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Perception of Patient Safety at The End of the 3rd Wave of COVID-19 (2021) and in 2014 in A Spanish Polyvalent ICU

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ABSTRACT

Introduction: *Healthcare has brought undeniable benefits, but each interaction with the health system can lead to inconveniences. The Intensive Care Unit (ICU) work environment is highly technical; security concerns may be especially relevant in this location. A fundamental issue of the development of safety tasks in health institutions is the assessment of the patient safety climate.*

Objective: *To assess the security climate perceived by the workers of our unit in 2014 and 2021 to articulate continuous improvement measures to improve the areas with poor evaluation.*

Results: *In 2021, employees worked in the ICU for less time (5.48 +/- 6.7 vs. 12.09 +/- 7.52 vs. years), and their safety perception score was somewhat better (8.06 + / - 1.16 vs. 7.69 +/- 1.43) than in 2014. Almost no worker declared any adverse event. The scores of the 12 dimensions were generally similar in the two periods, with a significant decrease in the positive responses of the dimension "Nonpunitive response to error" and a significant increase in "Teamwork within units" in the 2021 survey compared to 2014. In both surveys, the dimensions "Staffing" and "Management support for patient safety" account for more than 40% of the negative responses, so the efforts to improve the security climate must be directed in these two dimensions. The incorporation of a high percentage of young personnel and the slow consolidation of the safety culture values may explain these results.*

Conclusions: *The declaration of adverse events in the ICU is very scarce. The perception of teamwork within the ICU is very good. Quality improvement actions should target "Staffing" and "Management support for patient security".*

Keywords
Patient safety culture, Intensive Care Unit, Adverse events.

Introduction
Healthcare has brought undeniable benefits. However, each interaction with the health system can lead to inconveniences, the specific risks derived from each treatment and those related to failures of the health system. Furthermore, the Intensive Care Unit (ICU) work environment is highly technical; security concerns may be especially relevant in this location compared to other hospital areas.

Hospitals should strive to improve the quality of care and patient safety. It is crucial to implement a culture of safety within the hospital performance culture with values, beliefs, and norms about what is essential and appropriate attitudes and behaviors [1]. The definition of an organization's safety culture is the product of individual and group values, attitudes, perceptions, competencies,

and behavior models that determine commitment and competence in the safety and health organization [2].

Any company with a safety culture must be characterized by communications based on mutual trust, with shared perceptions of the importance of safety and confidence in the effectiveness of preventive measures. Healthcare or business organizations work supported by the Deming continuous improvement cycle [3] with the continuous implementation of its "Plan - Do - Check - Act" steps, with management plans and continuous improvement with which they manage to improve the competitiveness and the quality of its processes, reducing failures, optimizing productivity, and eliminating risks.

A fundamental issue of the development of security tasks within health institutions is the assessment of the security climate; and its performance is always pertinent, regardless of the external conditions of each epidemiological situation. This assessment can be made from different outlooks: the patient, their family members, or workers; these perspectives are not usually identical, but they can be complementary.

Our unit's HSOPS questionnaire was carried in two different periods, 2014 and 2021. The objective of our work was to assess the security climate perceived by the workers of our unit in those two times, to articulate measures of continuous improvement to enhance poorly valued areas.

Methods

We carried out a descriptive cross-sectional observational study, comparing the results of an assessment survey of the perception of patient safety that was distributed in the ICU of a second-level Spanish hospital in two moments: year 2014 (with the beginning of the RESISTENCIA ZERO project) [4] and between May to June 2021 (at the end of the third wave of the COVID-19 pandemic).

This study is a continuation of previous work done by our group [5], in which the results obtained in our survey in 2021 were compared with the results of a national survey published in 2008 [6].

The assessment of patient safety made by health professionals is made with the Hospital Survey on Patient Safety Culture (HOSPS) questionnaire developed by the Agency for Healthcare Research and Quality [7] and translated into Spanish [8]. It is a semi-structured questionnaire that consists of 42 questions grouped into 12 dimensions. There are five response options on a Likert-type rating scale [9], with the responses being ordered from "strongly agree" or "always" to "strongly disagree" or "never". Some questions are formulated in a positive sense (if the data asked is desirable within an adequate safety culture, it would be classified as "always" or "strongly agree"; or if the element data is not characteristic of a safety culture, it would rate as "never" or "strongly disagree"). Other questions are asked in the negative sense (if the item asked is not desirable for an adequate safety culture and is instead classified as "always" or "strongly agree", or if the data asked is typical of a safety culture and it is scored as "never" or "strongly disagree").

