Biomedicine & Healthcare Research

Biomedicine & Healthcare Research 2025 July;5:15-21

https://doi.org/10.71599/bhr.v5i1.164

Open Access

Original article

The impact of COVID-19 pandemic on decision and diagnostic making process in non-COVID-19 patients: A retrospective comparative study

Khaoula Meddeb[1,2ⱡ], Imen Ben Saida[1,2ⱡ], Radhouane Toumi[1,2], Emna Ennouri[1,2], Nesrine Thabet[1,2], Marwa Zghidi[1,2], Mohamed Boussarsar[1,2*]

[1]*University of Sousse, Faculty of Medicine of Sousse, 4000, Sousse, Tunisia.*
[2]*Farhat Hached University Hospital, Medical Intensive Care Unit, Research Laboratory "Heart Failure", LR12SP09, 4000, Sousse, Tunisia.*
ⱡ*Equal contribution as first author*

Abstract

Introduction: The COVID-19 pandemic has been challenging and has affected non-COVID-19 patients to some extent. In this study, we aim to illustrate the impact of the COVID-19 pandemic on the decision and diagnostic making processes, management, and outcomes in non-COVID-19 patients.

Methods: A retrospective, comparative observational monocentric study with historical control, carried out in a 12-bed medical intensive care unit (ICU) between March 9, 2020, and May 30, 2020. All non-COVID-19 patients were included. Patients' demographics, clinical characteristics, diagnoses before ICU, at admission, and diagnostic discrepancies, specific delays, management, and outcomes were collected. The impact on patients' clinical state was assessed using a predefined grading scale describing the severity of diagnostic and management discrepancies. Patients included were compared to those admitted during the same period one year prior.

Results: During the two-month study period, 57 patients were referred to the ICU; 12(21%), COVID-19 and 45(79%) non-COVID-19 patients. Compared to the same period last year, the number of non-COVID-19 admissions was lower, 45 in 2020 vs 74 in 2019. Patients admitted during the pandemic received less noninvasive ventilation (NIV); 11(24.4%) vs 40(54.1%), p=0.009; and had shorter length of stay (LOS); 4[3-10.5] days vs 8[5-13] days, p=0.04. Diagnostic discrepancies were higher during the pandemic compared to last year; 16(35.5%) vs 5(6.8%), p=0.001. While this did not result in a significant impact on outcomes, in some cases, fear-induced cognitive bias may have altered decision-making and diagnostic processes. The sample size did not allow clear correlations; however, the study focused on assessing data on a case-by-case basis.

Conclusion: This study showed a high rate of diagnostic and management discrepancies in non-COVID-19 patients during the COVID-19 pandemic.

Keywords: COVID-19; Bias; Decision-making; Ethics, Clinical; Medical errors

Received: June 20, 2025; Accepted: July 24, 2025

1. Introduction

Undeniably, the COVID-19 pandemic is one of the most prominent global health crises of the contemporary world. The initial unfamiliarity with the disease led to a collective state of fear, heightening the impact of cognitive bias on society's perceptions and reconditioning the approach to gather and process information [1,2]. The subsequent decision-making process was altered on several levels for patients, practitioners, and healthcare systems as a whole. In the case of healthcare systems, there were two-tier emergency responses to the surge of COVID-19. The surge focus was to circumvent scenarios where the surge of COVID-19 patients seriously disrupted healthcare systems, especially where the health systems would be overwhelmed with patients needing critical care COVID-19 ICUs [3]. Professionalism and the media primarily concentrated on flattening the curve [4]. Avoiding non-urgent consultations was encouraged. The downside was that some patients downplayed their symptoms and delayed Emergency Department (ED) consultations, even when necessary [5,6]. Cognitive bias influenced patients as well as practitioners, leading, in some cases to diagnostic discrepancies and management delay [7].

The present study aims to describe the impact of the COVID-19 pandemic on decision-making and diagnostic processes, management, and outcomes for non-COVID-19 patients.

2. Material and methods

Study design and participants

It is a retrospective, comparative observational mono-centric study with historical control, carried out in a 12-bed

***Correspondence:** Prof. Mohamed Boussarsar, Medical Intensive Care Unit, F. Hached University Hospital, Sousse, Tunisia. E-mail: hamadi.boussarsar@gmail.com

medical intensive care unit (ICU) during the first pandemic surge, March 09, 2020 to May 30, 2020.

