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Errors in Clinical Practice and Organizational Constraints: The Role of Leadership in Improving Patients' Safety

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Abstract: Background: Organizational constraints in healthcare organizations influence nursing performance and patient outcomes. Head nurses' leadership style might mitigate these effects and improve patient safety. This study aims to evaluate the role of ethical and authentic leadership styles in the relationship between organizational constraints and errors. Methods: A nationwide multicenter cross-sectional study evaluated nurses' organizational constraints, errors, and leadership styles. A structural equation model tested the hypothesized relationship. Results: In total, 2349 nurses working in Italian healthcare organizations were enrolled. Negative associations were found between organizational constraints and leadership styles, and a positive relation with errors. Errors were negatively associated with both leadership styles. The structural equation model showed that leadership styles partially mediated the relationship between organizational constraints and errors. Conclusion: Healthcare organizations should promote and support head nurses in the adoption of ethical and authentic leadership to mediate organizational constraint effects, reduce errors, and enhance the caring quality. The head nurse plays a crucial role within healthcare organizations in mitigating the impact of organizational constraints and enhancing patient safety. Developing a leadership style means improving nurses' well-being and reducing clinical errors for patients.

Keywords: medical errors; nurses; nursing supervisory; organizational constraints

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Academic Editor: Raphael Grzebieta

Received: 2 April 2025
Revised: 5 June 2025
Accepted: 12 June 2025
Published: 17 June 2025

Citation: Moraca, E.; Zaghini, F.; Fiorini, J.; Sili, A. Errors in Clinical Practice and Organizational Constraints: The Role of Leadership in Improving Patients' Safety. *Safety* **2025**, *11*, 57. https://doi.org/10.3390/safety11020057

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1. Introduction

Healthcare organizations are complex environments where organizational culture significantly influences healthcare professionals' attitudes and behaviors, consequently affecting the quality of care provided [1]. Nurses, as some of the most representative professionals within healthcare institutions, are directly influenced by organizational culture [2]. Organizational culture is defined as "a complex framework of national, organizational, and professional attitudes and values within which groups and individuals function" [3]. It plays a pivotal role in enabling efficient organizational management [4] and promoting shared values and behaviors among nurses to achieve organizational goals [5,6]. However, healthcare settings are often characterized by stressors such as financial limitations, high workloads, and ineffective leadership, which contribute to organizational constraints that hinder nursing performance and increase the risk of error [7,8].

Organizational constraints (OCSs) refer to situations or things that prevent employees from translating ability and effort into high levels of job performance [9], such as insufficient job-related information, poor equipment or supplies, interruptions by others, and restrictive organizational rules and procedures [9,10]. In nursing practice, OCSs cause delays in caring

activities and increases nurse's stress levels, undermining patient safety [11]. Moreover, OCSs also weaken teamwork and communication, key elements for error prevention and patient safety [12–14]. Insufficient, poor-quality, or inadequate resources (or their combination), including inefficient workflows and frequent interruptions, reduced nurses' performance [15–17], increasing the error risk [18], even during routine practices [19], such as drug administration [20,21].

The literature has shown that nurses with insufficient consciousness of errors easily experience adverse events [22] and that improving their perception of adverse events and error risks enhances caring and organizational outcomes [23]. In this regard, effective leadership represents a crucial counterbalance by fostering resilience and improving working conditions. Leadership is a strategic organizational factor that influences team behaviors [24]. Leaders who foster positive work environments, promote open communication, support staff, and encourage collaborative decision-making play a vital role in enhancing organizational culture and reducing errors [25,26].

The head nurse's leadership style has a significant impact on the nurses' performance and patient outcomes [27]. They directly affect the nurse's enthusiasm, initiative, and responsibility, the working state of the nursing staff, and the error culture management [17,23]. Authentic and ethical leadership styles have been studied in the nursing field, and they have been associated with fewer adverse events and improved patient outcomes [28,29]. Authentic leaders (ALs) focus on transparent communication, active listening, and fostering trust, which enhances job satisfaction and performance [30,31]. Ethical leaders (ELs), characterized by integrity, fairness, and altruism, empower their teams and create a culture of accountability and ethical behavior [32,33]. These leadership styles have become organizational elements to promote the organizational culture and prevent errors and adverse events [29].

