Ethics in the use of prognostic scores in intensive care units: an integrative review

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Abstract

Facing COVID-19 caused many problems in the healthcare field, due to the rise in the intensive care demand. To solve this crisis, caused by the scarcity of resources of high complexity, decision-making has been guided by prognostic scores; however, this process includes a moral dimension, although less evident. With na integrative review, this article sought to reflect on the reasonability of using severity indicators to define the allocation of the scarce resources in healthcare. We observed that the work carried out on resource scarcity situations causes moral overload, converging to the search for standard and objective solutions, such as the use of prognostic scores. We conclude that their isolated and indiscriminate use is not ethically acceptable and deserves cautious evaluation, even in emergency situations, such as COVID-19.

Keywords: COVID-19. Ethics. Organ dysfunction scores. Apache. Uncertainty. Bioethics. Healthcare rationing.

Resumo

Ética do uso de escores prognósticos em unidade de terapia intensiva: revisão integrativa
O enfrentamento da covid-19 suscitou uma série de problemas na área da saúde, em razão do aumento da demanda de cuidados intensivos. Para solucionar a crise causada pela escassez de recursos de alta complexidade, a tomada de decisão tem se norteado por escores prognósticos, porém esse processo inclui uma dimensão moral, ainda que esta seja menos evidente. Mediante revisão integrativa, este artigo buscou refletir sobre a razoabilidade da utilização de indicadores de gravidade para definir a alocação de recursos escassos na saúde. Observou-se que o trabalho realizado em situações de escassez de recursos provoca sobrecarga moral, convergindo para busca por soluções padronizadas e objetivas, como a utilização de escores prognósticos. Conclui-se que seu uso isolado e indiscriminado não é eticamente aceitável e merece avaliação cautelosa, mesmo em situações emergenciais, como a da covid-19.

Palavras-chave: Covid-19. Ética. Escores de disfunção orgânica. Apache. Incerteza. Bioética. Alocação de recursos para a atenção à saúde.

Resumen

Ética del uso de puntajes pronósticos en una unidad de cuidados intensivos: una revisión integradora
La lucha contra el Covid-19 implicó una serie de problemas en el área de la salud, debido al aumento de la demanda de cuidados intensivos. Para solucionar la crisis provocada por la escasez de recursos de alta complejidad, la toma de decisiones estuvo orientada por puntuaciones pronósticas, pero este proceso incluye una dimensión moral aún menos evidente. A partir de una revisión integradora, este artículo buscó reflexionar sobre la razonabilidad de utilizar indicadores de gravedad para definir la asignación de recursos escasos en salud. El trabajo realizado en situaciones de escasez de recursos genera sobrecarga moral, llevando a la búsqueda de soluciones estandarizadas y objetivas, como el uso de puntuaciones de pronóstico. Se concluye que su uso aislado e indiscriminado no es éticamente aceptable y merece una cuidadosa evaluación, incluso en situaciones de emergencia, como la del Covid-19.

Palabras clave: Covid-19. Ética. Puntuaciones en la disfunción de órganos. Apache. Incertidumbre. Bioética. Asignación de recursos para la atención de salud.

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In 1957, sociologist Renée C. Fox[1] published the essay *Training for uncertainty* where she reflects on uncertainty in medical practice, classifying it into two types: the first stems from individual failure to grasp the knowledge available about the patient's ailment; the second concerns the collective lack of knowledge regarding that problem. Fox[1] also points out a third type, derived from the first two: the difficulty in distinguishing which of the two types of uncertainty is occurring in a specific situation.

Historically, strategies to help physicians deal with distress resulting from such uncertainties are recurrent in the medical field, which include modern medicine resources based on evidence, protocols, guidelines, and consensus. Initiatives that change the routines of different medical services, standardizing treatments and diagnostic procedures, help to reduce individual uncertainty. Standardization of the decision-making process restricts professional individual freedom, while reducing uncertainty and individual accountability for eventual therapeutic failures.

Decision making and its ensuing results always include a moral dimension, even if not evident or considered in medical practice. In general, no moral conflict can be found on most occasions where there is no disagreement between professional and patient. Nor are there any conflicts when objective conditions are available to accomplish what was recommended by the professional or agreed upon with the patient (whether public or private supply). But if the patient, for whatever reason, lacks access to the prescribed means of diagnosis and treatment or disagrees with what has been prescribed, moral conflict can become evident.