The original survey is structured in several parts. Five groups of questions are defined, which include dimensions. Within each group, one or more dimensions are defined:

• **Group A:** Thinking about your work area/unit:
- Nonpunitive response to error: workers feel that their errors and event reporting are not held against them and that their errors do not remain in their personnel file (questions A8, A12, A16).
- Organizational learning - continuous improvement: errors have led to positive changes, and the effectiveness of those changes is evaluated (A6, A9, A13).
- Overall perceptions of patient safety: procedures and systems are adequate to prevent errors, and there are no patient safety issues (A10, A15, A17, A18).
- Staffing: there are enough staff to handle the workload, and working hours are appropriate to provide the best care for patients (A2, A5, A7, A14).
- Teamwork within units: staff support each other, treat each other with respect, and work together as a team (A1, A3, A4, A11).

• **Group B:** Your supervisor/manager: Supervisors and heads of service consider suggestions to improve patient safety, congratulate workers for following safety procedures, and do not overlook patient safety problems (B1, B2, B3, B4).

• **Group C:** Communications:
- Communication openness: workers speak freely if they see that something can negatively affect a patient, and they are free to communicate it with other colleagues with greater authority (C2, C4, and C6).
- Feedback and communication about error: workers are informed about the errors that occur, they are given feedback on the implemented changes, and they discuss ways to prevent errors (C1, C3, C5).

• **Group D:** Frequency of events reported: these include errors that are detected and corrected before affecting the patient, those that are not associated with potential harm to the patient, and those that could have harmed the patient but have not done so (D1 - D3).

• **Group F:** Your hospital:
- Handoffs and transitions: important patient care information is transferred between hospital units and during shift changes (F3, F5, F7, F11)
- Management support for patient safety: hospital management provides a work climate that promotes patient safety and shows that patient safeness is a top priority (F1, F8, F9)
- Teamwork across units: hospital units cooperate and coordinate with other units to provide the best patient care (F2, F4, F6, F10).

The original questionnaire included an added outcome as Group E, "Patient safety grade", referring to the overall grade on patient safety in your work area (labeled as excellent, very good, acceptable, poor, and failing). According to the Spanish translation

of the questionnaire [8], we removed this group E, and a question about global perception of safety culture was included with a numerical score between 0 and 10.

Other questions were also included:
- Professional group.
- Socio-labor characteristics: how long have they been working in their current profession, and in which year did they start working at the ICU.
- Frequency of notification of adverse events (AE) in the last year.
- Eight questions (between #53 and #60), added in the Spanish version of HSOPS [8], about standard work practices that indicate a safety culture: working with verbal orders, making medical history reports, medication changes, diagnostic information, request for informed consent and assessment of preferences of treatment in probably terminal patients.

The first survey was delivered on paper to the workers, and our team insisted personally for three weeks on the completion and delivery of the questionnaire. The second survey was sent on paper and through a web link, with various personal and electronic reminders about the convenience of responding. In both surveys, the authors tried to maintain anonymity in the responses.

The population to which the survey was directed were nurses, healthcare assistants, porters and physicians. The hospital cleaners were not included in the 2014 survey; this group was included in the 2021 survey.

The favorable opinion of the Clinical Trials and Research Committee was obtained for the development of this work.

Analogously to our published work [5], the responses were recoded into three categories:
- Negative (strongly disagree / never and disagree / rarely).
- Intermediate (neither, or sometimes).
- Positive (strongly agree / always or agree / almost always).

For each question and dimension, we calculated the relative frequency of positive responses (number of positive responses divided by the sum of the positive, negative and intermediate responses). A dimension was rated as a strength if >/= 75% of positive responses to questions posed in a positive sense, or >/= 75% of negative responses to questions posed in a negative sense. A question or dimension was considered as a weakness if >/= 50% of negative responses to questions posed in a positive sense, or >/= 50% of positive responses to questions posed in a negative sense. The relative frequency of negative responses in each dimension was also assessed to clarify the areas where efforts should be focused on improving the safety culture.

