

Structured Perceptions During Prolonged Sedation in a Patient with Advanced HIV and Severe COVID-19: A Case Report and Analysis of Possible Clinical-Phenomenological Correlations

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Abstract: Subjective experiences occurring during prolonged sedation in critically ill patients remain poorly understood and are often attributed to delirium and retrospective memory reconstruction. We report the case of a 53-year-old male healthcare professional and university lecturer with advanced HIV infection, severe COVID-19, pneumocystosis, and pulmonary histoplasmosis, who developed severe acute respiratory distress syndrome requiring invasive mechanical ventilation, moderate-to-deep sedation, neuromuscular blockade, and tracheostomy. Following clinical recovery and gradual withdrawal of sedation, the patient described structured perceptual experiences involving sensations of drowning, confinement, environmental vapors, food perception, and recognition of a family member's voice. Some of these experiences showed plausible temporal correspondence with events documented in the medical record, including ventilatory support, inhalation therapies, dietary changes, and transient episodes of altered sedation levels during family visits. The discussion considers alternative mechanisms, including delirium, hypoxia, COVID-19-associated neuroinflammation, HIV-related neurocognitive vulnerability, and potential effects of the pharmacological agents used during hospitalization. This case does not allow causal inferences or confirmation of specific perceptual processing mechanisms during sedation; however, it suggests that complex subjective experiences may occur during critical illness and deserve further investigation, particularly in the context of humanized intensive care practices.

Keywords: Critical illness; Delirium; Mechanical ventilation; HIV; COVID-19; Humanization of care.

Citation: Altunian RCS, Oliveira APF, Gonçalves WLS. Structured Perceptions During Prolonged Sedation in a Patient with Advanced HIV and Severe COVID-19: A Case Report and Analysis of Possible Clinical-Phenomenological Correlations. Brazilian Journal of Case Reports. 2026 Jan-Dec; 06(1):bjcr206.

<https://doi.org/10.52600/2163-583X.bjcr.2026.6.1.bjcr206>

Received: 25 May 2026

Accepted: 18 June 2026

Published: 25 June 2026



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1. Introduction

Survival among critically ill patients requiring prolonged invasive mechanical ventilation (IMV) and moderate-to-deep sedation has increased substantially over recent decades. Concurrently, growing interest has emerged regarding subjective phenomena reported after recovery of consciousness, including fragmented memories, delusional experiences, recollections of procedures, and structured perceptions occurring during intensive care unit (ICU) hospitalization [1–3]. Although many of these experiences are traditionally understood within the spectrum of delirium and illusory memories associated with critical illness, debate remains as to whether some reports may partially incorporate physiological, sensory, and emotional signals originating from the care environment [1,4–6]. Previous studies have demonstrated that factual memories, illusory memories, and

delusional narratives frequently coexist among survivors of critical illness, representing complex and multifactorial phenomena [1–3,5].

In the setting of critical illness, particularly under conditions of hypoxia, prolonged sedation, systemic inflammation, and neuroinflammatory dysfunction, alterations in consciousness may emerge through mechanisms involving physiological distress, acute cerebral vulnerability, and pharmacological modulation [4,5,7]. Among survivors of acute respiratory distress syndrome (ARDS) and prolonged ICU admissions, experiences of suffocation, threat, entrapment, and persecution have been described as recurrent components of delusional memories, often coexisting with partially accurate recollections of clinical events [1,6,8].

The COVID-19 pandemic further increased interest in these phenomena, particularly among patients undergoing prolonged IMV, social isolation, and intense systemic inflammatory responses [9,10]. In individuals living with advanced HIV infection and opportunistic coinfections, this scenario may acquire additional complexity because of the interaction between hypoxia, neuroinflammation, immunosuppression, and HIV-associated neurocognitive vulnerability [9–11]. Nevertheless, reports exploring possible correspondences between structured subjective experiences and documented clinical events during critical illness remain scarce.

Beyond neurobiological factors, increasing attention has been directed toward the role of meaningful relational stimuli, particularly the voices of family members, as potential modulators of responsiveness and subjective experience in critically ill patients. Family-centered care strategies have been associated with greater humanization of care and improved psychological outcomes among intensive care survivors, although the underlying mechanisms remain incompletely understood [12–15].

In this context, we report the case of a patient with advanced HIV infection, severe COVID-19, and opportunistic coinfections who, following recovery from prolonged sedation associated with invasive mechanical ventilation, described structured perceptual experiences showing plausible temporal correspondence with physiological, procedural, and relational events documented in the medical record. In addition to the clinical description, we present an exploratory schematic representation intended to contextualize potential clinical-phenomenological mechanisms involved in this specific case, without implying causal relationships or generalizability to other populations.