Previous studies have evaluated the direct effect of OCSs and errors in clinical practice [34] and between leadership and nurses' work environments [35]. However, no studies have investigated whether ethical or authentic leadership styles of head nurses mediate the relationship between OCSs and errors. Establishing the role of leadership style in this relationship may lead to head nurses reducing errors and improving patients' safety and quality of care inside healthcare organizations. Moreover, no previous research has simultaneously examined the relationship between the characteristics of the organizational context, the leadership style of the head nurse, and patients' quality of care. In light of the above, this research aimed to evaluate the role of the EL and AL styles in the relationship between organizational constraints (OCSs) in the healthcare organizational context and errors (or near misses) occurring in clinical practice within healthcare organizations (Figure 1).

In particular, we aim to verify the following hypotheses:

- H1, H2: High levels of OCSs have a negative relationship with nurses' perception of their head nurses' ethical and authentic leadership styles.
- H3: High levels of OCSs in organizations have a positive relationship with errors within healthcare organizations.
- H4, H5: Ethical and authentic leadership styles of head nurses have a negative relationship with errors in healthcare organizations.
- H6, H7: The ethical or authentic leadership styles of head nurses have a mediating role in the relationship between OCSs and nurses' errors.

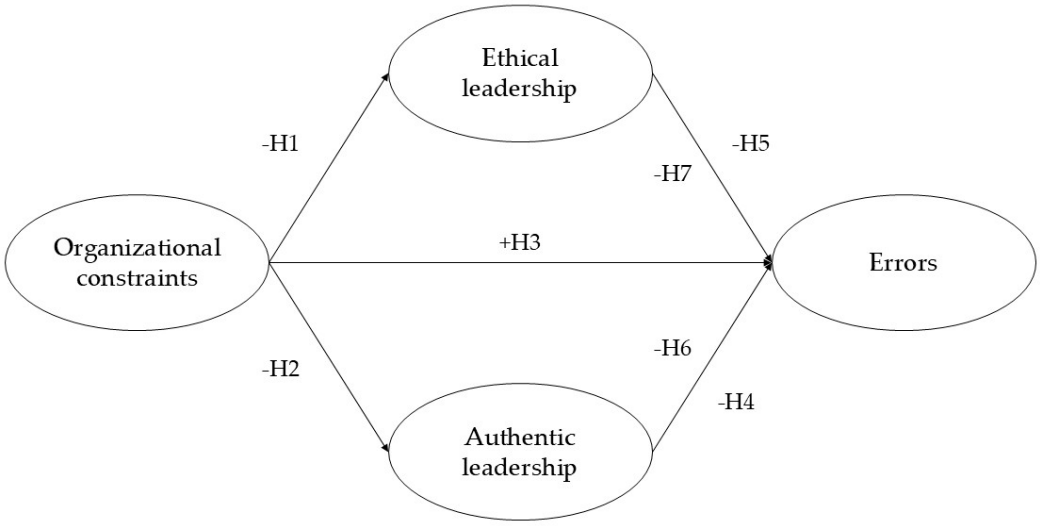


Figure 1. Model of the variables studied. Notes: H1: high levels of OCSs have a negative relationship with nurses' perception of their head nurses' ethical leadership style; H2: high levels of OCSs have a negative relationship with nurses' perception of their head nurses' authentic leadership style; H3: high levels of OCSs in organizations have a positive relationship with errors within healthcare organizations; H4: the authentic leadership styles of head nurses have a negative relationship with errors in healthcare organizations; H5: the ethical leadership styles of head nurses have a negative relationship with errors in healthcare organizations; H6: the authentic leadership styles of head nurses have a mediating role in the relationship between OCSs and nurses' errors; H7: the ethical leadership styles of head nurses have a mediating role in the relationship between OCSs and nurses' errors.

