



Safety Climate Evaluation in Primary Health Care: a Cross-sectional Study

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Abstract: The perception of the existence of deficits in patient safety, the associated costs and the limitation of resources have made it essential to define improvement strategies. Important concepts emerged, such as safety climate, that evaluates the perceptions of safety status held by professionals, in relation to their organization. This study aims to characterize the safety climate in Primary Health Care (PHC) using the Safety Attitudes Questionnaire (SAQ) - Short Form 2006 PT and to assess associations between SAQ-Short Form 2006 PT and demographic and professional characteristics. A cross-sectional study was conducted in all public PHC units in the northern region of Portugal. Data were collected through an online questionnaire, shared via institutional emails and by means of a snowball approach. Descriptive and inferential statistical analysis were performed. Statistical significance was considered to exist for $p \leq 0.05$. A total of 649/7427 (8.7%) responses were included in the analyses. The mean and median total SAQ-Short Form 2006 PT scores were 69.23 (SD=15.73, range 22.22-100.00) and 71.53 [59.03; 79.86], respectively. This was the first study to assess the safety climate in PHC in Portugal. The median total SAQ-Short Form 2006 PT score obtained was 71.53 [59.03; 79.86], below the threshold of ≥ 75 , pointing safety deficits.

Keywords: Patient Safety; Primary Health Care; Safety Attitudes Questionnaire; Safety Climate; Safety Culture

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1. Introduction

The first works highlighting the importance of patient safety appeared in the 20th century with the publication of the results of the *Harvard Medical Practice Study* (1991) (1, 2); *To Err is Human: Building a Safer Health System* (2000) (3) and *An organization with a memory* (2002) (4), among others. In 2002 the topic was addressed at the 55th World Health Assembly, in 2004 the World Alliance for Patient Safety was created (5), and in 2005 the First Global Challenge for Patient Safety was created (6).

The perception of the existence of deficits in patient safety, the associated costs and the limitation of resources have made it essential to define improvement strategies, in order to promote safety associated with health care delivery (7). Important concepts emerged, such as safety culture, which represents a structural indicator that promotes and facilitates initiatives to minimize risk and prevent adverse events.

According to Global patient safety action plan 2021–2030, towards eliminating avoidable harm in health care: “The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the characteristics of the organization’s health and safety management.”(8).

Safety climate, in turn, is a more readily measurable component of safety culture. It evaluates the perceptions of safety status, held by professionals in relation to their organization (9). Assessing the safety climate through questionnaires is a practical tool that allows organizations to act proactively and plan improvement strategies, evaluating the impact and effectiveness of implemented actions (7).

Research in Primary Health Care (PHC) on the nature, causes or consequences of incidents is performed to a lesser extent than in hospital settings (10). In fact a meta-analysis published in 2019 found a pooled prevalence of overall patient harm of 12% but only two of the studies included where based in PHC (11). This may be due to an assumption that PHC is safer than hospital care, is in the early stages of development in some parts of the world, and because records may not be easily accessible, making research in this area difficult (7).

A systematic review of PHC safety incidents and their association with harm identified a median of 2-3 incidents per 100 visits/medical records reviewed, 4% of which were associated with severe harm (10). In PHC the estimated proportion of patient safety incidents is generally lower than the estimated 10% of people who experience events in hospitals. However it is important to consider that, in many parts of the world, the overall volume of people using PHC is substantially higher than those using hospital services. Then the burden of potential harm related to patient safety incidents in PHC cannot be underestimated (10).

A recent study analyzed 1129 patient safety incidents reports in PHC and found that 25.0% didn’t reach the patient, 66.5% reached the patient without harm and 8.5% caused adverse events. By analyzing the adverse events it was possible to verify that 46.9% required observation, 34.4% caused temporary damage and required treatment, 13.5% required hospitalization, and 5.2% caused severe permanent damage and/or a situation close to death. In this study the main critical areas found were: communication (27.8%), management (25.1%), care delivery (23.5%) and medication (18.4%); few incidents were related to diagnosis (3.6%). Concerning specifically adverse events the main critical areas found were: care delivery (33.3%), communication (20.8%), management (17.7%) and medication (15.6%); the diagnosis was the less represented area (11.5%). The main contributing factors were related to the professional (55.8), the organization (36.8) and external (25.9). For adverse events the contributing factors were also related to the professional (47.9), the organization (40.6), and external (33.3) (12).

Safety and quality in healthcare are linked - identifying critical points that need intervention, once flagged, allows for the development and implementation of improvement strategies (13).

This study aimed to characterize the safety climate in public PHC, in the northern region of Portugal, using the SAQ-Short Form 2006 PT and to assess associations between SAQ-Short Form 2006 PT scores (total and by domains) and demographic and professional characteristics.