Cases of shortage of resources required for treating patients in severe conditions illustrate well these moral problems, as they cause moral overload for professionals who are prevented, for external reasons, from doing what they believe to be the best for their patient. Health care rationing relates to the effective organization of available resources where they are needed[2]. Intensive Care Units (ICU) concentrate high complexity health resources, making them inherently expensive.

The COVID-19 pandemic was problematic for health systems worldwide because it considerably increased the demand for intensive care, especially in Brazil, where judicialization of the demand for ICU beds was already common. In March 2020, Rache and collaborators[3] issued a technical note through the Institute for Health Policy Studies analyzing the availability of ICU beds in the public and private sectors, highlighting the scenario of scarcity: *If we look at total ICU beds, including both the Unified Health System (SUS) and the private sector, we find that more than half of the regions (279 of 436) have fewer than 10 beds per 100,000 inhabitants. In SUS alone, 316 out of 436 are below the minimum, or 72% of the regions, which corresponds to 56% of the total Brazilian population and 61% of the population without private health insurance. That is, these regions are already below the minimum in a typical year, without the influence of COVID-19. In the private sector, 224 regions have figures below 10 per 100,000 beneficiaries, accounting for 11.2% of the beneficiary population*[3].

The demand was partially met with the increase in temporary beds, but the issue of poor geographical distribution in different regions and precarious access to these resources by those outside the upper echelons of society increased the challenge of how to allocate these resources fairly. What to do in such a situation? Faced with this issue, some authors have proposed using scores that are employed to evaluate the evolution of critically ill patients as a predictive indicator of patient evolution. A score associated with a worse prognosis would thus be a decisive factor even for admitting patients in the ICU or for a possible limitation of therapeutic efforts.

According to Timóteo and collaborators[4], prognosis is usually intrinsic to the diagnostic process. Establishing a probable prognosis means establishing an estimate of overall survival to appraise the evolution of the disease and its possible outcomes. Hence, prognosis can also be defined as a variable to estimate a patient's chances of recovery or the possible recurrence of a given disease, depending on the accuracy and relevance of the elements used in designing the indicator. As Sir William Osler stated in the early 20th century, *medicine is a science of uncertainty and an art of probability*[5].

Originally designed to evaluate the severity of a patient's condition, scores have been used

to measure prognosis in the ICU, influencing the decision as to which patient should have access to various therapeutic resources. Although health care rationing is necessary, the specialized literature presents no consensus on the effectiveness of using such scores for this purpose. This leads to the following question: What are the necessary conditions to make the use of severity scores as prognosis predictors ethically acceptable?

Current prognostic scoring models were predominantly designed in countries of the Global North, where health care resources are more abundant. Demand for critical care in any ICU constantly exceeds supply, leading to the need to use reasonable criteria in decision-making [6-8]. The need for triage is undeniable in situations of sudden increased demand, as in health emergencies, but such rationing has often happened in an unstructured, biased, and unfair manner.

According to Sprung and collaborators [9], triage physicians are more likely to admit patients related to their specialty, regardless of any other factor. They further state that political power, medical provincialism, and income directly influence the provision of ICU care and triage.

Given this context, this paper analyzes the arguments set forth in the specialized literature for using prognostic scores as a decisive criterion in health care rationing.

Method

This study reflects on the reasonability of using severity indicators as health care rationing criteria. For this purpose, we performed an integrative review based on different studies about the topic, as this type of review allows us to explain the difference between studies with similar objects and make room for new reflections [10].

Bibliographic search was carried out in the Embase, MEDLINE via PubMed, LILACS via the Virtual Health Library (VHL) and Scopus databases, on December 14-20, 2020. We designed a general strategy, adaptable to the characteristics of each database, to identify studies addressing the use of prognostic scores in health care rationing, using the following basic search key: title-abs-key "*prognostic*

score or *prognosis* and *organ dysfunction score* or *sequential organ failure assessment score* or *Apache* and *resource allocation* or *decision making* and *ethics*." The search returned 53 papers in Embase, 49 in MEDLINE, 82 in LILACS and 15 in Scopus, totaling 199 articles.

