

# Evaluation of Patient Safety Culture in a Greek tertiary hospital during the COVID-19 pandemic

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## ABSTRACT

**Introduction:** The recent COVID-19 pandemic tested the resilience of health systems, with potential impact on safety culture.

**Aim:** To assess patient safety culture in a Greek tertiary hospital during the COVID-19 pandemic.

**Material – Methods:** A cross-sectional study with the Hospital Survey on Patient Safety Culture (HSOPSC) version 1.0. was conducted during the spring of 2022.

**Results:** The overall level of patient safety was moderate to good and was mainly predicted by adverse event reporting frequency, management support for safety, and overall safety perception. «Collaboration and teamwork within hospital departments» and «supervisors'/ managers' expectations and actions regarding patient safety» scored the highest, while «staffing» the lowest.

**Conclusions:** The pandemic magnified preexisting problematic issues, like shortage of staff, but also had a positive impact by enabling reinforcement of cooperation among health workers and jointed actions regarding patient safety. Building on the lessons learnt in patient safety in the post- COVID-19 era is a global challenge.

**Keywords:** healthcare professionals, hospital, HSOPSC, patient safety culture

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## INTRODUCTION

In the early 2000s, patient safety gained prominence as a critical global concern following the publication of the Institute of Medicine's influential report, *To Err is Human: Building a Safer Health System* (2000). This report sparked a vital dialogue on the development of an organizational culture that supports the delivery of safe health care services. Over two decades later, despite noteworthy advancements, the eradication of preventable harm in health care remains the focus of ongoing discourse. This challenge is underscored by the Global Patient Safety Action Plan 2021–2030, a promising initiative spearheaded by the World Health Organization (WHO).

Several studies have shown that building a positive safety culture influences healthcare professionals' error-reporting and failure-avoidance behaviors, resulting in a reduction of adverse events (Rodziewicz et al 2023). Organizations with a positive culture prioritize the recognition of patient safety challenges and manage clinical "errors" as an opportunity for learning and continuous improvement, within a wider Total Quality Management (TQM) framework, in which shaming or punishing professionals is not acceptable.

On the other hand, during the Covid-19 pandemic, all health professionals faced many unforeseen and debilitating factors: staffing and training problems, the need to modify existing working methods, operational management of the «new» clinical practice, and standardization of critical procedures. The strategic objective of the administrations of the Ministry of Health and the nursing institutions was to build a safe working environment (staffing, equipment, disposal of personal protective equipment, psychological support) to enhance the resilience of workers and the sustainability of the national health system (Baskin and Bartlett 2021).

The present study aimed to examine patient safety culture in a tertiary hospital in Greece, heavily involved in the management of the Covid-19 pandemic and determine its possible impact, as perceived by the workforce.

## MATERIAL - METHODS

### Study design and participants

A cross-sectional study was conducted among healthcare workers in a tertiary hospital in Northern Greece, between April and May 2022. Participants were permanent employees of all specialties and categories of all services directly involved in healthcare delivery and employees of other support services (IT, biomedical, technical). The exclusion criterion was students of all specialties conducting their clinical practice.

The study protocol was approved by the Bioethics and Ethics Committee of School of Medicine, at the Aristotle University of Thessaloniki (Reference Number: 10/2022 on 10/18/2022), as well as by the Scientific Board of the under-

study Hospital for the administration of the questionnaire (Reference Number: 352, th. 4.4, on 16/3/2022).

All participants provided written informed consent prior to participating. Stratified sampling was used according to the proportion of hospital health workers employed in each department. Health professionals received a verbal briefing regarding the objectives and time frame of the study. Then a copy of the questionnaire was distributed to the participants in paper form to self-complete, a written consent form for the study and an envelope with a self-adhesive label «SURVEY FOR PATIENT SAFETY CULTURE». To ensure anonymity and minimize bias, participants were asked to enclose each completed questionnaire in the accompanying blank envelope and place it in opaque boxes with the same labeling as the envelopes, placed in predetermined locations in the hospital. Participants did not receive any compensation for their participation in the research.