2. Materials and Methods

2.1. Study design

A cross-sectional study was conducted in all public PHC units in the northern region of Portugal.

2.2. Setting and subjects

In mainland Portugal, public PHC was structured according to five regional health administrations (Alentejo, Algarve, Center, Lisboa e Vale do Tejo, North), subdivided

into health center clusters (ACeS) which included, among others, PHC units with different types of organization and remuneration (Family Health Units A - USF-A, Family Health Units B - USF-B and Customized Health Care Units - UCSP) (14).

The research population in the present study included all the physicians, doctors in pre-career training, nurses and technical assistants working in PHC units, in the North Regional Health Administration in Portugal, in 2022. According to Bi-CSP® data (bicsp.min-saude.pt, access in 31.01.2022), this population corresponded to a total of 7427 professionals (Appendix B): 2318 physicians (31.2%), 929 doctors in pre-career training (12.5%), 2386 nurses (32.1%) and 1794 technical assistants (24.2%).

Professionals who refused to participate or who didn't met the eligibility criteria (first time participants in the study, who worked as physicians, doctors in pre-career training, nurses and technical assistants in PHC units in the North Regional Health Administration, in Portugal, at their current *workplace* for a month or more) were excluded.

2.3. Data collection

Data were collected from June 7th to August 9th 2022, through an online structured Google Forms® questionnaire, shared between June 7th and August 5th 2022, via institutional emails and by means of a snowball approach, a non-probabilistic sampling where participants help spread the word, recruiting additional responders. The questionnaire was voluntary, self-completed and totally anonymous. It included: an introductory message; informed consent to use data for the research purposes; questions about basic demographic and professional characteristics and Safety Attitudes Questionnaire – Short Form 2006 validated to Portugal (SAQ – Short Form 2006 PT, Appendix C) (7). A pilot test was conducted prior to its release to participants. The completion of all items was defined as mandatory for response submission.

2.4. Variables and Instruments

Sexton et al.'s SAQ is one of the most widely used tools, has been adapted for use in intensive care units, operating rooms, general inpatient and ambulatory clinics (7, 9) (Appendix A). It has been extensively tested, is considered psychometrically valid, and allows the assessment of health professionals' perceptions and attitudes related to safety (7). The original version was developed in 2006 by Bryan Sexton, Eric Thomas and Bob Helmreich (University of Texas) based on the Intensive Care Unit Management Attitudes Questionnaire, which in turn originated from the Flight Management Attitudes Questionnaire, widely used in commercial aviation (9).

SAQ – Short Form 2006 was translated, culturally adapted and validated to Portugal by Saraiva et al. (7) from the original SAQ version by Sexton et al. (9). Permission to use this instrument in the present study was obtained from the copyright holder of the instrument by the one of the authors. This questionnaire assesses organizational, work environment-related, and team-related factors (7).

SAQ-Short Form 2006 PT consists of two parts (7):

The first part of SAQ-Short Form 2006 PT consists of 41 items (Total SAQ Cronbach's alpha (α): 0.92) and six domains: *team environment* (perception of the quality of collaboration among professionals; items 1-6; $\alpha=0.70$); *safety climate* (perception of a solid and proactive organizational commitment to safety; items 7-13; $\alpha=0.73$); *job satisfaction* (pleasant or emotionally positive feeling resulting from the perception of the work experience; items 15-19; $\alpha=0.86$); *stress recognition* (recognition of how performance is influenced by stressful factors; items 20-23; $\alpha=0.82$); *management perception* (management approval regarding safety issues; unit and hospital; items 24-29; $\alpha=0.88$) and *working conditions* (perception of quality environment and logistics related to the workplace; items 30-32; $\alpha=0.71$). Items 14 and 33-36 are not part of the aforementioned domains, and items 2, 11, and 36 are scored inversely. In order to improve the filling out of the questionnaire by PHC professionals, three references were added to SAQ-Short Form 2006 PT (Google Forms version), defining equivalence between terms: hospital=ACeS; Unit=UCSP/USF; clinical area=UCSP/USF. The answers to each item follow a Likert scale consisting of five

levels: 1=strongly disagree; 2=partially disagree; 3=Neutral; 4=partially agree; 5=strongly agree; X=not applicable (7, 9). A calculation formula, suggested by the authors of the original study (9), was applied. It was based on averaging the responses (after inversion of reverse items 2, 11 and 36) and to calculate the 100pt scale score (1 was subtracted from the mean and the result was multiplied by 25). The final score ranges from 0-100 (0 - worst perception of the safety climate; 100 - best perception of the safety climate). "Not applicable" responses were considered missing (7, 9). A score of ≥ 75 indicates a strong safety environment reflecting positive attitudes towards patient safety (13).

The second part includes demographic and professional characteristics (*gender, function and length of service*) (7). *Age, workplace and type of primary care unit* were added.