An overall safety perception score was also calculated: the negative answer "never" or "totally disagree" awarded "0 points", and the positive answer "always" or "totally agree" awarded "4 points". The ideal for the maximum safety perception score would be 4 (maximum score) x 42 questions = 168 points.

Some dimensions include four questions and others have three. We calculated the number of negative responses for each dimension weighted by the number of questions included in that dimension. The relative percentage of negative responses for each dimension is obtained by dividing the weighted number of negative responses of the dimension by the sum of the 12 weighted numbers of negative responses.

Continuous numerical variables were described with mean and standard deviation (SD), and categorical variables were described as percentages. The Student's t-test was used to compare a continuous numerical variable against a categorical dichotomous one. The JI SQUARE test was used to assess 2 categorical variables. P value was statistically significant if <0.05. Several charts were made:

- Radial, to compare the percentages of positive responses in the different dimensions in the 2 moments (2014 and 2021).

- Bars, to describe the difference in percentages of positive responses in the different dimensions between the two moments.

- Stacked bars, to compare the positive, intermediate, and negative answers in the last group of questions (53 to 60) in both moments.

- Sectors, to identify the dimensions with the highest percentage of negative responses.

Results

The results of the 2021 survey review were recently published [5]. 68 questionnaires were obtained (a response rate of 73.9%), corresponding to 40 nurses, 14 healthcare assistants, 2 porters, 1 hospital cleaner and 11 physicians. Staff is working 12.75 +/- 11.09 years in their profession, and 5.48 +/- 6.7 years in ICU. A high percentage (91.2%) had not reported any AE the last year. The mean degree of safety score was 8.06 +/- 1.16. The dimensions "Supervisor/manager expectations and actions promoting safety" and "Teamwork within units" were strengths (percentages of positive responses of 85.29 and 95.58%). The dimensions "Staffing" and "Management support for patient security" were considered weaknesses.

In 2014, the set of ICU health workers consisted of 14 nursing assistants, 19 nurses and 8 physicians: 41 workers in total. 27 professionals responded to the survey (response rate 65.85%).

The comparison of our results in 2021 with those of 2014 are as follows:
- Shorter working time, both in their profession (26.26 +/- 8.41) and in the ICU (12.09 +/- 7.52) with statistically significant differences, p <0.001 in both cases, compared to the working times in 2021) (Figure 1).

- Slightly better score for the perception of patient safety (in 2014 7.69 +/- 1.43), with a median that goes from 7 to 8 with a significant overlap in the distribution of scores, with a difference that is not statistically significant (p = 0.23) (Figure 2).

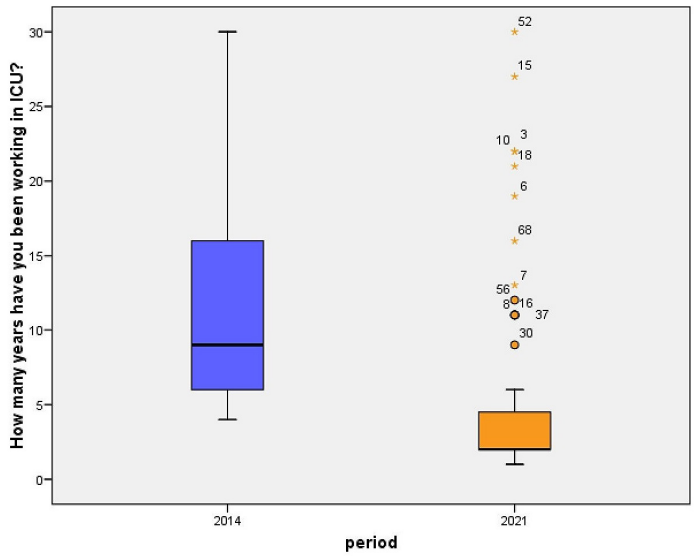

Figure 1: Box chart showing the lowest ICU seniority of health workers in the second period.