Inclusion criteria

All consecutive patients not presenting COVID-19, at admission or after excluding a suspicion of COVID-19 (negative RT-PCR for SARS-CoV-2 and/or absence of evocative images on Computed Thoracic scan). Consecutive sampling was performed to control sampling bias.
Patients included were compared to all consecutive patients admitted at the same period a year prior, from March 09, 2019 to May 30, 2019.

Data Collection

All data were collected retrospectively from medical charts recorded according to a well-established protocol by intensivists trained in data collection and handling, so to control for potential interobserver and intraobserver bias. Data were recorded on a specific case record form. Healthcare records were reviewed to obtain the following data: patients' demographics such as age and gender; past medical history, reason for ICU admission, severity on admission attested by the Simplified Acute Physiology Score (SAPSII), PaO2/FiO2 ratio, the need for vasopressors, ventilatory support and outcomes including mechanical ventilation duration, ventilation free days (VFD), healthcare acquired infections, length of ICU stay and vital status at discharge. In addition, data were collected, which include delay between illness onset and first medical contact, delay between first medical contact and ICU admission, diagnostic discrepancies, and impact on patient clinical state according to a predefined severity scale.

Definitions

COVID-19 was suspected according to the National Observatory of New and Emerging Diseases case definition: 1) Presence of fever and/or respiratory symptom AND history of travel to epidemic region, 14 days prior to symptom onset; OR 2) Acute respiratory failure signs requiring hospitalization [8].

SAPSII Score is a severity score and mortality estimation tool made of 12 physiological variables and 3 disease-related variables. The worst physiological variables are collected within the first 24 hours of ICU admission [9].
Patient delay was defined as the time interval between symptoms onset and first medical contact.

Delay to ICU was defined as the time interval between first medical contact and ICU admission.

Diagnostic discrepancy was defined when diagnosis made on first medical contact differed from diagnosis made in ICU. All new admissions were systematically discussed during a daily meeting that included the entire medical team. The admitting shift team presents the full clinical data collected from the emergency department (ED), initial investigations, and any updates. Following this, two senior medical experts (KM and MB) review the presented information and, based on their clinical expertise, validate or refine the ICU admission diagnosis. It is important to note that these experts were not blinded to the initial diagnosis established in the ED, as this diagnosis is part of the clinical information routinely discussed to guide patient care. The consensus process relied on a thorough collective discussion, after which the two experts formally approved the final ICU diagnosis recorded in the database. Their role was to ensure diagnostic accuracy and consistency by critically reassessing all available data, identifying possible discrepancies between the initial ED diagnosis and the ICU diagnosis, and documenting these discrepancies according to predefined criteria. This process helped us retrospectively analyze diagnostic discrepancies and their potential impact on patient management and outcomes.

A diagnostic discrepancy classification system exist in the literature; however, most are based on autopsy results or require detailed real-time data that were not fully available in our retrospective dataset [10]. A modified pragmatic, outcome-based classification was developed, tailored to our study setting, focusing on the actual clinical consequences observed:

- Class I: discrepancy without impact on patient outcomes.
- Class II: discrepancy leading to adverse events.
- Class III: discrepancy resulting in death.

This approach allowed us to systematically assess the clinical relevance of diagnostic discrepancies in a retrospective context.

Management delay: for the purpose of the present study, a patient delay over four days and/or the presence of diagnostic discrepancy at ICU admission was considered as management delay.

Statistical analysis

Data were analysed using Excel 2013 software and SPSS 21.0 for windows (SPSS Inc., Chicago, IL, USA). Initial descriptive analysis was performed where categorical variables were presented as n (%), continuous normally distributed values as mean±SD, skewed numerical variables as median (Interquartile range [IQR]). Variables distributions were assessed by the Shapiro-Wilk test and histogram analysis. For univariate analysis, Chi-squared tests and unpaired t-tests or Mann-Whitney U-tests were used to compare groups.

3. Results

During the study period, 57 patients were admitted, 12 (21%) COVID-19 patients and 45(79%) non-COVID-19 patients. Patients' demographics and clinical characteristics are shown in table 1. Compared to the same period last year, the number of admissions was lower, 45 in 2020 vs 74 in 2019.

