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Structuring and validation of a risk score to assess the level of pharmaceutical care for patients admitted to a hospital in Salvador

Estruturação e validação de escore de risco para avaliar o nível de cuidado farmacêutico aos pacientes internados em um hospital de Salvador

Estructuración y validación del score de riesgo para evaluar el nivel de atención farmacéutica a pacientes ingresados en un hospital de Salvador

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Abstract
Objective: This study aims to develop and validate a score to identify the level of pharmaceutical care that will be provided to patients hospitalized in a tertiary hospital in Salvador, Bahia. Method: The present study took place over a period of one year (2022-2023) at reference hospital in Salvador. An online form was constructed containing several variables collected from the literature, which were later validated by the Delphi-Method. The evaluation of the experts occurred in two stages mediated by the Likert scale until reaching a consensus and finalizing the score. Finally, a pilot test was conducted to evaluate the agreement in the applicability of this score, based on the responses of a group of pharmacists using the weighted Kappa Cohen. Result: The pharmaceutical risk score was developed from the decisions of the specialists, considering eight variables such as the number of medications, age, comorbidities, and others capable of assessing the level of care that hospitalized patients demand, being responsible for assisting the pharmaceutical clinical practice. The model presented a weighted Kappa Cohen of 0.67 (p-value <0.0001; CI 0.46-0.87), demonstrating moderate and satisfactory reliability. Thus, the score allows the pharmacist to offer proportional attention to the needs of the patient, performing their activities more safely. Conclusion: This study developed an objective and clear risk assessment instrument from the pharmaceutical perspective, based on evidence in the literature. The implementation of this score will significantly improve pharmaceutical care, enabling pharmacists to offer proportional attention to patient needs and conduct their activities more safely.
Keywords: Pharmaceutical care; Patient safety; Risk score.

Resumo
Objetivo: Assim, o objetivo deste trabalho é desenvolver e validar um escore para identificar o nível de cuidado farmacêutico que será prestado aos pacientes internados em um hospital terciário em Salvador, Bahia. Método: O presente trabalho ocorreu no período de um ano (2022-2023) no Hospital Universitário Professor Edgard Santos. Foi construído um formulário online contendo diversas variáveis colhidas da literatura que, posteriormente, foram validadas pelo Método-Delphi. A avaliação dos especialistas ocorreu em duas etapas mediadas pela escala de Likert até chegar a um consenso e finalização do escore. Por fim, foi realizado um teste piloto para avaliação da concordância na aplicabilidade desse escore, a partir das respostas de um grupo de farmacêuticos usando o Kappa Cohen ponderado. Resultado: O escore de risco farmacêutico foi desenvolvido a partir das decisões dos especialistas

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com oito variáveis como, número de medicamentos, idade, comorbidades e outras capazes de avaliar o nível de cuidado que os pacientes internados demandam, sendo responsável por auxiliar a prática clínica farmacêutica. O modelo apresentou um Kappa Cohen ponderado de 0,67 (p valor <0,0001; IC 0,46-0,87) que demonstra uma confiabilidade moderada e satisfatória. Desta forma, o escore permite que o farmacêutico ofereça uma atenção proporcional às necessidades do paciente, exercendo suas atividades com mais segurança. Conclusão: Esse estudo desenvolveu um instrumento objetivo e claro de avaliação de risco pela perspectiva farmacêutica, baseado em evidências na literatura.
Palavras-chave: Cuidados farmacêuticos; Segurança do paciente; Fatores de risco.

