MEDWAVE
Peer Reviewed Medical Journal

RESEARCH

Contextual factors and use of heuristics in the care of critically ill patients by intensivists during the COVID-19 pandemic: a quasi-experimental vignette study in Chile

Fabiola Jaramillo-Castell[a], Sergio Minué-Lorenzo[b*], Demetrio Carmona-Derqui[c], Manuel Correa[c], Carmen Fernández-Aguilar[d*], José Martín-Martín[c]

[a]Servicio de Salud del Reloncaví, Ministerio de Salud de Chile, Puerto Montt, Chile; [b]Primary Health Care WHO Collaborating Centre, Escuela Andaluza de Salud Pública, Granada, España; [c]Departamento de Economía Aplicada, Facultad de Ciencias Económicas y Empresariales, Universidad de Granada, Granada, España; [d]Departamento de Economía Internacional y de España, Facultad de Ciencias Económicas y Empresariales, Universidad de Granada, Granada, España

ABSTRACT

BACKGROUND Clinical decision-making in intensive care units during the COVID-19 pandemic has been poorly studied. The aims of this study are to assess the variability of intensivists' decision-making in Chile, analyze the association between clinical decision-making and certain contextual factors (time, pandemic wave, patient age, available clinical information), and estimate the frequency of heuristic use (statu quo, representativeness, and availability) in clinical decision-making.

METHODS Quasi-experimental, cross-sectional, qualitative-quantitative study using an online questionnaire of clinical vignettes on the care of critically ill patients during the pandemic. Fifty-one intensivists participated, choosing between two alternatives per case, one of which involved using a heuristic. Frequencies were calculated to estimate variability. Intra-individual changes after manipulating contextual variables were evaluated using the McNemar test (mid-P) or binomial tests.

RESULTS There is wide variability in the decision-making process: only 4 out of 16 cases exceeded 82% agreement. Contextual factors had a heterogeneous influence. No differences were observed regarding the time of day when the decision was made. The pandemic wave influenced 2 of the 4 vignettes. Regarding patient age, it was observed that the decision to withdraw treatment in the absence of a response within 30 days is more likely in older patients, but this is not a determining factor for admission to intensive care units. On the other hand, the clinical decision is modified according to the availability of clinical information. The use of availability heuristic (greater in the first wave) and statu quo heuristic is observed in three of the four vignettes studied, but not representativeness heuristic.

CONCLUSIONS The participating intensivists showed high variability and sensitivity to specific contextual factors. The use of statu quo and availability heuristics was observed under certain conditions. This analysis could help improve decision-making during health crises.

KEYWORDS Clinical Decision-making, Heuristics, Intensive Care Units, COVID-19, Chile

INTRODUCTION

Clinical decisions in critically ill patients involve high complexity, limited availability of resources, and risks to patient safety. In intensive care units, uncertain diagnoses and multiple comorbidities contribute to errors with severe consequences. For example, in the United States, between 40 000 and 80 000 people die each year from diagnostic errors in these units [1]. The emergence of SARS-CoV-2 intensified this uncertainty to the point that the term " blindness COVID" was coined [2]. In Chile, supply constraints, with fewer intensive care unit beds than the average for the Organization for Economic

* **Corresponding author** sergiominue21@gmail.com
Citation Jaramillo-Castell F, Minué-Lorenzo S, Carmona-Derqui D, Correa M, Fernández-Aguilar C, Martín-Martín J. Contextual factors and use of heuristics in the care of critically ill patients by intensivists during the COVID-19 pandemic: a quasi-experimental vignette study in Chile. Medwave 2026;26(01):e3162
DOI 10.5867/medwave.2026.01.3162
Submitted Sep 3, 2025, **Accepted** Dec 23, 2025,
Published Feb 26, 2026
Postal address Escuela Andaluza de Salud Pública, Cuesta del Observatorio 4, Campus Universitario de Cartuja, Granada 18080, España

MAIN MESSAGES

- The clinical decision-making process in intensive care units during the COVID-19 pandemic has been poorly studied.
- In this paper, we use clinical vignettes to demonstrate the variability of this process, the association of contextual factors with decision-making, and the use of status quo and availability heuristics (mental shortcuts).
- This study is the first of its kind conducted in Chile and one of the first internationally.
- This study has limitations inherent to vignette-based studies, as well as limitations related to sample size, the Hawthorne effect, and social desirability bias, all of which could affect its external validity.

Cooperation and Development (OECD) [3], prompted the integrated public-private management of critical beds through specific regulations [4]. In this scenario, understanding how intensivists make decisions and the factors that influence them is particularly relevant.

The literature on decision-making in intensive care units during the COVID-19 pandemic is limited, especially regarding cognitive processes [5,6]. Substantial variations have been described in the management of patients with severe COVID-19 [7], in interhospital mortality [8], and in the care of acute respiratory distress syndrome [9]. This variability calls into question the hypothesis of strictly protocolized practice and suggests the influence of contextual factors and cognitive shortcuts.

This study is framed within two complementary conceptual frameworks developed by Herbert Simon: the role of contextual factors in the decision-making environment and the architecture of cognitive processes [10]. The first involves taxonomies that distinguish between workplace, patient, and professional factors [11–14], with some authors pointing to context as the most relevant determinant of clinical reasoning [15]. As for the cognitive process, Kahneman's Dual Process Theory distinguishes between a fast, intuitive System 1 and a slow, analytical System 2 [16,17], whose complex interaction can lead to heuristics and cognitive biases. Alternatively, other authors emphasize the adaptive role of heuristics as effective frugal strategies under limited information [18]. Using heuristics in clinical decision-making does not necessarily imply making wrong decisions [19].