2. Case Report

A 53-year-old male healthcare professional and university lecturer with a previous diagnosis of HIV infection was admitted to a general hospital in the Baixada Fluminense region on March 9, 2022, presenting with progressive dyspnea, diarrhea, marked asthenia, and severe acute respiratory failure (ARF), with an oxygen saturation of 90% while receiving oxygen through a reservoir mask at a fraction of inspired oxygen (FiO_2) of 100%. Chest computed tomography revealed bilateral pulmonary involvement estimated at 50–80%, characterized by ground-glass opacities and multilobar consolidations consistent with severe viral pneumonia. Testing for SARS-CoV-2 was positive, confirming the diagnosis of COVID-19.

On March 10, the patient required admission to the intensive care unit (ICU) because of clinical deterioration and worsening oxygen desaturation ($\text{SpO}_2 = 84\%$). On March 11, he was transferred to the Evandro Chagas National Institute of Infectious Diseases, a national referral center for infectious diseases. Upon admission, he presented with severe acute respiratory distress syndrome (ARDS), with a $\text{PaO}_2/\text{FiO}_2$ (P/F) ratio of 90. His clinical course required invasive mechanical ventilation (IMV), moderate-to-deep sedation with midazolam and fentanyl, intermittent neuromuscular blockade (rocuronium and succinylcholine), hemodynamic support, and treatment for opportunistic coinfections.

Initial immunovirological assessment demonstrated advanced immunosuppression, with a CD4^+ T-cell count of 50 cells/ mm^3 . During hospitalization, pneumocystosis and pulmonary histoplasmosis were diagnosed through laboratory confirmation, and specific

treatment was initiated. Testing for cryptococcal antigen was negative. A single attempt at prone positioning was performed but discontinued because of hemodynamic intolerance, characterized by marked increases in blood pressure and heart rate. Electrocardiography demonstrated sinus rhythm with left ventricular hypertrophy and no evidence of acute ischemia. The major clinical events, therapeutic interventions, and outcomes are summarized in Table 1 and Figure 1.

Table 1. Clinical Characteristics, Therapeutic Course, and Outcomes.

Domain	Clinical Data
Patient characteristics	Male, 53 years old, intensivist physician and university lecturer
Main diagnoses (ICD)	B59 – Pneumocystosis; B24 – HIV/AIDS; B39 – Histoplasmosis; U07.1 – COVID-19
Initial chest CT	50–80% bilateral pulmonary involvement
SARS-CoV-2 testing	Positive COVID-19 molecular test
Initial arterial blood gas analysis	pH 7.40; PaO ₂ 51 mmHg; PaCO ₂ 39 mmHg; HCO ₃ ⁻ 20 mEq/L; SpO ₂ 87%; P/F ratio 90
Intensive care support	Invasive mechanical ventilation (IMV), deep sedation, and neuromuscular blockade
Prone positioning	Single attempt interrupted because of hemodynamic intolerance (BP: 220/150 mmHg; HR: 180 bpm)
ECG	Sinus rhythm; left ventricular hypertrophy
Airway management	Tracheostomy (March 20); decannulation on the day before hospital discharge (April 13)
Opportunistic coinfections	Clinico-radiological pneumocystosis; laboratory-confirmed histoplasmosis; negative cryptococcal antigen (CrAg)
Initial immunovirological profile (March 13)	Viral load: 101 copies/mL; CD4: 50 cells/mm ³ ; CD8: 137 cells/mm ³ ; CD45+: 389 cells/mm ³
Discharge immunovirological profile (April 14)	Undetectable viral load; CD4: 116 cells/mm ³ ; CD8: 1,035 cells/mm ³ ; CD45+: 1,502 cells/mm ³
Discharge arterial blood gas analysis	pH 7.41; PaO ₂ 96 mmHg; PaCO ₂ 44 mmHg; HCO ₃ ⁻ 26 mEq/L; SpO ₂ 96%; P/F ratio 386
Outcome	Direct discharge home from the ICU

Abbreviations: PaO₂/FiO₂ (P/F), arterial oxygen pressure/fraction of inspired oxygen ratio; ARDS, acute respiratory distress syndrome; ICU, intensive care unit; HIV, human immunodeficiency virus; COVID-19, coronavirus disease 2019; CD4, CD4+ T lymphocytes; VL, viral load; PEEP, positive end-expiratory pressure; BP, blood pressure; HR, heart rate; mmHg, millimeters of mercury; bpm, beats per minute; RASS, Richmond Agitation-Sedation Scale; ART, antiretroviral therapy; ECG, electrocardiogram; CrAg, cryptococcal antigen; SpO₂, peripheral oxygen saturation; pH, hydrogen potential; PaCO₂, partial pressure of carbon dioxide; PaO₂, partial pressure of oxygen; HCO₃⁻, bicarbonate ion.