### Research tool

The reliable and valid Greek version of the Hospital Survey on Patient Safety Culture (HSOPSC) version 1.0 (Kapaki and Souliotis 2017, AGENCY FOR HEALTHCARE RESEARCH AND QUALITY 2004) was used. Its psychometric properties make it more comprehensive in documentation compared to other similar tools (Madsen 2006). It is a questionnaire of 42 items, with answers on a 5-point Likert scale, categorized in 12 dimensions: 1) Open Communication, 2) Feedback and Communication About Error, 3) Frequency of Events Reported, 4) Hand-offs and Transitions, 5) Management Support for Patient Safety, 6) Non-punitive Response to Error, 7) Organizational Learning and Continuous Improvement, 8) Overall Perceptions of Patient Safety, 9) Staffing, 10) Supervisor's/ Manager's Expectations and Actions Promoting Patient Safety, 11) Teamwork Within Units, and 12) Teamwork Across Units.

The range of scores on questions regarding agreement or disagreement with formulated statements ranged from 1–5 (1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, 5= strongly agree). The range scores on questions regarding the frequency of events ranged from 1–5 (1= never, 2= rarely, 3= sometimes, 4= most of the time, 5= always).

The Patient Safety Grade scores ranged from A–F (A= excellent, B= very good, C= acceptable, D= poor, E= failing), while the number of Events Reported ranged from a–f (a= no event reports, b= 1 to 2 event reports, c= 3 to 5 event reports, d= 6 to 10 event reports, e= 11 to 20 event reports, f= 21 event reports or more).

### Statistical Analysis

Statistical processing was performed using the statistical package SPSS 27.0.1.0. The items were grouped into sub-dimensions of the «safety culture» for efficient crowd management. The reliability and validity of the research

tool were tested (Cronbach's alpha coefficient, principal components analysis, without data rotation, with Kaiser-Meyer-Olkin (KMO) sampling adequacy test, Bartlett's  $\chi^2$  global test, and Scree plots).

After the initial distinction of the data/ variables into quantitative-qualitative, the appropriate tests were applied (variance, normality: Kolmogorov-Smirnov or Shapiro-Wilk → choice of parametric or non-parametric analysis to test the correlation/ dependence of quantitative - qualitative variables, quantitative variables between them). Descriptive analysis performed frequency and relative frequency calculation for qualitative variables, and calculation of mean and standard deviation for quantitative variables.

Inductive analysis was performed to test for variation of mean values of the dimensions of safety culture in categories of qualitative variables (normality test → Independent-Samples T-Test or ANOVA - Mann-Whitney U test or Kruskal Wallis test, depending on the number of categories of qualitative variables and observations), and correlation between the dimensions of culture (normality test → Pearson and Spearman coefficients). Also, a multivariate regression analysis performed with the assessment of overall patient safety as the dependent variable and the other dimensions as independent variables.

## RESULTS

### Description of participants

In total 441 health workers participated in the study (response rate 68.6%), with a mean age 43.3 years ( $\pm 9.4$  SD, min. 19 - max. 65). The health workers were employed for an average of 11 years ( $\pm 7.7$  SD, min. 1 - max. 25), in the specific hospital, and 6.8 years ( $\pm 6.456$  SD, min. 1 - max. 23), in the specific department. They worked an average of 42.7 hours per week ( $\pm 9.2$  SD, min. 20 - max. 112), while the total time of their professional experience was 14.1 years ( $\pm 9.569$  SD, min. 1 - max. 40). The descriptive statistics of the study sample is presented in detail in Table 1.

### Descriptive statistics of the Patient Safety Culture Dimensions

The mean score and the standard deviation for each of the 12 dimensions of patient safety culture in the hospital are presented in Table 2.

### Correlation between Dimensions of Patient Safety Culture

Spearman correlations conducted among patient safety culture dimensions indicated that nearly all correlations (a total of 64 out of 66) were statistically significant and positive, with magnitudes ranging from weak to moderate ( $\rho = .10$  -  $.69$ , all  $p < .01$  or  $p < .05$ ). The only two relationships that were statistically non-significant

were those of "Staffing" with "Adverse Event Reporting Frequency" and "Error Feedback and Communication" (Table 3).