Given the difficulty, for ethical and logistical reasons, of studying decision-making in actual clinical practice, clinical vignettes are a widely used method for investigating decision variation under controlled, comparable conditions [20]. Of the more than 100 heuristics described [21], this study focuses on three: statu quo/omission [22], representativeness [23], and availability [24]. These have clinical plausibility and prior evidence, having been described in the decision-making process for critically ill patients [25–27].

The COVID-19 pandemic created an ideal environment for context and heuristics to influence decision-making: high pressure to provide care, incomplete information, frequent interruptions, fatigue, and high emotional stress [28,29]. This environment can lead to systematic biases, such as a preference for maintaining previous behaviors (statu quo) [30,31], overweighing recent or vivid cases (availability) [24], or assessing the probability of an event occurring based on its degree of similarity to a clinical pattern (representativeness) [23,26]. There is no specific existing empirical evidence, either in Latin America or particularly in Chile, on the use of heuristics in the clinical decision-making process in intensive care units during the pandemic. This study aims to improve this situation with three specific objectives:

1. To determine the variability in the decision-making process by intensive care unit physicians during the COVID-19 pandemic in Chile.
2. Analyze the association of certain contextual variables related to the workplace, the patient, and the physician with clinical decision-making.
3. Estimate the frequency of use of status quo, representativeness, and availability heuristics in clinical decisions.

The object of study is, therefore, the clinical decision-making process of Chilean intensivists during the COVID-19 pandemic.

METHODS

Study design, scope, and participants

This is a quasi-experimental cross-sectional study of a qualitative-quantitative nature using an online questionnaire adapted via the Otree platform [32] (Appendix 1). The questionnaire was distributed among Chilean intensivists affiliated with the Chilean Society of Intensive Care Medicine (Sochimi) through this association. In addition, a snowball strategy was used to recruit intensivists who met the study profile. Participating physicians received a questionnaire that included sociodemographic data and vignettes describing clinical cases and decision alternatives, accessible via a link or QR code in the email.

The study design maintains the anonymity of the person completing the questionnaire. Five clinical vignette models were designed by eight specialists, three in intensive care responsible for care during the COVID-19 pandemic, and five professors from the Faculty of Economic Sciences at the University of Granada, experts in behavioral economics and health economics.

The vignettes were developed following the recommendations for vignette development by Peabody [33], Converse [34], and Spalding [35]. The content of the vignettes is based on a review of the scientific literature, the authors' clinical experience, and other previously published vignettes [36,37].

The vignettes were validated and piloted by international intensive care specialists at La Paz Hospital (Spain) and by specialists in intensive care units at Puerto Montt Hospital (December 2021 to March 2022). The project was approved by the Ethics Committee of the University of Granada (Spain) and by the Ethics Committee of the Reloncaví Health Service of the Ministry of Health (Chile).

The vignettes included scenarios with contextual variables depending on the context (time of day when the decision was made, pandemic wave), the patient (age), or the physician (clinical information available on the patient). Each vignette presented two decision alternatives, one of which involved the use of a heuristic (statu quo, representativeness, or availability; Table 1, Appendix 2).

The questionnaire was answered by 51 physicians (specialists and residents) who treated patients in intensive care units during the COVID-19 pandemic in Chile, in both the public and private systems (June 2023 to June 2024).

All cases were presented to all physicians in random order, with a time limit established in the pilot study, after which the application presented a new vignette if there was no response, assigning a missing value for that case and physician. The response time for each case can be found in Appendix 1.

Data analysis

For the first objective (analysis of variability), absolute and relative frequencies of the possible answers are used. The cases will show greater variability the closer their answers are to 50%.

For the second and third objectives, the mid-P version of the McNemar test is used to determine whether the differences are significant in each case. We start with a contingency table of responses to the same vignette across the two possible contextual situations. The discordant ones are defined by the counts in cells b and c for each vignette (Table 2).

In cases where fewer than 25 discrepancies are recorded in the responses to two compared cases, the results are reinforced by a binomial test [38,39].

Regarding the second and third objectives, we compared physicians' responses to cases across the clinical vignette models. We used an intra-subject design, comparing subjects' responses to one case (e.g., case A) with those to another case in the same model (e.g., case G). The difference between cases within the same model lies solely in the value of a contextual variable (e.g., case A occurs at 10 a.m., and case G at 3 a.m.). This intra-subject design was evaluated using the McNemar test (mid-P version) based on 2×2 tables; only discordant pairs (cells b and c) are used in the contrast. In vignettes 1, 2, 4, and 5, the option linked to the heuristic was identical across versions, so the coding remained constant (0 when participants selected the option without using the heuristic, 1 when they selected it using the heuristic). In vignette 3, the option “orotracheal intubation and admission to intensive care units” was adopted as the reference category to unify the interpretation of the contrast between its variants.

To determine the effect size, the prevailing trend in the literature is followed, and the odds ratio is calculated as follows [40]:

$OR = b/c$

RESULTS

First objective

There is significant variability among physicians' responses. Four vignettes showed low variability (more than 82% agreement among physicians), six showed medium variability (70 to 82%), and six showed high variability (equal to or less than 65%), which shows marked heterogeneity in clinical decisions (Table 3 and Appendix 4).

Second objective

Table 4 shows the results of the McNemar test for the five clinical vignettes and the 14 statistical contrasts across contextual variables.

The contextual factor of decision time (10 hours versus 3 hours) did not alter responses (A versus G; binomial test, $p > 0.05$; vignette model 1). Regarding the decision on whether to withdraw treatment after 30 days without response (vignette model 2), the patient’s age influenced both waves (I versus B and F versus M, $p < 0.05$), although the pandemic wave itself had no effect (I versus F and B versus M, $p > 0.05$).