There were no significant differences between the two periods in terms of patients' general characteristics, co-morbidities, reasons for ICU admission. However, compared to 2019, non-COVID patients admitted during the pandemic received less noninvasive ventilation (24.4% vs. 54.1%, p=0.009) and had a shorter median ICU stay (4 [3–10.5] vs. 8 [5–13] days, p=0.04). The main diagnosis, in the two periods, was AECOPD; yet, rates were seemingly lower in 2020.

During the pandemic period, diagnostic discrepancies were significantly more frequent than in the historical control group; 16(35.5%) vs 5(6.8%); p=0.001. The majority of these discrepancies were classified as Class I, 11(24.4%), reflecting errors without impact on outcomes, but notably, five cases were Class II, resulting in adverse events. Importantly, no discrepancies in the control group led to adverse events or death. Patients with discrepancies tended to have complex clinical presentations and, in several cases, were initially suspected to have COVID-19 based on respiratory symptoms and radiological findings, which delayed the recognition of other severe conditions (myocardial infarction, meningitis). Although median patient delay and delay to ICU admission were similar between periods. Despite these discrepancies, there was no statistically significant difference in terms of LOS and mortality between the two periods.

According to Table 3, the presence of management delay, defined as a diagnostic discrepancy and/or patient delay exceeding four days, was not associated with significant differences in outcomes such as ventilator-free days (VFD), ICU length of stay (LOS), or mortality.

A visual presentation of patients (n=26 out of 45) with management delay is displayed in Fig. 1**,** showed, from left to right, diagnostic discrepancy, the management delays, ventilatory management (type and duration), ICU LOS, and death. This represents a closer look to the singularities of each case. The figure is displaying a myriad of non-COVID-related severe misdiagnosed diseases, while all patients were referred to ICU with the initial diagnosis of COVID-19 suspicion, mainly on the presence of polypnea, fever, and/or radiological findings. The longest pre-ICU management delays seem to be associated with higher IMV duration, longer ICU stays, and/or increased mortality (see patients, 2, 3, 9, 10, 16, 18, 21, 23, 24, 26).

Table 1. Compared patients' demographics, clinical characteristics, management and outcomes between non-COVD-19 ICU-admitted patients within the first surge (March-May 2020) of the pandemic (Study Group) and historical control patients (March-May 2019) (Control Group).

Variable	Study Group 2020 n=45	Control Group 2019 n=74	*p*
Age (years)[a]	52±20	56±18	0.221
Male[b]	27(60)	42(56.8)	0.728
Comorbidities[b]			
No medical past history[b]	12(26.7)	7(9.5)	0.13
COPD[b]	11(24.4)	30(40.5)	0.19
Diabetes[b]	10(22.2)	22(29.7)	0.37
Hypertension[b]	11(24.4)	27(36.5)	0.17
Cardiomyopathy[b]	9(20)	15(20.3)	0.97
Asthma[b]	5(11.1)	7(9.5)	0.77
Reason for admission[b]			
Mild ARF[b]	4(8.9)	20(27)	0.10
Moderate ARF[b]	18(40)	22(29.7)	
Severe ARF[b]	10(22.2)	20(27)	
Polypnea / ACF[b]	2(4.4)	3(4.1)	
Polypnea / metabolic acidosis[b]	5(11.1)	3(4.1)	
Neurological disorder / coma[b]	6(13.3)	6(8.1)	
Diagnosis at ICU admission[b]			
AECOPD[b]	10(22.2)	23(31.1)	0.29
ARF/CRF[b]	1(2.2)	7(9.5)	0.09
Asthma exacerbation[b]	4(8.9	6(8.1)	0.88
Diabetic decompensation[b]	2(4.4)	3(4.1)	0.91
Others[b]	28(62.2)	35(47.3)	0.11
PF ratio (mmHg)[a]	296±156	269±106	0.32
SAPS II[c]	22 [13-31.5]	24 [18-31]	0.07
Vasoactive drugs[b]	18(40)	22(29.7)	0.25
Ventilatory support[b]			
Room air[b]	4(8.9)	5(6.8)	**0.009**
Nasal cannula[b]	9(20)	7(9.5)	
Non rebreathing mask[b]	3(6.7)	8(10.8)	
NIV[b]	11(24)	40(54)	
IMV[b]	17(62.2)	12(70.3)	
HFNC[b]	1(2.2)	2(2.7)	
VFD (days)[c]	1 [0-2.5]	2 [0-3]	0.26
LOS (days)[c]	4 [3-10.5]	8 [5-13]	**0.04**
Discharge[b]			
Home[b]	26(57.8)	40(54.1)	0.3
Transfer to another department[b]	6(3.3)	18(24.3)	
Death[b]	13(28.9)	16(21.6)	