Because of agitation, difficulty in ventilator weaning, and a high burden of respiratory secretions, a tracheostomy was performed on March 20, 2022. During the clinical course, transient episodes of psychomotor agitation, attempts to remove invasive devices, and the need for temporary mechanical restraint of the upper limbs were documented. For behavioral management, quetiapine and risperidone were administered, according to medical records. The patient gradually improved both clinically and respiratorily, allowing progressive withdrawal of sedation and ventilatory support. Aerosol therapy and supplemental oxygen were maintained for secretion management, and the tracheostomy tube was removed prior to discharge from the intensive care unit. The main medications administered during hospitalization are summarized in Table 2.

Tabela 2. Principais fármacos utilizados durante a internação, doses registradas e indicação clínica.

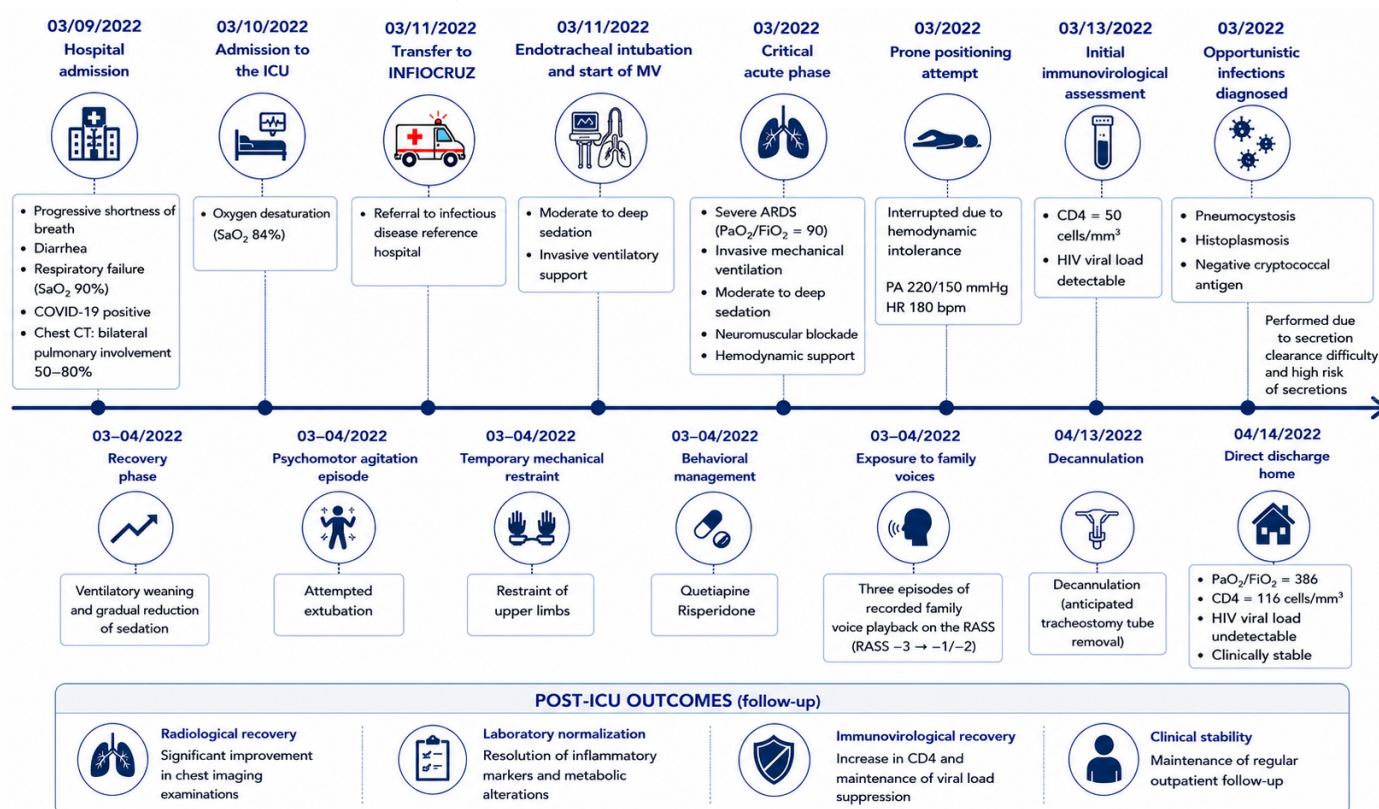
Classe terapêutica	Fármaco	Dose registrada	Indicação clínica no caso
Sedativo	Midazolam	5 mg	Sedação durante ventilação mecânica invasiva
Analgésico opioide	Fentanil	50 mcg	Analgesia e adaptação à ventilação mecânica