Regarding the decision to admit patients with different profiles to intensive care units (vignette model 3), age was not a determining factor within each wave (J versus P; L versus C, $p > 0.05$), although decisions changed between waves for both profiles (J versus L; P versus C, $p < 0.05$). An odds ratio less than 1 indicates that, in the last wave, the preference for conservative management/sedation decreased, while the preference for admission to intensive care units increased. Regarding the availability of clinical information, the prior request for a computed axial tomography scan (vignette model 4) modified the choice in both waves (D versus N; H versus K, $p < 0.05$), while the wave alone showed no effect (D versus H; N versus K, $p > 0.05$). Finally, in the last wave, clinicians were more willing to consider alternative diagnoses to COVID-19 (O versus E, $p < 0.05$; vignette model 5).

Third objective

The use of the statu quo heuristic is studied in models 1, 2, and 4. In model 1, its use was not observed, even at 3 a.m. In model 2, an odds ratio of less than 1 suggests that physicians tend to be less likely to choose a wait-and-see approach (statu quo) when the patient is older. The results of the comparisons made for model 4 show that the statu quo heuristic is used when a CT scan has already been requested (Table 4).

The use of the representativeness heuristic (vignette model 3) has not been observed based on the patient’s age (binomial tests for vignettes J versus P and L versus C, $p > 0.05$).

Table 1. Vignettes models and their corresponding cases.

Vignette model	Cases corresponding to this vignette model	Studied heuristic	General description of the vignette model	Contextual variables analyzed (specific to each case)	Alternative response
1	A G	Statu quo	A 44-year-old woman with morbid obesity admitted to the ICU, who on day 10 of admission is sedated and relaxed in volume control with an FiO2 of 50%, blood gas analysis with pH of 7.40, PaCO2 49 mmHg, PaO_2 90 mmHg, arterial O_2 saturation 90% (Pa/FiO_2 ratio 180).	Time of day Decision at 10 AM (case A) Decision at 3 AM (case G)	A.- Remove relaxation and progress in awakening (no use of heuristic). B.- Maintain sedo-relaxation (use of heuristic).
2	B F I M	Statu quo	The patient was admitted to the ICU 30 days ago for severe respiratory sepsis with little improvement.	Age and pandemic wave 74 years old, 1st wave (case B) 54 years old, last wave (case F) 54 years old, 1st wave (case I) 74 years old, last wave (case M)	A.- Talk to the family and adjust the therapeutic effort (no use of heuristics). B.- Maintain the same treatment and expectant attitude (use of heuristics).
3	C J L P	Representativeness	The hospital emergency department admits a patient with acute respiratory failure, oxygen saturation of 60% barely rising to 70% with a reservoir mask, respiratory rate > 45 rpm with significant respiratory effort, blood pressure 170/78 mmHg, and heart rate 130 bpm.	Age and pandemic wave 81 years old, active lifestyle, previously in good general health, last wave (case C) 45 years old, sedentary, multimorbidity, 1st wave (case J) 45 years old, sedentary, multimorbidity, last wave (case L) 81 years old, active lifestyle, previously in good health, first wave (case P)	Cases C and P (81 years old) A.- Orotracheal intubation and admission to the ICU (no use of heuristics). B.- Conservative management and palliative sedation (use of heuristics). Cases J and L (45 years old) A.- Orotracheal intubation and admission to the ICU (use of heuristic). B.- Conservative management and palliative sedation (no use of heuristic).
4	D H K N	Statu quo	A 60-year-old patient admitted to the ICU for COVID-19 pneumonia, on mechanical ventilation on day 10 of evolution. He presents with sudden desaturation requiring an increase in FiO2 to 100% and tachycardia of 130 bpm, with blood pressure remaining stable without vasoactive drugs.	Available clinical information and pandemic wave CT scan already ordered in first wave (case D) CT scan already ordered in last wave (case H) CT scan not ordered during last wave (case K) CT scan not ordered during first wave (case N)	With CT scan already ordered: A.- Withdraw anticoagulation and suspend CT scan. Supinate and reassess (no use of heuristics). B.- Wait for CT scan results (use of heuristics). Without CT scan ordered: A.- Maintain anticoagulation and monitor progress (use heuristic). B.- Order contrast-enhanced CT scan (do not use heuristic).

(Continued)

(Continued)

Vignette model	Cases corresponding to this vignette model	Studied heuristic	General description of the vignette model	Contextual variables analyzed (specific to each case)	Alternative response
5	E O	Availability	A 34-year-old patient was seen in the emergency department with suspected COVID-19 infection and associated hypoxia. The PCR result was negative. The chest X-ray showed non-specific multifocal opacities in the airspace.	Pandemic wave Last wave (case E) First wave (case O)	A.- Handle the situation as a COVID-19 case, repeating the PCR test the following day (use of heuristics). B.- Rule out COVID-19 and reassess the situation (no use of heuristics).

ICU, intensive care unit. FIO2, fractional inspired oxygen. PaCO2, alveolar carbon dioxide pressure. mmHg, millimeters of mercury. PaO2, alveolar partial pressure of oxygen. rpm, respirations per minute. bpm, beats per minute. CT, computed tomography. PCR, polymerase chain reaction. AM, before noon. PM, after noon.
Source: Prepared by the authors.

Table 2. Example of a contingency table: concordant and discordant events.

		"G" model		
		Non heuristic (0)	Heuristic (1)	Total
"A" model	Non heuristic (0)	a = 16	b = 5	21
	Heuristic (1)	c = 0	d = 8	8
	Total	16	13	29

Notes: This Table 2 a practical example of the McNemar test.
Source: Prepared by the authors.

Table 3. Absolute and relative frequencies of heuristic use in responses to each case.

