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# Authentic Nursing Leadership and Safety Climate Across Hospital Settings During the COVID-19 Pandemic: A Cross-Sectional Study

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## ABSTRACT

**Aim:** To analyse the relationship between authentic nursing leadership and safety climates across hospital settings during the COVID-19 pandemic.

**Background:** Authentic nursing leadership shapes the safety climate by fostering positive perceptions of workplace policies, processes, procedures and practices that influence how safety is prioritised and addressed within an organisation.

**Design:** A cross-sectional study.

**Methods:** Our study was conducted from December 2021 to December 2022 in six Brazilian hospitals. Participants were nursing staff working in General Medicine Units, Intensive Care Units (ICU) and Emergency Departments (ED) who provided care to patients with COVID-19. The Authentic Leadership Questionnaire and the Safety Attitudes Questionnaire were used to measure nursing staff perceptions of authentic leadership and safety climates. Data were analysed using descriptive and inferential statistics.

**Results:** 391 nursing staff across six hospitals participated. Self-awareness significantly enhanced perceptions of the safety climates. Additionally, being a Registered Nurse and working in the ICU were positively associated with achieving safe climates in the working environment. In contrast, working in EDs was significantly negatively related to safety climates.

**Conclusions:** The COVID-19 pandemic underscored a lack of authentic nursing leadership and unsafe climates. Therefore, it is critical to implement educational strategies that foster authentic leadership, particularly focusing on self-awareness, to promote more positive safety climates. Ensuring that leadership and safety climates are relationship-focused is critical to enhancing patient outcomes.

**Implications for the Profession and/or Patient Care:** Nursing staff's perceptions of authentic leadership and safety climates are important in making more informed decisions about patient management.

**Impact:** Since self-awareness increases positive perceptions of safety climates, nursing staff should exercise it to guide their actions in facing future health crises.

**Reporting Method:** STROBE guidelines.

**Patient or Public Contribution:** Higher self-awareness in relationships with others is a predictor of safety climates and can lead to enhanced patient outcomes.

**Summary**

- What does this paper contribute to the wider global clinical community?
  - The COVID-19 pandemic revealed a worrisome scenario with a lack of authentic nursing leadership and unsafe work environments.
  - Hospitals should implement strategies that foster authentic leadership among nursing staff, particularly focusing on self-awareness, to promote more positive safety climates.

## 1 | Introduction

Flexible and contemporary leadership models, such as resonant and authentic, contribute to worker and patient satisfaction (Cummings et al. 2018) and to health system performance by improving quality and efficiency through supporting positive perceptions of the safety climate (Wong, Cummings, and Ducharme 2013; Dirik and Seren Intepeler 2017). Authentic leadership refers to leaders with deep self-awareness of their beliefs, behaviours and values that enhance effective outcomes in healthcare organisations (Avolio et al. 2004; Sfantou et al. 2017; Cummings et al. 2018) and increase positive perceptions of safety climate (Dirik and Seren Intepeler 2017; Cummings et al. 2018; Mrayyan et al. 2023). Safety climates refer to the shared perception of workplace policies, processes, procedures and practices that shape how safety is prioritised and addressed within the workplace in an organisation (Zohar 2011). Given that health care was compromised around the world during the COVID-19 pandemic (Moynihan et al. 2021), effective leadership is essential to ensure safe and quality practices (Wong, Cummings, and Ducharme 2013; Dirik and Seren Intepeler 2017).

As the largest health workforce, nurses fulfil various essential roles in health care, management and teaching (World Health Organization 2020). The nursing workforce played a leading role in addressing the COVID-19 pandemic but has been negatively affected by the pandemic's effects on the organisation and functioning of health services and systems, with unfavourable working conditions increasing the risk of adverse outcomes related to patient safety (Pan American Health Organization 2022). Concurrently, as one of the contemporary leadership models, authentic leadership has been studied in the health sector and among nursing staff to understand the leadership profile of nurses and their contributions to health services and systems (Cummings et al. 2010, 2018; Maziero et al. 2020). A systematic review showed that authentic nursing leadership improves outcomes for the nursing workforce and environments (Cummings et al. 2018). Thus, investigating the relationship between leadership and safety climate in healthcare organisations is crucial, as leadership plays a vital role in guiding individuals toward making the right choices, ultimately fostering a safety culture that reduces unnecessary harm within healthcare settings (Dirik and Seren Intepeler 2017; Cummings et al. 2018).