Resumen
Objetivo: Así, el objetivo de este trabajo es desarrollar y validar un puntaje para identificar el nivel de atención farmacéutica que será brindado a los pacientes ingresados en un hospital terciario en Salvador, Bahía. Método: Este trabajo se llevó a cabo durante un período de un año (2022-2023) en el Hospital Universitario Profesor Edgard Santos. Se creó un formulario en línea que contenía varias variables recopiladas de la literatura, que luego fueron validadas mediante el Método Delphi. La evaluación de los expertos se produjo en dos etapas mediadas por la escala Likert hasta llegar a un consenso y finalizar la puntuación. Finalmente, se realizó una prueba piloto para evaluar la concordancia en la aplicabilidad de este puntaje, a partir de las respuestas de un grupo de farmacéuticos utilizando Kappa Cohen ponderado. Resultado: El puntaje de riesgo farmacéutico se desarrolló con base en decisiones de expertos con ocho variables como número de medicamentos, edad, comorbilidades y otras capaces de evaluar el nivel de atención que requieren los pacientes hospitalizados, siendo responsable de auxiliar la práctica clínica farmacéutica. El modelo presentó un Cohen Kappa ponderado de 0,67 (valor p <0,0001; IC 0,46-0,87) que demuestra una confiabilidad moderada y satisfactoria. De esta forma, la puntuación permite al farmacéutico ofrecer una atención proporcional a las necesidades del paciente, realizando sus actividades de forma más segura. Conclusión: Este estudio desarrolló un instrumento de evaluación de riesgos objetivo y claro desde una perspectiva farmacéutica, basado en la evidencia de la literatura.
Palabras clave: Atención farmacéutica; Seguridad del paciente; Puntuación de riesgo.

1. Introduction

The safety of patients should be a priority during the work of health professionals, being essential for the management of care. However, there are failures aimed at the monitoring process during the hospitalization of patients and in several other stages aimed at the follow-up of hospitalization (Gleason et al., 2010).

The number of available professionals and work processes are barriers to health systems that influence patient care. This situation triggers an overload that compromises the quality of work, making professionals more susceptible to health problems and mistakes (Zanatta & Lucca, 2015).

In the pharmaceutical field, several studies are already looking for alternatives that can be used in clinical practice to prioritize the interventions of these professionals, direct and improve the management of health care through the optimized use of resources, reducing errors and overloads. A strategy for valuing clinical work is the use of scores that determine the degrees of risk and level of frailty of hospitalized patients (Audurier et al., 2021; Falconer et al., 2018; Lima et al., 2020).

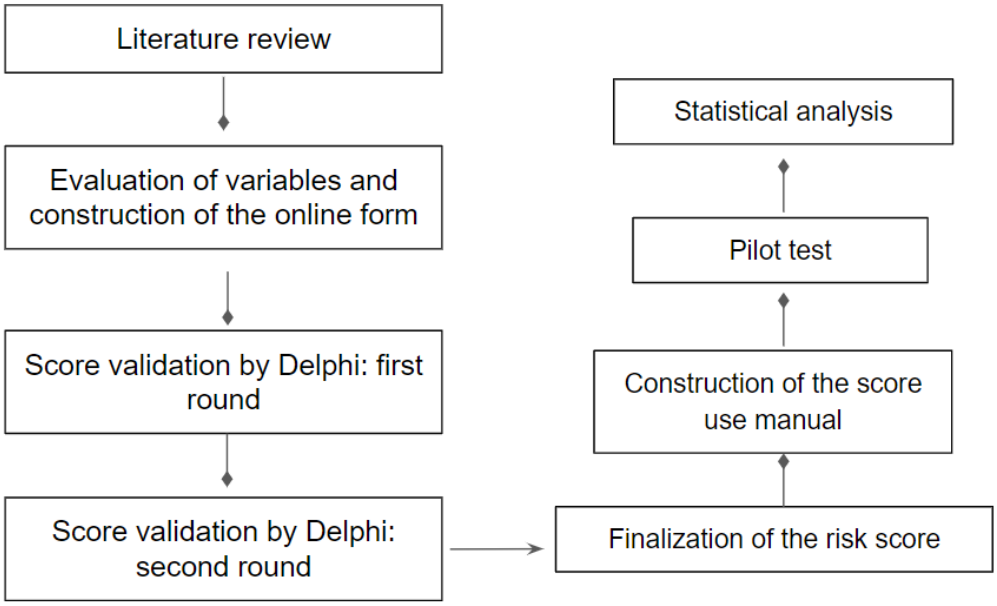
These tools have the potential to list individuals according to health risks, prioritizing care and targeted interventions in a hospital setting (Falconer et al., 2022). Thus, the use of risk scores that prioritize pharmaceutical interventions based on the criticality of patients becomes a necessary strategy. In this context, the professional can act efficiently in clinical practice, improving their conduct (Audurier et al., 2021).