2.5. Data Analysis

Categorical variables were described by absolute and relative frequencies, n (%). Continuous variables normally distributed were summarized using means and standard deviation, M (SD). Non-normally continuous variables were described using median and interquartile interval, $Med [Q_1; Q_3]$, where Q_1 is the first quartile and Q_3 the third quartile. In ordinal variables, although it is recommended to present $Med [Q_1; Q_3]$, it was decided to also present M (SD), to facilitate interpretation and possible comparisons with other studies. The normality of distributions was verified by visual observation of their histograms and through Kolmogorov-Smirnov test.

The internal consistency of the SAQ-Short Form 2006 PT scale and its six domains was assessed using Cronbach's alpha (α), with values above 0.70 being considered acceptable. To study association between two continuous variables, Pearson's coefficient (r_P) was used when the two variables are normally distributed or Spearman's coefficient (r_S) when at least one of the variables is not normally distributed or is ordinal. To compare means between 2 independent, normally distributed samples, the t-test for independent samples was used. To compare distributions between 2 independent, not normally distributed samples, the Mann-Whitney test was used. To compare means between 3 or more independent, normally distributed samples, the One-way Anova test was used. To compare distributions between 3 or more independent samples, not normally distributed, the Kruskal-Wallis test was used. In both the One-way Anova test and the Kruskal-Wallis test, when significant differences were found, multiple comparisons were performed with Bonferroni adjustments.

For analysis of the results was used Statistical Package for the Social Sciences® (SPSS, version 27.0 for Windows® SPSS Inc., 1989.2020) and statistical significance was considered to exist for $p \leq 0.05$.

2.6. Ethical considerations

This study was authorized by the management boards of the institutions involved and approved by four ethics committees of the northern region of Portugal related to PHC (ethics committees of North Regional Health Administration, Alto Minho Local Health Unit, Matosinhos Local Health Unit and Northeast Local Health Unit). To avoid loss of anonymity, the names of PHC units were not collected. All participants were invited by signing an informed consent. All the recommended ethical principles were respected.

3. Results

3.1. Descriptive analysis of the sample

A total of 676/7427 (9.1%) responses were collected. From these 2 (2/676, 0.3%) were excluded because they didn't consent to participate, 25 (25/676, 3.7%) were excluded because didn't meet the eligibility criteria (first time participants in the study, who worked as physicians, doctors in pre-career training, nurses and technical assistants in PHC units in the North Regional Health Administration, in Portugal, at their current workplace for a month or more). The sample was stratified by *function* and *workplace*.

In total, 649/7427 (8.7%) responses were included in the analyses. The mean age was 42.6 years (SD = 9.9, range 18-67 years) and 77% (500/649) were females. The following distribution was found considering demographic and professional characteristics: a) *age*: 0.2% (1/649) 18-20 years; 9.7% (63/649) 21-30 years; 37.1% (241/649) 31-40 years; 34.1% (221/649) 41-50 years; 11.6% (75/649) 51-60 years; 7.4% (48/649) 61-70 years; b) *function*: 21.9% (142/649) were technical Assistants; 31.7% (206/649) were nurses; 10.9% (71/649) were doctors in pre-career training and 35.4% (230/649) were physicians; c) *length of service at the current workplace*: 2.5% (16/649) 1-5 months; 8.5% (55/649) 6-11 months; 13.7% (89/649) 1-2 years; 12.2% (79/649) 3-4 years; 13.7% (89/649) 5-10 years; 29.0% (188/649) 11-20 years; 20.5% (133/649) 21 or more years; d) *workplace* (Table 1); e) *type of primary care unit*: 19.7% (128/649) UCSP; 22.5% (146/649) USF-A; 57.8% (375/649) USF-B.

Table 1. Descriptive analysis of the sample – *Workplace* and *function*.

