [Updated 2021 Apr 19]. In: StatPearls. Treasure Island , FL: StatPearls Publishing; 2021 [cited 2021 Jun 10]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK507776/.

Acknowledgment:
Our thanks to the managers and multidisciplinary team of the institution participating in the study.

Authorship contribution
Formal analysis: Edilaine Maran, Laura Misue Matsuda, Ana Maria Muller de Magalhães, Sonia Silva Marcon, João Lucas Campos de Oliveira, Alexandre Biasi Cavalcanti, Maria do Carmo Fernandez Lourenço Haddad, Gislene Aparecida Xavier dos Reis.
Conceptualization: Edilaine Maran, Laura Misue Matsuda, Ana Maria Muller de Magalhães, Sonia Silva Marcon, João Lucas Campos de Oliveira, Alexandre Biasi Cavalcanti, Maria do Carmo Fernandez Lourenço Haddad, Gislene Aparecida Xavier dos Reis.
Data curation: Edilaine Maran.
Writing-original draft: Edilaine Maran, Laura Misue Matsuda, Ana Maria Muller de Magalhães, Sonia Silva Marcon, João Lucas Campos de Oliveira, Alexandre Biasi Cavalcanti, Maria do Carmo Fernandez Lourenço Haddad, Gislene Aparecida Xavier dos Reis.
Writing-review & editing: Edilaine Maran, Laura Misue Matsuda, Ana Maria Muller de Magalhães, Sonia Silva Marcon, João Lucas Campos de Oliveira, Alexandre Biasi Cavalcanti, Maria do Carmo Fernandez Lourenço Haddad, Gislene Aparecida Xavier dos Reis.
Investigation: Edilaine Maran.
Methodology: Edilaine Maran, Laura Misue Matsuda, Ana Maria Muller de Magalhães, Sonia Silva Marcon, João Lucas Campos de Oliveira, Alexandre Biasi Cavalcanti, Maria do Carmo Fernandez Lourenço Haddad, Gislene Aparecida Xavier dos Reis.
Resources: Edilaine Maran, Laura Misue Matsuda, Ana Maria Muller de Magalhães, Sonia Silva Marcon, João Lucas Campos de Oliveira, Alexandre Biasi Cavalcanti, Maria do Carmo Fernandez Lourenço Haddad, Gislene Aparecida Xavier dos Reis.
Software: Edilaine Maran, Laura Misue Matsuda, Ana Maria Muller de Magalhães, Sonia Silva Marcon, João Lucas Campos de Oliveira, Alexandre Biasi Cavalcanti, Maria do Carmo Fernandez Lourenço Haddad, Gislene Aparecida Xavier dos Reis.
Validation: Edilaine Maran, Laura Misue Matsuda, Ana Maria Muller de Magalhães, Sonia Silva Marcon, João Lucas Campos de Oliveira, Alexandre Biasi Cavalcanti, Maria do Carmo Fernandez Lourenço Haddad, Gislene Aparecida Xavier dos Reis.

The authors declare that there is no conflict of interest.

Corresponding author:
Edilaine Maran
E-mail: edi_enf@hotmail.com

Associate editor:
Graziella Badin Aliti

Received: 12.30.2021
Approved: 06.13.2022

Editor-in-chief:
Maria da Graça Oliveira Crossetti