Vignette model	Heuristic	Case	Contextual factors analyzed (independent variables)				Responses involving heuristic use (dependent variable)		
			Time	Wave	Age	Clinical information provided	Absolut n°	Total	Proportion
1	Status quo	A	10 AM	First	Not evaluated	Not evaluated	9	35	25.7%
		G	3 AM	First			21	45	46.6 %
2		B	No se evalúa	First	74 years old		11	45	24.4%
		F		Last	54 years old		20	45	44.4%
		I		First	54 years old		26	48	54.1%
		M		Last	74 years old		14	48	29.1%
4		D		First	Not evaluated	Anticoagulation and CT scan request	35	37	94.5%
		H		Last		Anticoagulation and CT scan request	39	42	92.8%
		K		Last		Anticoagulation	4	44	9.1%
		N		First		Anticoagulation	9	49	18.3%
3	Representativeness	C		Last	81 years old	Not evaluated	4	44	9.1%
		J		First	45 years old		28	43	65.1%
		L		Last	45 years old		40	49	81.6%
		P		First	81 years old		15	50	30.0%
5	Availability	O		First	Not evaluated		37	42	88.1%
		E		Last			31	47	65.9 %

AM: before noon. PM: afternoon. CAT: computed axial tomography. N°: number.
Source: Prepared by the authors.

The use of the availability heuristic is explored in vignette model 5. An odds ratio of less than 1 suggests that physicians are less likely to choose the option involving the use of the availability heuristic when moving from the first to the last wave.

DISCUSSION

The results of this study provide important insights into the clinical decision-making process of intensive care specialists in Chile during the COVID-19 pandemic. With regard to the first objective, the study shows wide variability in decision-making across five different clinical vignette models. If these results are obtained in a study based on theoretical cases, it is likely that the variability in real conditions would be even greater, refuting the hypothesis that critical care follows established protocols. The wide variability described in the management of COVID-19 has already been mentioned [7–9]. In an attempt to reduce variability, multiple practice guidelines were developed during the pandemic [41]. However, some studies show that only half of patients receive the care established in protocols [9]. In these situations of high uncertainty, with incomplete information, the likelihood of cognitive biases increases [42].

The second objective analyzes the association between four contextual factors and the clinical decision. Two are contextual factors (the time of day the decision was made and the pandemic wave). Regarding the first, no statistically significant differences were observed between deciding in the morning (10 a.m.) and in the early morning (3 a.m.), although the decision of not intervening is more common in the early morning (21 versus 9). Certain studies have demonstrated a relationship between time of day and admission rate [43]. In our study, the hypothesis that the tendency to maintain the statu quo would be greater in the early morning (due to fatigue, loneliness, or difficulty accessing procedures) is not supported. One possible interpretation is the need in Chile to expedite the availability of intensive care unit beds amid bed shortages. Regarding the other contextual factor analyzed (the pandemic wave), statistically significant differences are observed in two of the four vignette models studied: model 3 on the admission to intensive care units of two patients of different ages and clinical conditions, and model 5 on a case suggestive of COVID-19 but with negative diagnostic tests. They suggest that physicians' decisions changed throughout the pandemic, probably as a

Table 4. Results of the McNemar test.

Vignette	Contrasted vignette models	Contextual factors[1]	Heuristic	Contrast	MN p value	Bi p value[2]	OR (95% CI)
1	A vs G	Time	Statu quo	Decision at 10 AM vs. 3 AM	0.031	0.0625	-(0.917,-)
2	I vs B	Age, wave		Decision: 54-year-old patient, first wave vs. 74-year-old patient, first wave	< 0.001	0.007	0.15 (0.017 to 0.680)
	F vs M			Decision: 54-year-old patient, last wave vs. 74-year-old patient, last wave	< 0.001	0.039	0.2 (0.021 to 0.939)
	I vs F			Decision: 54-year-old patient, first wave vs. 54-year-old patient, last wave	0.075	0.790	0.75 (0.214 to 2.464)
	B vs M			Decision: 74-year-old patient, first wave vs. 74-year-old patient, last wave	0.42	1.000	1 (0.134 to 7.466)
4	D vs N	Clinical intervention Wave		Decision CT scan already ordered first wave vs CT scan not ordered first wave	< 0.001		0.03 (0.0008 to 0.201)
	H vs K			Decision CT scan already ordered last wave vs CT scan not ordered last wave	< 0.001		0 (0 to 0.126)
	D vs H			Decision CT scan already ordered first wave vs CT scan already ordered last wave	0.625	1.000	2 (0.104 to 117.994)
	N vs K			Decision CT scan not ordered first wave vs CT scan not ordered last wave	0.289	0.453	0.4 (0.038 to 2.443)
3	J vs P	Age, wave	Representativenes s	Decision: 45-year-old patient, first wave vs. 81-year-old patient, first wave	0.302	0.423	0.55 (0.146 to 1.846)
	L vs C			Decision: 45-year-old patient, last wave vs. 81-year-old patient, last wave	0.344	0.508	0.5 (0.081 to 2.341)
	J vs L			Decision: 45-year-old patient, first wave vs. 45-year-old patient, last wave	0.008	0.016	0 (0 to 0.69)
	P vs C			Decision: 81-year-old patient, first wave vs. 81-year-old patient, last wave	0.001	0.002	0 (0 to 0.446)
5	O vs E	Wave	Availability	Decision in first wave vs. decision in last wave	0.012	0.021	0.11 (0.003 to 0.80)

95% confidence interval. AM, before noon. PM, after noon. OR, odds ratio. CI 95%, vs, versus. CT, computed tomography.MN: McNemar test. Bi: Binomial test.
Notes: [1]Discordant events in cell "c," which are the denominator in the calculation of the OR, are equal to 0.
[2]The p-values in the column titled "Bi p-value" are the result of performing binomial contrasts in the terms described in the methodology.
Source: Prepared by the authors.

result of greater knowledge of the disease, reduced severity, and greater availability of resources. It is noteworthy that participants were able to differentiate their behavior between the first and last waves of the pandemic, which is an indicator of the robustness of the vignettes.