Classe terapêutica	Fármaco	Dose registrada	Indicação clínica no caso
Analgésico opioide	Metadona	5 mg	Transição analgésica e controle de desconforto
Bloqueador neuromuscular	Rocurônio	10 mg	Bloqueio neuromuscular em insuficiência respiratória grave
Bloqueador neuromuscular despolarizante	Suxametônio	100 mg	Manejo avançado de vias aéreas
Agente anestésico	Etomidato	2 mg	Procedimentos relacionados ao manejo intensivo
Catecolamina vasoativa	Epinefrina	1 mg	Suporte hemodinâmico
Antiarrítmico	Amiodarona	50 mg	Controle da instabilidade hemodinâmica associada à tentativa de pronação
Antipsicótico atípico	Quetiapina	25 mg	Manejo da agitação psicomotora
Antipsicótico	Risperidona	1 mg	Controle de sintomas comportamentais e agitação
Corticosteroide	Prednisona	20 mg	Tratamento adjuvante da pneumocistose
Corticosteroide	Prednisona	5 mg	Redução gradual do esquema terapêutico
Antifúngico	Anfotericina B	5 mg	Tratamento da histoplasmosse
Antifúngico	Itraconazol	100 mg	Consolidação/manutenção do tratamento da histoplasmosse
Antibiótico	Azitromicina	500 mg	Tratamento de infecção respiratória
Antibiótico	Levofloxacino	500 mg	Cobertura antimicrobiana respiratória
Antibiótico	Ceftriaxona	1 g	Cobertura antimicrobiana empírica
Antibiótico	Cefepime	2 g	Tratamento de infecção bacteriana grave
Antibiótico	Piperacilina/Tazobactam	4,5 g	Cobertura antimicrobiana de amplo espectro
Antimicrobiano	Clindamicina	300 mg	Tratamento da pneumocistose
Antimalárico/antiparasitário	Primaquina	15 mg	Tratamento da pneumocistose
Sulfona	Dapsona	100 mg	Terapia complementar/profilaxia da pneumocistose
Antiprotzoário	Pirimetamina	25 mg	Tratamento/profilaxia de infecções oportunistas
Terapia antirretroviral	Tenofovir	300 mg	Tratamento da infecção pelo HIV
Terapia antirretroviral	Lamivudina	300 mg	Tratamento da infecção pelo HIV
Terapia antirretroviral	Dolutegravir sódico	50 mg	Tratamento da infecção pelo HIV
Anti-hipertensivo	Captopril	25 mg	Controle pressórico
Diurético	Furosemida	10 mg	Manejo do balanço hídrico
Procinético	Bromoprida	5 mg	Manejo da intolerância gastrointestinal

Classe terapêutica	Fármaco	Dose registrada	Indicação clínica no caso
Antissecretor gástrico	Omeprazol sódico	50 mg	Profilaxia gastrointestinal
Inibidor da bomba de prótons	Omeprazol	20 mg	Proteção gástrica
Antidiarreico	Racecadotril	100 mg	Controle de sintomas gastrointestinais
Antagonista NMDA	Dextroretamina	50 mg	Sedação e analgesia adjuvantes

Abreviações: mg, miligrama; mcg, micrograma; HIV, vírus da imunodeficiência humana; NMDA, N-metil-D-aspartato. Nota: As doses apresentadas correspondem aos registros disponíveis em prontuário e não necessariamente representam doses cumulativas ou a totalidade dos esquemas terapêuticos utilizados durante a internação.

Figure 1. Clinical timeline from hospital admission to discharge from the intensive care unit (ICU).



Abbreviations: mg, milligram; mcg, microgram; HIV, human immunodeficiency virus; NMDA, N-methyl-D-aspartate. Note: The doses presented correspond to those available in the medical records and do not necessarily represent cumulative doses or the entirety of therapeutic regimens administered during hospitalization.

Following recovery of consciousness, while still in the intensive care unit, the patient reported structured perceptual experiences that could be grouped into four domains: respiratory distress, interoceptive phenomena, affective auditory perceptions, and persecutory narratives. Recurrent sensations included submersion and drowning, strangulation, air hunger, and progressively increasing pressure within the head. One particularly distinctive account involved the perception of being submerged inside a “chamber,” possibly related to interoceptive stimuli associated with mechanical ventilation and positive end-expiratory pressure (PEEP) adjustments.

Recurring environments characterized by vapors and smoke showed possible correspondence with inhalation therapies administered during invasive mechanical ventilation. Another noteworthy aspect was a positive perception associated with a change in

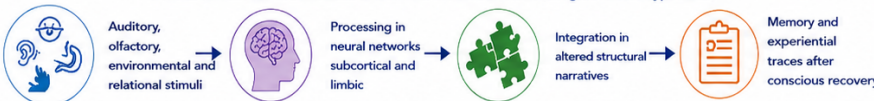
enteral nutrition, which was subsequently identified in the medical records. Clinical documentation also described three transient episodes of altered sedation levels, measured using the Richmond Agitation-Sedation Scale (RASS), associated with exposure to the voice of the patient's sister, the only family member authorized to visit during the COVID-19 pandemic. These episodes consisted of increases in RASS scores from -3 to -1/-2, followed by a return to baseline sedation levels.