No filter was used to narrow the search, as the search key combinations were tightly closed and aligned with the topic. Exclusion criteria consisted of typified documents, such as letters to the editor, comments, reviews and abstracts of scientific events, for lack of comprehensive data. Mendeley reference manager and Microsoft Excel software were used to help organize and remove duplicates. Of the 199 articles identified, 65 were removed for being duplicates and 62 for meeting exclusion criteria. After reading the abstracts of the remaining 72, another 19 were excluded for not addressing the topic under study.

In reading the final sample (n=53), we identified and analyzed the arguments presented for using prognostic scores for patient triage and resource allocation. Content analysis classified these articles into three large groups: 1) proposing the use of scores for health care rationing; 2) comparing scoring systems to validate a new model; 3) questioning the use of scores for triage.

Results and discussion

Using scores for health care rationing

This category includes studies that offer guidelines for using and prioritizing severity and mortality scores, such as Sequential Organ Failure Assessment (SOFA) and Acute Physiology and Chronic Health Disease Classification System (APACHE). Such articles used scores to identify morbidity, mortality, organ failure and/or disease severity, factors that help in health care rationing decisions, especially at the bedside (Chart 1). These scoring systems focus on distributing resources to the greatest number of people. The authors argue that it may seem unfair to use a scarce medical resource, with very little chance of benefiting a patient, to the detriment of someone who, mathematically, might have a better chance of benefiting from said resource.

Chart 1 presents the list of studies that advocate using scoring systems for health care rationing.

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Chart 1. Articles that propose using scores for healthcare rationing

Title	Year	Main characteristic
"Prognostic scoring systems: facing difficult decisions with objective data" [11]	1993	Advocates the need to make the scoring criteria explicit
"The low frequency of futility in an adult intensive care unit setting" [12]	1996	Evaluates therapeutic futility in the ICU. Sets markers used to determine the probability of death at 90%
"Resuscitation decisions in the elderly: a discussion of current thinking" [13]	1996	Argues that the decision about cardiopulmonary resuscitation in older adults can be based on medical prognostic scores, which should also be presented to patients to assist them in decision-making
"Strong vasopressor support may be futile in the intensive care unit patient with multiple organ failure" [14]	2000	Reports that SOFA was used as a criterion to administer norepinephrine treatment
"Withdrawal of medical treatment in the ICU. A cohort study of 318 cases during 1994-2000" [15]	2003	Examines the frequency of the decision to withdraw basic life support based on prognosis and treatment failures
"Year in review in intensive care medicine, 2005. II. Infection and sepsis, ventilator-associated pneumonia, ethics, haematology and haemostasis, ICU organization and scoring, brain injury" [16]	2006	Shows markers as effective if age-adjusted
"Limitación del esfuerzo terapêutico tras el ingreso en una Unidad de Medicina Intensiva. Análisis de factores associados" [17]	2007	Points out the limitation of ICU therapeutic efforts via prognostic scores
"Year in review 2006: Critical Care: resource management" [18]	2007	Describes prognostic scores as effective when monitored continuously with all parameters in a modern ICU for better resource allocation
"Influence of malignancy on the decision to withhold or withdraw life-sustaining therapy in critically ill patients" [19]	2009	Indicates the influence of malignancy, prognostic scores, and age on the decision to withdraw life support
"Review article: Towards a considered and ethical approach to organ support in critically ill patients with cirrhosis" [20]	2013	Reflects on the use of scores to withdraw or maintain ICU treatment
"Outcomes and prognostic factors of patients with lung cancer and pneumonia-induced respiratory failure in a medical intensive care unit: A single-center study" [21]	2014	Points out that when two scores are low, non-ICU admission can be considered
"Prognostic factors associated with hospital survival in comatose survivors of cardiac arrest" [22]	2016	Shows that APACHE II and APACHE III were used as a prognostic score correlating with mortality after 24 hours of cardiac arrest
"Outcome of colon cancer initially presenting as colon perforation and obstruction" [23]	2017	Argues that APACHE was used as a severity criterion for patients with colon perforation or obstruction
"Shock subtypes by left ventricular ejection fraction following out-of-hospital cardiac arrest" [24]	2018	Describes the use of prognostic scores as a means of choosing treatment
"Clinical outcomes of patients undergoing primary percutaneous coronary intervention for acute myocardial infarction requiring the intensive care unit" [25]	2018	Reports the use of prognostic scores for coronary intervention in acute myocardial infarction