Significant inequalities in treatment according to age have been described, with an impact even on mortality [44]. The results regarding age are heterogeneous in our study. When analyzing the decision to withdraw treatment in the absence of response at 30 days, it is observed that this is more likely to occur in older people (vignette model 2), which is consistent with other studies [45]. However, in our study, age was not a determining factor in the decision to admit a patient to intensive care units, unlike in other countries, where age was a criterion for admission [46].

The association between the contextual factor "clinical information available" (vignette model 4) and the clinical decision can be observed. In this vignette model, the response varies depending on whether or not a CT scan has been requested. If there was a prior request for this image, there would be a greater probability of maintaining the statu quo without intervention, whereas if it had not been requested, intervention would occur, specifically by requesting the CT scan, with a statistically significant difference. The study by Aberegg (on which this vignette is based) obtained similar results [37].

The third objective estimates the frequency of heuristic use in clinical decision-making. Critical care has characteristics that make it particularly susceptible to the use of heuristics: decisions must be made quickly, often with incomplete information, while caring for multiple patients simultaneously, with frequent interruptions and distractions, and under a high degree of emotional overload and fatigue [47,48]. Heuristics would be evidence of how people "satisfice" their information needs, without having to find the "perfect" answer, which is very difficult to obtain under circumstances such as those described [49,50].

The statu quo heuristic, defined as the tendency to maintain a given situation without intervening, is supported by solid evidence [51,52]. Of particular relevance is the work by Aberegg [37], which demonstrated statu quo bias in critical care. In our study, the result is mixed. Its use is not observed for the time difference (vignette model 1), but it is observed in the options of maintaining or withdrawing treatment after 30 days without improvement (vignette model 2), or when the decision is analyzed according to the clinical information available (vignette model 4).

The study found no evidence of the representativeness heuristic (vignette model 3). In this regard, age is not interpreted as a sign of poor prognosis that would lead to deprioritizing admission to the intensive care unit for an older person in good clinical condition.

Finally, the availability heuristic is observed, especially during the first wave, leading most physicians to consider any clinical presentation as SARS-CoV-2 infection, even when diagnostic results are negative (vignette model 5). This bias could result in overlooking other equally serious conditions [36].

This work has several limitations. First, the Hawthorne effect (awareness of being studied) and social desirability bias should be noted. Despite the meticulous validation process, conducting a study using vignettes may be considered a limitation to external validity, although most studies on heuristics use this methodology given the difficulty of conducting them under real-world conditions [53]. Used for more than 30 years, clinical vignette studies yield better measures of quality of care than medical record reviews when assessing differential diagnosis, test selection, and treatment decisions [54]. The simultaneous use of several heuristics in the decision for each case also cannot be ruled out. The study is not representative of all Chilean intensivists; logistical and economic constraints precluded conducting a study with a representative sample of the country's professional population, leading to recruitment through scientific societies [55]. The case sample is small for demonstrating external validity, but it allows identification of findings that justify initiating an in-depth line of research. Although it is true that other factors could influence clinical decision-making, keeping cases constant and allowing variation only in the variables studied, in our view, favors the precision of the study's objective measurements. The unavoidable accumulated knowledge about COVID-19 throughout the pandemic, rather than a bias, is considered a highly relevant contextual factor, confirming that decisions differed depending on that knowledge.

The results identify opportunities to improve critical care during pandemics. First, they suggest the need to update and simplify care protocols to reduce the observed variability. They also point to the formulation of strategies to improve intensivist training, particularly in recognizing cognitive biases and heuristics in high-pressure contexts, and to promote the implementation of clinical case analysis activities.

The complexity of clinical decision-making, and its consequences in terms of safety, cost, and survival, make it necessary to improve knowledge about the influence of cognitive biases in this process.

CONCLUSIONS

Chilean intensive care physicians participating in the study show wide variability in their clinical decisions during the COVID-19 pandemic. In addition, the association of certain contextual factors with the decision (pandemic wave at the time of the decision, patient age, or available clinical information) is demonstrated. Finally, the use of certain heuristics (availability, status quo) in certain circumstances during intensive care unit care during the pandemic is observed.

This study is the first of its kind conducted in Chile and one of the first internationally. Despite its limitations, its results contribute to the analysis of the "black box" of clinical decision-making in contexts of uncertainty, allowing for the formulation of strategies for improving the training of intensive care specialists. This could be useful for optimizing clinical management in future pandemics or endemic problems in Chile (e.g., hantavirus infection).

The study and its limitations allow us to propose future lines of research in this area, expanding the casuistry to a larger number of intensivists and residents, exploring other contextual factors, analyzing additional heuristics, and comparing results with those from other countries.

The need to deepen our understanding of decision-making, the influence of context, and the use of heuristics is transversal to any medical discipline.

Contributor roles FJC, SML, JMM: conceptualization, investigation, methodology, project administration, resources, validation, visualization, writing original draft, writing review, and editing. DCD, MC: data acquisition and curation, formal analysis, methodology, resources, software, visualization, writing review and editing. CFA: methodology, writing review and editing.

Acknowledgments To the Regional Ministry of Knowledge, Research, and the General Secretariat for Universities, Research, and Technology of the Regional Government of Andalusia, for funding this project. To the Chilean Society of Intensive Care Medicine (Sochimi), the Reloncaví Health Service, the Puerto Montt Hospital, and especially Dr Marco Balkenhol and Dr Esteban Figueroa for their collaboration in the project.

Conflicts of interest The authors declare that they have no conflicts of interest related to the subject matter of this work.