The COVID-19 pandemic exposed concerns from nursing staff and patients, underscoring the lack of authentic nursing leadership and unsafe climates. In this context, leaders played a crucial role in developing policies, organising health institutions and enhancing team communication. They provided social and emotional support, empowering their teams to make informed decisions (Bavel et al. 2020). Evidence from nursing staff regarding authentic leadership and its connection to safety climates offers valuable information for diagnosing patient safety issues, leading to more informed decisions about patient management. These findings can contribute to practice by promoting future behaviour changes, where leadership is crucial in improving the safety climate.

## 2 | Background

Authentic leadership refers to leaders with deep self-awareness of their beliefs, behaviours and values. They are recognised for understanding their own and others' moral perspectives, knowledge and strengths. These leaders are attuned to their environment and characterised by confidence, hope, resilience and strong moral character (Avolio et al. 2004). Authentic leadership theory includes four components: (1) Self-awareness; (2) Relational transparency; (3) Balanced processing and (4) Internalised moral perspective. Self-awareness reflects leaders' willingness to assess their strengths and opportunities for improvement continually. Relational transparency refers to leaders' ability to remain consistent with their values in their relationship with their team. Balanced processing reflects unbiased decision-making. Finally, an internalised moral perspective involves leaders' values that are consistent with their moral conduct (Avolio et al. 2004; Walumbwa et al. 2008).

Authentic leaders promote positive emotions and transparent relationships in which the team and the organisation recognise the leader's authenticity (Gardner et al. 2011). Based on authentic leadership theory, an organisational culture centred on quality of care, patient and employee safety can be established. Consequently, when these leaders demonstrate commitment and provide the necessary resources and incentives to promote and improve patient safety, the perception of employee safety is also improved. In this way, authentic leadership can directly affect staff's perceptions of the safety climate in a healthcare organisation (Dirik and Seren Intepeler 2017).

Patient safety has been studied in health services over the last few decades, given the complexity of providing safe patient care and organisational factors (Bates et al. 2023). The perceived importance of patient safety and its influence on care outcomes has led to a growing interest in assessing the safety climate in healthcare organisations. The safety climate refers to the shared perception of workplace policies, processes, procedures and practices that shape how safety is prioritised and addressed within an organisation (Zohar 2011). Thus, by evaluating the safety climate, it is possible to provide information to hospital management on how to implement safe care practices that enhance patient outcomes (Alsalem, Bowie, and Morrison 2018; Wong, Cummings, and Ducharme 2013; Zhou et al. 2018).

## 3 | The Study

### 3.1 | Aim

To analyse the relationship between authentic nursing leadership and safety climates across hospital settings during the COVID-19 pandemic.

### 3.2 | Hypothesis

Given the negative repercussions of the COVID-19 pandemic on the performance of health systems, our hypothesis was that authentic nursing leadership and safety climates were negatively related across hospital settings during the COVID-19 pandemic.

## 4 | Methods

### 4.1 | Design

This cross-sectional study measures authentic leadership and safety climates during the COVID-19 pandemic, from the perspective of nursing staff (nursing assistants, nursing technicians and Registered Nurses) working in General Medicine Units, Intensive Care Units (ICU) and Emergency Departments (ED) across six hospitals. The study was reported using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist (Von Elm et al. 2007).

### 4.2 | Study Setting and Sampling

The study was conducted from December 2021 to December 2022 in six Brazilian hospital settings: Four in Brasília, Federal District, one in Campinas, São Paulo, and one in Ribeirão Preto, São Paulo. The hospitals were chosen for their role as reference centers in delivering care to patients during the COVID-19 pandemic. Table 1 describes the hospitals per type of facility, location, number of beds and number of nursing staff.

