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ORIGINAL ARTICLE

Design of a safety round model for intensive care units

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KEYWORDS
Safety rounds;
Patient safety;
Quality of care;
Intensive care

Abstract
Introduction: Safety Rounds (SR) are an operational tool that allow knowing adherence to good practices, help identify risks and incidents in patient safety (PS), allowing improvement actions to be implemented. The objective of this work was the design of a procedure to perform SR in an Intensive Care Unit (ICU).
Methods: Preparation of a checklist for the development of SR in the ICU through the nominal group technique, with the participation of managers, middle managers and professionals from different disciplines and categories. In the first place, a group of experts agreed, based on the recommendations on good practices in PS, the definition of items, their coding, the criteria for compliance and the impact of non-compliance. Subsequently, its viability was determined through a cross-sectional study through the piloting of two SRs to adjust the items in real clinical practice conditions.
Results: A specific SR model for ICUs has been obtained through a checklist. The group of experts prepared a first list made up of 39 items of 6 essential dimensions and defined the method of implementation. Mean time to complete the two SRs was 85 min, including the briefing and subsequent debriefing. After the validation pilot, the dimensions were reduced to 5, 3 items were deleted, 2 items were transferred to another dimension and 3 items related to nosocomial infections and informed consent were modified. In addition, the data sources, the compliance criteria and their relative weight were redefined. The final list was considered useful and relevant to improve practice.

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◊ The names of the members of the working group on ICU safety rounds are listed in Appendix 1.

Conclusions: Through a consensus methodology, a checklist has been built to be used in the RS of an ICU. This model can serve as a basis for its use in healthcare services with similar characteristics.

PALABRAS CLAVE
Rondas de seguridad;
Seguridad del paciente;
Calidad asistencial;
Cuidados intensivos

Diseño de un modelo de ronda de seguridad para unidades de cuidados intensivos

Resumen
Introducción: Las Rondas de Seguridad (RS) son una herramienta operativa que permiten conocer la adherencia a las buenas prácticas, ayudan a identificar riesgos e incidentes en seguridad del paciente (SP), permitiendo implementar acciones de mejora. El objetivo de este trabajo fue el diseño de un procedimiento para realizar RS en una Unidad de Cuidados Intensivos (UCI).
Métodos: Elaboración de un listado de verificación para el desarrollo de RS en UCI mediante técnica de grupo nominal, con la participación de directivos, mandos intermedios y profesionales de diferentes disciplinas y categorías. En primer lugar, un grupo de expertos consensuó, atendiendo a las recomendaciones en buenas prácticas en SP, la definición de ítems, su codificación, los criterios de cumplimiento y el impacto de su incumplimiento. Posteriormente, determinó su viabilidad mediante un estudio transversal a través del pilotaje de dos RS para ajustar los ítems en condiciones de práctica clínica real.
Resultados: Se ha obtenido un modelo de RS específico para UCI mediante un listado de verificación. El grupo de expertos elaboró un primer listado compuesto por 39 ítems de 6 dimensiones esenciales y definió el modo de realización. Tiempo medio de realización de las dos RS fue de 85 minutos, incluyendo el briefing y debriefing posterior. Tras el pilotaje de validación, se redujo las dimensiones a 5, suprimió 3 ítems, trasladó 2 ítems a otra dimensión y modificó 3 ítems, relativos a infecciones nosocomiales y consentimiento informado. Además, se redefinieron las fuentes de datos, los criterios de cumplimiento y su peso relativo. El listado definitivo fue considerado útil y relevante para mejorar la práctica.
Conclusiones: Mediante una metodología de consenso se ha construido un listado de verificación para ser usado en las RS de una UCI. Este modelo puede servir de base para su empleo en servicios asistenciales de similares características.

What is known?

Safety rounds are recommended tools to promote patient safety and quality of care. Their usefulness lies in risk detection and monitoring adherence to best practice, preventing adverse events.

What is the contribution of this?

The development of a safety round model in the intensive care setting allows areas for improvement to be established as detected by the team itself. It also increases communication between the different agents involved.