<i>Workplace</i>	<i>Function</i>				<i>Total</i>	
	Physicians n	Doctors in pre-career training n	Nurse n	Techni- cal Assis- tant n	n	%
1. ACeS Alto Ave - Guimarães, Vizela e Terras de Basto	12	4	10	6	32	4.9
2. ACeS Alto Minho	12	3	12	8	35	5.4
3. ACeS Alto Trás-os-Montes - Alto Tâmega e Barroso	5	3	6	5	19	2.9
4. ACeS Alto Trás-os-Montes – Nordeste	9	3	9	16	37	5.7
5. ACeS Ave/Famalicão	9	4	4	4	21	3.2
6. ACeS Cávado I – Braga	15	6	12	7	40	6.2
7. ACeS Cávado II – Gerês / Cabreira	4	1	7	4	16	2.5
8. ACeS Cávado III – Barcelos / Esposende	7	4	10	6	27	4.2
9. ACeS Douro I – Marão e Douro Norte	7	1	6	3	17	2.6
10. ACeS Douro II – Douro Sul	2	1	4	3	10	1.5
11. ACeS Entre Douro e Vouga I – Feira e Arouca	5	3	7	8	23	3.5
12. ACeS Entre Douro e Vouga II – Aveiro Norte	5	3	4	7	19	2.9
13. ACeS Grande Porto I – Santo Tirso/Trofa	14	2	8	4	28	4.3
14. ACeS Grande Porto II – Gondomar	8	4	5	4	21	3.2
15. ACeS Grande Porto III – Maia / Valongo	24	4	7	11	46	7.1
16. ACeS Grande Porto IV – Póvoa do Varzim / Vila do Conde	7	4	15	4	30	4.6
17. ACeS Grande Porto V – Porto Ocidental	20	4	9	4	37	5.7
18. ACeS Grande Porto VI – Porto Oriental	7	3	5	4	19	2.9
19. ACeS Grande Porto VII – Gaia	10	4	6	3	23	3.5
20. ACeS Grande Porto VIII – Espinho / Gaia	10	2	8	5	25	3.9
21. ACeS Matosinhos	15	2	8	4	29	4.5
22. ACeS Tâmega I – Baixo Tâmega	8	1	15	9	33	5.1
23. ACeS Tâmega II – Vale do Sousa Sul	6	4	8	8	26	4.0
24. ACeS Tâmega III – Vale do Sousa Norte	9	1	21	5	36	5.5
TOTAL	230	71	206	142	649	100.0

3.2. Descriptive analysis of SAQ - Short Form 2006 PT

It was performed a descriptive analysis of SAQ-Short Form 2006 PT. All the 41 items of SAQ-Short Form 2006 PT were analyzed. The median response rate "not applicable" considering the totality of the items of SAQ-Short Form 2006 PT was 3.2%. These were excluded from the analysis.

In order to evaluate internal consistency of the present survey Cronbach's alpha (α) was performed: Total SAQ-Short Form 2006 PT, $\alpha=0.93$; *team environment* (items 1-6), $\alpha=0.79$; *safety climate* (items 7-13), $\alpha=0.82$; *job satisfaction* (items 15-19), $\alpha=0.91$; *stress recognition* (items 20-23), $\alpha=0.88$; *management perception* (items 24-29), $\alpha=0.89$ and *working conditions* (items 30-32), $\alpha=0.72$.

The mean and median total SAQ-Short Form 2006 PT scores were 69.23 (SD=15.73, range 22.22-100.00) and 71.53 [59.03; 79.86], respectively (Table 2).

The median SAQ-Short Form 2006 PT scores by domains ranged from 54.55 [38.64; 70.45] to 93.75 [75.00; 100.00] (Table 2). *Stress recognition* obtained the highest median score of 93.75 [75.00; 100.00] and *management perception* and *working conditions* the lowest median scores, 54.55 [38.64; 70.45] and 66.67 [50.00; 83.33] respectively (Table 2).

Table 2. Descriptive Analysis of SAQ - Short Form 2006 PT: mean (SD); median [Q1; Q3] of total score and per domain.

SAQ - Short Form 2006 PT	n	Mean (SD)	Median [Q1; Q3]
Total Score	350	69.23 (15.73)	71.53 [59.03; 79.86]
<i>Team environment (items 1-6)</i>	608	77.41 (19.38)	79.17 [66.67; 91.67]
<i>Safety climate (items 7-13)</i>	587	71.91 (20.00)	75.00 [60.71; 85.71]
<i>Job satisfaction (items 15-19)</i>	597	75.61 (24.13)	80.00 [60.00; 95.00]
<i>Stress recognition (items 20-23)</i>	503	83.42 (21.34)	93.75 [75.00; 100.00]
<i>Management perception (items 24-29)</i>	486	54.66 (22.20)	54.55 [38.64; 70.45]
<i>Working conditions (items 30-32)</i>	492	66.55 (23.97)	66.67 [50.00; 83.33]

The median scores obtained in the domain *management perception* were different if calculated for UCSP/USF or ACeS, 62.50 [41.67; 75.00] and 50.00 [30.21; 66.67], respectively.

The item “7.” obtained the highest mean score of 4.47 (SD=0.92) [median score 5 [4; 5]] and the item “24. b)” obtained the lowest mean score of 2.66 (SD=1.33) [median score 3 [1; 4]] (Table 3).

In four items were obtained mean scores below 3 (Table 3): “36.” mean score of 2.93 (SD=1.31) [median score 3 [2; 4]]; “29.” mean score 2.90 (SD=1.48) [median score 3 [2; 4]]; “27. b)” mean score of 2.79 (SD=1.25) [median score 3 [2; 4]] and “24. b)” mean score of 2.66 (SD=1.33) [median 3 [1; 4]].