In this sense, the implementation of a risk score in hospital pharmaceutical units is of great importance to assist the work of the pharmacist, ensuring not only more safety for patients but also the quality of care. Therefore, the objective of this study was to develop and validate a score to identify the level of pharmaceutical care that will be provided to patients hospitalized in a tertiary hospital in Salvador, Bahia.

2. Methodology

The present study is an observational, prospective and descriptive study with the purpose of implementing a risk stratification score for patients hospitalized in Professor Edgard Santos University Hospital (HUPES) to define the level of pharmaceutical care that should be given, at that moment, to these patients. The development of the score followed the steps of Figure 1.

Figure 1 - Outline of steps for the construction of the pharmaceutical risk score for patients admitted to a reference hospital in Salvador/BA.



Source: Own authorship.

The process of creating the score took place in the period of 01/2022 - 06/2023, going through several stages, from the literature review to the application of the score. The project was developed at HUPES, is a large hospital and outpatient service focused on teaching, a reference in medium and high complexity services in the state of Bahia, and is part of the Unified Health System (SUS) (Brasil, [SD]).

The Hospital Pharmacy Sector (SFH) of HUPES has a Clinical Pharmacy Unit (UFC) that has clinical pharmacists who are responsible for clinical services in the hospital wards. The services provided include medication reconciliation, pharmacotherapy review and pharmacotherapeutic monitoring.

First, an online form was constructed containing several variables selected from a review of the scientific literature. The search included articles in English, Portuguese and Spanish from the last 5 years (2018-2022) that addressed the theme development, validation or implementation of risk scores aimed at pharmaceutical practice, in any area of activity of the profession. In addition, the references of the articles already selected were analyzed manually, selecting studies that could be included in this review.

Articles that presented scores focused on other areas of health were excluded, as well as studies that did not expose the final variables of their score. There were no restrictions on the type of publication, be it an article, monograph or thesis.

The databases Virtual Health Library (VHL), Scopus, PubMed, and Google Scholar were used for the research, using the descriptors: (Development OR Validation OR Implementation OR "systematic review") AND (score OR "predictive risk model" OR "risk score") AND (medication OR Pharmacy OR "Adverse drug event" OR "clinical pharmacy" OR "drug-related

problems"). The final variables of each selected study were organized in order to avoid repetitions or the presence of items that are not related to a pharmaceutical evaluation. Then, an online form was structured with all the selected variables, and next to each one, the Likert scale was arranged, which makes the evaluation more objective, facilitating the choices and adherence to the project.

The model made by Rensis Likert (1932) consists of representing the degree of agreement between the respondents through a numerical scale represented from 1 to 5, with 1 totally disagreeing; 2 partially disagree; 3 neither agree nor disagree; 4 partially agree and 5 totally agree (Júnior & Costa, 2014).

For each variable, a discursive space of suggestions was available that was filled by the panelists, opening space for questions, criticisms, or ideas that increase the construction of the score. The use of the online form previously included the application of the Term of Free and Informed Consent (ICF) applied in a virtual way to those who answered the link.

The model built was validated using the Delphi-Method that seeks a consensus among the opinions of a group of experts, from the application of online questionnaires in several rounds (Thangaratnam & Redman, 2005). The selection of judges was based on the criteria of this method, inviting eleven professionals, Brazilian pharmacists with at least one postgraduate degree (whether master's, specialization or others) and, at least, five years of experience in the area of clinical or hospital pharmacy, willing to participate in all the necessary rounds.

The evaluation rounds took place online, and the invitations to the evaluators and forms were sent via e-mail, with anonymous answers that initially included questions about the academic background of the panellist and place of professional performance.

After receiving the returns of the first round, the answers were condensed and transformed into absolute numerical data placed in an Excel spreadsheet and served as the basis for the calculation of the Content Validity Index (CVI) that evaluates the agreement of the evaluators according to each item and the general scale of the CVI (s-IVC) that generates an average of agreement between all the items involved in the study (Vieira et al., 2020; Yusoff, 2019).

According to Cunha, de Almeida Neto and Stackfleth (2016), the CVI is the most widely used quantitative method to assess agreement among specialists, especially in the health area through the Likert scale. The authors point out that there is no consensus regarding the minimum level of agreement to determine the cutoff and classification of the data. However, in the literature, some authors suggest a CVI greater than 0.80; however, values greater than 0.90 are admitted; a minimum percentage of 90% among the evaluation members, aiming at a higher degree of confidence.