In retrospective accounts, the patient associated these episodes with attempts to respond to his sister's voice, offering a possible phenomenological interpretation for the transient periods of increased responsiveness observed by the healthcare team. Although he had previous professional experience in intensive care medicine, the patient reported that the experiences were perceived as real events while they occurred rather than as interpretations related to the hospital environment. Nevertheless, the influence of prior knowledge, critical illness-associated delirium, and retrospective memory reconstruction cannot be excluded [1,8,16]. The reported experiences and their potential clinical-phenomenological correlates are summarized in Figure 2.

Figure 2. Mapping of the reported perceptual experiences and their potential clinical-phenomenological correlates during intensive care unit hospitalization.

RELATED EXPERIENCES (after contact recovery)	POSSIBLE CLINICAL CORRELATE (event during the illness course)	POSSIBLE PATHOPHYSIOLOGICAL MECHANISMS	EVIDENCE / FINDINGS THAT SUPPORT THE ASSOCIATION	RELATED OUTCOME / EVOLUTION
1  Sensation of drowning, suffocation and extracorporeal agitation in extreme difficulty to breathe.	Severe ARDS by COVID-19 with refractory hypoxemia ($\text{PaO}_2/\text{FiO}_2 < 90$), need for invasive mechanical ventilation and deep sedation.	- Hypoxemia severe - Permissive hypercapnia - Peripheral chemoreceptor overactivation - Reduced level of consciousness - Hypoxia delirium 	 - Severe ARDS recorded - Need for invasive mechanical ventilation - Deep sedation (RASS -4/-5) - Neuromuscular blockade - Hypoxia delirium	 Improved gas exchange, successful weaning from ventilator and clinical recovery.
2  Environments with vapor and odors: sensation of air in the face and repeated treatments.	Inhalation therapies with disconnected devices (nebulizations, hypertonic solution, budesonide, N-acetylcysteine) and repeated tracheal suctioning.	- Olfactory and trigeminal stimuli - Sensory processing altered - Impaired olfactory memory - Subcortical sensory integration 	 - Record of nebulizations and aerosol medications - Tracheal suction - Use of humidification system	 Reduction of the need for nebulizations and improvement of pulmonary function.
3  Perception of change in food flavor and food dysgeusia ("tastes like something rancid or something else").	Change in enteral diet or palliative diet for dysphagia (immunomodulatory formula hyperproteic and normocaloric).	- Gustatory and interoceptive stimuli - Altered sensorimotor processing - Impaired gustatory memory - Altered interoceptive perception 	 - Record of change in diet enteral on 03/27/2022 - Continuous administration for tube feeding	 Maintenance of food tolerance and adequate nutritional intake.
4  Perception of loud voice associated with stressful presence, comfort and return to consciousness.	Presence and communication of familiar (family recordings of videos and audio stimuli) during the sedation period.	- Residual auditory processing - Subcortical limbic system - Altered emotional stimuli - Modulation of arousal and responsiveness 	 Recordings of RASS -3 to -1/-2 after exposure to family voices recorded in different classes	 Possible modulation of anxiety level and sedation and responsiveness.
5  Perception of figures or spirits in the ICU: sensation of presence, threat and persecution.	Episodes of hypoactive delirium associated with deep sedation, isolation, ICU environment and systemic inflammation.	- Hypoactive delirium - Systemic hypoxia and inflammation - Altered neurotransmission - Sleep-wake cycle disturbance 	 - Hypoactive delirium diagnosis (CAM-ICU positive) - Sedation records with multiple hypnotics - Systemic infection	 Resolution of delirium with reduction of sedatives and overall clinical improvement.

INTEGRATION OF MULTIMODAL RESIDUAL PERCEPTION (integrative case hypothesis)



IDENTIFIED MODULATING FACTORS

- Depth of sedation and delirium duration
- Systemic inflammation and hypoxia
- Environmental stimuli (odors, light, noise, touch, speech)
- Meaningful emotional stimuli (family voices)
- Individual predisposition and neural vulnerability