The sample was obtained from the Brazilian nursing workforce, which includes Registered Nurses (RNs), nurse technicians and nursing assistants. RNs are responsible for various activities, such as managing nursing departments, organising and evaluating care, consulting, auditing, prescribing nursing care and providing high-complexity care. They also participate in health programming, medication management and infection control, with responsibilities extending to health education. Nursing technicians, under the supervision of RNs, participate in nursing care programming, performing all care tasks except those reserved for nurses. Nursing assistants, under the supervision of RNs, focus on observing and reporting patient symptoms, providing essential treatments and ensuring patient hygiene and comfort (COFEN 1986). Nursing staff working in General Medicine Units, Intensive Care Units (ICU) and Emergency Departments (ED) that provided care to patients with COVID-19 were included. Duplicate data, missing data and inconsistent records were not considered.

Due to the pandemic context in which the study was conducted and the lack of essential information provided by the hospitals for accurate sample calculation, convenience sampling was used. Although this approach may limit the representativeness of the sample relative to the overall population, the Chi-square test was used to determine statistical significance by comparing the sample proportions to those expected in the general population, thereby identifying any significant differences.

### 4.3 | Measurement

Nursing staff responded to a survey comprising: (1) Sociodemographic characteristics questionnaire; (2) Authentic Leadership Questionnaire- Rater Version (ALQ-Rater) and (3) Safety Attitudes Questionnaire (SAQ) – Short Form 2006. Validity and reliability metrics for Brazilian Portuguese were obtained for ALQ-Rater and SAQ (Maziero et al. 2022; Carvalho and Cassiani 2012). Permission to use the ALQ-Rater and SAQ was obtained via email to the corresponding author, who established the psychometric properties for the Brazilian context.

The sociodemographic characteristics were obtained from a semistructured questionnaire, which included the following data: Hospital (H1-H6), type of hospital (private or public), professional category (Registered Nurse, nursing technician and nursing assistant), education (technician, undergraduate, specialisation and Master's degree), gender (female or male) and work unit (General Medicine Unit, ICU or ED).

The 'Authentic Leadership Questionnaire – Rater Version (ALQ-Rater),' was used to measure observer-assessed authentic

**TABLE 1** | Profile of study hospitals.

| Hospital | Type of facility | Location (City, State) | Number of beds | Number of nursing staff |
|---|---|---|---|---|
| H1 | Private | Brasília, Federal District | 125 | 631 |
| H2 | Public Military | Brasília, Federal District | 400 | 760 |
| H3 | Public | Brasília, Federal District | 634 | 2077 |
| H4 | Public | Brasília, Federal District | 286 | 649 |
| H5 | Public Teaching | Ribeirão Preto, São Paulo | 815 | 1991 |
| H6 | Private | Campinas, São Paulo | 202 | 720 |

leadership. Nursing assistants and technicians assessed their direct RN, while RNs assessed their direct nurse manager. ALQ-Rater consists of 13 items with a score of 0 to 4 for each item, computed by selecting an option on a 5-point scale: 0 = rarely/never; 1 = occasionally; 2 = sometimes; 3 = frequently; 4 = often, almost always. The total score of the instrument ranges from 0 to 52 points, with higher scores indicating greater perceived authenticity in their supervisor's leadership style and has three domains: Relational and Moral; Balanced Processing; and Self-awareness (Maziero et al. 2022).

The 'Safety Attitudes Questionnaire (SAQ) – Short Form 2006' was used to measure the safety climate perceived by nursing staff. The instrument has 41 items within six theoretical domains: Teamwork Climate, Safety Climate, Job Satisfaction, Stress Recognition, Perception of the Management Unit and the Hospital and Working Conditions. Each item is answered on a scale of agreement: Disagree strongly (A) = 0 points; slightly disagree (B) = 25 points; neutral (C) = 50 points; slightly agree (D) = 75 points; and strongly agree (E) 100 points, or not applicable. The final score of the scale ranges from 0 to 100, in which 0 corresponds to the worst perception of the safety climate and 100 to the best perception. Positive values are considered when the score is greater than or equal to 75 (Carvalho and Cassiani 2012).

Cronbach's Alpha was used to assess the ALQ-Rater and SAQ's reliability, resulting in satisfactory values of 0.94 for each (Dunn, Baguley, and Brunsden 2014). *Independent variables* for all outcomes were: Sociodemographic characterisation, hospital (H1, H2, H3, H4, H5 and H6), unit of work (General Medicine Unit, ICU and ED), type of hospital (public and private), time of work in the hospital (years) and weekly workday (hours). Our independent variable was authentic leadership (Avolio et al. 2004; Walumbwa et al. 2008), and we used the ALQ-Rater (0–52 points) and its three domains—Relational Transparency (0–28 points), Internalised Moral Perspective (0–12 points) and Self-Awareness Balanced (0–12 points). *Outcome variables* for the analyses were: Teamwork Climate, Safety Climate, Job Satisfaction, Stress Recognition, Perception of Unit Management, Perception of Hospital Management and Working Conditions (seven SAQ domains).