Therefore, the variables with excellent agreement (> 0.90) were accepted for the final score. Those that were below the s-CVI were excluded directly, and those with good agreement (< 0.90 and > s-CVI) were to be analyzed individually. For this last group of variables under analysis, the data placed in the suggestions by the panellists were taken into account to improve and modify the items, resulting in a new form and a new round.

A new form based on the result of the first round was built and sent by email. Following the same idea as the first round, the judges answered the questionnaire, and an email was sent to remind them of the deadline for response. Finally, the new data were analyzed, computed and calculated (based on CVI and s-IVC) reaching a final consensus in this second round.

With the validation stage completed, the variables chosen and defined by the panellists were structured in a checklist format, thus forming the final score. Then, ideas and opinions were collected about the process of execution and application of the score in the clinical practice of pharmaceutical professionals to build the manual for the use of the score.

With the score made and with all the information collected, an outline of the standard operating procedure was constructed. Then, the manual was sent for evaluation, via email, to the managers involved in the process for finalization and adjustments of the document. With the feedback received, the manual was structured, standardized and finalized.

With the score and manual finalized, a pilot test was performed to evaluate the agreement in the applicability of these instruments. Thus, the number of patients was defined based on the previous data of the indicators of patients followed by the CFU. The number of patients will correspond to 10% of patients in monthly follow-up by clinical pharmacists in 2022.

Then, the clinical pharmacists working in the study hospital were invited to apply the risk score to a group of patients. The choice of patients was made by the researcher randomly, they were hospitalized at the time of selection and were found in the hospital system. To ensure representation from different specialties, samples from all wards were included. The score was applied to the same patient by more than one professional, in order to evaluate the agreement between them. In this stage, the professionals applied the score made available online, the results were analyzed on the level of agreement between pharmacists for the same patient, using the Kappa Cohen coefficient weighted using the R program.

The statistical data were computed in two moments: first during the validation of the score, based on the choices made in the Likert scale, and then after the collection of descriptive and quantitative data in the wards obtained with the application of the score.

In view of the choices made through the Likert scale, the absolute numerical values of disagreement or agreement were grouped and organized in an Excel spreadsheet, and the CVI and s-CVI of this data set were calculated. This analysis occurred in the two rounds of validation and was responsible for the formation of the final risk score.

The second moment was an evaluation of agreement between the result of the score applied by a group of clinical pharmacists. Using the numerical results found by these professionals, the Kappa Cohen (weighted) was applied using the R software to determine the of agreement and feasibility of using the pharmaceutical score.

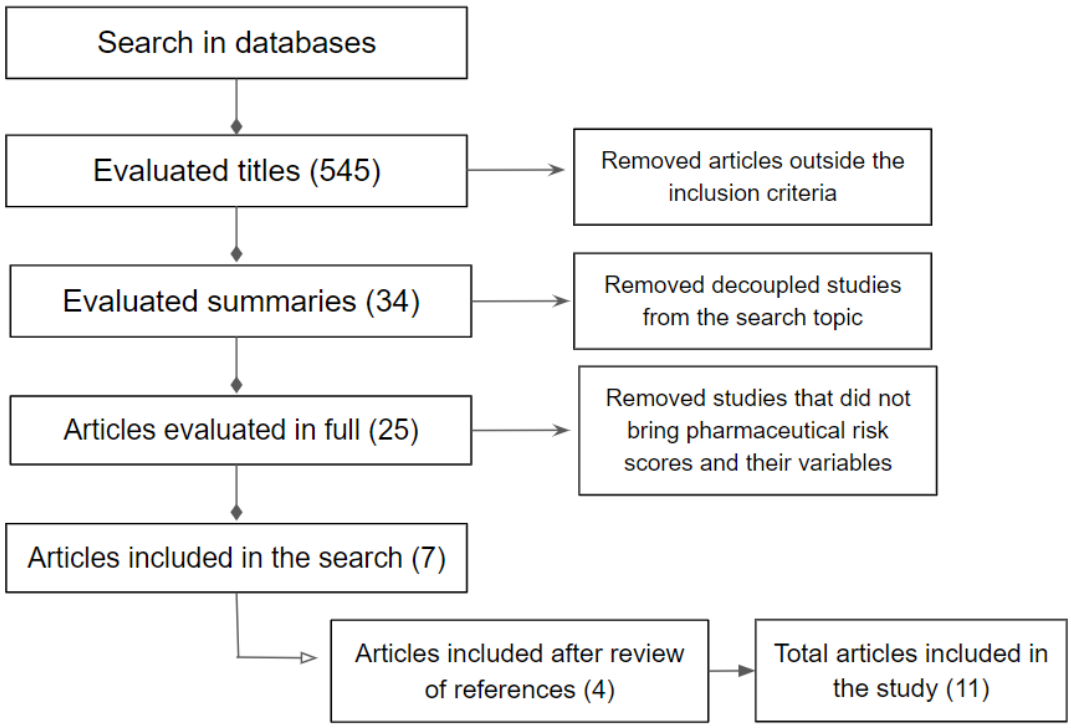
All data were counted, and the records were entered in Microsoft Office Professional Plus Excel, version 2018, being organized in standard tables.