a (Mean±SD); b, n(%); c, median [Interquartile]; COPD, Chronic obstructive pulmonary disease; ARF, Acute respiratory failure; ACF, Acute circulatory failure; ICU, Intensive care unit; AECOPD; Acute exacerbation of COPD; CRF; Chronic respiratory failure; PF, PaO2/FiO2; IMV, Invasive Mechanical ventilation; HFNC, High flow nasal cannula; VFD, Ventilation free days; LOS, Length of stay.

Table 2. Compared pre-ICU management delays and diagnostic discrepancies between non-COVID-19 ICU-admitted patients within the first surge (March-May 2020) of the pandemic (Study Group) and historical control patients (March-May 2019) (Control Group).

Variable	Study Group 2020 n=45	Control Group 2019 n=74	p
Patient delay[a] (days)	4 [1-7]	5 [2-10]	0.12
Patient delay > 4 days[b]	20 (44.4)	41 (55.5)	0.24
Delay to ICU[a] **(hours)**	11 [6-35]	16 [5.7-59]	0.40
Diagnostic discrepancy[b]	16 (35.5)	5 (6.8)	**0.001**
Discrepancy class I[b]	11 (24.4)	3 (4)	
Discrepancy class II[b]	0(0)	1 (1.4)	
Discrepancy class III[b]	5 (11.1)	1 (1.4)	
Management delay[b]	26 (57.8)	44 (59.5)	0.86

a, median [Interquartile]; b, n(%); ICU, intensive care unit

Table 3. Impact of management delay on outcomes in non-COVID-19 patients hospitalized during the pandemic.

Variable	No management delay n=16	Management delay n=26	P
Need for intubation[a]	6(37.5)	14(53.8)	0.13
VFD (days)[b]	2[0-3]	0.5 [0-1.5]	0.32
Length of stay (days)[b]	3 [3-7]	4.5 [2-14.25]	0.49
Mortality[a]	3(18.7)	10(38.4)	0.09

a, n(%); b, median [Interquartile]; VFD, Ventilation free days.