2. Materials and Methods

2.1. Study Design

A cross-sectional multicenter study was conducted in Italian healthcare organizations, following the Strengthening the Reporting of Observational Studies in Epidemiology Statement (STROBE; Supplementary File S1) [36]. This study is part of a multicenter study [37] with relative registration (Research registry number 7418).

2.2. Participants

Participants were nurses providing direct patient care in clinical wards, with at least six months of experience, without limitation of shifts and contracts (full-time/part-time or fixed-term/open-ended). Having at least six months of clinical experience has been used as an inclusion criteria to ensure the participants had sufficient familiarity with their clinical environment and organizational processes [37]. Nurses with administrative roles, head nurses, and nursing managers have been excluded.

A sample size of 608 was determined to achieve 80% statistical power and an alpha level of 0.05, according to previous research where the nursing error mean was 1.45 (standard deviation SD = 0.88) [38] and assuming, to estimate in the current study, an error mean of 1.55 [39]. Considering a 20% rate of possible unfilled questionnaires or missing data, the final estimated sample size was 730 nurses.

2.3. Data Collection

The data were collected through an anonymous web survey between 2020 and 2023. An electronic survey was chosen for disseminating the questionnaire and limiting missing responses [40]. The survey was disseminated through Italian healthcare organizations, inviting them to participate and communicating their total number of nurses and relative personal emailing lists. After the organization's acceptance, researchers randomized the sample through an online sequence (www.randomization.com). Nurses received a link to

participate in the survey on their institutional email. On the first page of the web survey, there was a research description, information about data collection and analysis, along with a request for informed consent.

2.4. Instruments

The researchers used a web survey composed of a socio-demographic information section (e.g., gender, age, educational level, and marital status), a working characteristics section (e.g., clinical setting, working years, daily working hours), and a section including the measurement scales for the constructs of interest.

The 9-item Organizational Constraints Scale measured the OCS. Nurses expressed the barriers or obstacles within their workplace that influence their performance and their caring activities, rating them on a 5-point Likert scale (from 1 = never or not at all to 5 = very often/always). The final score was calculated as the mean of item responses, and higher scores indicated greater OCS perception. The OCS scale was a single-dimension, reliable instrument with a Cronbach alpha α in the validation study of 0.85 [41] and in this study of 0.88.

The 10-item Ethical Leadership Scale 5 measured the EL. Nurses rated the correspondence between the ethical behavior described in each item and their head nurse's behavior on a 5-point Likert scale (from 1 = totally disagree to 5 = totally agree). The final score was calculated as the mean of the items' response, and higher scores indicated the nurses' greater perception of the head nurses' EL. The EL scale was a reliable single-dimension instrument with a Cronbach α in the validation study of 0.92 [42]. In the current research, Cronbach's α was 0.94.

The 16-item Authentic Leadership Questionnaire (ALQ), measured the AL. Nurses rated the correspondence between the authentic behavior described in each item and their head nurse's behavior on a 5-point Likert scale (from 0 = never to 4 = always). The final score was calculated as the mean of the items' responses, and higher scores indicated the nurses' greater perception of the head nurses' AL. A validation study supported the 4-dimension scale (self-awareness, transparency, ethical/moral, balanced processing) and tested its reliability, with a Cronbach α of 0.88 [43]. In the current study, Cronbach's α was 0.98.

Care errors were measured by an 8-item Nurses Care Errors Scale (NCES). Nurses were asked to think about potential errors occurring in their ward during ordinary caring activities and rate their frequency on a 5-point Likert scale (from 1 = never to 5 = always). The final score was calculated as the mean of item responses, and higher scores indicated greater error perception by nurses. NCES is composed of two dimensions (slips/lapses and mistakes) and was a reliable instrument with a Cronbach α in the validation study of 0.88 [38]. In our study, Cronbach's α was 0.87.