Implications of the study

The safety round model outlined focusses on the specificities of intensive care units. It is flexible, participatory, and capable of identifying the risks specific to each unit. The next step will be to evaluate its usefulness.

Introduction

Patient safety (PS) is an essential element of quality of care. Adverse events (AE) associated with healthcare are a major public health challenge due to the human and material costs they incur. WHO data reveal that AEs are among the 10

leading causes of mortality and disability worldwide,[1] and it is estimated that one in 10 patients suffers harm while receiving hospital care.[2]

This situation is aggravated in patients admitted to intensive care units (ICU). The special vulnerability of these patients, together with the complexity of the procedures and care they require, means that they are more likely to suffer healthcare-related AEs. The most current evidence shows that the risk of suffering an AE in the ICU can be as high as 29%, with up to 2 AEs occurring every hour in every 100 patients.[3]

The commitment to quality and PS in the ICU is clear, and for some time now projects have been developed to implement best evidence-based practice, such as the quality indicators of SEMICYUC and SEEIUC,[4] or the Zero Projects.[5–8] The latter consist of a package of preventive measures implemented to reduce the rates of the main nosocomial infections that occur in the ICU.

In our ICU we have designed a comprehensive safety plan (PSI) that includes the implementation of different strategies to promote and strengthen the culture of safety. Our unit is committed to the development and implementation of safety rounds (SR) in the context of this PSI.

SRs were introduced by Frankel and developed at the Institute for Healthcare Improvement. They are an operational tool to ascertain adherence to best practice and best scientific evidence. They have proven effective in the development of safety culture, helping to identify risks and AEs and to implement relevant improvement actions.[9,10] They function as PS audits, with the joint participation of managers, unit managers, and healthcare professionals. This substantially improves communication between management and front-line professionals, creating formal communication spaces aimed at healthcare quality. They are an effective tool for improving critical PS and, therefore, for improving care. They help identify adherence to both best practice and risks, and reduce incidents and AE's. They are dynamic tools, as they allow for the introduction of new items and the removal of items where full compliance is demonstrated on an ongoing basis. They allow a cycle of continuous improvement, clearly identifying areas for improvement and evaluating the impact of corrective measures introduced.[11–13]

Objective: to design a procedure for SRs using a participatory methodology in an ICU.

Methods

Study design

This is a mixed design study (qualitative and quantitative). The methodology of consensus studies was used for the checklist, based on a narrative review of the literature, documents from scientific societies, and a nominal group of experts. For the feasibility study, a cross-sectional observational study was conducted by 2 pilot rounds in real clinical practice conditions.

The recommendations of the UNE EN ISO 9001-2015 standard on how to successfully conduct an internal audit were followed for the design of the entire procedure.

Drafting of the checklist. Nominal group

First, a multidisciplinary group of healthcare professionals with interest and experience in PS and ICU was formed, consisting of 2 intensive care nurses (the project coordinators), 2 members of the hospital's PS committee (preventive medicine physician and the hospital's patient safety nurse, both specialists in quality and patient safety in healthcare institutions), a hospital pharmacist, and an intensivist physician.

In the first phase, a narrative review of the literature was conducted in search of articles and guidelines on best PS practice applicable to critical patients. Search strategies were used with Mesh terms (Patient safety, Quality control, Critical care) and the term P̈atient Safety Walkroundẅas added to these.

The guidelines and documents related to PS of national and international scientific societies considered relevant in critical care, were compiled: Project Zero and quality indicators of SEMICYUC and SEEIUC,[4–8] safe use of medication (management of high-risk medications in the critically ill patient by the institute for the safe use of medicines and SEMICIUC[14,15]), prevention of pressure injuries (incorporated following the recommendations of the GENAUPP guidelines and, fundamentally, of the international consensus on preventive interventions on pressure ulcers (PU) or level of risk in critical patients[16,17]), clear identification of patients and samples[18] (in accordance with best practice included in the patient safety strategy of the Andalusian Public Health System), transfusion of plasma derivatives[19] (according to the general transfusion procedure of the haematology and haemotherapy clinical management unit of the Hospital Universitario Clínico San Cecilio de Granada, framed within the best practice of the Patient Safety Observatory of the Regional Ministry of Health) and, lastly, the content of the clinical records according to Law 41/2002, of 14 November, the basic law regulating Patient Autonomy and Health Documentation and Information-Related Rights and Obligations Regarding Clinical Information and Documentation.[20] Additional sources of data used were the risks identified while developing the unit's risk map and the analysis of notifications received through the corporate system of patient safety incident notification and management (notificASP).