Table 3. Descriptive Analysis of SAQ - Short Form 2006 PT: mean (SD); median [Q₁; Q₃] per item.

SAQ-Short Form 2006 PT, per item	Mean (SD)	Median [Q ₁ ; Q ₃]
Team environment (items 1-6)		
1. Nurse input is well received in this clinical area. (^a clinical area=UCSP/USF), n = 636	4.42 (0.89)	5 [4; 5]
2. In this clinical area, it is difficult to speak up if I perceive a problem with patient care ^b . (^a clinical area=UCSP/USF), n = 640	3.59 (1.41)	4 [2; 5]
3. Disagreements in this clinical area are resolved appropriately (i.e., not who is right, but what is best for the patient). (^a clinical area=UCSP/USF), n = 638	3.83 (1.21)	4 [3; 5]
4. I have the support I need from other personnel to care for patients, n = 636	4.29 (0.97)	5 [4; 5]
5. It is easy for personnel here to ask questions when there is something that they do not understand. (^a Unit=UCSP/USF), n = 634	4.30 (1.07)	5 [4; 5]
6. The physicians and nurses here work together as a well-coordinated team. (^a Unit=UCSP/USF), n = 639	4.09 (1.11)	4 [4; 5]
Safety climate (items 7-13)		
7. I would feel safe being treated here as a patient, n = 629	4.47 (0.92)	5 [4; 5]
8. Medical errors are handled appropriately in this clinical area. (^a clinical area=UCSP/USF), n = 631	4.10 (1.10)	4 [4; 5]
9. I know the proper channels to direct questions regarding patient safety in this clinical area. (^a clinical area=UCSP/USF), n = 632	3.97 (1.14)	4 [4; 5]
10. I receive appropriate feedback about my performance, n = 642	3.59 (1.28)	4 [3; 5]
11. In this clinical area, it is difficult to discuss errors ^b . (^a clinical area=UCSP/USF), n = 640	3.36 (1.38)	4 [2; 5]
12. I am encouraged by my colleagues to report any patient safety concerns I may have, n = 638	3.95 (1.19)	4 [3; 5]
13. The culture in this clinical area makes it easy to learn from the errors of others. (^a clinical area=UCSP/USF), n = 632	3.64 (1.19)	4 [3; 5]
Single item (item 14)		
14. My suggestions about safety would be acted upon if I expressed them to management, n = 626	3.23 (1.27)	3 [2; 4]
Job satisfaction (items 15-19)		
15. I like my job, n = 607	4.41 (0.95)	5 [4; 5]
16. Working here is like being part of a large family, n = 632	3.89 (1.21)	4 [3; 5]
17. This is a good place to work, n = 632	4.06 (1.16)	4 [4; 5]
18. I am proud to work in this clinical area. (^a clinical area=UCSP/USF), n = 626	4.11 (1.15)	5 [4; 5]
19. Morale in this clinical area is high, n = 638	3.52 (1.28)	4 [2; 5]
Stress recognition (items 20-23)		
20. When my workload becomes excessive, my performance is impaired, n = 603	4.37 (0.95)	5 [4; 5]
21. I am less effective at work when fatigued, n = 602	4.42 (0.94)	5 [4; 5]
22. I am more likely to make errors in tense or hostile situations, n = 602	4.38 (0.97)	5 [4; 5]
23. Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure), n = 530	4.14 (1.15)	5 [4; 5]
Management perception (items 24-29)		
24. a) Management supports my daily efforts (Unit Management) (^a Unit=UCSP/USF), n = 635	3.21 (1.39)	4 [2; 4]
24. b) Management supports my daily efforts (Hospital Administration). (^a hospital=ACeS), n = 561	2.66 (1.33)	3 [1; 4]
25. a) Management doesn't knowingly compromise patient safety (Unit Management) (^a Unit=UCSP/USF), n = 621	3.68 (1.23)	4 [3; 5]
25. b) Management doesn't knowingly compromise patient safety (Hospital Administration). (^a hospital=ACeS), n = 554	3.45 (1.24)	4 [3; 5]
26. a) Management is doing a good job (Unit Management) (^a Unit=UCSP/USF), n = 635	3.60 (1.22)	4 [3; 5]