### 4.4 | Data Collection

The data collection was conducted in two phases: (1) Phase One: In-person pilot test and (2) Phase Two: Online Google Forms. To ensure consistency in the selection of the participants, the research team ensured that each nursing staff member completed the survey only once.

Data from Phase One were collected in person as part of a pilot test conducted between November and December 2021. Face-to-face data collection was undertaken to ensure consistency and reliability in responses. Participants were approached by the research team during their work hours, at times when they were not engaged in direct patient care. The purpose of the study was explained to the participants to confirm their interest in participating. Those who agreed to participate were given a sealed envelope containing the questionnaires and an informed consent form. The researchers remained available to address questions and ensure the participants' privacy. Once the questionnaires were completed, the research team collected the sealed envelopes. The primary objective of this initial phase was to identify potential issues with the survey instrument, but no adjustments were required. Given the challenges in accessing staff led to low participation, the data collected during this phase = were included in the final analysis to provide a baseline and context for subsequent findings.

Phase Two data were collected online from December 2021 to December 2022 using Google Forms. Participants were invited to complete the survey via institutional emails provided by hospitals. Due to the pandemic, multiple attempts were necessary to engage participants, with up to eight contact attempts made per individual and reminders sent every 15 days.

The final database was established by merging the data from Phases One and Two. The data from Phase One were independently double-entered into Excel by two researchers in a blinded manner. Subsequently, consensus meetings were held among the researchers to check and validate the entered data. The data from Phase Two were directly exported from Google Forms to Excel. As a result, the data from both phases were combined in Excel, composing the final database.

### 4.5 | Data Analysis

Data were analysed using descriptive statistics; Mann–Whitney and Kruskal–Wallis tests, considering a 5% significance level and 95% confidence interval; and the Generalised Additive Models for Location, Scale and Shape (GAMLSS). The variables were selected by assessing the presence of multicollinearity among the independent variables and by the Generalised Akaike Information Criterion (GAIC) with a penalty equal to 2 (AIC, $k = 2$) (Sakamoto et al. 1986). The same criterion was also applied in a subsequent step to select data for the independent variables with a penalty parameter equal to 4 ($k = 4$) according to the following procedure (Bastiani et al. 2018).

1. Use a forward GAIC to select variables for $\mu$ while keeping the parameters $\nu$ and $\tau$ constant.
2. Use a forward GAIC to select variables for $\nu$, given the model obtained for $\mu$ at 1 and constant for the parameter $\tau$.
3. Use a forward GAIC to select variables for $\tau$, given the model obtained for $\mu$ and $\nu$ obtained e values of 1 and 2, respectively.
4. Backward GAIC was used to eliminate variables for $\tau$, given that the models obtained for $\mu$ and $\nu$ obtained $e$ values of 1 and 3, respectively.
5. Backward GAIC was used to eliminate variables for $\nu$, given that the models obtained for $\mu$ and $\tau$ obtained e values of 3 and 4, respectively.

6. Backward GAIC was used to eliminate variables for $\mu$, given that the models obtained for $\mu$ and $\nu$ obtained e values of 4 and 5, respectively.

To assess the adequacy of the adjusted model, a diagnostic analysis was applied to the model residuals, defined by the graphs of residuals versus adjusted values, residuals with the order of observation, the density of residuals and quantile–quantile graph (qqplot). In addition, the Shapiro–Wilk normality test was applied to the residuals of the adjustment. The intercept was established based on the sample's representativeness and calculated as the average Safety Climate score for nursing assistants and technicians in the General Medicine Unit. This approach was taken to allow for a more precise evaluation of the relationship between other predictors, such as self-awareness and work in the ICU or ED, particularly since this group represents the largest portion of the study's participants. According to the study hypothesis, it was not possible to specify the difference by unit and by hospital in the analysis.