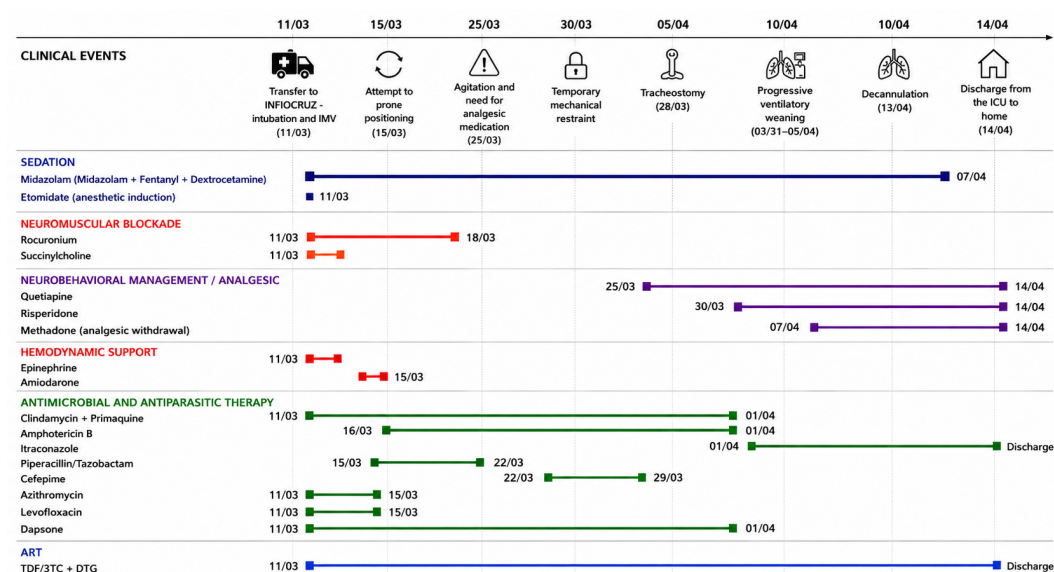
Abbreviations: ARDS, acute respiratory distress syndrome; $\text{PaO}_2/\text{FiO}_2$, arterial oxygen pressure/fraction of inspired oxygen ratio; RASS, Richmond Agitation-Sedation Scale; CAM-ICU, Confusion Assessment Method for the Intensive Care Unit; ICU, intensive care unit.

At discharge, the patient demonstrated recovery of gas exchange ($\text{PaO}_2/\text{FiO}_2 = 386$) and immunological status ($\text{CD4} = 116 \text{ cells/mm}^3$; undetectable viral load). Discharge occurred directly from the ICU to home on April 14, 2022, at the patient's request, with family agreement and a favorable assessment by the healthcare team, followed by outpatient follow-up. The chronology of the main medications administered during hospitalization and their temporal relationship with clinical events is summarized in Figure 3.

During post-ICU outpatient follow-up, records of evaluations performed on May 16, 2022, and June 14, 2022, were identified. The patient remained on antiretroviral therapy

(TDF/3TC + DTG), itraconazole, and restarted dapsone, maintaining a favorable clinical course. Evaluations conducted by infectious disease and neuropsychology specialists included investigation of possible psychological repercussions related to the critical illness hospitalization. Although no diagnosis of post-traumatic stress disorder (PTSD) was established, medical records documented reports of sadness, emotional distress, and existential questioning related to survival and the recovery process. No subsequent records were identified in the institutional medical chart analyzed, possibly due to continuation of follow-up at another healthcare facility.

Figure 3. Chronological representation of the main clinical events, therapeutic interventions, and medications considered most relevant to the patient's clinical course during intensive care unit hospitalization.



Abbreviations: ART, antiretroviral therapy; IMV, invasive mechanical ventilation; TT, tracheostomy; O₂, oxygen therapy; HIV, human immunodeficiency virus; COVID-19, coronavirus disease 2019 (caused by SARS-CoV-2).

3. Discussion

The subjective experiences reported by survivors of critical illness remain a poorly understood phenomenon and represent a challenge for contemporary intensive care medicine. Although traditionally interpreted as manifestations of delirium or confabulatory processes associated with recovery of consciousness, growing evidence suggests that structured perceptual experiences may occur during periods of prolonged sedation and invasive mechanical ventilation (IMV), frequently incorporating elements of the care environment and the patient's physiological state [1–3,8,16].

In the present case, a patient with severe COVID-19, advanced HIV infection, pneumocystosis, and pulmonary histoplasmosis developed severe acute respiratory failure, requiring IMV, moderate-to-deep sedation, neuromuscular blockade, and prolonged intensive care support. Following recovery of consciousness, he reported organized experiences involving sensations of drowning, entrapment, exposure to environmental vapors, altered food perception, and attempts at communication with a family member. Some of these experiences showed an apparent temporal correspondence with events documented in the medical record, including changes in ventilatory support, aerosol therapy, modifications in enteral nutrition, and exposure to a family member's voice [7,9,11].