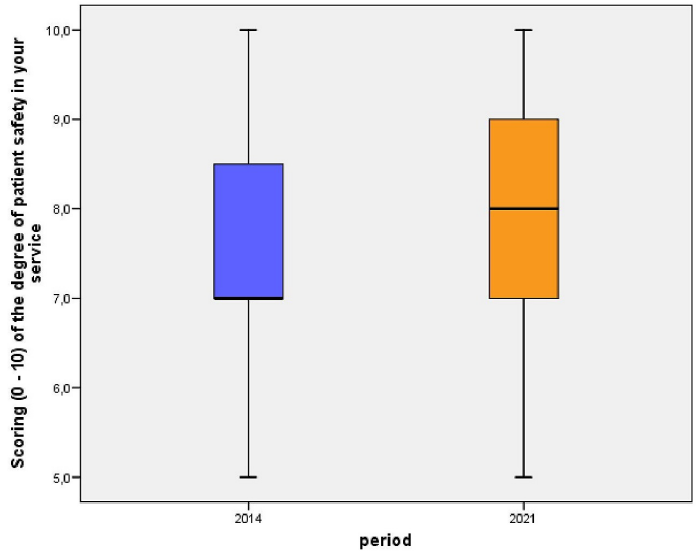

Figure 2: Box plot of patient safety perception scores in both periods.

- The low number of reported adverse events. The 27 workers who responded to this section in 2014 indicate, "0 declared events"; in 2021, 1 worker declared 2 adverse events in the last year, 3 declared 1 adverse event, and the remaining 62 (93.93%) did not declare any.

- The scores in the different dimensions are mostly similar. The sum of scores is 104.12 +/- 18.17 in 2021 and 100.62 +/- 11.59 in 2014, equivalent to an overall score of 6.2 and 6.0 (p = 0.39).

- There are 6 dimensions with the best scores in 2021 and 6 with the best results in 2014. The groups of questions that improved their assessment in 2021 compared to 2014 were "B. Supervisor/ manager expectations and actions promoting safety", "C. Communications" and "D. Frequency of events reported". In the other two groups of questions, "A. About your work area/unit" and "E. Your hospital", the dimensions referred to teamwork (within and across units) improved their assessment. The remaining dimensions assessed in groups A and E ("Nonpunitive response to error", "Organizational learning - Continuous learning", "Overall perception of patient safety" and "Staffing" within "Our work area"; and "Handoffs and transitions" and "Management support for patient safety" within "Our hospital") worsened their assessment. The dimension "Nonpunitive response to error" significantly decreased the score (77.77 in 2014 vs. 55.39 in 2021, with a difference in scores of -22.38; p = 0.002). The dimension "Teamwork within units" significantly increased the score (86.11 in 2014 vs. 95.58 in 2021, difference of +9.47, p = 0.013). The dimension "Teamwork across units" had a meaningfully increased score (43.51 vs. 54.41, difference of +10.9) with a non-statistically significant difference (p = 0.14) (Figures 3 and 4, Table 1).

- The percentages of negative responses for the dimensions are similar. In the two periods, "Staffing and "Management support for patient safety" (the implication of hospital management in the creation of an adequate safety climate) account for more than 40% of the total, with a greater number in both in the 2021 cut-off. Other dimensions such as "Handoffs and transitions", "Teamwork across units" and "Overall perception of patient safety" have percentages between 6.75 and 12.82%, with a decrease in negative responses in "Teamwork across units" and an increase in negative responses in the "Overall perception of patient safety". In the two moments, the "Teamwork within the unit" is the dimension with the least negative responses (2.11 and 0.55%) (Figure 5).

- The evaluation of the answers of the last group of questions (from 53 to 60) are similar in both courts with little differences. All the questions have percentages of positive answers higher than 60%. Questions 55 to 58 are strengths at both times (> = 75%). Question 53 is not a strength in 2014 or 2021. Questions 54, 59 and 60 were strengths in 2014, but they are not strengths in 2021. Only question 59 ("Before signing the informed consent, the patient or his representative is asked to repeat what he has understood from the explanations received") has slightly higher percentages of neutral and negative responses in 2021, with a difference that tends to be significant (p = 0.069).

Discussion

The usefulness of the HSOPS survey is to reinforce/emphasize the patient safety climate and promote the reporting of AE and errors. Other essential aspects are:

- Sensitize staff on patient safety.
- Evaluate the current situation of the safety culture, identifying strengths and areas for improvement of the safety culture.
- Examine trends in safety culture over time.
- Evaluate the impact of initiatives and interventions on the culture of patient safety.
- Carry out comparisons between organizations [1].

We must explain the results of our study with a temporal

Table 1: Comparison of the percentages of positive responses in the 12 Quality Dimensions. S strength, W weakness.