26. b) Management is doing a good job (Hospital Administration). (^a hospital=ACeS), n = 566	3.03 (1.28)	3 [2; 4]
27. a) Problem personnel are dealt with constructively by our Administration (Unit Management) (^a Unit=UCSP/USF), n = 614	3.18 (1.31)	3 [2; 4]
27. b) Problem personnel are dealt with constructively by our Administration (Hospital Administration). (^a hospital=ACeS), n = 546	2.79 (1.25)	3 [2; 4]
28. a) I get adequate, timely info about events that might affect my work, from (Unit Management) (^a Unit=UCSP/USF), n = 628	3.55 (1.21)	4 [3; 4]
28. b) I get adequate, timely info about events that might affect my work, from (Hospital Administration). (^a hospital=ACeS), n = 560	3.19 (1.25)	3 [2; 4]
29. The levels of staffing in this clinical area are sufficient to handle the number of patients, n = 638	2.90 (1.48)	3 [2; 4]
Working conditions (items 30-32)		
30. This hospital does a good job of training new personnel. (^a hospital=ACeS), n = 559	3.52 (1.31)	4 [2; 5]
31. All the necessary information for diagnostic and therapeutic decisions is routinely available to me. n = 582	3.41 (1.22)	4 [2; 4]
32. Trainees in my discipline are adequately supervised, n = 561	4.04 (1.13)	4 [4; 5]
Single items (items 33-36)		
33. I experience good collaboration with nurses in this clinical area. (^a Unit=UCSP/USF), n = 624	4.41 (0.95)	5 [4; 5]
34. I experience good collaboration with staff physicians in this clinical area. (^a Unit=UCSP/USF), n = 619	4.46 (0.85)	5 [4; 5]
35. I experience good collaboration with pharmacists in this clinical area, n = 266	3.54 (1.08)	3 [3; 5]
36. Communication breakdowns that lead to delays in delivery of care are common ^b , n = 623	2.93 (1.31)	3 [2; 4]

^areferences added to SAQ-Short Form 2006 PT, in Google Forms, defining equivalence between terms.

^bresults obtained after inversion of the item, as foreseen in the methodology.

Figure 1 shows the distribution of responses, for each of the 41 items of the SAQ - Short Form 2006 PT, according to the Likert scale. These are constructed using absolute and relative frequencies, n (%), without inversion of the items 2, 11 and 36 and after exclusion of "not applicable" responses. The total percentage of "not applicable" responses was 7.0%.

It is possible to verify that item "35." raised the highest percentage of "indifferent" responses. The item "34." gathered the highest percentage of positive responses "Agree" or "Strongly agree". Items "2." and "11." obtained the highest percentage of negative responses "Disagree" or "Strongly disagree". Item "24. b)" obtained the third highest percentage of negative responses "Disagree" or "Strongly disagree". Some of the items included in the *management perception* domain (items 24-29) are among those with higher percentage of negative answers "Disagree" or "Strongly disagree".