However, interpretation of these findings requires caution. Delirium associated with critical illness remains one of the most likely explanations for complex perceptual experiences observed in intensive care unit (ICU) patients. It is a multifactorial neuropsychiatric syndrome related to systemic inflammation, neurotransmitter dysfunction, sleep depriva-

tion, sedative use, IMV, and disease severity [4–7,17,18]. Furthermore, fragmented memories formed during periods of fluctuating consciousness may be retrospectively reorganized, generating coherent narratives after clinical recovery [1,7,16,18]. In the present case, several factors known to be associated with delirium were simultaneously present, including severe acute respiratory failure, significant hypoxemia, prolonged sedation, IMV, systemic infections, and prolonged ICU stay. Therefore, it is not possible to determine to what extent the reported experiences reflected direct perception of environmental stimuli, delirious processes, or a combination of these mechanisms [7,18].

Another relevant aspect concerns the potential role of hypoxia and neuroinflammation. Severe COVID-19 is associated with an intense systemic inflammatory response and neurological manifestations that may include encephalopathy, delirium, and transient cognitive dysfunction [9–11]. In parallel, individuals with advanced HIV infection may exhibit increased vulnerability to neurocognitive alterations resulting from chronic inflammatory activation, even in the absence of opportunistic infections involving the central nervous system. The coexistence of severe COVID-19, advanced HIV-related immunosuppression, and opportunistic pulmonary infections constitutes a biologically plausible setting for alterations in perception and sensory integration during critical illness [10,11]. Beyond inflammatory and infectious factors, the pharmacological context of hospitalization should also be considered when interpreting the perceptual phenomena observed.

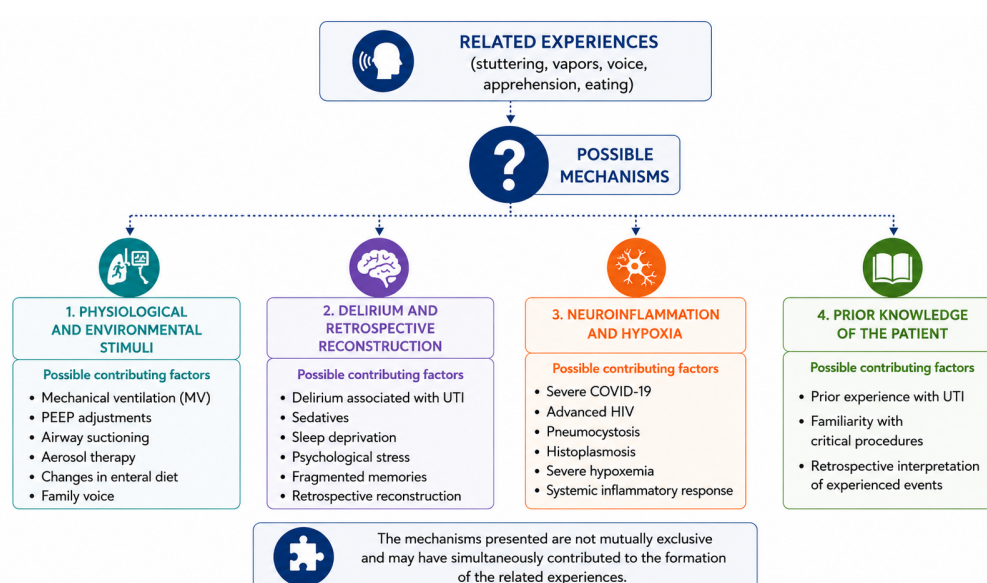
An additional relevant aspect relates to the pharmacological management during hospitalization (Table 2; Figure 3). The patient received a combination of sedatives, opioids, neuromuscular blocking agents, and medications used for behavioral management during different phases of critical illness. Previous studies have demonstrated that sedative and analgesic agents may influence memory formation, fragmentation, and reconstruction in critically ill patients, contributing to complex subjective experiences that are sometimes disconnected from objective reality [4,19]. Although deep sedation reduces the likelihood of organized explicit memory formation, experimental evidence suggests that certain levels of implicit sensory processing may remain preserved, particularly during periods of fluctuating consciousness [20,21,23]. In addition, during the recovery phase, medications directed at controlling agitation, behavioral symptoms, and preventing delirium-related complications, including quetiapine and risperidone, were administered (Table 2 and Figure 3). The use of these medications suggests that the healthcare team identified clinically relevant neurobehavioral manifestations throughout the hospitalization.

In this context, the coexistence of delirium, prolonged exposure to sedation, severe hypoxia, systemic neuroinflammation, and subsequent pharmacological management constitutes a scenario compatible with the formation of fragmented memories and complex subjective narratives, as described in survivors of intensive care [1,2,5]. Although causal relationships cannot be established from a single case, these elements provide a clinically plausible context for interpreting the experiences reported after recovery of consciousness. The probable clinical and phenomenological mechanisms potentially involved in the formation of the experiences described in this case are presented exploratorily in Figure 4. The diagram summarizes competing and non-mutually exclusive hypotheses, including physiological and environmental stimuli, delirium, hypoxia, neuroinflammation, and the influence of the patient's prior knowledge of the intensive care environment [4–9,11,19–23].