	2014		2021	
1. Commmunication openness	53.70		57.84	
2. Feedback and communication about error	52.47		59.31	
3. Frecuency of events reported	51.85		55.88	
4. Handoffs and transitions	64.50		58.82	
5. Management support for patient safety	**23.46**	**W**	**17.65**	**W**
6. Nonpunitive response to error	**77.77**	**S**	55.39	
7. Organizational learning – continuous improvement	72.84		63.72	
8. Overall perceptions of patient safety	53.70		51.47	
9. Staffing	**35.18**	**W**	**27.57**	**W**
10. Supervisor / manager expectations and actions promoting patient safety	**81.48**	**S**	**85.29**	**S**
11. Teamwork across units	**43.51**	**W**	54.41	
12. Teamwork within units	**86.11**	**S**	**95.58**	**S**

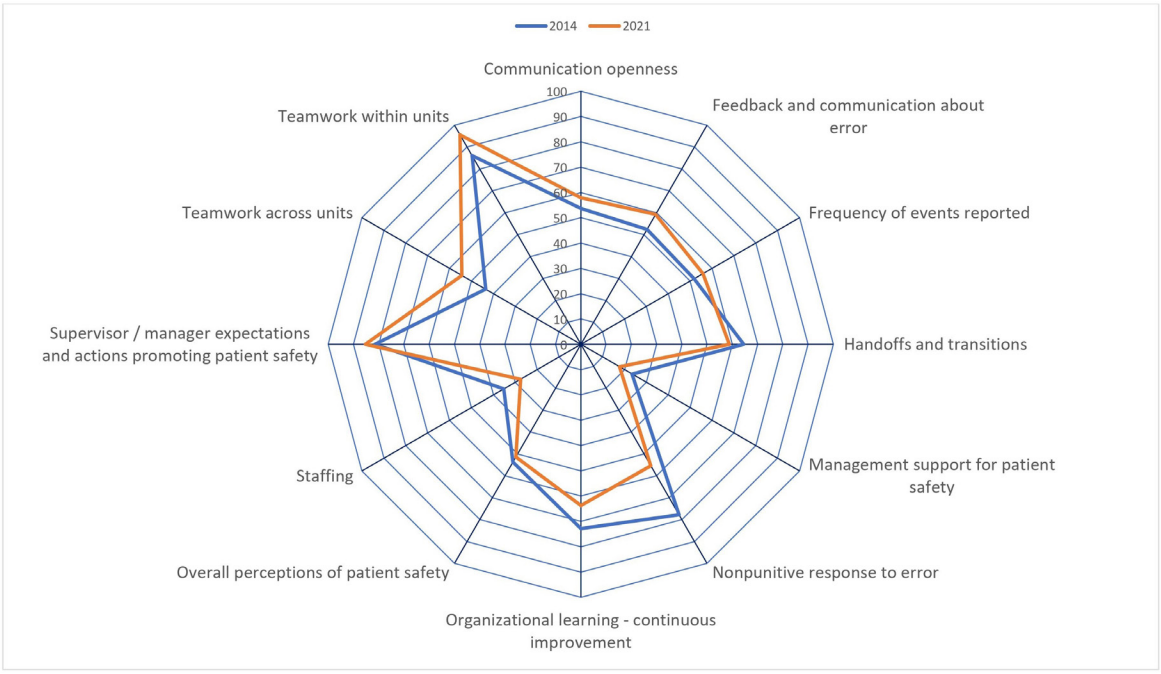

Figure 3: Radial chart comparing percentages of positive responses in 2014 and 2021.