2.5. Data Analysis

The collected data were aggregated and analyzed to safeguard the participants' privacy. Using the statistical package SPSS Ver 25®, qualitative data were described using frequencies and percentages, while quantitative data was described with means, medians, and standard deviations (SD). Pearson's correlation (r) analysis evaluated the associations between the studied variables. The internal consistency of the instruments was tested by using Cronbach's alpha test. To test the hypothesized relationships, a structural equation model (SEM) was conducted using MPlus® Ver 7.1. SEM is an advanced statistical technique that allows for the simultaneous analysis of complex relationships between observed and latent variables, integrating factor analysis and regression to test complex theoretical models. The following fit indices were used to assess the model adequacy: chi-square

(χ^2) (not significant), RMSEA (<0.06), CFI (>0.90), TLI (>0.90), and SRMR (<0.08) [44,45]. Some covariate variables discussed in the literature, such as age and gender, have been included in the SEM to avoid possible bias [33]. The significance level was set at $p < 0.05$ for all analyses.

2.6. Ethical Considerations

The study was conducted following the principles of the Declaration of Helsinki [46] and was approved by the Ethics Committee (Prot. No. RS143.21). All nurses received information about the study proposed on the first web survey page and were asked to provide informed consent before completing the web survey. The participants were informed about data confidentiality and the option to withdraw their consent to participate in the study at any time.

3. Results

The final sample was composed of 2349 nurses; it was predominantly female, at 81.3% (n = 1909), with an average age of 40.4 years (standard deviation SD = 10.9). The nurses were mostly married, worked on average 7 h a day, and were employed in their current organizations for 15 years. Among the participants, 58.3% (n = 1369) had a nursing Bachelor's degree, and 47.8% (n = 1122) worked in a medical clinical setting (Table 1).

Table 1. Nurses' descriptive characteristics.

Nurses' Characteristics	***n* (%)**	**Mean (SD)**	**Range**
Age		40.37 (10.92)	18–65
Gender			
Male	440 (18.7)		
Female	1909 (81.3)		
Non-binary	-		
Civil Status			
Single	929 (39.5)		
Separated/Divorced	190 (8.10)		
Married	1212 (51.6)		
Widow/Widower	18 (0.80)		
Professional Education			
Regional Diploma	737 (31.4)		
Nursing Diploma	243 (10.3)		
Bachelor of Nursing	1369 (58.3)		
Working Clinical Settings			
Surgery	239 (10.2)		
Cardiothoracic surgery	50 (2.1)		
Transplantation Surgery	53 (2.3)		
Emergency Surgery	180 (7.7)		
Neurological Surgery	28 (1.2)		
Orthopedics	82 (3.5)		
Medicine	1122 (47.8)		
Neurology	88 (3.7)		
Urology	16 (0.7)		
Nephrology	42 (1.8)		
Geriatrics	60 (2.6)		
Cardiovascular	113 (4.8)		

Table 1. *Cont.*

Nurses' Characteristics	*n* (%)	Mean (SD)	Range
Oncology	58 (2.5)		
Hematology	64 (2.7)		
Infection disease	44 (1.9)		
Pulmonary disease	84 (3.6)		
Gastroenterology	26 (1.1)		
Working years		15.45 (10.71)	0–45
Daily working hours		7.36 (3.12)	0–13

3.1. Results of Correlations Between the Variables

As shown in Table 2, the nurses perceived an average OCS level (M = 2.40, SD = 0.73). The nurses' perception of EL from their head nurses was highest (M = 4.05, SD = 0.83), while the perception of AL was slightly lower (M = 3.27, SD = 0.92) and errors were reported with a lower frequency (M = 1.56, SD = 0.49).

Table 2. Descriptive and correlation analysis.

		Pearson's Correlation (r)		
	M (SD)	**OCS**	**EL**	**AL**
OCS	2.40 (0.73)	1		
EL	4.05 (0.83)	−0.45 ***	1	
AL	3.27 (0.92)	−0.41 ***	0.76 ***	1
Errors	1.56 (0.49)	0.42 ***	−0.24 ***	−0.24 ***

Notes: OCS = organizational constraint scale; EL = ethical leadership; AL = authentic leadership; *** = $p < 0.001$; SD = standard deviation; M = mean.