This study was submitted to and approved by the Research Ethics Committee (CEP) by CAAE: 59792222.6.0000.0049. To apply the online forms of the score evaluation, a TCLE was applied to all the panelists who participated in the construction of the score.

3. Results

The search process occurred in steps, as detailed in Figure 2. Initially, 545 study titles were evaluated from the databases, and 34 were included for reading the abstracts. Out of these, 25 studies were read in full, and 7 were selected for this study. Additionally, a query was performed in the references of the seven included studies to expand the references, being identified and including four more articles in this study.

Figure 2 – Representation of the flow for the selection of articles based on a literature review carried out, to construct the pharmaceutical risk score for patients hospitalized in a reference hospital in Salvador/BA.



Source: Own authorship.

After reading the eleven articles included in the study (Audurier et al., 2021; dos Santos Barreto et al., 2022; Geeson et al., 2019; Mahony et al., 2018; Falconer et al., 2018; Lima et al., 2020; Mongaret et al., 2018; Gwynn et al., 2019; Falconer et al., 2020; Parekh et al., 2020; Ferrández et al., 2018), the variables of the final scores for each article were extracted and analyzed. Duplicates and items not related to pharmaceutical evaluation were excluded during this process. At the end of this analysis, 17 variables were identified and presented in Table 1 for evaluation.

Table 1 – Final set of variables collected after reviewing the literature on existing pharmaceutical scores, to compose the new pharmaceutical risk score for patients admitted to a reference hospital in Salvador/BA.

	VARIABLES
1	Number of drugs in use, excluding those if necessary and at the medical discretion
2	Gender (Female/Male)
3	Age
4	AVM medications (consider the list of institutional AVM)
5	Medications that act on the Central Nervous System (CNS) (antipsychotics, antidepressants, anxiolytics, sedatives, anticonvulsants, anesthetics)
6	Intravenous Drugs
7	Comorbidities (patient with kidney or liver disease))
8	Feeding pathway: Nasoenteral Probe (NSS), Nasogastric Probe (NGS), Gastrostomy Pathway (VG), Total Parenteral Nutrition (TPN)
9	Patient with immunosuppression
10	Prescription of anticoagulants or drugs that act on the hematological system
11	Prescription of antibiotics (strict/broad spectrum)
12	Severe Adverse Reaction (patient with a history of severe ADR or admitted by ADR) and/or drug allergies
13	Patient with some Neoplasm
14	Patient using vasoactive drug, sedation, hemodialysis or ventilatory support
15	Special condition (illiterate, physical or mental disability) (*For pediatrics to consider the condition of the responsible)
16	Heart rate ≥ 72 bpm OR Systolic blood pressure ≥148 mmHg OR Serum potassium ≥ 4.9 mmol/L
17	Length of stay

Source: Own authorship.

The form was created online using closed questions to evaluate the variables and included a discursive space for suggestion. In the first round of evaluation, a total of eight responses were received from the eleven participants. The results of the agreement validation indexes for each item and the general CVI scale are available in Table 2. Based on these results and following the excellence value for CVI (> 0.90), the following variables were directly included in the final score since they reached a CVI of 1: number of drugs in use, excluding those if necessary and at the medical discretion; AVM medications (consider the list of institutional AVM); prescription of anticoagulants or drugs that act on the hematological system; prescription of antibiotics (strict/broad spectrum) with suggestions made by the judges; and Severe Adverse Reaction (patient with a history of severe ADR or admitted by ADR) and/or drug allergies.