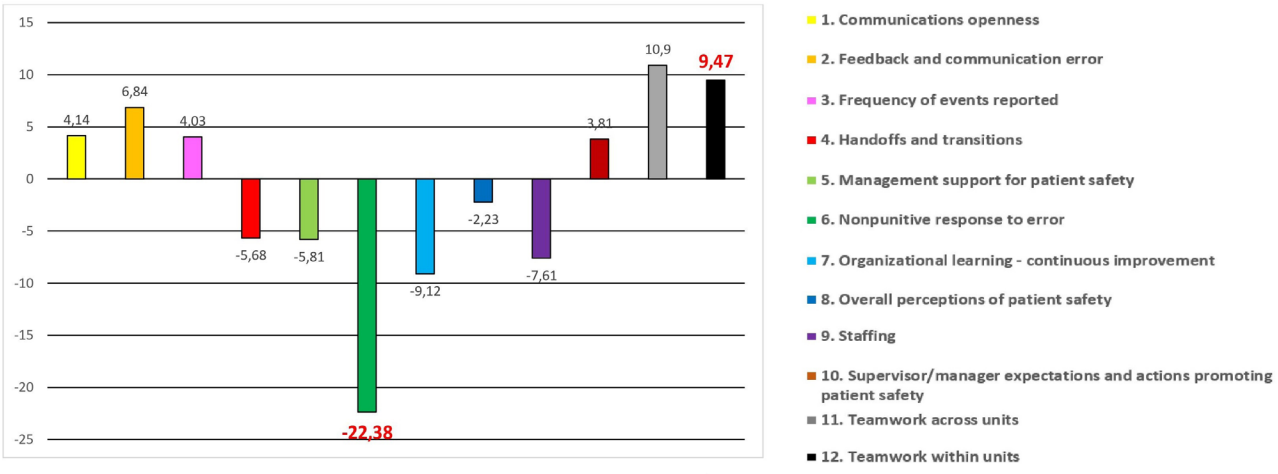

Figure 4: Variation in the percentages of positive responses in the different dimensions between the years 2021 and 2014. Numbers with statistically significant differences are marked in bold.