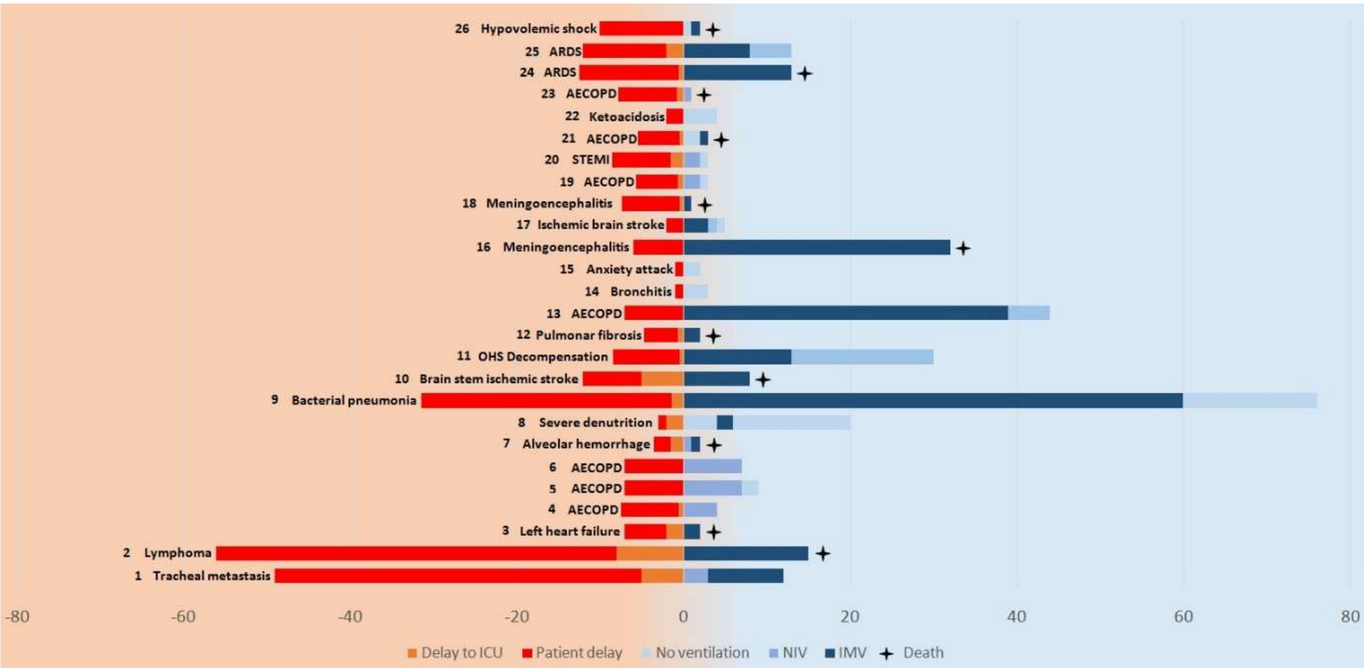

Fig. 1. Diagnostic discrepancies and management delays vs outcomes (IMV duration, ICU LOS, death) in non-COVID-19 patients (n=26 out of 45) referred to ICU during the first surge of the pandemic.

4. Discussion

A diagnostic process is a complex, patient-centered, collaborative activity that involves information gathering and clinical reasoning with the goal of determining a patient's health problem [11]. Clinical decision-making and timely management will depend on the adequate unfolding of the diagnostic process.

The current study revealed that non-COVID-19 ICU-admitted patients seemed to be lower in number relative to the same period last year during the pandemic. These patients were subjected to a higher rate of diagnostic discrepancy. They required less noninvasive ventilation and shorter ICU LOS. Patients (10 out of 26) with a rapidly evolving disease and the longest pre-ICU management delays seem to have the highest IMV duration, ICU LOS and/or mortality.

This study presented some limitations, mainly the small sample size, which did not allow for establishing clear correlations. However, the particularity of the present study was to assess data on a case-by-case basis. In addition, the retrospective design did not allow for the use of already existing diagnostic discrepancy classification [10].

Diagnostic and management discrepancies, defined as errors in medicine, have consequences not only for patients and their families. These errors impact also extend to the healthcare personnel, the support staff, the healthcare system, and the society, constituting the second, third, fourth, and even fifth victims [12,13].

Multiple stages of the diagnostic process can result in diagnostic error. As the primary step in the diagnostic process, a patient's delay in consulting a doctor, or their inability to receive care, constitutes the initial step to error [14]. The non-COVID patient admission decline has been noted, especially during lockdowns and in the context of the pandemic, where many patients avoided hospital visits due to fear [15-17]. In Italy, the lowest rate of non-COVID-19 patients' ED visits corresponded with the highest peak of COVID-19 daily deaths. One author sums this up nicely, "The fear of what we can get might be greater than the fear of what we have" [5]. Patients influenced by fear-induced cognitive bias tended to neglect symptoms and delayed ED consultation.

In the present study, some patients experienced moderate dyspnea for twelve to fifteen days before consulting, belittling the necessity to visit ED, until worsening of clinical state. These reactions emanated from cognitive bias that going to the hospital would increase risk of contamination, not considering that contamination is possible each time precautions are not taken.

A second level, where faulty diagnostic error can occur, is when there is a failure in gathering, integrating, and interpreting information, leading to a possible diagnosis. At this stage, the practitioner's cognitive bias can interfere with the diagnostic process. A theory advanced by Kahenman and Tversky in 1974 suggested that decisions made in the face of uncertainty and the cognitive biases related to them could stem from a dualistic thinking process. The first type is quick and reflexive thinking, shaped by a wide range of factors such as genetics, the environment, age and experience, mood, and social and psychological traits. It is likely to be the source of the most cognitive biases. The second type is slow and analytic thinking, which relies on education and training, critical thinking skills, rationality, and prior feedback. When a physician encounters a patient, he or she can either engage in the first thinking process or the second, depending on whether a schema is recognizable [18].