The correlation showed that OCSs had a negative correlation with EL (r = −0.45, $p < 0.001$) and AL (r = −0.41, $p < 0.001$), while OCSs had a positive correlation with errors (r = 0.41, $p < 0.001$). In addition, the errors had a negative correlation with EL (r = −0.24, $p < 0.001$) and AL (r = −0.24, $p < 0.001$).

3.2. Results of the Structural Equation Model

The results of the structural equation model (SEM) (Figure 2) allowed for the verification of the hypothesized relationships with a good fit index (χ^2 = 46,525.087, df = 990; RMSEA = 0.040, 90% CI = 0.039–0.042, p = 1.000; CFI = 0.94; TLI = 0.94; SRMR = 0.051). Specifically, the hypothesized results (H1) confirmed that the OCS negatively explained the variability in EL (β = −0.39, $p < 0.001$), which, in turn (H4), negatively explained the variability in errors (β = −0.28, $p < 0.001$). Therefore, high levels of OCS correspond to low levels of EL but high levels of errors.

Furthermore, the hypothesized (H2) OCS negatively explains the variance in AL (β = −0.12, $p < 0.001$), which in turn, (H5) negatively explains the errors (β = −0.26, $p = 0.035$). Consequently, high levels of OCS correspond to low levels of AL and high levels of errors. Finally (H3), it was possible to verify the direct and positive relationship between the OCS and errors (β = 0.34, $p < 0.001$).