All this information was used by the 2 project coordinators to select best practice on which there is a broad consensus in the scientific community. With this, they made a first draft of the checklist which they presented at the nominal group meeting. After reviewing all the data, they agreed on the variables to be included and how they would be evaluated.

A definitive checklist was then generated for use in the SR simulations. Consensus was defined as agreement between at least ⅔ of the members of the group (i.e., 4 of the 6 members).

Feasibility study. Pilot group

The feasibility of the checklist in clinical practice was tested in a small cross-sectional study. In addition to the members of the checklist development expert group, 1 manager, 2 intensive care nurses (the supervisor and the patient care

Table 1 Criteria for randomisation of cubicles to be included in the safety round.

% ICU occupancy	Randomisation system
<50	Every 2 cubicles
51–75	Every 3 cubicles
>75	Every 4 cubicles

The SR will start at the first occupied ICU cubicle and then all the beds in the unit will be checked according to the corresponding randomisation system.

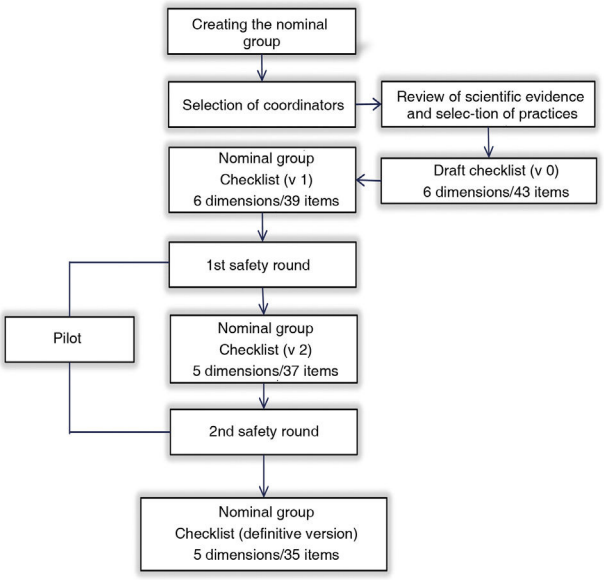

Figure 1 Summary of the process of elaboration and consensus of the checklist.

manager), and an intensive care physician participated. A methodology for the implementation of the round was also developed, following the Cavanagh and Hulme model.[21] The professionals to undertake the visits, the timetable, the team briefing methodology, with the assignment of functions and the systematic randomisation of the cubicles to be checked, were determined (Table 1). In addition, although not part of the validation of the checklist, the designs of the reports on the results of the round, the dissemination of these to the professionals, and the action plan to address the areas for improvement identified were established.

After each of the 2 rounds, the coordinators brought together the group of experts with the annotations, suggestions, and changes proposed by the members participating in the rounds and a new consensus was reached on the checklist. As in the previous phase, consensus was defined as agreement among at least ⅔ of the group members, i.e., 7 of the 10 members. A summary of the process of elaboration and consensus of this list is shown in Fig. 1.

For the execution of the round, each item was evaluated by a pair of participants, and if there was disagreement, a third person was the tiebreaker. One of the coordinators of the study managed and conducted the round, recording it in a database specifically designed for the study and hosted in the hospital servers (with all safeguarding guarantees) by input into an electronic tablet.