Funding This article is the result of the international multicenter research project on "Use of heuristics in patients treated for COVID-19 in Primary Care, Mental Health Units, and Intensive Care Units in Spain, Chile, and the United States," a project funded under the Frontier of Knowledge line in the Call for Grants for "R&D&I projects" from universities and public research entities by the Regional Ministry of Knowledge, Research, and the General Secretariat for Universities, Research, and Technology of the Regional Government of Andalusia, Spain. (BOJA No. 119 - Tuesday, June 23, 2020).

Supplementary files Supplementary files: Jaramillo Castell F, Minué Lorenzo S, Carmona Derqui D, Correa M, Fernández Aguilar C, Martín Martín J. Contextual factors and use of heuristics in intensivists' care of critically ill patients during the COVID-19 pandemic: quasi-experimental study with vignettes in Chile (Journal contribution). 2025. Available from: https://doi.org/10.6084/m9.figshare.30968230.

Language of submission Spanish.

Peer review and provenance Externally peer-reviewed by two reviewers, using a double-anonymous modality. Statistical review by the journal's statistical editor, using a single-anonymous modality (the editor is masked to the authors' names).

REFERENCES

1. Pisciotta W, Arina P, Hofmaenner D, Singer M. Difficult diagnosis in the ICU: making the right call but beware uncertainty and bias. Anaesthesia. 2023;78: 501–509. https://doi.org/10.1111/anae.15897
2. Brown L. COVID Blindness. Diagnosis (Berl). 2020;7: 83–84. https://doi.org/10.1515/dx-2020-0042
3. OECD. In: Health at a glance 2023 [Internet]. Paris: OECD Publishing; https://doi.org/10.1787/7a7afb35-en
4. Ministerio de Salud del Gobierno de Chile. In: Resolución exenta 248 de 11 de mayo de 2020 donde se dicta instrucciones para la gestión de camas y derivación de paciente crítico en la red integrada público-privada [Internet]. https://www.superdesalud.gob.cl/app/uploads/2020/07/articles-19517_recurso_1.pdf
5. Teixeira C, Rosa RG, Rodrigues Filho EM, Fernandes E de O. The medical decision-making process in the time of the coronavirus pandemic. Rev Bras Ter Intensiva. 2020;32: 308–311. https://doi.org/10.5935/0103-507x.20200033
6. Metlay JP, Armstrong KA. Clinical Decision Making During the COVID-19 Pandemic. Ann Intern Med. 2021;174: 691–693. https://doi.org/10.7326/M20-8179
7. Azoulay E, de Waele J, Ferrer R, Staudinger T, Borkowska M, Povoa P, et al. International variation in the management of severe COVID-19 patients. Crit Care. 2020;24: 486. https://doi.org/10.1186/s13054-020-03194-w https://doi.org/10.1186/s13054-020-03194-w
8. Churpek MM, Gupta S, Spicer AB, Parker WF, Fahrenbach J, Brenner SK, et al. Hospital-Level Variation in Death for Critically Ill Patients with COVID-19. Am J Respir Crit Care Med. 2021;204: 403–11. https://doi.org/10.1164/rccm.202012-4547OC
9. Johnson SW, Garcia MA, Sisson EKQ, Sheldrick CR, Kumar VK, Boman K, et al. Hospital Variation in Management and Outcomes of Acute Respiratory Distress Syndrome Due to COVID-19. Crit Care Explor. 2022;10. https://doi.org/10.1097/CCE.0000000000000638
10. Simon HA. Invariants of human behavior. Annu Rev Psychol. 1990;41: 1–19. https://doi.org/10.1146/annurev.ps.41.020190.000245
11. Al Azzawi R, Halvorsen PA, Risør T. Context and general practitioner decision making - a scoping review of contextual influence on antibiotic prescribing. BMC Fam Pract. 2021;22. https://doi.org/10.1186/s12875-021-01574-xhttps://doi.org/10.1186/s12875-021-01574-x
12. Bock LA, Noben CYG, Haeren RHL, Hiemstra FA, van Mook W, Essers BAB. Unravelling Low-Value Care Decision-Making: Residents' Perspectives on the Influence of Contextual Factors. Int J Health Policy Manag. 2024;13. https://doi.org/10.34172/ijhpm.2024.7907
13. Karmelić E, Lindlöf H, Linnea Luckhaus JL, Malmqvist Castillo M, Vicente V, Pukk Härenstam K, et al. Decision-making on the fly: a qualitative study of physicians in out-of-hospital emergency medical services. BMC Emerg Med. 2023;23. https://doi.org/10.1186/s12873-023-00830-whttps://doi.org/10.1186/s12873-023-00830-w
14. Pelaccia T, Plotnick LH, Audétat MC, Nendaz M, Lubarsky S, Torabi N, et al. A scoping review of physicians' clinical reasoning in emergency departments. Ann Emerg Med. 2020;75: 206–217.
15. Croskerry P. Context Is Everything or How Could I Have Been That Stupid? hcq. 2009;12: e171–e176. http://www.longwoods.com/publications/healthcarequarterly/604 https://doi.org/10.12927/hcq.2009.20945