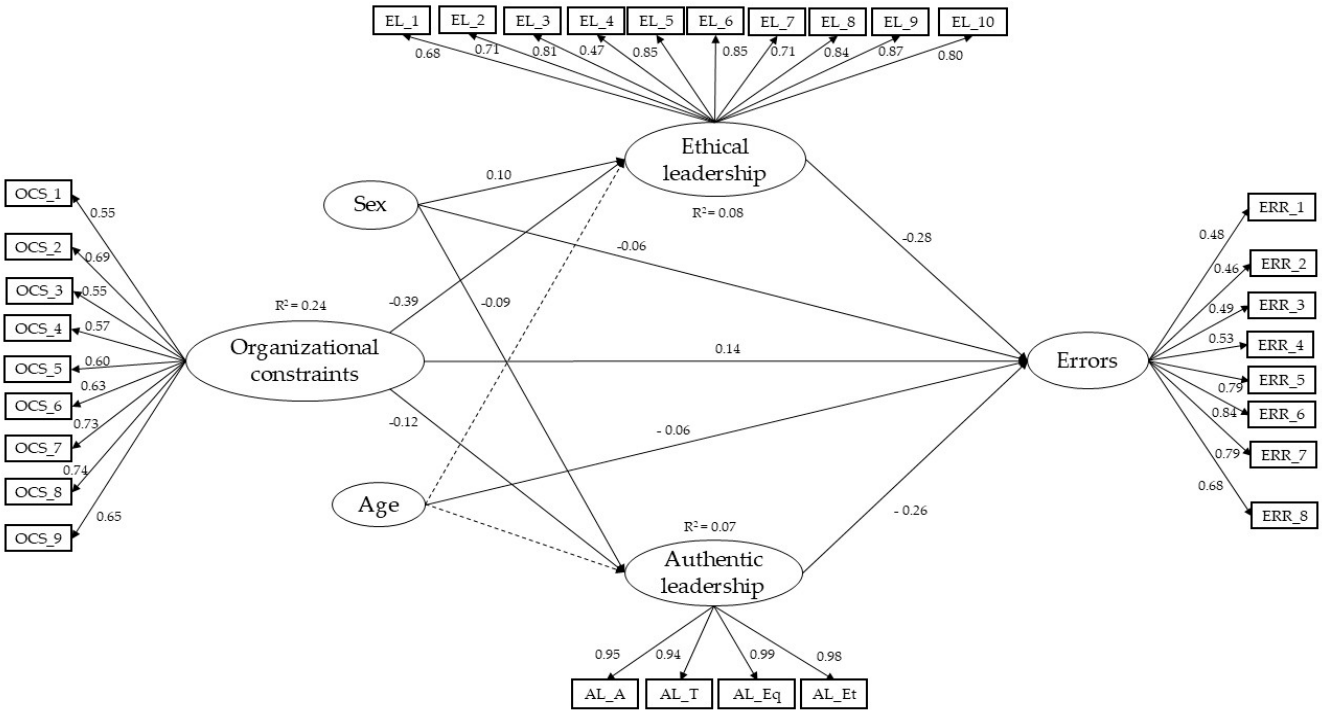


Figure 2. Results of the structural equation model. Notes: OCS = organizational constraint scale; EL = ethical leadership; AL = authentic leadership; ERR = error. Dotted lines are not statistically significant relationship.

Moreover, the SEM was used to test the potential mediation effect of leadership between the OCS and errors (H6 and H7). The results showed that EL partially mediates the relationship between OCS and errors (total effect = 0.14, indirect effect = 0.11, direct effect = 0.03, β = 0.11, CI = 0.018–6.119, p = 0.000) and that AL also partially mediates the relationship between OCS and errors (total effect = 0.14, indirect effect = 0.03, direct effect = 0.11, β = 0.03, CI = 0.012–2.594, p = 0.009).

Gender has a positive effect on EL (β = 0.10) and a negative effect on AL (β = −0.09), with no direct effect on organizational constraints and errors. Whereas age has a negative effect on organizational constraints (β = −0.12), there was the same negative effect for both EL and AL (β = −0.06) without a direct effect on errors.

4. Discussion

This study aimed to investigate head nurses' leadership styles, ethical or authentic, regarding organizational constraints and errors. The findings highlighted the central role of OCS as a predictor of errors and showed how the EL and AL styles can mitigate these effects.

Our findings showed a positive correlation between organizational constraints and errors, supporting hypothesis 3. The presence of organizational constraints, such as interruptions, a lack of necessary information, and poor equipment or supplies, interferes with nurses' performance, increasing the likelihood of errors. These findings are in line with previous studies that demonstrated how the work environment influences patient outcomes [47]. Limited nursing staff and resources have a negative impact on patient care outcomes [48–50]. In light of this, organizational constraints should be considered a global critical predictor influencing the quality of care [51], whereas nursing performance influences patient outcomes [52]. Some studies showed how organizational constraints generate frustration, burnout, and professional dissatisfaction, limiting a nurse's ability to perform optimally [11,17,47]. However, it has been observed that nurses often tend to

actively resist the effects of organizational constraints, trying to maintain an ideal level of performance [53]. While this behavior is positive, it can lead to cumulative stress that further increases the risk of error. Considering the consequences of OCSs and their influence on nurses, the review by Coelho et al. highlighted that the systemic presence of organizational constraints in the work environment, such as poor knowledge, hard working conditions, workload, and interruptions are significant drivers of errors [34].

Furthermore, we verified the hypothesis formulated about the relationships between the investigated variables. Our findings showed that OCSs had a negative relation with the perception of AL and EL (H1, H2), while EL and AL were associated with a significant decrease in errors (H4, H5). When organizational constraints are present in the organization, there are negative implications for clinical practice and leadership perceptions. A significant finding of this study was the mediating role of EL or AL in the relationship between organizational constraints and errors (H6, H7); the organizational constraints are factors determining errors, and the role of leadership is key to mediating this effect in healthcare practices.

This result could be due to the important role of the leadership style of head nurses, as shown in previous research [54] in terms of job setting, productivity, nursing motivation, and quality of care. Indeed, EL fosters a supportive and resilient work environment to reduce the impact of organizational constraints [55] and the possibility of committing errors [23].

In this regard, EL is based on moral principles, focusing on the work process, the interests of nurses, and developing moral competence in nurses [56]. Similarly, AL enhances trust and mutual support, improving resource management and communication between team members [54]. This approach not only improves the quality of care but also fosters a culture of safety, where errors are identified, reported, and used as learning opportunities [25,57]. The review by Moraca et al. showed how EL and AL promoted a safe culture and error management, promoting trust and transparency and encouraging nurses to report errors without fear of repercussions [29]. These leadership approaches strengthen organizational learning, enhance nurse engagement, and improve job satisfaction, resulting in a resilient work environment focused on patient safety.