One of the most intriguing aspects of this case was the documentation of three episodes of transient elevation in the Richmond Agitation–Sedation Scale (RASS) score during exposure to the patient's sister's voice. Studies using functional electroencephalography and neuroimaging suggest that emotionally relevant auditory stimuli may continue to be processed during altered states of consciousness, including sedation and coma, although the clinical significance of these findings remains under investigation [12,13,22]. In

the present report, the observed temporal association does not allow inference of preserved conscious auditory perception but suggests that affectively meaningful stimuli may have influenced observable behavior even under conditions of reduced consciousness [19–23]. Studies investigating implicit memory during sedation indicate that environmental information may be processed to varying degrees, even in the absence of subsequently retrievable explicit memory formation [19,20].

Figure 4. Illustrative schematic representation of the probable factors contributing to the formation of the subjective experiences reported after the patient’s recovery of consciousness. The different clinical and phenomenological mechanisms are not mutually exclusive and may have acted simultaneously or synergistically. This schematic model should be interpreted solely as an exploratory hypothesis intended to illustrate possible mechanisms involved in this case.



Abbreviations: ICU, intensive care unit; IMV, invasive mechanical ventilation; PEEP, positive end-expiratory pressure; HIV, human immunodeficiency virus; COVID-19, coronavirus disease 2019 (caused by SARS-CoV-2).

The interpretation of these reports should also consider an important limitation: the patient was a healthcare professional with previous experience in intensive care and academic teaching. This prior knowledge may have influenced both the way the experiences were perceived and the manner in which they were subsequently interpreted and narrated. Consequently, the contribution of retrospective reconstruction processes based on previous familiarity with ICU procedures, equipment, and routines cannot be excluded [1,9,10,23].

Despite these limitations, several aspects deserve attention. The observed correspondence between certain subjective experiences and events documented in the medical record, particularly those related to mechanical ventilation, aerosol therapy, changes in enteral nutrition, and exposure to a family member’s voice, reinforces the importance of considering the subjective experience of critically ill patients as a relevant component of intensive care. These findings are also consistent with the growing interest in the humanization of ICU care, emphasizing the relevance of family interactions, therapeutic communication, and attention to the potential psychological consequences of critical illness hospitalization [12,13,15].

Therefore, the findings of this report do not demonstrate residual perceptual integration, nor do they establish causal relationships between specific environmental stimuli and the experiences subsequently reported. However, they suggest that multiple potentially concurrent mechanisms, including delirium, hypoxia, neuroinflammation, residual

sensory processing, and retrospective memory reconstruction, may have contributed to the formation of the experiences described. Prospective studies are needed to better understand the nature of these experiences and their relationship to consciousness during critical illness requiring prolonged sedation.

4. Conclusion

This report describes structured perceptual experiences reported after recovery of consciousness by a patient with severe COVID-19, advanced HIV infection, and opportunistic pulmonary infections who underwent invasive mechanical ventilation and prolonged ICU sedation. The observed correspondence between some of the experienced contents and documented events during hospitalization suggests the possibility of interaction among physiological, sensory, and affective stimuli present in the healthcare environment and the narratives subsequently reported. However, the presence of multiple potentially contributing factors precludes any causal inference regarding the mechanisms responsible for these experiences. Furthermore, the patient's prior knowledge of the intensive care environment should be considered when interpreting the findings.

Accordingly, this single case does not allow determination of the mechanisms responsible for the perceptual experiences reported during sedation but highlights the complexity of subjective phenomena observed in critically ill patients and reinforces the need for prospective studies to better understand the relationship between perceptual experiences, critical illness, and recovery of consciousness. It also underscores the importance of patient- and family-centered care strategies, contributing to the ongoing discussion regarding the humanization of intensive care practice.

Funding: None.

Research Ethics Committee Approval: This case report was prepared in accordance with the CARE (CAse REport) Guidelines to ensure transparency, completeness, and rigor in clinical reporting. Written informed consent was obtained from the patient for publication of this case report and the associated figures. We declare that the study was conducted in accordance with the ethical principles established by the Declaration of Helsinki.

Acknowledgments: The authors thank the multidisciplinary teams of Hospital Municipalizado Adão Pereira Nunes (HMAPN) and the Instituto Nacional de Infectologia Evandro Chagas (INI/Fiocruz) for their technical excellence and humanized care throughout the patient's treatment and recovery.

Conflicts of Interest: All other authors declare no conflicts of interest.

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