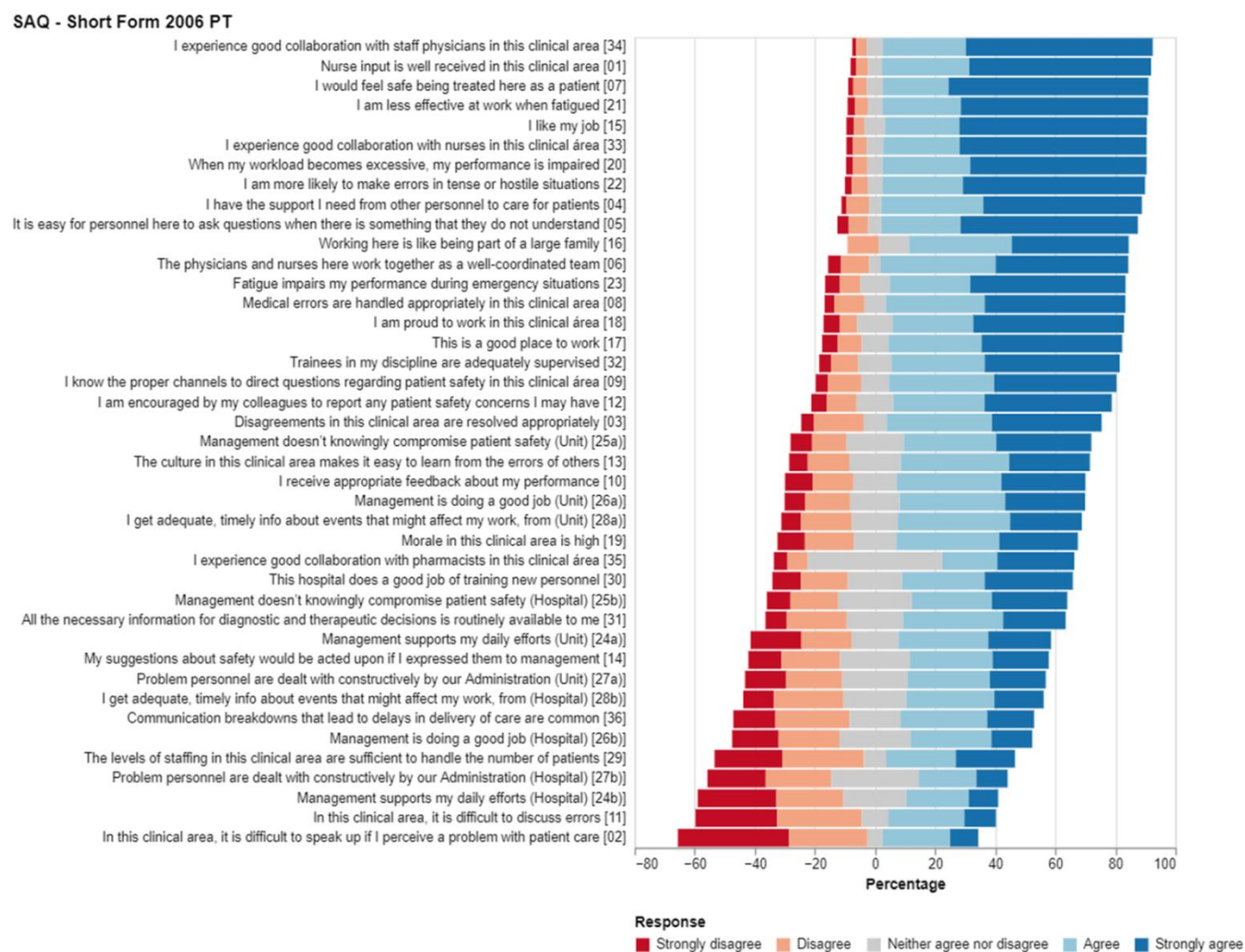


Figure 1. Descriptive Analysis of SAQ - Short Form 2006 PT, per item. In this figure are presented the 41 SAQ-Short Form 2006 PT items and respective Likert scale responses (without inversion of the items 2, 11 and 36). In order to improve the filling out of the questionnaire by PHC professionals, three references were added to SAQ-Short Form 2006 PT (Google Forms version), defining equivalence between terms: hospital=ACeS; Unit=UCSP/USF; clinical area=UCSP/USF.

3.3. Inferential analysis

The following sections describe each of the domains and Total SAQ-Short Form 2006 PT score shown in Table 4.

- *Team environment*
The *team environment* domain is only associated with the characteristics *function* ($p < 0.001$) and *type of primary care unit* ($p < 0.001$). Regarding the variable *function*, multiple comparisons with Bonferroni adjustments show that the differences were found between the categories Nurse-Physicians ($p < 0.001$); Nurse-Doctor Pre-Career Training ($p = 0.004$), with the Nurse category showing lower values for this domain and between the categories Technical Assistant-Physicians ($p = 0.007$); Technical Assistant-Doctor Pre-Career Training ($p = 0.015$), with the Technical Assistant category also showing lower values for this domain. As regards the variable *type of primary care unit*, by performing multiple comparisons with Bonferroni adjustments, we found differences between the categories UCSP-USF-A ($p < 0.001$) and UCSP-USF-B ($p < 0.001$), with the UCSP category showing lower values for this domain.
- *Safety climate*
The *safety climate* domain is only associated with the *type of primary care unit* variable ($p < 0.001$). Performing multiple comparisons with Bonferroni adjustments, we found differences between the categories UCSP-USF-A ($p < 0.001$) and UCSP-USF-B ($p < 0.001$), with the UCSP category showing lower values for this domain.
- *Job satisfaction*
Regarding the *job satisfaction* domain is associated with *gender* ($p = 0.001$) and *type of primary care unit* ($p < 0.001$). With regard to *gender*, women show higher values in this domain than men. As regards the variable *type of primary care unit*, performing multiple comparisons with Bonferroni adjustments, we found differences between the categories UCSP-USF-B ($p < 0.001$), with the UCSP category showing lower values for this domain.
- *Stress recognition*
The *stress recognition* domain shows associations with the characteristics *age* ($p < 0.001$), *length of service at the current workplace* ($p = 0.032$) and *function* ($p < 0.001$). As the age of the respondent increases, the score obtained in this domain decreases. However, the linear correlation is weak ($r_s = -0.166$). As the *length of service* at the respondent's *current workplace* increases, so does the score obtained in this domain. However, this linear correlation is also weak ($r_s = -0.095$). With regard to the variable *function*, by performing multiple comparisons with Bonferroni adjustments, we found differences between the categories Technical Assistant-Nurse ($p < 0.001$); Technical Assistant-Doctor Pre-Career Training ($p < 0.001$); Technical Assistant-Physicians ($p < 0.001$), with the Technical Assistant category showing lower values for this domain and between the categories Nurse-Physicians ($p = 0.005$), with the Nurse category showing lower values for this domain than Physicians.
- *Management perception*
The *management perception* domain is associated with *gender* ($p = 0.024$) and *type of primary care unit* ($p = 0.038$). With regard to *gender*, women show higher values in this domain than men. Regarding the variable *type of primary care unit*, performing multiple comparisons with Bonferroni adjustments, we found differences between the categories UCSP-USF-B ($p = 0.044$), with the UCSP category showing lower values for this domain.
- *Working conditions*
The *working conditions* domain is associated with the characteristics *function* ($p = 0.016$) and *type of primary care unit* ($p < 0.001$). With regard to the variable *function*, by performing multiple comparisons with Bonferroni adjustments, we found differences between the categories Technical Assistant-Physicians ($p = -0.014$) and Technical Assistant-Doctor Pre-Career Training ($p = 0.048$), with the Technical Assistant category showing lower values for this domain. With regard to the variable *type of primary care unit*, performing multiple comparisons with Bonferroni adjustments,