Our findings highlight that organizational constraints are significant predictors of errors, but this effect may be mediated by EL or AL. The values characterized by EL and AL contribute to the well-being of the healthcare organization and reduce errors while increasing patient safety. These results permit us to underline the role of EL and AL in healthcare organizations and to develop new approaches in error management and to improve the quality of care.

The considerable number of participants, compared to the sample size, strengthens the generalizability of the results obtained, at least in the context of Italian hospitals. Moreover, it assures adequate statistical power, but also reduces the risk of sampling errors, thus increasing the strength and validity of the results. This showed that gender and age had an impact on organizational constraints and leadership, which indirectly influenced the errors, as shown previously [58].

This study highlights how leadership can mediate the effects of organizational constraints, with organizational responsibility for error. Healthcare organizations play a key role in developing ethical and authentic leadership through strategies and developing programs. These programs should promote behaviors focused on open communication, creating a supportive and considerate work climate, and pursuing initiatives for a manageable workload. Implementing such actions can lead to a more resilient nursing workforce that can provide high-quality, safe care and reduce the incidence of clinical errors.

Limitations

The results of this study are highly significant for the nursing scientific community and reveal important findings that had not been previously shown. However, they should be considered in light of certain limitations. First, the cross-sectional design of the study does not allow for the verification of changes over time. Therefore, future research should adopt longitudinal or experimental designs to provide clearer insights into causal relationships and better understand the connections between organizational constraints, leadership styles, and errors. Second, the sample was recruited exclusively from Italian healthcare organizations, which may limit the generalizability of the findings to other countries or healthcare systems with different organizational cultures and practices. Furthermore, data were collected using a self-report questionnaire on the perception of nurses about the leadership style of their head nurses, which was an important limitation that may have introduced bias, such as the accuracy of the responses. Although the SEM analysis controlled for the participants' age and sex, other possible confounding variables have not been considered that might influence OCS and error perceptions, such as burnout, stress levels, and organizational well-being.

5. Conclusions

According to the aim of this study, the results showed that organizational constraints are determinants in healthcare organizations and in clinical practice, contributing to the occurrence of errors. The adoption of EL and AL can mediate the effects of organizational constraints and reduce the possibility of errors occurring. Every healthcare organization will have constraints, and errors are not an inevitable consequence of this, but in both cases, leadership has the potential to deliver positive outcomes. For this reason, organizations should reduce the existing OCS and introduce new strategies (e.g., leadership training and communication technologies) that could benefit different aspects of organizations. This approach is necessary as it helps create a positive work environment that supports nurses, improves patient safety, reduces errors, and enhances the quality of patient care.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/safety11020057/s1: Supplementary File S1: STROBE Statement—checklist of items that should be included in reports of observational studies.

Author Contributions: Conceptualization, E.M., F.Z., J.F. and A.S.; methodology, F.Z., J.F. and A.S.; validation, E.M., F.Z. and J.F.; formal analysis, E.M., F.Z. and J.F.; investigation, E.M., F.Z. and J.F.; data curation, F.Z. and J.F.; writing—original draft preparation, E.M., F.Z. and J.F.; writing—review and editing, A.S.; visualization, E.M., F.Z., J.F. and A.S.; supervision, A.S.; project administration, A.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Center of Excellence for Nursing Scholarship of Rome, Italy, grant number 3.21.1.

Institutional Review Board Statement: The study is part of a multicenter study [37] with relative registration (Research registry number 7418). The study was conducted by the ("World Medical Association Declaration of Helsinki," 2024) and approved by the Ethics Committee of the University Hospital of Rome Tor Vergata (Prot. No. RS142.21—approval date 7 July 2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author due to privacy or ethical restrictions.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

AL	Authentic leadership
ALQ	Authentic Leadership Questionnaire
EL	Ethical leadership
NCES	Nurses Care Errors Scale
OCS	Organizational constraints
SD	Standard deviation
SEM	Structural equation model
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology Statement

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