To analyse whether the resulting model meets feasibility criteria,[22] all participants completed a survey at the end of the pilot of the 2 SRs. This survey included questions related to the execution of the round and the content of the checklist:

- Adequacy of the time taken to conduct the round (adequate, short, or excessive).
- Simplicity: in relation to its complexity, how you found the execution of the SR. Likert scale score from 1 (very simple) to 10 (very complicated).
- Usefulness: how useful you found the SR. Likert scale score from 1 (totally useless) to 10 (essential).
- Impact. How you assess its impact on your daily practice. Likert scale score from 1 (contributes nothing) to 10 (essential).
- Acceptance in the unit. Rate the acceptance and interest of other healthcare professionals present who were not part of the PS team (indifferent, low, moderate, or high).
- Recommendation of the procedure to other units (yes, no, or DK/NC)
- Comments (free text).

Data analysis

Descriptive analysis of the data was performed as a qualitative study. Quantitative variables are expressed as mean and standard deviation and qualitative variables as frequencies and percentages.

Ethical considerations

ICU healthcare professionals undertook the data collection, who were members of the ICU SR working group. At no time were data collected that could identify patients or the professionals responsible for them, guaranteeing the protection of personal privacy, in accordance with the provisions of Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and Organic Law 3/2018 on Protection of Personal Data and Guarantee of Digital Rights.

Only the degree of compliance with best practice agreed with recognised standards was assessed. The database is kept by the coordinator of the working group.

The study complies with the standards of best clinical practice set out in Law 14/2007, of 3 July, regulating biomedical research. If any significant risk to PS is detected during the SR, it is immediately reported to those responsible for the patient's care, to prevent this risk affecting the patient.

The study was approved by the corresponding ethics committee with reference 1730-N-21.

Results

The nominal group drew up a checklist containing 6 dimensions and 39 items. After the pilot phase, the final approved checklist (Fig. 2) consisted of 5 dimensions and 35 items, distributed as follows:

		Items	Location	BED						Complies		Does not comply		Item impact	Prioritisation of objectives
										n	%	n	%		
SAFE USE OF MEDICATION	Prescription/ Administration of medication	Recording of medication allergies on chart	CHART											5	0
		Updated and validated medical prescription	CHART											3	0
		Identification of drug on infusion pump	Cubicle											5	0
		Identification of drug on infusion line	Cubicle											5	0
		Administration of drugs with most appropriate light	Cubicle											3	0
		Record of treatment administered	Cubicle											5	0
		Concordance of administered – prescribed drugs	CHART											5	0
PREVENTION AND CONTROL OF ARI	Hand hygiene	Hydroalcoholic solution in the cubicle	Cubicle											0	0
	Pneumonia Zero	Endotracheal tube cuff pressure monitoring per shift	Cubicle											4	0
		ETT repositioning per shift	CHART											3	0
		Oral hygiene per shift	CHART											5	0
		Headrest 30º -45º	Cubicle											5	0
	Bacteraemia and phlebitis zero	Catheter dressing in good condition	Cubicle											3	0
		Catheter dressing date on dressing	Cubicle											1	0
		Catheters needed	Cubicle											4	0
		3-way keys needed	Cubicle											4	0
		Correct change of infusion sets	Cubicle											3	0
	UTI zero	Urinary catheter needed	Cubicle											0	0
		Appropriate maintenance of catheter and collection system	Cubicle											0	0
SAFE CARE	Clear patient identification	Patient identification wristband	Cubicle											5	0
		P. Wristband. Cross-matched, updated, or removed if expired	Cubicle											3	0
	Fall prevention	Use of bed rails	Cubicle											0	0
	PU prevention	PU risk assessment per shift	CHA-RT / Clini-cal history											0	0
		Recording of PU development/treatment	CHA-RT / Clini-cal history											0	0
		Perform postural changes	CHART											5	0
	Prevention and identification of PICS	Monitoring pain	CHART											4	0
		Monitoring sedation/agitation	CHART											4	0
		Daily monitoring of delirium (if required)	CHART											4	0
		Mechanical restraint not prescribed/not indicated	Cub-icle / CHA-RT											5	0
	Other	Optimal fixation of devices (ETT/trach, NGT/ urinary catheter	Cubicle											0	0
MEDICAL/NURSING RECORD		Nursing assessment and care plan	Clinical history											0	0
		Record of family identification, telephone number, weight, and height	CHART											4	0
		Informed consent procedures/drugs	CHART											5	0
EQUIPMENT	CPR trolley	CPR trolley in appropriate condition, checked and stamped	CRP trolley											5	0
	Cubicle	Completion of cubicle checklist	Cubicle											3	0

Figure 2 Safety round checklist.