Chart 1. Continuation

Title	Year	Main characteristic
"Outcome and prognostic factors of patients with right-sided infective endocarditis requiring intensive care unit admission" [26]	2018	Notes that disease severity was evaluated with SOFA and SAPS scores in patients with infective endocarditis
"Quality assessments of end-of-life care by medical record review for patients dying in intensive care units in Taiwan" [27]	2020	Indicates measurement of end-of-life quality in critically ill ICU patients and the score of the prognostic models used as inclusion criteria in the study

The articles analyzed were published starting on the late 20th century, showing that for over 30 years there has been a need for effective indicators to guide decision-making in cases of critically ill patients in environments with scarce resources. Studies in this category also address the use of scores to compare patients who did or did not benefit from clinical trials [28].

Such studies provide support for developing guidelines in which score results play a key role, since rationing already occurs and is inevitable, and a scoring systems would make this choice process clearer and more explicit. In other words, they seek to show that patients with worse scores are less likely to recover, which would justify neglecting them.

Scoring systems

Comparison to validate a new model

Prognostic measurement and risk assessment within ICU are constantly improving. As such, several categories of patients have been included in various updates of existing scoring systems or in the creation of new ones. For the studies in this category (Chart 2), the responsibility shifts to the algorithms calculated by the machines, allowing to include more and more critically ill patients.

Many validated models are in use and have been updated, such as Simplified Acute Physiology Score (SAPS), Mortality Prediction Model (MPM), APACHE, SOFA, Pediatric Index of Mortality (PIM), Portsmouth Physiological and Operative Severity Score for Enumeration of Mortality and Morbidity (p-POSSUM), Model for End-Stage Liver Disease (MELDScore), Trauma Injury Severity Score (TRISS), among others. Nevertheless, the authors argue that these models are still not yet sufficient to contemplate different markers that reveal the patients' degree of vulnerability. In this group are authors who seek to perfect the indicators so as to improve the quality of the decision indicated by the algorithm. Consequently, several protocols were developed to propose new models and validate them for use. Chart 2 summarizes the articles that address the comparison of already consolidated and well-known scoring systems to develop and validate new proposals.

Chart 2. Articles that compare new models with others already validated and in use

Title	Year	Main characteristic
"Risk-adjustment in hepatobiliarypancreatic surgery" [29]	2005	Evaluates the performance of p-Possum, ASA, APACHE and Child Pugh classification in predicting mortality and morbidity in hepatobiliarypancreatic surgery
"Serum lipopolysaccharide-binding protein concentrations in trauma victims" [30]	2006	Evaluates whether concentrations of a plasma protein (LBP) are predictive of outcome (mortality)
"Futilidade terapêutica e insuficiência respiratória: realização de um estudo de coorte prospectiva" [31]	2007	Compares two predictive indexes of prognosis (Unicamp II and APACHE II), showing that such indexes can help in decision-making regarding therapeutic futility