Table 2 – Results of the indices of variation of agreement (CVI) and the general mean of CVI (s-IVC) of the first round of Delphi evaluation to determine the final variables for the pharmaceutical risk score for patients admitted to a reference hospital in Salvador/BA.

VARIABLES	CVI
Number of drugs in use, excluding those if necessary and at the medical discretion	1
AVM medications (consider the list of institutional AVM)	1
Prescription of anticoagulants or drugs that act on the hematological system (such as: warfarin, clopidogrel, enoxaparin therapeutic dose, tranexamic acid)	1
Prescription of antibiotics (strict/broad spectrum)	1
Severe Adverse Reaction (patient with a history of severe ADR or admitted by ADR) and/or drug allergies	1
Patient using vasoactive drug, sedation, hemodialysis or ventilatory support	0,875
Comorbidities (Kidney, hepatic, heart or lung disease)	0,875
Age	0,875
Immunosuppression Patient	0,875
Feeding pathway: Nasoenteral Probe (NSS), Nasogastric Probe (NGS), Gastrostomy Pathway (VG), Total Parenteral Nutrition (TPN)	0,875
Medications that act on the Central Nervous System (CNS) (antipsychotics, antidepressants, anxiolytics, sedatives, anticonvulsants, anesthetics)	0,625
Intravenous Drugs	0,5
Patient with some Neoplasm	0,625
Gender (Female/Male)	0,375
Special condition (illiterate, physical or mental disability) (*For pediatrics to consider the condition of the responsible)	0,625
Heart rate ≥ 72 bpm OR Systolic blood pressure ≥148 mmHg OR serum potassium ≥ 4.9 mmol/L	0,75
Length of stay	0,625
s- IVC	**0,78**

Source: Own authorship.

Next, the general scale of the CVI (s-IVC) was evaluated to determine which variables have a relevance above the general average and should enter the second validation stage for further analysis by the judges. Therefore, the variables that did not demonstrate an excellent degree of agreement (>0.90) or a moderate degree (<0.90 >0.78) according to the CVI were excluded in the first round.

The other variables with CVI higher than the mean (>0.78), but which did not achieve excellent agreement (>0.90), were individually analyzed, considering the suggestions given by the evaluators. Subsequently, the variables were modified and subjected to a new validation step, involving the creation of a new form.

In the second validation stage, there was a 100% response rate compared to the first round, with all eight participants providing feedback. CVI and s-CVI were then applied to all variables, as shown in Table 3. As a result, the variables age, patient with immunosuppression and comorbidities (patient with kidney or liver disease) achieved a CVI of excellence (>0.90) and were included in the final score.

Table 3 – Results of the concordance variation indexes (CVI) and the general mean of CVI (s-CVI) of the second round of Delphi evaluation to determine the final variables for the pharmaceutical risk score for patients admitted to a reference hospital in Salvador/BA.

VARIABLES	**CVI**
Age	1
Comorbidities (Kidney and/or liver disease)	1
Patient with Immunosuppression	1
Comorbidities (heart and/or lung disease)	0,75
Feeding pathway: Nasoenteral Probe (NSS), Nasogastric Probe (NGS), Gastrostomy Pathway (VG), Total Parenteral Nutrition (TPN)	0,75
Patient using vasoactive medications, sedation, hemodialysis or ventilatory support	0,75
s- IVC	**0,875**

Source: Own authorship.

Therefore, all variables were classified, and after two rounds of validation, the final score was compiled, and Chart 1 was completed. The final score was presented to the clinical pharmacists of the UFC, and discussions were held regarding the internal processes for the instrument's application and the orientation on how the pilot test would be conducted with the participation of these professionals.

Chart 1 – Final model of the pharmaceutical risk score for patients admitted to a referral hospital in Salvador/BA.