- Safe use of medication: 7 items.
- Prevention and control of healthcare-associated infections: 12 items distributed in 4 domains - Hand hygiene, Pneumonia Zero, Bacteraemia Zero, Urinary tract infection Zero.
- Safe care: 11 items distributed in 5 fields - unequivocal patient identification, prevention of falls, prevention and management of PUs, prevention and identification of post-intensive care syndrome, and others.
- Medical and nursing records: 3 items.
- Equipment: 2 items.

The document includes information on the definition of each item, the criteria for compliance and their coding, and the definition of the impact of non-compliance for each of the items, which was conducted using consensus methodology, with a degree of agreement of at least 2/3 of the members of the group.

Once the SR has been completed, the working group analyses the results and issues a report to those in charge of the unit, who will disseminate it to the professionals during the daily clinical sessions, where suggestions from the professionals will be collected and potential areas for improvement will be agreed upon based on the results obtained.

The average time needed to complete the SR was 85 min (the first was 90 min with 32 patients and the second 80 min with 26 patients), including the briefing and debriefing before and after the round.

During the pilot phase, it was decided to eliminate the dimension of AE identification and reporting, as the unit uses a well-functioning incident and AE reporting system and the SR itself functions as a tool for identifying risks to PS.

The modifications made to the list of items were as follows:

- Include the prevention of urethral catheter-related urinary tract infections (UTIs) as the third nosocomial infection associated with the Zero programme.
- Add informed consent for procedures for which it is considered mandatory (according to SEMICYUC quality indicators [4]).
- Include in the dimension of prevention of central venous catheter-related bacteraemia the item: non-existence of unnecessary 3-way stopcocks.
- The items corresponding to clear identification and prevention of post-intensive care syndrome were included in the follow-up care dimension.

Furthermore, it was recommended to indicate more precisely the data sources for the items related to the assessment of PU risk and the preventive measures adopted, because there is a double record in the nursing digital history and chart. The criteria for compliance and coding of data sources were also amended, leaving them as follows: 0 complies with item; 1 does not comply with item; 2 not precise; 3 not assessable; and 4 contraindications.

Finally, to assess the weight of each item, and more specifically the repercussion and impact on the patient of non-compliance with each item, a multiplier value was established for each. This multiplier factor is reflected in the checklist.

In relation to the feasibility analysis, the results show that 100% of the team considered the duration of the SR to be adequate. It was moderately complex to conduct (4.34, SD 1.80). The usefulness of the SR was rated as 9.56 (SD .72) and its impact on daily clinical practice was 8.78 (SD 1.30). For the respondents, the acceptance by other professionals was initially: high 22.22%, moderate 44.44%, and low 33.33%. All respondents would recommend this procedure to other ICUs (Table 2).

Table 2 Results of the safety round survey (feasibility analysis).

Items assessed	Results
Duration (%)	Short (0); adequate (100); Excessive (0)
Acceptance by professionals (%)	High (22.22); moderate (44.44); low (33.33)
Recommendation (%)	Yes: (100); no: (0)
Complexity (mean + SD) Likert scale 1 to >10 (1: very simple; 10: very complicated)	4.34 ± 1.80
Usefulness (mean + SD)	9.55 ± .72
Impact (mean + SD)	8.77 ± 1.30

SD: Standard Deviation.