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Chart 2. Continuation

Title	Year	Main characteristic
"A prognostic model for 6-month mortality in elderly survivors of critical illness" [32]	2013	Predicts, derives and validates a prognosis model after discharge (6 months) of surviving older ICU patients
"Characterization of patients who were mechanically ventilated in general medicine wards" [33]	2015	Addresses prognosis in mechanically ventilated older patients using laboratory values, medical diagnosis, and demographic and ventilation data, relating them to mortality
"Diagnostic value of Pentraxin-3 in patients with sepsis and septic shock in accordance with latest sepsis-3 definitions" [34]	2017	Assesses the diagnostic and prognostic factor of PTX-3 in patients with sepsis or septic shock in the ICU
"Early warning score independently predicts adverse outcome and mortality in patients with acute pancreatitis" [35]	2017	Compares established prognostic scores (examples: APACHE II) and early warning scores (EWS) in patients with acute pancreatitis
"Neutrophil to lymphocyte ratio and platelet to lymphocyte ratio are superior to other inflammation-based prognostic scores in predicting the mortality of patients with gastrointestinal perforation" [36]	2017	Addresses the neutrophil/lymphocyte ratio as an independent predictor of survival with various clinical conditions, comparing various prognostic factors
"Simplified prognostic model for critically ill patients in resource limited settings in South Asia" [37]	2017	Proposes a simplified critical care prognostic model (TropICS) for use in limited resources settings without electronic equipment
"Development and internal validation of the multivariable CIPHER (Collaborative Integrated Pregnancy High-dependency Estimate of Risk) clinical risk prediction model" [38]	2018	Develops and validates the CIPHER model to predict death or severe morbidity for pregnant or postpartum women, given their unique physiology
"Soluble TREM-1 Serum Level can Early Predict Mortality of Patients with Sepsis, Severe Sepsis and Septic Shock" [39]	2018	In search of a simple model that facilitates early prognosis, the authors test a biomarker (sTREM-1) as a new severity score
"Development and external validation of a prognostic nomogram for acute decompensation of chronic hepatitis B cirrhosis" [40]	2018	Develops a nomogram for diagnostic prediction in patients with acute decompensation due to liver cirrhosis
"Microbial dysbiosis and mortality during mechanical ventilation: a prospective observational study" [41]	2018	Proposes microbial diversity in the respiratory tract as a new prognostic indicator and criticizes the use of APACHE II for this purpose
"The prognostic performance of qSOFA for community-acquired pneumonia" [42]	2018	Evaluates the prognostic performance of qSOFA, CURB-65 and PSI for both death and ICU admission. It concludes that the three predictors are not significantly different
"Pneumonia in patients with cirrhosis: risk factors associated with mortality and predictive value of prognostic models" [43]	2018	Discusses the possibility of optimizing risk stratification in patients with pneumonia due to liver cirrhosis, comparing various prognostic models
"Investigation of microcirculation in patients with venoarterial extracorporeal membrane oxygenation life support" [44]	2018	Establishes microcirculatory parameters as a prognosis in cardiogenic shock
"A multicenter, prospective evaluation of the Chinese Society of Thrombosis and Hemostasis Scoring System for disseminated intravascular coagulation" [45]	2019	Evaluates the use of CDSS (Chinese Society of Thrombosis and Hemostasis Scoring System for disseminated intravascular coagulation)
"Prognostic accuracy of the serum lactate level, the SOFA score and the qSofa score for mortality among adults with Sepsis" [46]	2019	Explores and compares diagnostic accuracy of the serum lactate level, qSOFA and SOFA for mortality in septic patients
"Prognostic values of the Berlin definition criteria, blood lactate level, and fibroproliferative changes on high-resolution computed tomography in ARDS patients" [47]	2019	Evaluates the severity criteria of Berlin and other systems, such as high-definition tomography and serum lactate level, for ARDS prognosis

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Chart 2. Continuation

Title	Year	Main characteristic
"Circulating microRNAs as biomarkers for Sepsis secondary to pneumonia diagnosed via Sepsis 3.0" [48]	2019	Investigates the use of microRNAs (miRNA) values as a biomarker for prognostic scores in cases of sepsis secondary to pneumonia
"Indicators of severe prognosis of scrub typhus: prognostic factors of scrub typhus severity" [49]	2019	Evaluates tumor necrosis factor alpha (TNF-a) levels as a prognostic factor of disease severity (scrub typhus)
"The prognostic value of troponin in pediatric polytrauma" [50]	2019	Discusses the use of troponin (TNT) as a predictive factor of prognosis in pediatric polytraumatized patients at the time of hospital admission.
"Hemodynamics in Shock Patients Assessed by Critical Care Ultrasound and Its Relationship to Outcome: A Prospective Study" [51]	2020	Evaluates the use of critical care ultrasound (CCUS) as a tool for prognosis of patients in shock
"Obstetric early warning score for prognostication of critically ill obstetric patient" [52]	2020	Studies the use of Obstetric Early Warning Score (OEWS) for a prognostic clinical score of ICU pregnant patients

What stands out most in these studies, in all these new prognostic scoring models (regardless of the audience or disease targeted), is that these prognostic systems are not effective for individual patient prognosis. All selected articles compared previously used scores, such as SOFA, APACHE, SAPS, etc., with the new scores. Despite the controversy, more prognostic models and/or updates of existing models continue to emerge for use in decision-making and health care rationing in single patient care, instructed and supported by the developed guidelines.