PHARMACEUTICAL RISK SCORE

Variable		Punctuation		
Number of drugs in use (excluding those if necessary and at the medical discretion)		≤5	6-9	≥10
		1	2	3
High Surveillance Drugs (AVM) (Consider the institutional AVM list)		1-2	≥3	
		1	2	
Prescription of anticoagulants or drugs that act on the hematological system (such as: warfarin, clopidogrel, enoxaparin therapeutic dose, tranexamic acid)		1	≥2	
		1	2	
Antibiotic prescription (strict/broad spectrum)		1-2	≥3	
		1	2	
Serious Adverse Reaction (ADR) (patient with a history of severe ADR or admitted for ADR) and/or Drug allergies		YES	NO	
		1	0	
Age	RN-1	>1-14	15-65	>66
	3	2	1	2
Comorbidities (Kidney and/or liver disease)		YES	NO	
		1	0	
Patient with Immunosuppression		YES	NO	
		1	0	
TOTAL*				

*Risk classification: ≤ 6 Low (Admission and weekly evolution); 7-11 Intermediate (Admission and evolution 2-3 times a week); ≥12 Intensive (Admission and Daily Evolution).

Source: Own authorship.

In the phase of evaluating the applicability of the project, the monthly number of patients treated at the CFU of the hospital was determined, and a sample of 10% of this value was calculated. Consequently, the researcher selected 25 patients admitted to HUPES at the time of selection, randomly choosing one or two patients from each ward/specialty of the hospital. The cases were then randomized among the nine clinical pharmacists at the UFC, with each pharmacist applying the score to an average of 5 different patients. Additionally, two professionals applied the score to the same patient, and there was no knowledge among the pharmacists about which group of patients each was responsible for.

All orientations for this stage were sent via e-mail to the pharmacists, including the patient's data necessary to locate them in the hospital system, the risk score, the Manual for application, and the researcher's contact information for any questions.

The weighted Kappa Cohen value, which assessed the degree of agreement and reliability between the analyses performed by the pharmacists, was 0.67 (p-value <0.0001; CI 0.46-0.87). In this test, there is an assignment of weight according to the degrees of disagreement, which weights the analyses made and is defined as moderate or substantial agreement (Mchugh, 2012; Landis & Koch, 1977).

After completing this stage of score application and gathering all the results, the pharmacists raised questions and provided suggestions for the instrument's application process. The researcher collected the information, organized it, and

incorporated more detailed guidelines into the manual to enhance clarity and precision. It is essential to note that the manual should undergo periodic updates and revisions whenever there are convergences of information, preventing discrepancies in the interpretation of the instrument.

4. Discussion

This study developed an objective and clear instrument for risk assessment from a pharmaceutical perspective, based on evidence in the literature. The application of this tool aims to support the clinical performance process of pharmacists and was designed by professionals with expertise in the hospital clinical area.

Among the items defined in this score, the most frequently described in the literature is the number of prescribed drugs, which often correlates with the severity or complexity of the patient (O'Mahony et al., 2018) (Lima et al., 2020). This polypharmacy is also associated with a higher probability of the occurrence of ADR, drug interactions, and a lower therapeutic adherence due to forgetfulness, access difficulties, or medication errors (da Silva et al., 2021). Consequently, proper medication reconciliation during hospitalization becomes crucial for maintaining a safe and appropriate therapy (Gama, 2021).

Age was the second most frequently considered variable in the research. This factor can be attributed to metabolic changes in the elderly, leading to alterations in pharmacokinetics and pharmacodynamics (Barbon et al., 2016) which in turn modify therapeutic responses and adverse events. Similarly, in pediatrics, different developmental are marked by morphological and metabolic variations. The physiological changes during each phase of childhood impact processes such as secretion, gastric emptying, and constitution of the child's tissues. These transformations directly influence pharmacokinetics and pharmacodynamics, potentially resulting in potentiation or inhibition of pharmacological effects (Medeiros & Oliveira, 2020; Benarrosh et al., 2022).

When considering comorbidities, renal or hepatic dysfunctions become significant parameters for pharmaceutical practice, as the metabolism and excretion of most drugs occur, at least in part, in these organs. Therefore, the pharmacist should pay attention to dose adjustments and evaluate potential risks of overdose due to reduced drug excretion or underdose due to accelerated drug metabolization, with a focus on ensuring the appropriate effectiveness of drugs (Le Couteur et al., 2005; Yokoo, 2021; Pernasi, 2017).