Discussion

There are few examples of SR models in ICU in either the national[23,24] or international[25] literature. Checklists have been made for specific aspects of critical patient safety, such as information transfer,[26] tracheal intubation,[27] prevention of pressure injuries,[28] electronic prescribing,[29] pain detection, level of sedation or delirium,[30] and intra-hospital transport.[31] The model we present attempts to be exhaustive and include all the dimensions and items that can measure the level of implementation of evidence-based best practice with the greatest impact on the critical patient.

A real-time random safety tool (AASTRE) has been developed for use in ICUs in Spain, with a checklist that measures the impact on structure, process, and outcome indicators.[32] It was drawn up by a group of experts using Delphi methodology, validated in a multicentre study[33] and its impact on clinical practice has been studied.[34] The difference with the SRs presented here is that only intensive care professionals participated in AASTRE and it was conducted internally, without the presence of management teams or professionals from other disciplines. It is not surprising that the 2 lists share several of the same items, as both come from a review of the available scientific evidence. Our proposal would be for the items to be renewed according to the sustained achievement of a certain level of compliance and to be replaced by others, according to the results of each centre.

Developing a procedure for conducting SR requires prior consensus and a pilot phase, during which questions of content and method of implementation are defined by a multidisciplinary team.[35] The participation of professionals with different profiles and responsibilities in critical patient care guarantees a comprehensive view of the procedure developed. In our study, we believe that the group chosen was sufficiently broad and diverse to contribute knowledge, experience, and different points of view. Although it is recommended to include groups of patients in the development of questionnaires,[36] they tend to participate in cases in which the questions are addressed to them (quality of life surveys or similar) and not as with ours, which is to be used by the professionals themselves.

The time taken to conduct the round was found to be reasonable, although obviously much longer than in the case of the checklists made with a single intention, because in our case it covers multiple dimensions of patient safety. It is important that the time spent on rounds does not create a burden that discourages compliance. With the practice of safety rounds, we believe that the time required is reduced, especially the time spent in pre- and post-meetings. Likewise, if some of the items repeatedly achieve a high level of

compliance, they could be removed from the list and further reduced.

Limitations

Despite the usefulness and strengths of using SRs, several limitations and drawbacks were highlighted.[37] Firstly, the study is limited to the design of the checklist and its usability, using an expert consensus methodology (nominal group and pilot) and a user survey. Although some of the characteristics of questionnaire validation (content, construct) were achieved through the various expert meetings and discussions,[38] no formal evaluation was made using quantitative statistical techniques of other dimensions of internal validation (consistency, intra- and inter-observer agreement).[39] However, in this type of checklist, where the items are very objective, these characteristics are usually well met. External validation or generalisation, checking its usefulness in other ICUs with other patient populations or work dynamics, was not part of the objective of the study either.

Nor have we yet studied the impact of the rounds on clinical outcomes and safety culture, this being one of the most relevant aspects of the use of these tools.

Several studies agree that implementing rounds has increased knowledge of safety problems, making it possible to identify and resolve them,[11,40] increase the recognition of urgency in warning signs, and increase the scope of knowledge on the objectives of the rounds.[37]

Studies before and after the application of checklists and after an intervention show improvements in the rate of compliance with the items.

Thus, Sirvent et al.[41] found an increase in compliance from .86 ± .12 to .91 ± .52 (p = .023) in a checklist created with the SEMICYUC ̈do's and don'tsrecommendations[42] after training sessions aimed at the items with the lowest compliance. Similarly, Bodí et al.[33] with their AASTRE tool not only improved 12 of the 37 items on their list (32.4%), but also reduced the incidence of ventilator-associated pneumonia.

Finally, the attendance of senior and middle management (clinical managers) can generate fear, and its objective can be lost. It is important that these staff are aware of this and facilitate communication and promote an educational environment.[43] In addition, staff attention may be distracted from patient care and patients and their families may lose trust.

Conclusion

A checklist was constructed using consensus methodology to be used in the SR of an ICU. It was designed to detect areas for improvement in patient safety. The professionals consider it to be simple, useful, and relevant to clinical practice.

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Conflict of interests

The authors have no conflict of interests to declare.

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Appendix 1. Members of the ICU safety rounds working group

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