The present study showed a higher rate of diagnostic discrepancy during the duration of the pandemic compared to the same period last year. A closer look at the singularities of some cases identified several cognitive biases, mainly the premature closure bias, where physicians fail to consider reasonable alternatives after an initial diagnosis is suspected [19,20]. A patient with cardiovascular risks presented to the ER with typical chest pain, neglected by the patient and dyspnea, and anterior ST-elevation and necrosis Q wave on electrocardiogram (EKG) was considered as a viral myocarditis associated with a possible COVID-19.

The diagnosis of an ST-elevation myocardial infarction (STEMI) complicated with heart failure was overlooked, even though more probable [case 20]. A coronary angioplasty, that should have been immediate, was delayed by several hours. Similar cases of delayed management in acute coronary syndrome (ACS) were observed worldwide with an increase in time from symptom to first medical contact [21]. Another example is considering a fever with compensatory polypnea as COVID-19 with no further examination or exploration, and later correcting the diagnosis as a severe meningo-encephalitis, leading to a delay in antibiotic administration and management with a rapid fatal issue [Case 18]. The COVID-19 perceived as a threat, created a constant state of fear, generating major holes in the layers of the diagnostic process and subsequent therapeutic attitude according to severity. At times, diagnosis was based on minimal examination and in some cases led to inaction (omission bias) in terms of adequate decision making [22]. As an example, a patient with exacerbation of asthma or COPD would not, immediately, receive nebulized beta-agonists and/or adequate ventilator assistance due to fear of aerosolization in case of COVID-19 [23]. The present study, seemingly, does not show a significant impact of management delay on patients' outcomes; however, it is mandatory to detect and prevent errors in the diagnostic making process to ensure patients' safety.

Finally, patients' safety is a requirement, not only for practitioners but for healthcare systems as well. The established healthcare systems were overthrown by an unpredictable and unprecedented health crisis. The need for immediate responsiveness of politics and healthcare authorities in a context of doubt and fear led to poorly thought and executed strategies. These strategies targeted, mainly, COVID-19 patients overlooking critical patients suffering from other conditions such as chronic comorbidities and oncologic disease [24-26].

At the start of the pandemic, detection and isolation of COVID-19 cases were prioritized. The population was asked to stay home with the recommendation to call the national emergency medical service. Only one phone number was available, and rapidly calls overflowed, creating major stress on practitioners and delaying patients' access to adequate assistance. The French health system experienced the same dilemma, urging experts to improve the health system response by creating two defined strategies with possible crossover to access health facilities for all patients [27].

For an already fragile health system, issues arose when a suspicion of COVID-19 needed hospitalization. Several hospitals and departments were not ready to cope with the reality of the situation. Some patients, in the present study, were excessively admitted to ICUs, misusing ICU beds, for lack of isolated beds in some medical departments [28]. This would explain the lower need for NIV and shorter length of stay. Fear and miscommunication were major reasons impeding the development of proactive and efficient strategies.

The Healthcare System learned, the hard way, that reorganizing the response to COVID-19 is mandatory in order to ensure patients' safety, with or without COVID-19. The present study tried to shed light on some of the pitfalls to avoid those patients, physicians, and healthcare systems have encountered during the COVID-19 pandemic. With this in mind, it would be helpful to develop some tools to help in the decision-making and diagnostic process, such as a clinical decision support system, the application of e-health and m-health [29,30].

Conclusion

The present study showed that there was a higher rate of diagnostic discrepancy in non-COVID-19 patients during the COVID-19 pandemic. Patients required less NIV and had shorter ICU LOS, reflecting a misuse of ICU beds. Fear-induced cognitive bias may have altered diagnostic and decision-making processes for patients as well as practitioners, leading, in some cases to severe consequences. Constructive feedback is necessary to detect deficiencies in healthcare systems' responsiveness that might expose to higher risk of discrepancies, in order to ensure the safety of patients with or without COVID-19.

Ethics approval and consent to participate

The Research and Ethics Committee of Farhat Hached Teaching Hospital, Sousse, Tunisia, (IORG 0007439, Office for Human Research Protection-US Department of Health and Human Service) approved the study and waived the need for written informed consent as the study was a retrospective one.