High Surveillance Drugs (AVMs), also known as potentially dangerous drugs, belong to a group of medications that have a high probability of causing significant harm to patients, especially when there is a failure in their use (ISMP, 2015). Considering that most medication errors are associated with AVMs, closer and more assertive monitoring of these drugs becomes essential to prevent greater harm to patients (Bohomol, 2014; Silva & Oliveira, 2016).

Immunosuppression renders individuals more susceptible to infectious processes and vulnerable to pathogen involvement, as it induces a reduction in the production of immune cells by the marrow. Long-term immunosuppression also exposes patients to specific adverse effects from the prophylactic therapies needed to minimize such risk. Consequently, certain immunosuppressive regimens that create this scenario require more careful monitoring (de Oliveira et al., 2019; Correa et al., 2022).

Anticoagulant drugs pose several risks to patients, particularly the risk of severe bleeding. The healthcare professional responsible for monitoring individuals using such medications plays a critical role in identifying signs or symptoms of ADR, monitoring changes in the INR, and providing guidance to patients and their families regarding the proper use and care (Leal et al., 2020; Falconer et al., 2022).

The inappropriate use of antimicrobials over the years has led to several cases of bacterial resistance and microbiological selection in hospital environments. Conversely, the correct use of these medications is an essential practice

that should be encouraged and prioritized by pharmaceutical professionals. Moreover, the number of ADEs associated with the use of these therapies is high and, often, can result in serious events. It is the responsibility of the healthcare team to closely monitor their use, prescribe judiciously and individualized treatment (Vieira & Vieira, 2017; Pagnussat et al., 2021).

Adverse drug reactions and drug allergies are not only common causes of hospitalization in various institutions but also contribute to clinical deterioration and avoidable deaths. Monitoring and promptly reporting these cases are fundamental for patient safety, and this responsibility falls on the pharmacist (Lima, 2021; Ferreira, 2021; Santos & Boing, 2018).

To analyze the agreement between pharmacists, the Kappa coefficient is a statistical analysis that measures the agreement between evaluators for categorical items. It is a more robust method than a simple percentage analysis, and the Kappa range extends from -1 to +1, representing absence of agreement, low, moderate, to strong concordances (Bakeman, 2022). The Kappa coefficient applied in this study demonstrated a moderate level of agreement. With the statistical confidence of the method and the degree of agreement observed, the score proves to be a reliable tool for defining the degree of risk of patients in the hands of pharmaceutical professionals.

The ideal Kappa coefficient is defined as ‘almost perfect’ (> 0.82). Several factors can influence the value of this coefficient, and problems of agreement can be evaluated and resolved using this statistical tool (Benchoufi et al., 2020). One hypothesis for this study was that after the application of the score, the researcher received feedback from the professionals, and it became evident that some of the doubts that arose during the instrument’s application influenced their varied analyses and results, resulting in a moderate Kappa classification.

Among the possible causes raised by other authors for measurement errors are: poor clarity in the instrument, situational factors that influence decision-making, personal biases, among others (Perroca & Gaidzinski, 2003). As the score is being used, the manual and understanding of the tool evolve, and this Kappa coefficient, when applied again, will likely be classified as ‘almost perfect’ (> 0.82).

Based on this, it is possible to define an applicable and useful score for the provision of pharmaceutical clinical services, where the professional will apply the tool to hospitalized patients and monitor, evolve, and intervene in a manner proportionate to the identified needs.

5. Conclusion

This study has limiting factors such as the number of patients evaluated, and must also be tested on a wide range of patients for broader applications. Another limitation is that, although the professionals invited to the project have extensive knowledge and practical experiences, their perceptions may not universally represent all aspects within the pharmaceutical profession.

Therefore, as it is a general tool, the score can also be stratified according to clinical specialties. Moreover, since this study focused on a general hospital, the score was developed in a broad manner, leaving room for future improvements to tailor it to specific needs of each clinical area. A new evaluation of the clinical impact of this tool is still necessary.

It is also noteworthy that the clinical score is a tool of general use and easy application, enabling pharmacists to enhance their clinical practice and encouraging adherence among professionals. The score allows pharmacists to provide proportional attention to the specific needs of each patient. In future work, this tool could be applied to larger groups of patients or be improved for some specialty.

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