The mean score of the "Overall Patient Safety" assessment was 3.67, which ranks marginally in the "moderate" response and is not far from the "good" response. The "Overall Patient Safety Rating" had statistically significant and positive, low-to-moderate relationships with all dimensions of patient safety culture, with values ranging from  $\rho = .21$  to  $\rho = .47$  (all  $p < .01$ ).

The multiple regression model was statistically significant [ $F(12,440) = 19.05$ ,  $p < .0005$ ], and patient safety culture dimensions explained 34.8% of the observed variance in "Overall Patient Safety Rating" ( $R^2 = .348$ ). Three out of the 12 dimensions were statistically significant predictors of Overall Patient Safety assessment (all  $p < .01$ ). Specifically, a one-unit increase in "Adverse Event Reporting Frequency", "Management Support for Safety", and "Overall Safety Perception" corresponded to increases of .12, .18, and .24 units, respectively, in the "Overall Patient Safety Rating". The remaining safety culture dimensions did not statistically significantly predict patients' Overall Safety assessment (Table 4).

Using Mann-Whitney U non-parametric independent samples tests, the results showed that gender influenced the dimension of "Management Support for Safety" ( $U = 11442.5$ ,  $p = .007$ ), as well as the dimension of "Supervisors'/ Managers' Expectations and Actions Promoting Patient Safety" ( $U = 12079.5$ ,  $p = .040$ ). Women had in statistical terms, a significantly higher score on both dimensions compared to men. The levels of the remaining 10 dimensions did not differ based on gender.

Occupation exerted a statistically significant effect on 5 out of the 12 safety culture dimensions. Specifically, on occupation-influenced "Staffing" ( $U = 4958.5$ ,  $p = .049$ ), "Management Support in Safety matters" ( $U = 4933.0$ ,  $p = .044$ ), "Organizational Learning and Continuous Improvement" ( $U = 4948.0$ ,  $p = .044$ ), "Feedback and Communication about Errors" ( $U = 4461.0$ ,  $p = .003$ ), as well as the "Overall Perception of Safety" ( $U = 4679.0$ ,  $p = .012$ ). In all five dimensions, nurses scored significantly higher compared to physicians.

Finally, it was examined whether the profession of doctor or nurse differentiates the "Frequency of Reported Errors". The results showed that there was no statistically significant difference ( $U = 5517.0$ ,  $p = .279$ ).

## DISCUSSION

Our results make it possible to draw important conclusions regarding the safety culture that prevails in a tertiary Greek hospital during COVID-19 pandemic. Employees rated the overall level of patient safety as moderate to good. The safety culture dimensions that

scored highest related to “Collaboration and Teamwork Within Hospital Units” and “Supervisors’/ Managers’ Expectations and Actions Promoting Patient Safety”.

In the recent 2022 User Database Report of the Agency for Healthcare Research and Quality (AHRQ) (using HSOPSC version 2.0), the safety culture dimensions related to «Collaboration and Teamwork Within Hospital Units» and «Supervisors’/ Managers’ Expectations and Actions Promoting Patient Safety» were the most highly rated (Hare et al 2022). However, the dimension «Collaboration and Teamwork Within Hospital Units» which was most highly ranked, is confirmed by only one Greek survey (Avgoustidou 2017), while in the other Greek studies (Kapaki 2015, Aggeli and Kapaki 2020, Dermetzoglou 2019, Kapaki and Souliotis 2017, Limtsiouli 2021, Maltsaki 2021, Aletras et al 2020, Antonakos et al 2021) this dimension was neither highest nor lowest rated. This finding could be attributed to the positive effect that the pandemic may have on building collaboration and teamwork among colleagues.