For all the model parameters, whose link function used was logarithmic (log) or logit (logit), the relative increase in the mean was calculated as $AR(\beta) = 100 \times |\exp.(-) - 1|$. A value above 1 indicates a relative increase in the mean, while a value below 1 indicates a relative decrease in the mean. Data analysis was performed using the R program version 4.2.2, which can be downloaded for free at www.r-project.org at the 5% significance level ($\alpha = 0.05$) and using the gamlss (Rigby and Stasinopoulos 2005) and gamlss.tr (Stasinopoulos and Rigby 2020) packages.

### 4.6 | Ethical Considerations

The study was conducted according to the Declaration of Helsinki guidelines and approved by the Ethics Committee, Ribeirão Preto College of Nursing, University of São Paulo (EERP/USP), on November 16, 2020, under permit number 39424820.2.0000.5393. Informed consent forms were obtained from all participants.

## 5 | Results

Overall, 391 nursing staff participated, with 111 from Phase One and 290 from Phase Two. There was a predominance of nursing technicians (58.3%) and females (79.0%) who worked in General Medicine Units (55.4%). Most respondents (51.41%) were from hospitals in Brasília (H1 to H4), followed by 40.15% from Ribeirão Preto (H5) and 8.44% from Campinas (H6). The average age was 38.3 years old, with 12.1 years of training, 7.7 years of experience in the hospital and 5.5 years of experience in the unit. Table 2 shows the sociodemographic characteristics of the nursing staff.

Table 3 presents descriptive statistics for the ALQ-Rater and SAQ across various dimensions. The domains of the ALQ-Rater, including Relational Transparency, Internalised Moral Perspective and Balanced Self-Awareness, show moderate mean scores with notable variability, as indicated by their standard deviations. The overall ALQ-Rater mean score was 10.9, suggesting moderate levels of authentic leadership among participants.

**TABLE 2** | Sociodemographic characteristics of the nursing staff ($n = 391$).

| Variables | *n* | % |
|---|---|---|
| Gender | | |
| Female | 309 | 79.0 |
| Male | 82 | 21.0 |
| Professional category | | |
| Nursing Assistant | 24 | 6.1 |
| Nursing Technician | 228 | 58.3 |
| Registered Nurse (RN) | 139 | 35.5 |
| Education | | |
| Technician | 166 | 43.8 |
| Undergraduate | 91 | 24 |
| Specialisation | 112 | 29.6 |
| Master's degree | 10 | 2.6 |
| Work unit | | |
| General Medicine Units | 211 | 55.4 |
| Intensive Care Units (ICU) | 150 | 39.4 |
| Emergency Departments (ED) | 20 | 5.2 |
| Hospital | | |
| H1 | 44 | 11.3 |
| H2 | 55 | 14.1 |
| H3 | 51 | 13.0 |
| H4 | 51 | 13.0 |
| H5 | 157 | 40.2 |
| H6 | 33 | 8.4 |
| Type of hospital | | |
| Public | 283 | 72.4 |
| Private | 108 | 27.6 |

In contrast, dimensions of the SAQ, including Teamwork Climate, Safety Climate and Job Satisfaction, display higher average scores, particularly Job Satisfaction, with a mean of 79.8, indicating generally positive perceptions among participants. However, domains like Perception of Hospital Management and Working Conditions have lower mean scores, highlighting prospective areas for improvement. High standard deviations and interquartile ranges across ALQ-Rater and SAQ dimensions suggest significant variability in responses, reflecting diverse experiences and perceptions within the sample (Table 3).

Table 4 presents correlations between ALQ-Rater and SAQ domains across six contexts (H1 to H6). Significant differences are observed in various ALQ-Rater dimensions, with Relational and Moral ($p = 0.006$), Balanced Processing ($p = 0.005$), Self-awareness ($p = 0.020$) and overall ALQ-Rater score ($p = 0.003$) showing higher mean scores. Among the