16. Kahneman D, Slovic P, Tversky A. Judgment under Uncertainty. D G, D K, editors. Heuristics and biases. The psychology of intuitive Judgement. Cambridge, United Kingdom: Cambridge University Press; 1982. https://www.cambridge.org/core/product/identifier/9780511809477/type/book https://doi.org/10.1017/CBO9780511809477
17. Stanovich KE, West RF. Individual differences in reasoning: implications for the rationality debate. Behav Brain Sci. 2000;23: 645–65.
18. Gigerenzer G. Heuristic decision making. Simply rational. Oxford, United Kingdom: Oxford University Press;2015; https://doi.org/10.1093/acprof:oso/9780199390076.001.0001
19. Norman GR. Monteiro SD,Sherbino J,Ilgen JS,Schmidt HG,Mamede S.The Causes of Errors in Clinical Reasoning:Cognitive Biases, Knowledge Deficits, and Dual Process Thinking. Acad Med. 2017;92: 23–30.
20. Blumenthal-Barby J, Krieger H. Cognitive biases and heuristics in medical decision making: a critical review using a systematic search strategy. Med Decis Making. 2015;35: 539–57.
21. Elstein AS. Thinking about diagnostic thinking: a 30-year perspective. Adv in Health Sci Educ. 2009;14: 7–18. https://doi.org/10.1007/s10459-009-9184-0
22. Ritov I, Baron J. Status-quo and omission biases. J Risk Uncertainty. 1992;5: 49–6. https://doi.org/10.1007/BF00208786
23. Kahneman D, Frederick S. Representativeness revisited: Attribute substitution in intuitive judgement. In: D G, D K, editors. Heuristic and biases The psychology of Intuitive Judgment. New York; United States: Cambridge University Press;2002; pp. 49–81. https://doi.org/10.1017/CBO9780511808098.004
24. Tversky A, Kahneman D. Availability: A heuristic for judging frequency and probability. Cogn Psychol. 1973;5: 207–232. https://doi.org/10.1016/0010-0285(73)90033-9
25. Coen M, Sader J, Junod-Perron N, Audétat MC, Nendaz M. Clinical reasoning in dire times. Analysis of cognitive biases in clinical cases during the COVID-19 pandemic. Intern Emerg Med. 2022;17: 979–988. https://doi.org/10.1007/s11739-021-02884-9
26. Kulkarni SS, Dewitt B, Fischhoff B, Rosengart MR, Angus DC, Saul M, et al. Defining the representativeness heuristic in trauma triage: A retrospective observational cohort study. PLoS ONE. 2019;14. https://doi.org/10.1371/journal.pone.0212201 https://doi.org/10.1371/journal.pone.0212201
27. Awanzo A, Thompson J. Cognitive biases in clinical decision-making in prehospital critical care; a scoping review. Scand J Trauma Resusc Emerg Med. 2025;33: 101. https://doi.org/10.1186/s13049-025-01415-1
28. Lakhlifi C, Rohaut B. Heuristics and biases in medical decision-making under uncertainty: The case of neuropronostication for consciousness disorders. Presse Med. 2023;52: 104181. https://doi.org/10.1016/j.lpm.2023.104181
29. Persson E, Barrafrem K, Meunier A, Tinghög G. The effect of decision fatigue on surgeons' clinical decision making. Health Econ. 2019;28: 1194–1203. https://doi.org/10.1002/hec.3933
30. Ritov I, Baron J. Status-quo and omission biases. J Risk Uncertainty. 1992;5: 49–61. https://doi.org/10.1007/BF00208786
31. Anderson CJ. The psychology of doing nothing: forms of decision avoidance result from reason and emotion. Psychol Bull. 2003;129: 139–167.
32. Chen DL, Schonger M, Wickens C. oTree—An open-source platform for laboratory, online, and field experiments. J Behav Exp Finance. 2016;9: 88–97. https://doi.org/10.1016/j.jbef.2015.12.001 https://doi.org/10.1016/j.jbef.2015.12.001
33. Peabody JW, Luck J, Glassman P, Dresselhaus TR, Lee M. Comparison of Vignettes, Standardized Patients, and Chart Abstraction: A Prospective Validation Study of 3 Methods for Measuring Quality. JAMA. 2000;283: 1715. https://doi.org/10.1001/jama.283.13.1715https://doi.org/10.1001/jama.283.13.1715
34. Converse L, Barrett K, Rich E, Reschovsky J. Methods of Observing Variations in Physicians' Decisions: The Opportunities of Clinical Vignettes. J Gen Intern Med. 2015;30: 586–594. https://doi.org/10.1007/s11606-015-3365-8https://doi.org/10.1007/s11606-015-3365-8
35. Spalding NJ, Phillips T. Exploring the use of vignettes: from validity to trustworthiness. Qual Health Res. 2007;17: 954–62. https://doi.org/10.1177/10497 https://doi.org/10.1177/1049732307306187
36. Coleman JJ, Manavi K, Marson EJ, Botkai AH, Sapey E. COVID-19: to be or not to be; that is the diagnostic question. Postgrad Med J. 2020;96: 392–398. https://doi.org/10.1136/postgradmedj-2020-137979
37. Aberegg SK, Haponik EF, Terry PB. Omission bias and decision making in pulmonary and critical care medicine. Chest. 2005;128: 1497–505. https://doi.org/10.1378/chest.128.3.1497
38. Fagerland MW, Lydersen S, Laake P. Recommended tests and confidence intervals for paired binomial proportions. Stat Med. 2014;33: 2850–75. https://doi.org/10.1002/sim.6148 https://doi.org/10.1002/sim.6148
39. Pembury Smith MQR, Ruxton GD. Effective use of the McNemar test. Behav Ecol Sociobiol. 2020;74. https://doi.org/10.1007/s00265-020-02916-y https://doi.org/10.1007/s00265-020-02916-y
40. Cleophas T, Zwinderman A. McNemar's Odds Ratios. 2th edition. Clinical Data Analysis on a Pocket Calculator Understanding the Scientific Methods of Statistical Reasoning and Hypothesis Testing. 2th edition. New York, United States: Springer;2018; https://doi.org/10.1007/978-3-319-27104-0_49 https://doi.org/10.1007/978-3-319-27104-0_49
41. In: Intensive Care Society. Clinical Guidance: Assessing whether COVID-19 patients will benefit from critical care, and an objective approach to capacity challenges.2024 [Internet]. https://www.covid19.public-inquiry.uk/documents/

inq000395282-guidance-from-the-intensive-care-society-titled-clinical-guidance-assessing-whether-covid-19-patients-will-benefit-from-critical-care-and-an-objective-approach-to-capacity-challenges/