Furthermore, in similar Greek research studies (Kapaki 2015, Aggeli and Kapaki 2020, Dermetzoglou 2019), it was found that the dimension «Supervisors’/ Managers’ Expectations and Actions Promoting Patient Safety» was among the two most highly ranked dimensions, indicating a high degree of management awareness regarding safety culture. However, there were also studies in which this dimension was the lowest ranked (Dermetzoglou 2019, Kapaki and Souliotis 2017). These conflicting findings can be attributed to the absence of central health policies towards a common direction and the adoption of a safety culture in Greek hospitals. However, the pandemic may have also had a significant effect on increasing supervisors’ actions promoting patient safety.

The employees maintained a negative opinion about the hospital climate regarding the non-punitive attitude to mistakes, considering that the environment was hostile to them when mistakes were made. This is probably also related to the high rates of adverse events not reported by workers in the last year. These findings are supported by other research both in Greek hospitals (Kapaki 2015, Aletras et al 2020, Antonakos et al 2021), and internationally (Hare et al 2022), with the main reasons for not reporting errors by health service workers being related to the fear of impending professional sanctions, criminal prosecutions, and negative reactions from the other staff (Potylycki et al 2006, Aiken et al 2014, Cho et al 2014), as well as the fear of being labeled as incompetent (Blegen et al 1998). Additionally, this fear can be attributed to the fact that the hospital under study operates as a legal entity under private law, being more oriented a private hospital compared to the purely public hospitals in the country.

The results are particularly discouraging in terms of

staffing, with this parameter scoring the lowest among employees in terms of safety culture. The problem of hospital under-staffing has also been highlighted by other researchers (Kapaki, 2015, Aggeli and Kapaki 2020, Antonakos et al 2021), while it is considered a factor in increasing the possibility of mistakes and errors that could have been predicted and avoided (Dermetzoglou 2019, Potylycki et al 2006). Conversely, staffing adequacy is associated with both a reduction in the rate of medication errors and patient satisfaction (Yates et al 2005). In the absence of previous data from the specific hospital concerning safety culture and given the fact that this survey was conducted during the COVID-19 pandemic, it is likely that the understaffing problem was further exacerbated by the pressured situation in the hospitals. Therefore, it would be useful to study how the end of the pandemic affected this dimension.

In contrast to the positive view of the employees regarding supervisors’/ managers’ expectations and actions regarding patient safety, there was a neutral attitude towards management’s support for safety issues, indicating the management’s inability to be sufficiently supportive of employees and to convince them of its commitment to safety. As the same finding emerges from other research (Kapaki 2015, Blegen et al 1998, Yates et al 2005), it can be assumed that there is insufficient knowledge and training of the administrators on patient safety issues. This parameter, combined with the lack of staff and the increased workload of the rest of the staff at the specific hospital, makes it difficult to properly manage safety issues. However, the role of leadership in creating a positive safety culture is crucial, as it is the one responsible for setting the organization’s strategy, and processes for establishing patient safety (Nie et al 2013).

In the overall study sample, gender was found to significantly differentiate the dimensions of administrative support to safety and supervisors’/ managers’ expectations and actions regarding patient safety in statistical terms, with women scoring higher than men. However, this may be because most of the health professionals who participated in the survey were women. The problem of the over-representation of women in the hospital population of the respective surveys has also been mentioned by other Greek researchers (Kapaki 2015, Maltsaki 2021).

Although the profession did not affect the frequency of reported errors, it significantly differentiated five of the study dimensions, with nurses scoring significantly higher than physicians on the staffing parameters, management support on safety, organizational learning and continuous improvement, feedback and communication, as well as in the overall perception of safety. This finding is also confirmed in other studies in Greece (Aggeli and Kapaki 2020, Kapaki and Souliotis 2017), and internationally

(Yates et al 2005), and is probably due to the increased quantitative and qualitative time that nurses devote to patient care.

Most of the patient safety dimensions were positively correlated both with each other and with the overall patient safety rating in statistical terms. In multiple linear regressions performed on the total sample, overall patient safety rating was statistically significantly predicted by three dimensions of safety culture – adverse event reporting frequency, management support for safety, and overall safety perception.