**TABLE 3** | Descriptive statistics by ALQ-Rater and SAQ.

| Variables | *n* | Mean | Std. deviation | Median | Interquartile range |
|---|---|---|---|---|---|
| ALQ-Rater | | | | | |
| Relational transparency | 391 | 17.5 | 7.0 | 18.0 | 11.0 |
| Internalised moral oerspective | 391 | 7.6 | 3.3 | 8.0 | 4.0 |
| Self-awareness balanced | 391 | 7.5 | 3.3 | 9.0 | 5.0 |
| ALQ-Total | 391 | 10.9 | 12.7 | 34.0 | 19.0 |
| SAQ | | | | | |
| Teamwork climate | 391 | 72.1 | 19.7 | 75.0 | 25.0 |
| Safety climate | 391 | 70.4 | 20.4 | 75.0 | 28.0 |
| Job satisfaction | 386 | 79.8 | 23.6 | 85.0 | 30.0 |
| Stress recognition | 386 | 70.5 | 28.6 | 75.0 | 43.8 |
| Perception of unit management | 390 | 60.0 | 24.3 | 62.5 | 34.2 |
| Perception of hospital management | 390 | 57.1 | 23.9 | 58.3 | 33.3 |
| Working conditions | 386 | 60.6 | 30.2 | 62.5 | 49.0 |
| SAQ-Total | 391 | 67.2 | 16.8 | 69.4 | 21.2 |

**TABLE 4** | Correlation of ALQ-Rater and SAQ domains with the settings.

| | H1 (*n* = 44) | H2 (*n* = 55) | H3 (*n* = 51) | H4 (*n* = 51) | H5 (*n* = 157) | H6 (*n* = 33) | *p* |
|---|---|---|---|---|---|---|---|
| ALQ-Rater | | | | | | | |
| Relational and moral | 17.47 (7.48) | 16.82 (8.51) | 17.60 (7.12) | 20.72 (6.90) | 16.67 (6.11) | 17.09 (6.95) | **0.006*** |
| Balanced processing | 7.65 (3.27) | 6.82 (4.06) | 7.79 (3.29) | 8.25 (2.85) | 7.33 (3.03) | 7.63 (3.22) | **0.005*** |
| Self-awareness | 7.95 (2.97) | 7.00 (3.75) | 7.56 (3.16) | 8.78 (2.91) | 6.73 (3.17) | 7.50 (3.31) | **0.020*** |
| ALQ-Total | 33.07 (12.53) | 30.64 (15.51) | 32.96 (12.73) | 38.56 (11.89) | 31.24 (11.42) | 32.22 (12.78) | **0.003*** |
| SAQ | | | | | | | |
| Teamwork climate | 68.00 (23.93) | 68.58 (18.19) | 75.82 (18.06) | 75.58 (22.98) | 71.71 (17.87) | 74.22 (19.03) | 0.059 |
| Security climate | 72.44 (23.20) | 68.79 (19.29) | 69.70 (22.59) | 73.18 (22.66) | 69.20 (18.14) | 72.65 (20.29) | 0.265 |
| Job satisfaction | 73.26 (30.95) | 76.25 (24.27) | 85.56 (20.25) | 83.15 (24.06) | 78.35 (21.73) | 85.12 (20.83) | **0.026*** |
| Stress perception | 67.30 (32.76) | 84.08 (21.00) | 68.23 (29.48) | 74.75 (25.32) | 66.09 (28.23) | 75.65 (27.37) | **0.002*** |
| Perception of unit management | 60.99 (26.13) | 55.98 (27.34) | 59.13 (25.00) | 60.15 (25.29) | 58.36 (21.87) | 71.41 (23.30) | **0.017*** |
| Perception of hospital management | 65.08 (25.92) | 54.73 (24.71) | 61.91 (22.26) | 56.70 (22.52) | 51.16 (22.61) | 67.83 (22.43) | **< 0.001*** |
| Work conditions | 69.86 (32.65) | 50.75 (31.07) | 59.90 (33.85) | 55.42 (31.86) | 61.49 (26.90) | 70.31 (27.04) | **0.008*** |
| Safe behaviour | 74.42 (31.73) | 74.00 (26.06) | 82.12 (22.92) | 68.83 (27.49) | 73.34 (23.63) | 78.26 (22.57) | 0.118 |
| SAQ-Total | 67.70 (22.00) | 65.58 (15.75) | 69.24 (15.81) | 67.86 (18.36) | 65.33 (14.64) | 73.46 (17.50) | **0.004*** |

*$p < 0.05$.