42. Blasco Mariño R, Clau Terré F, Landucci F, Biarnes-Suñé A. The human factor in critical decision making. Revista Española de Anestesiología y Reanimación (English Edition). 2022;69: 310–311. https://doi.org/10.1016/j.redare.2021.05.008
43. Gaucher N, Bailey B, Gravel J. Impact of physicians' characteristics on the admission risk among children visiting a pediatric emergency department. Pediatr Emerg Care. 2012;28: 120–124.
44. Olenski AR, Zimerman A, Coussens S, Jena AB. Behavioral heuristics in coronary-artery bypass graft surgery. N Engl J Med. 2020;382: 778–9.
45. Hamel MB, Teno JM, Goldman L, Lynn J, Davis RB, Galanos AN, et al. Patient Age and Decisions To Withhold Life-Sustaining Treatments from Seriously Ill, Hospitalized Adults. Ann Intern Med. 1999;130: 116–125. https://doi.org/10.7326/0003-4819-130-2-199901190-00005
46. Over 4,000 Covid victims at Madrid care homes 'could have been saved. In: The Guardian.com [Internet]. 28 Mar 2024. https://www.theguardian.com/world/2024/mar/28/over-4000-covid-victims-madrid-care-homes-could-have-been-saved
47. Lakhlifi C, Rohaut B. Heuristics and biases in medical decision-making under uncertainty: The case of neuropronostication for consciousness disorders. Presse Med. 2023;52: 104181.
48. Persson E, Barrafrem K, Meunier A, Tinghog G. The effect of decision fatigue on surgeons'clinical decision making. Health Econ. 2019;28: 1194–203.
49. Simon HA. A Behavioral Model of Rational Choice. Q J Econ. 1955;69: 99. https://doi.org/10.2307/1884852
50. Marewski JN, Gigerenzer G. Heuristic decision making in medicine. Dialogues Clin Neurosci. 2012;14: 77–89.
51. Ritov I, Baron J. Status-quo and omission biases. J Risk Uncertainty. 1992;5: 49–61. https://doi.org/10.1007/BF00208786
52. Anderson CJ. The psychology of doing nothing: forms of decision avoidance result from reason and emotion. Psychol Bull. 2003;129: 139–67. https://doi.org/10.1037/0033-2909.129.1.139
53. Plaum P, Visser LN, de Groot B, Morsink MEB, Duijst WLJM, Candel BGJ. Using case vignettes to study the presence of outcome, hindsight, and implicit bias in acute unplanned medical care: a cross-sectional study. Eur J Emerg Med. 2024;31: 260–266. https://doi.org/10.1097/MEJ.0000000000001127
54. Veloski J, Tai S, Evans AS, Nash DB. Clinical vignette-based surveys: a tool for assessing physician practice variation. Am J Med Qual. 2005;20: 151–7. https://doi.org/10.1177/1062860605274520
55. Zwaan L, Monteiro S, Sherbino J, Ilgen J, Howey B, Norman G. Is bias in the eye of the beholder? A vignette study to assess recognition of cognitive biases in clinical case workups. BMJ Qual Saf. 2017;26: 104–110. https://doi.org/10.1136/bmjqs-2015-005014

Factores contextuales y uso de heurísticos en la atención por intensivistas a pacientes críticos durante la pandemia COVID-19: estudio cuasi-experimental con viñetas en Chile

RESUMEN

INTRODUCCIÓN La decisión clínica en unidades de cuidados intensivos en pandemia por COVID-19 ha sido escasamente estudiada. Los objetivos del estudio son determinar la variabilidad de las decisiones de intensivistas en Chile, analizar la asociación de la decisión clínica con ciertos factores contextuales (hora, ola pandémica, edad del paciente, información clínica disponible) y estimar la frecuencia de uso de heurísticos (*statu quo*, representatividad y disponibilidad) en las decisiones clínicas.

MÉTODOS Estudio cuasi-experimental transversal cuali-cuantitativo mediante cuestionario en línea de viñetas clínicas sobre la atención a pacientes críticos en pandemia. Participaron 51 intensivistas, quienes eligieron entre dos alternativas por caso; una de ellas implicaba el uso de un heurístico. Se calcularon frecuencias para estimar la variabilidad. Los cambios intraindividuos tras manipular variables contextuales se evaluaron con test de McNemar (mid-P) o pruebas binomiales.

RESULTADOS Existe amplia variabilidad en el proceso de decisión: solo 4 de 16 casos superaron el 82% de coincidencia. Los factores contextuales influyeron heterogéneamente. No se observó efecto de la hora del día en que se tomó la decisión. La ola pandémica influyó en 2 de 4 viñetas donde se estudia. Respecto a la edad del paciente, se observa que la decisión de retirar el tratamiento ante falta de respuesta en 30 días ocurre con mayor probabilidad en personas de mayor edad, pero no es factor determinante en la decisión de ingresar a unidades de cuidados intensivos. Por otra parte, la decisión clínica se modifica en función de la disponibilidad de información clínica. Se observa uso de heurístico de disponibilidad (mayor en la primera ola), de *statu quo* en 3 de las 4 viñetas en que se estudia, pero no de heurístico de representatividad.

CONCLUSIONES Los intensivistas participantes mostraron alta variabilidad y sensibilidad a factores contextuales específicos. Se observa uso de heurísticos de *statu quo* y disponibilidad en determinadas condiciones. Este análisis podría ser útil para mejorar las decisiones en crisis sanitarias.