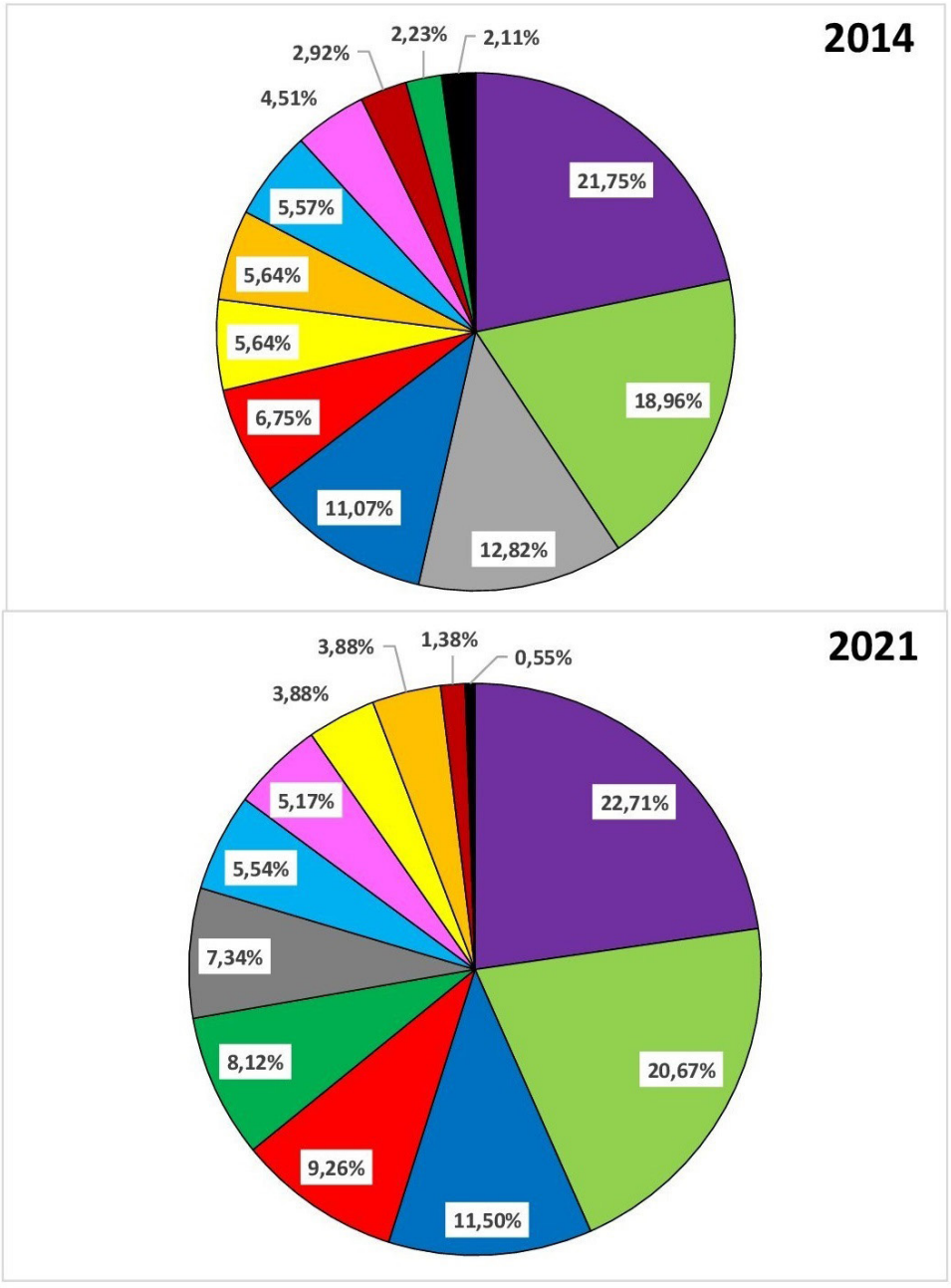

Figure 5: Sectors charts of comparison of negative responses in the 12 dimensions.

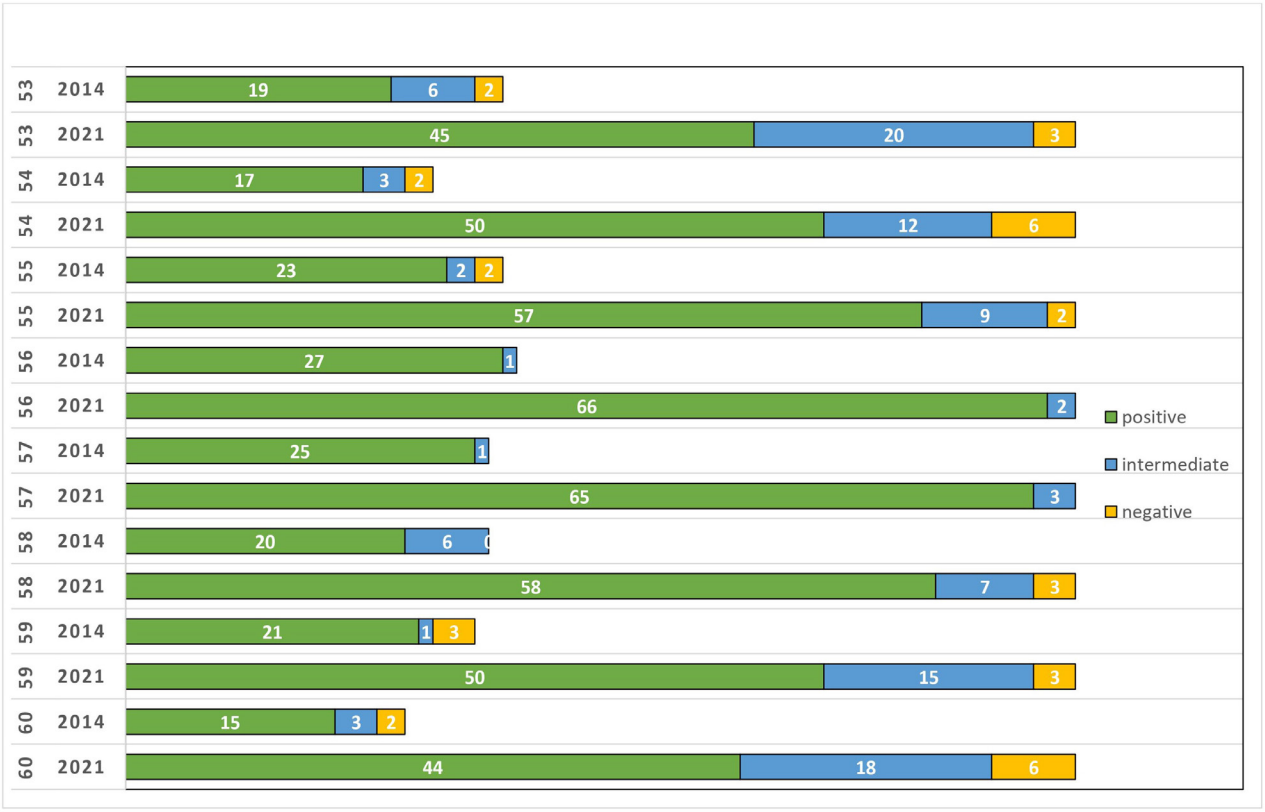

Figure 6: Comparison of positive, intermediate and negative answers in the final questions of the questionnaire.