#### **Limitations**

This study has its limitations. The primary limitation stems from its cross-sectional nature, which restricts the establishment of causal relationships, allowing only probabilistic relations that may include errors. To obtain more dependable insights into the patient safety culture within Greek hospitals, additional studies with a larger participant pool are recommended to minimize the likelihood of random errors. Another issue is the absence of data on the hospital's safety culture prior to the COVID-19 pandemic. As such, the research relies on data from other Greek hospitals with similar operating conditions deemed comparable to the study hospital. Greece lacks a centralized plan for systematically assessing safety culture in healthcare institutions; consequently, comparisons and evaluations of this study's results are based on longitudinal data from other Greek hospitals functioning under similar conditions as NHS institutions. Lastly, since participation in the study was voluntary, it is possible that those who chose to participate are more attuned to patient safety concerns, potentially leading to systematic bias.

#### **CONCLUSIONS**

The present research constitutes an attempt to approach patient safety culture in a tertiary hospital in Greece during a period of significant changes in the health sector due to the Covid-19 pandemic. The results of the survey highlighted many aspects of the patient safety culture, as well as many of its weaknesses, providing a guide for further improvement. The fact that even during the pandemic the patient safety culture was maintained at a satisfying level outlines the resilience of the health workers and their dedicated efforts to overcome it. The pandemic magnified preexisting problematic issues, like shortage of staff, but also had a positive impact by enabling reinforcement of cooperation among health workers and jointed actions regarding patient safety.

The WHO declared the end of the pandemic on the 5th of May 2023 (Nie et al 2013), but more crises in public health are yet to come. Thus, it is of great importance to assess how the health care systems react and adapt to challenging conditions and whether they maintain their core priorities,

such as assuring patient safety.

In addition, it will be of great interest to study potential changes in safety culture over time in nursing centers that maintain historical data to benchmark and establish causal relationships and the mechanism of influence of pandemic management.

#### **Contribution of the authors**

GG: She analyzed the data, contributed to the interpretation of the results, the writing of the text and the collection of the data. AG and AS: Contributed to the collection of the data. VK: He participated in the conception, design of the study and contributed to the interpretation of the results. ZT and TD: They participated in the design of the study and to the interpretation of the results.

All authors critically evaluated and approved the submission of the final text.

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**Table 1:** Demographic and occupational data for the total sample (frequencies) (N = 441)

| <b>Characteristics</b>                                  | <b>N</b> | <b>%</b> |
|---------------------------------------------------------|----------|----------|
| <b>Gender</b>                                           |          |          |
| Male                                                    | 78       | 17.7     |
| Female                                                  | 363      | 83.3     |
| <b>Educational level</b>                                |          |          |
| High School                                             | 133      | 30.2     |
| University (P.E.)                                       | 308      | 69.8     |
| Postgraduate studies                                    | 103      | 23.4     |
| Doctoral Diploma, PhD                                   | 11       | 2.5      |
| <b>Staff Position</b>                                   |          |          |
| Intern                                                  | 29       | 6.6      |
| Medical specialist                                      | 24       | 5.4      |
| Nurse                                                   | 153      | 34.7     |
| Nursing Assistant                                       | 73       | 16.6     |
| Support staff                                           | 32       | 7.3      |
| Physiotherapist/                                        | 10       | 2.3      |
| occupational therapist                                  | 2        | 0.5      |
| Social worker, sociologist                              | 118      | 26.8     |
| Other                                                   |          |          |
| <b>Job involves contact/communication with patients</b> |          |          |
| Yes                                                     | 360      | 81.6     |
| No                                                      | 81       | 18.4     |
| <b>Work environment/Sector/Unit</b>                     |          |          |
| Pathology/Internal Med.                                 | 221      | 50.1     |
| Surgical - OR                                           | 220      | 49.9     |
| <b>Number of adverse events reported (last 12</b>       |          |          |

| months) |     |      |
|---------|-----|------|
| None    | 310 | 70.3 |
| 1-2     | 62  | 14.1 |
| ≥ 3     | 69  | 15.6 |