Questioning scoring systems for triage

The papers included in this group recognize that prognostic indicator systems help face uncertainties but consider them insufficient for professionals to decide fairly in situations of health care rationing. Chart 3 describes the studies that make up this category.

Chart 3. Articles that question resource allocation based on prognostic scores

Title	Year	Main characteristic
"Ethical implications of risk stratification in the acute care setting" [53]	1993	Shows APACHE as a tool for dealing with complex situations, providing reasonably accurate information that can be used to develop better decisions for critically ill patients. It considers the system a mere support in decision-making
"The ethical appropriateness of using prognostic scoring systems in clinical management" [54]	1994	Views prognostic scores as an aid in medical decision rather than a determinant. It stresses that they improve communication between patient/family/doctors
"Limitation of life support: Frequency and practice in a London and a Cape Town intensive care unit" [55]	1996	Examines reasons for withdrawing life support. It indicates multiple organ failure as the sole factor
"Ethik in der Intensivmedizin" [56]	1997	Argues that severity scores (examples: APACHE, SOFA, MPM, SAPS) can only be used for groups of patients, scientific exams or ICU quality, and not for individual triage
"Evaluation of triage decisions for intensive care admission" [9]	1999	Shows that, despite the prognostic scores, triage for ICU admission is based on another order of priorities, according to which the number of available beds is more significant
"End-of-life decisions in Greek intensive care units: a multicenter cohort study" [57]	2010	Considers that the lack of response to treatment was the sole limiting factor in therapy

continues...

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Chart 3. Continuation

Title	Year	Main characteristic
"Ten common questions (and their answers) on medical futility"[58]	2014	Regarding prognostic scores, it understands that there is no way to accurately determine the days of life of a patient and that such rigid data cannot be predictive of choice to continue or start important medical care
"Predicting the future-big data, machine learning, and clinical medicine"[59]	2016	Criticizes prognostic models and shows how AI can help in the future
"Intensive care unit prognostic factors in critically ill patients with advanced solid tumors: a 3-year retrospective study"[60]	2016	Shows that both SOFA and APACHE perform poorly. It concludes that both play a limited role in ICU decision-making
"Common intensive care scoring systems do not outperform age and Glasgow coma scale score in predicting mid-term mortality in patients with spontaneous intracerebral hemorrhage treated in the intensive care unit"[61]	2017	Argues that there is no justification for using prognostic scores in patients with spontaneous intracerebral hemorrhage (ICH) in the ICU
"Estimating severity of influenza epidemics from severe acute respiratory infections (Sari) in intensive care units"[62]	2018	Analyzes the severity of influenza epidemics due to acute respiratory infections in the ICU. It suggests that APACHE showed no difference in predictive values, despite the peak in the pandemic and rising mortality showing its seasonality
"Performance of critical care prognostic scoring systems in low and middle-income countries: a systematic review"[63]	2018	Shows that the most commonly used predictive models in the Global North cannot be used in low-income countries

Of the articles classified in this category, only three discuss the ethical implications related to medical choices, considered not only technical but also moral[53-56]. These studies classify some of the prognostic scores as unfair, such as: the physicians' possibility to admit only patients who have diseases related to their specialty, as well as the age of the patients—a common indicator among scores, such as APACHE.

Prognostic scoring systems may predict the probability of survival or death, but not determine whether an individual patient will survive or die. Adopting such instruments in a triage and resource allocation process involves various critical points. Other authors point out that scoring systems disregard the diagnosis or not even consider that a high score may indicate poor initial treatment assessment[64].

Other criteria not foreseen in these scores make up the daily practice of physicians, such as: diagnosis of hospitalization, number of available beds, severity of the disease, age, and functional status of the patient. In this list, the number of available beds is the factor that most impacts medical decision, with admits only critically ill patients, regardless of prognosis pre-established by algorithms for when there are few beds available[9]. This happens in practice, despite the several documented recommendations advising against such a procedure, for not favoring a broader view in the use of resources for the benefit of the community.