Consent for publication

All authors consented to the publication of the article.

Availability of data and materials

The datasets used and/or analyzed during the study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

None.

Authors' contributions

KM, IBS, and MB contributed substantially to drafting the article and revising it critically for intellectual content. All authors read and approved the final manuscript. No individuals, but authors, provided writing assistance in the present manuscript**.** In preparing this work, Artificial Intelligence (ChatGPT) was used by the authors solely for language refinement to improve clarity and coherence. The tool did not generate new content or alter the scientific meaning. The authors reviewed and edited the text and are fully responsible for the publication's content.

Acknowledgments

Not applicable.

References

[1] Zagury-Orly I, Schwartzstein RM. Covid-19, A Reminder to Reason. N Engl J Med. 2020;383:e12. https://doi.org/10.1056/ NEJMp2009405

[2] Landucci F, Lamperti M. A pandemic of cognitive bias. Intensive Care Med. 2021;47(5):636-7. https://doi.org/10.1007/s00134-020-06293-y

[3] Halpern SD, Truog RD, Miller FG. Cognitive bias and public health policy during the COVID-19 pandemic. JAMA. 2020;324(4):337-8.https://doi.org/10.1001/jama.2020.11623

[4] Roberts S. Flattening the Coronavirus Curve. The New York Times, 2021. https://www.nytimes.com/article/flattencurve-coronavirus.html. Accessed 24/02/2021.

[5] Mantica G, Riccardi N, Terrone C, Gratarola A. Non-COVID-19 visits to emergency departments during the pandemic: the impact of fear. Public Health. 2020;183:40-1. https://doi.org/10.1016/j.puhe.2020.04.046

[6] Boeken T, Le Berre A, Mebazaa A. Non-COVID-19 emergencies: where have all the patients gone? Eur Radiol. 2020;30(9):5220-1. https://doi.org/10.1007/s00330-020-06961-z

[7] O'Sullivan ED, Schofield SJ. Cognitive bias in clinical medicine. J R Coll Physicians Edinb. 2018;48(3):225-32. https://doi.org/10.4997/JRCPE.2018.306

[8] ONMNE. Point de situation sur l'épidémie d'infections au Nouveau Coronavirus «COVID-19 ». https://www.onmne.tn/wpcontent/uploads/2020/10/COVID-19-dernier-bulletin-17032020.pdf. Accessed 24/02/2021.

[9] Le Gall JR, Loirat P, Alperovitch A, Glaser P, Granthil C, Mathieu D et al. A simplified acute physiology score for ICU patients. Crit Care Med. 1984;12:975-7. https://doi.org/10.1097/00003246-198411000-00012

[10] Zerbini T, Singer JM, Leyton V. Evaluation of the discrepancy between clinical diagnostic hypotheses and anatomopathological diagnoses resulting from autopsies. Clinics (Sao Paulo). 2019;74:e1197. https://doi.org/10.6061/clinics/2019/e1197

[11] Committee on Diagnostic Error in Health Care; Board on Health Care Services; Institute of Medicine; The National Academies of Sciences, Engineering, and Medicine Erin P. Balogh, Bryan T. Miller, John R. Ball , editors. Improving Diagnosis in Health Care. Washington, 2015.

[12] Ellaham S. The Domino Effect of Medical Errors, 2021 https://www.middleeastmedicalportal.com/the-domino-effect-of-medical-errors-2/ . Accessed 20/05/2021.

[13] Ozeke O, Ozeke V, Coskun O, Budakoglu II. Second victims in health care: current perspectives. Adv Med Educ Pract. 2019;10:593–603. https://doi.org/10.2147/AMEP.S185912

[14] Schiff GD, Hasan O, Kim S, Richard A, Cosby K, Lambert BL et al. Diagnostic error in medicine: analysis of 583 physician-reported errors. Arch Intern Med. 2009;169(20): 1881-7. https://doi.org/10.1001/archinternmed.2009.333

[15] Colivicchi F, Di Fusco SA, Magnanti M, Cipriani M, Imperoli G. The Impact of the Coronavirus Disease-2019 Pandemic and Italian Lockdown Measures on Clinical Presentation and Management of Acute Heart Failure. J Card Fail. 2020;26(6):464-5. https://doi.org/10.1016/j.cardfail.2020.05.007