**Table 2:** Descriptive statistics of the patient safety culture dimensions (N = 441)

| Patient safety<br>culture dimensions                                                  | Mean | SD   |
|---------------------------------------------------------------------------------------|------|------|
| Open communication                                                                    | 3.34 | .792 |
| Non punitive response<br>to error                                                     | 2.83 | .862 |
| Frequency of events<br>reported                                                       | 3.39 | .934 |
| Staffing                                                                              | 2.52 | 6    |
| Management support<br>for patient safety                                              | 3.43 | .759 |
| Supervisor's/<br>Manager's<br>Expectations and<br>Actions Promoting<br>Patient Safety | 3.73 | .667 |
| Organizational<br>Learning -<br>Continuous<br>Improvement                             | 3.63 | .549 |
| Feedback and<br>Communication<br>About Error                                          | 3.59 | .750 |



|                                       |      |      |
|---------------------------------------|------|------|
| Overall Perceptions of Patient Safety | 3.62 | .613 |
| Handoffs and Transitions              | 3.41 | .637 |
| Teamwork Within Units                 | 3.78 | .741 |
| Teamwork Across Units                 | 3.36 | .600 |

**Table 3:** Spearman correlations between patient safety culture dimensions

| Dimensions*** | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11     | 12     |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1             | .402** | .247** | .149** | .371** | .554** | .398** | .626** | .368** | .353** | .449** | .381** |
| 2             |        | .139** | .340** | .229** | .299** | .261** | .239** | .307** | .328** | .297** | .286** |
| 3             |        |        | .012   | .142** | .213** | .178** | .334** | .224** | .181** | .122*  | .181** |
| 4             |        |        |        | .256** | .171** | .097*  | .076   | .333** | .158** | .118*  | .163** |
| 5             |        |        |        |        | .448** | .412** | .468** | .549** | .484** | .246** | .593** |
| 6             |        |        |        |        |        | .386** | .550** | .408** | .411** | .368** | .356** |
| 7             |        |        |        |        |        |        | .581** | .459** | .353** | .475** | .423** |
| 8             |        |        |        |        |        |        |        | .441** | .369** | .432** | .425** |
| 9             |        |        |        |        |        |        |        |        | .439** | .373** | .456** |
| 10            |        |        |        |        |        |        |        |        |        | .301** | .691** |
| 11            |        |        |        |        |        |        |        |        |        |        | .342** |

\*,  $p < .05$ . \*\*,  $p < .01$ .

\*\*\*1: Open Communication, 2: Non-punitive Response to Error, 3: Frequency of Events Reported, 4: Staffing, 5: Management Support for Patient Safety, 6: Supervisor's/ Manager's Expectations and Actions Promoting Patient Safety, 7: Organizational Learning - Continuous Improvement, 8: Feedback and Communication About Error, 9: Overall Perceptions of Patient Safety, 10: Handoffs and Transitions, 11: Teamwork Within Units, 12: Teamwork Across Units.

**Table 4:** Predictive power of patient safety culture dimensions on the assessment of overall patient safety

| <b>Model</b>                                                          | <b>Beta</b> | <b>t</b> | <b>p</b> |
|-----------------------------------------------------------------------|-------------|----------|----------|
| 1. (Constant)                                                         |             | .519     | .604     |
| Open Communication                                                    | -.042       | -.742    | .458     |
| Non-punitive Response to Error                                        | .002        | .041     | .967     |
| Frequency of Events Reported                                          | .121        | 2.866    | .004     |
| Staffing                                                              | .061        | 1.347    | .179     |
| Management Support for Patient Safety                                 | .183        | 3.224    | .001     |
| Supervisor/ Manager Expectations and Actions Promoting Patient Safety | .061        | 1.130    | .259     |
| Organizational Learning - Continuous Improvement                      | -.022       | -.412    | .680     |
| Feedback and Communication About Error                                | .105        | 1.671    | .095     |
| Overall Perceptions of Patient Safety                                 | .236        | 4.257    | .000     |
| Handoffs and Transitions                                              | -.006       | -.108    | .914     |
| Teamwork Within Units                                                 | .077        | 1.618    | .106     |
| Teamwork Across Units                                                 | .076        | 1.229    | .220     |