**TABLE 5** | Model of factors associated with the domain 'Safety Climate'.

| | Estimate | Std. error | *t* | Pr(> \|*t*\|) |
|---|---|---|---|---|
| $\mu$ | | | | |
| (Intercept) | 62.171 | 2.463 | 25.242 | 0.000* |
| Professional category (Registered Nurse) | 0.705 | 1.763 | 0.400 | 0.690 |
| Intensive Care Units (ICU) | 1.083 | 1.763 | 0.614 | 0.540 |
| Emergency Departments (ED) | −13.818 | 4.163 | −3.320 | 0.001* |
| Self-awareness | 2.212 | 0.259 | 8.536 | 0.000* |
| $\sigma$ | | | | |
| (Intercept) | 2.681 | 0.045 | 59.746 | 0.000* |

*Note:* Shapiro–Wilk normality test: 0.99354, $p$ value = 0.2047.
*$p < 0.05$.

SAQ dimensions, Job Satisfaction ($p = 0.026$) and Perception of Unit Management ($p = 0.017$) show significant variability between scenarios, with the highest Job Satisfaction in H3 and the highest Perception of Unit Management in H6. Stress Perception ($p = 0.002$) is notably higher in H2, while Perception of Hospital Management ($p < 0.001$) also varies significantly, with the highest scores in H6. Working Conditions ($p = 0.008$) are perceived most favourably in H6, indicating substantial differences between scenarios. Although Teamwork Climate ($p = 0.059$) and Total SAQ ($p = 0.004$) approach significance, Safety Climate ($p = 0.265$) and Safe Behaviour ($p = 0.118$) do not, indicating more consistent experiences in these domains across different scenarios.

Table 5 presents the regression model results identifying factors associated with Safety Climates. The intercept is highly significant ($p = 0.000$) with an estimate of 62.171, providing a baseline for the Safety Climate score. Self-awareness is a significant positive predictor (estimate = 2.212, $p = 0.000$), suggesting that greater self-awareness among staff enhances the Safety Climate. Conversely, working in the ED is associated with a significantly lower Safety Climate score (estimate = −13.818, $p = 0.001$), indicating challenges in this environment. The professional category of RN (estimate = 0.705, $p = 0.690$) and working in the ICU (estimate = 1.083, $p = 0.540$) were not significant predictors of Safety Climate, although they were positively related to achieving a safe climate in the working environment. The Shapiro–Wilk normality test ($p = 0.2047$) confirms the model's validity by demonstrating its normality in distribution.

## 6 | Discussion

Our study provides evidence that the COVID-19 pandemic revealed a worrisome scenario for nursing staff and patients, underscoring a lack of authentic nursing leadership and unsafe climates. The results suggest that self-awareness by nursing leaders and staff significantly enhances the safety climates in ICUs and General Medicine Units, while working in EDs showed a significantly negative relationship. Given EDs were the entry to the health system at a time when entire communities were terrified of the pandemic and its impacts on health and life, this may have led to the lack of authentic nursing leadership and unsafe climates. Ensuring that leadership and safety climates are relationship-focused is critical to enhancing patient outcomes.

No studies analysed the relationship between authentic leadership and the safety climate during the COVID-19 pandemic. Nonetheless, several studies applying SAQ to evaluate the safety attitudes in four countries (Cyprus, Ireland, Portugal and Poland) with different sample sizes (ranging from 4 to 577 nurses and staff nurses) revealed that a safety climate is not the most essential aspect of achieving safety attitudes. The most critical elements were job satisfaction and teamwork climate (Relihan et al. 2009; Pinheiro and Uva 2016; Al-Mugheed et al. 2022; Malinowska-Lipień et al. 2022). In addition, predictive research conducted with Jordanian nurses indicated a significant positive association (from moderate to high) between Registered Nurses' authentic leadership and safety climates. The study suggests that authentic leadership be applied as a guide to ensure safe practices (Mrayyan et al. 2023), thus generating positive patient outcomes.

Although some studies show that authentic leadership increases positive perceptions of the safety climate (Dirik and Seren Intepeler 2017; Labrague et al. 2021), our study examined how this relationship performed during the COVID-19 pandemic. Although most leadership styles are still task-focused rather than people (relational)-focused, our findings suggest that nursing tends to exercise authentic leadership, primarily due to relational transparency. Relational transparency describes leaders' ability to remain consistent with their values in their relationships with others (Walumbwa et al. 2008; Carvalho et al. 2016). Therefore, our findings align with other literature showing that nurse leaders play a crucial role in fostering safety cultures and enhancing perceptions of safety climates through their behaviours and support for their teams (Lee, Dahinten, and Lee 2023).