[16] Santi L, Golinelli D, Tampieri A. Non-COVID-19 patients in times of pandemic: Emergency department visits, hospitalizations and cause-specific mortality in Northern

Italy. PLoS One. 2021;16(3):e0248995. https://doi.org/10.1371/journal.pone.0248995
[17] Bodilsen J, Nielsen PB, Søgaard M, Dalager-Pederson M, Speiser LOZ, Yndigegn T et al. Hospital admission and mortality rates for non-covid diseases in Denmark during covid-19 pandemic: nationwide population based cohort study. BMJ. 2021;373:n1135. https://doi.org/10.1136/bmj.n1135
[18] Tversky A, Kahneman D. Judgment under Uncertainty: Heuristics and Biases. Science. 197;185(4157):1124-31. https://doi.org/10.1126/science.185.4157.1124
[19] Howard J. Premature Closure: Anchoring Bias, Occam's Error, Availability Bias, Search Satisficing, Yin-Yang Error, Diagnosis Momentum, Triage Cueing, and Unpacking Failure. In: Cognitive Errors and Diagnostic Mistakes. Springer, 2019.
[20] DiMaria CN, Lee B, Fischer R et al. Cognitive Bias in the COVID-19 Pandemic. Cureus. 2020;12(7):e9019. https://doi.org/10.7759/cureus.9019
[21] Tam CCF, Cheung KS, Lam S, Wong A, Yung A, Sze M et al. Impact of Coronavirus Disease 2019 (COVID-19) Outbreak on ST-Segment–Elevation Myocardial Infarction Care in Hong Kong, China. Circ Cardiovasc Qual Outcomes. 2020;13(4):e006631. https://doi.org/10.1161/CIRCOUTCOMES.120.006631
[22] Baron J, Ritov I. Omission bias, individual differences, and normality. Organ Behav Hum Decis Process. 2004; 94(2):74-85. https://doi.org/10.1006/obhd.1999.2839
[23] Meddeb K, Chelbi H, Boussarsar M. Fear, Preparedness and Covid-19. Tunis Med. 2020 ;98(5):321-323.
[24] Feitosa G. The Unapparent Non-COVID Consequences of the COVID-19 Pandemic. Arq Bras Cardiol. 2020;115(5):871-2. https://doi.org/10.36660/abc.20200935
[25] Malina D, Rosenbaum L. The Untold Toll: The Pandemic's Effects on Patients without Covid-19. N Engl J Med. 2020;382(24):2368-71. https://doi.org/10.1056/NEJMms2009984
[26] Hassan B, Arawi T. The Care for Non-COVID-19 Patients: A Matter of Choice or Moral Obligation? Front Med (Lausanne). 2020;7:564038. https://doi.org/10.3389/fmed.2020.564038
[27] Goulabchand R, Claret PG, Lattuca B. What if the worst consequences of COVID-19 concerned non-COVID patients? J Infect Public Health. 2020;13(9):1237-1239. https://doi.org/10.1016/j.jiph.2020.06.014
[28] Valley TS, Noritomi DT. ICU beds: less is more? Yes. Intensive Care Med. 2020;46(8):1594-6. https://doi.org/10.1016/j.jiph.2020.06.014
[29] Sutton RT, Pincock D, Baugmart DC, Sadowski DC, Fedorak RN, Kroeker KI. An overview of clinical decision support systems: benefits, risks, and strategies for success. Npj Digt Med. 2020;3:17. https://doi.org/10.1038/s41746-020-0221-y
[30] Da Fonseca MH, Kovaleski F, Picinin CT, Pedroso B, Rubbo P. E-health practices and technologies: A systematic review from 2014 to 2019. Healthcare (Basel). 2021;9(9):1192. https://doi.org/10.3390/healthcare9091192

Cite this article as : Meddeb K, Ben Saida I, Toumi R, Ennouri E, Thabet N, Zghidi M, Boussarsar M. The impact of COVID-19 pandemic on decision and diagnostic making process in non-COVID-19 patients: A retrospective comparative study. Biomedicine Healthcare Res. 2025;5:15-21. https://doi.org/10.71599/bhr.v5i1.164