In short, mathematical models, software, and machines may help in patient care, but they are incapable of deciding ethically in such complex situations, such as a pandemic in a setting of scarce resources. We found no data showing precisely how many services use prognostic scoring systems in their daily practice to support triage criteria. Conversely, some authors state that such scoring models play a limited role in decision-making[65], or serve only as support for decision-making[66]. Other articles, such as that by Kranidiotis and collaborators[57], point out that resource limitation or restriction by triage usually happens not because of some

prognostic score, but due to lack of response to current treatment.

Final considerations

During public health crisis, groups of healthcare experts and bioethicists work to develop guidelines for medical decisions in situations of health care rationing. It is not uncommon for such guidelines to be based on prognostic scores previously designed and reasonably established in the medical community. Most of these guidelines and scores, however, were developed using the technologies and data quality as criteria. Consequently, frequent calibration of these parameters is essential so that they continue to make sense in different settings. Risk stratification using these scores is neither good nor bad in itself, but their use may cause inequalities in patient triage, resulting in arbitrary decisions about who is fit or not to receive the resources.

During the COVID-19 pandemic, the Brazilian health system saw an excessive demand for hospitalizations of critical patients, which was aggravated by its prior overload and progressive public disinvestment in recent years, made worse by the cap on public spending, including for the health sector. Basic health supplies like syringes, needles, gloves, gauze, laboratory test kits for recurrent measurements, and even other resources such as computers, internet connection, air conditioning are in shortage. In such a context, we must reflect on the adequacy of using scoring systems to avoid their indiscriminate use, disconnected from reality. An ethical reflection on the reality faced in Brazil, one that considers the inequities in access to health and the different layers of vulnerability that affect the population, is necessary and urgent [67].

Given this context, one must consider, for instance, that prognostic scores are sensitive to changes due to specific actions/behaviors and protocols adopted by individual ICUs [68]. Thus, as Soares and Dongelman caution, *validation studies are necessary before these instruments are used in a specific region or country* [69]. New calibrations of certain indices are also recommended so that care remains updated and compatible with the healthcare context and the specialized ICU support offered. One example is the Dublin-Boston score evaluation, created specifically for COVID-19 prognosis and resource allocation. This assessment uses blood measurements of super-specific proteins (interleukin 6 and 10), to which countries in the Global South are less likely to have access due to their high cost [70].

In the categorized and analyzed sample, we found no research addressing ethical dilemmas in health care rationing, for example, when there are two patients in need of intensive care, with the same severity and with the same chance of recovery, and only one bed available. Such situations require other criteria not provided or supported by the guidelines. It is therefore imperative to establish an open and transparent debate on prioritization criteria for health care rationing. The ethical values of benefit maximization, equity of treatment, and prioritization of care for critically ill patients are some of the aspects that must be considered in health care rationing, but they are insufficient if analyzed individually [71]. An evaluation that intends to be ethical and fair must consider each value in relation to one another.

Establishing such criteria and scores is not a simple task, as it directly impacts the lives of many critically ill patients awaiting high complexity treatment in ICU. The criteria must be adapted to the Brazilian reality, especially if one considers the unequal provision of services and the social determinants historically involved in the Brazilian population's illness. In a country with so much inequality of access to information, healthcare and supplies, adaptations are necessary. If choices must inevitably be made, on the other hand there is no single and totally safe criterion to make such choice ethical.

Therefore, no consensus can be found among health professionals regarding the effectiveness of using prognostic indices to choose the recipients of scarce resources. Hence, we argue that the isolated use of such prognoses should not be understood as ethically acceptable. We recognize that working in scarcity scenarios leads to moral overload among workers. Such a context certainly contributes to the search for standardized and

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objective solutions, such as the use of prognostic indices. These can be interpreted as comfortable solutions to deal with the limits imposed by the circumstances that constrain professional medical practice; however, they deserve careful evaluation, whether in emergencies or otherwise, and their indiscriminate use in isolation is not ethically acceptable.

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