During the COVID-19 pandemic, various solutions were proposed by nurse leaders in response to the challenges faced in improving the work environment and the care provided to patients. Among these solutions are adapting the physical infrastructure, ensuring the availability of supplies, modifying protocols, establishing guidelines and workflows, integrating new employees,

offering remote work options, providing daycare services for the children of working parents and arranging hotel accommodations for frontline staff (Freitas et al. 2022). Such strategies require a broad vision from nurse leaders about favourable work environments and the safety, support and comfort of the nursing team (Freitas et al. 2022; Ribeiro et al. 2022). Additionally, factors such as a feeling of insecurity, lack of personal protective equipment, lack of diagnostic tests, changes in the flow of care and fear of the unknown should be considered by nurse leaders. Management support was essential for the perception of safety during the pandemic, including actions to improve work processes and implement safe flows for staff and patients (Gnatta et al. 2023).

Our analysis showed that higher scores in self-awareness were associated with higher scores in all safety climate domains except for perceived stress. These findings are aligned with the findings of a systematic review in which authentic leadership was shown to be a relevant factor in building a healthy work environment where nurses were encouraged to establish safe, effective nursing care anchored in scientific evidence to prevent or reduce issues related to patient safety, such as adverse events (Labrague et al. 2021).

In the uncertain context of the COVID-19 pandemic, nurse leadership was essential in managing environments and resources to overcome the crisis by promoting trust that led to cooperative team behaviour (Bavel et al. 2020; Zhang et al. 2022), especially in a moment when efforts to ensure high-quality end-of-life care and good deaths were hampered even in developed countries (Wilson et al. 2022). Authentic nursing leadership was fundamental to enabling coping strategies such as team engagement, credibility and self-development. Given the positive outcomes achieved through relational nursing leadership for nurses, nursing environments and the nursing workforce (Cummings et al. 2018), nurses should be continually educated and develop their leadership competencies through educational opportunities within the organisations. Therefore, hospitals should offer opportunities for continuing education for nursing staff, particularly focusing on self-awareness, to ensure they are well-prepared for promoting a safe climate in future public health crises.

Despite the contributions of our study, some limitations are noted. When seeking to analyse the influence of authentic leadership on the safety climates, other domains of safety climate could not be explored in their entirety, which may make it challenging to understand safety attitudes. While the ALQ-Rater demonstrated validity and reliability in Brazilian Portuguese, the 5-point Likert scale merged two classifications into a single score, which may affect the results. Additionally, responses obtained do not allow for determining differences by unit and by hospital. As this is a cross-sectional study conducted in the context of the COVID-19 pandemic, the results cannot be generalised despite contributing to guiding nursing action in facing future health crises. In addition, it is suggested that new studies evaluate the influence of authentic nursing leadership on safety climate and safety attitudes.

The COVID-19 pandemic highlighted prospective areas for improvement within the nursing profession. When exercising authentic leadership, nursing staff can significantly enhance safety attitudes, job satisfaction, stress perception, work conditions and perceptions of unit and hospital management. Beyond the context of COVID-19, authentic nursing leadership can contribute to achieving a safe climate, leading to positive outcomes for patients and the health system.

## 7 | Conclusions

Our study provides evidence that the COVID-19 pandemic revealed a worrisome scenario for nursing staff and patients, underscoring a lack of authentic nursing leadership and unsafe climates. The results suggest that self-awareness by nursing leaders and staff significantly enhances the safety climates in ICUs and General Medicine Units, while working in EDs showed a significantly negative relationship. Implications for hospital management may emerge from the results. Therefore, it is critical to implement strategies that foster authentic leadership among nursing staff, particularly focusing on self-awareness, to promote more positive safety climates in future public health crises. Ensuring that leadership and safety climates are relationship-focused is critical to enhancing patient outcomes.


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### Conflicts of Interest

The authors declare no conflicts of interest.

### Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

### Peer Review

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1111/jan.16686.

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