perspective, assessing the moment in which the surveys were done. In 2014, practices that seek to improve the safety of patients were being implemented successfully in ICUs, and the RESISTENCIA ZERO project, promoted by SEMICYUC and SEEIUC scientific societies, started up after some previous zero projects (Bacteriemia Zero and Pneumonia Zero) that get to reduce the rate of device-associated nosocomial infections. The months of May and June 2021 are moments of reconstruction, of re-prioritizing activities to promote patient safety, after passing the tsunami of over occupation and extreme work and psychological stress involved in the third wave of COVID-19. They are unique moments, not extrapolated to other circumstances.

In our 2014 study, we found 3 dimensions considered Strengths ("Supervisor/manager expectations and actions promoting safety"; "Teamwork within units"; and "Nonpunitive response to error") and 3 dimensions considered as Weaknesses ("Staffing", "Management support for patient safety" and "Teamwork between units"). In 2021 the situation changed; there is no shift in 4 dimensions ("Supervisor/manager expectations…" and "Teamwork within units" remain Strengths, and "Management support…" and "Staffing" are still Weaknesses); but "Nonpunitive response to error" is no longer strength, and "Teamwork across units" is no longer weak. How can we explain these results? The incorporation of new personnel without previous work experience in our unit has influenced the presence of an unfounded fear of punishment or the search for guilty in the presence of errors. Furthermore, possibly the safe and slow consolidation of the values of the safety culture has managed to improve the perception of teamwork between units.

In the opinion of our workers, in the two periods, the priority actions to improve patient safety should focus on getting adequate staffing and improving the support of the hospital management in the development of daily work in the ICU. This finding is common to other studies [6,10].

After completing the questionnaire, some respondents told us that the questionnaire was not specific to issues related to safety in the ICU. The questionnaire was indeed created to assess the culture of safety in a general hospital environment. The problem that may arise is that it is insufficient to detect specific complications that ICU patients may suffer. However, the usefulness in the entire hospital setting opens the door for comparisons between different services of the same hospital, as was done in the national study [6].

Assessment of patient safety can be done in other ways. Some studies [11] assess the quality of nursing care from the patient's point of view, specified in data on the technical quality of health care, communication to the patient, and the comfort of care. Other studies [12] address the frequency and type of adverse events registered in the ICU. The work of the Andalusian Public Health System [10] collects a vast number of questionnaires (14091 and 7982) at Hospital (HSOPS) and Primary Care (MOSPS) levels, with similar findings to the national work [6].

The comparison of our current study results with our previous one is striking. In comparison with the national study, some improvement was perceived in the safety scores (except for 2 dimensions that remained weak at the present time). In the before-after comparison of this work in our unit, 6 dimensions have worsened their score (with the surprising data of a worsening in the perception of the nonpunitive response to error) and 6 that have improved, with similar global scores. The dimension with the lowest percentage of negative responses is at both times "Teamwork within units". There is also a slight mismatch between the numerically evaluated global perception of security (8.06 and 7.69) versus the estimate of perception of security by adding the dimensions (scores of 6.2 and 6.0); perhaps this lack of specificity in the ICU questionnaire and the absence of distinct ICU elements in the questionnaire are an explanation for this difference.

Our study has some strengths: the comparison before - after, within the same unit, although the workers have changed (retirements, beginning, and end of the contract), is very valuable when identifying trends in promoting the safety culture. Perhaps this comparison makes more sense than our previous work with the national study. The acceptable percentage of responses (65.85 and 73.9%) indicate adequate representativeness of the ICU way of thinking over time. However, it also has weaknesses: As it has been said, this test may not be specific enough to reflect the security climate in the ICU. Moreover, comparing two non-similar moments (calmer in 2014 and more intense in 2021, with findings that cannot be generalized to other circumstances) can remove external validity to its conclusions.

Because of the applicability of the HSOPS questionnaire to the entire hospital setting, our future efforts could be directed towards making a comparison of our results with those of other hospital areas (operating theaters, surgical specialties, Pediatrics, Internal Medicine wards).

Conclusion

The declaration of adverse events in our ICU is very scarce. The perception of “Teamwork within the UCI” is very good. Quality improvement actions should target “Staffing” and “Management support for patient security”.

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