we found differences between the categories UCSP-USF-A ($p<0.001$) and UCSP-USF-B ($p<0.001$), with the UCSP category presenting lower values for this domain.

- Total SAQ-Short Form 2006 PT score

The total SAQ-Short Form 2006 PT score shows association with the *gender* ($p=0.019$) and *type of primary care unit* ($p<0.001$) characteristics. As regards *gender*, women show higher values than men. With regard to the variable *type of primary care unit*, by performing multiple comparisons with Bonferroni adjustments, we found differences between the categories UCSP-USF-A ($p<0.001$) and UCSP-USF-B ($p<0.001$), with the UCSP category presenting lower score values.

Table 4. Descriptive Analysis of the SAQ - Short Form 2006 PT and comparison with Demographic and Professional Characteristics.

Demographic and Professional Characteristics/SAQ-Short Form 2006 PT Domains	Total SAQ-Short Form 2006 PT Score			SAQ-Short Form 2006 PT Scores per Domain																	
				Team environment			Safety climate			Job satisfaction			Stress recognition			Management perception			Working conditions		
	n	S	p	n	S	p	n	S	p	n	S	p	n	S	p	n	S	p	n	S	p
Gender, Med [Q ₁ ; Q ₃]/M (SD)			0.019^a			0.119 ^a			0.182 ^a			0.001^a			0.597 ^a			0.024^c			0.126 ^a
Male	79	67.4 [54.9; 77.1]		138	79.2 [66.7; 91.7]		135	75 [60.7; 85.7]		133	75 [55; 90]		116	93.8 [75; 100]		106	50.4 (21.8)		115	66.7 [50; 75]	
Female	271	72.9 [60.4; 80.6]		470	83.3 [66.7; 95.8]		452	75 [60.7; 89.3]		464	85 [65; 95]		387	87.5 [75; 100]		380	55.9 (22.2)		377	75 [50; 83.3]	
Age, rs/rP	348	-0.014	0.794 ^b	604	-0.041	0.315 ^b	583	-0.029	0.487 ^b	593	0.023	0.578 ^b	500	-0.166	<0.001 ^b	484	0.013	0.775 ^d	490	-0.003	0.942 ^b
Function, Med [Q ₁ ; Q ₃]			0.109 ^e			<0.001 ^e			0.165 ^e			0.360 ^e			<0.001 ^e			0.559 ^e			0.016^e
Technical Assistant	38	62.8 [53.1; 76.2]		125	79.2 [58.3; 91.7]		120	73.2 [60.7; 85.7]		123	80 [60; 95]		79	75 [37.5; 87.5]		79	61.4 [38.6; 75]		66	58.3 [47.9; 75]	
Nurse	128	71.9 [59; 79.9]		198	77.1 [62.5; 91.7]		189	75 [57.1; 85.7]		189	80 [60; 95]		172	87.5 [75; 100]		166	56.8 [38.1; 72.7]		170	66.7 [50; 83.3]	
Doctor Pre-career training	49	75.7 [66.7; 79.9]		67	87.5 [75; 91.7]		66	78.6 [64.3; 86.6]		67	90 [75; 95]		65	93.8 [81.3; 100]		57	59.1 [40.9; 70.5]		64	75 [58.3; 89.6]	
Physicians	135	70.1 [59.0; 80.6]		218	87.5 [70.8; 95.]		212	75 [57.1; 89.3]		218	80 [60; 95]		187	100 [81.3; 100]		184	52.3 [38.6; 67.6]		192	75 [50; 83.3]	
Length of service at the current workplace, rs	350	0.041	0.450 ^b	608	-0.027	0.500 ^b	587	-0.020	0.624 ^b	597	-0.001	0.971 ^b	503	-0.095	0.032^b	486	-0.017	0.707 ^b	492	0.059	0.191 ^b
Type of primary care unit, Med [Q ₁ ; Q ₃] /M (SD)			<0.001 ^e			<0.001 ^e			<0.001 ^e			<0.001 ^e			0.601 ^e			0.038^f			<0.001 ^e
UCSP	58	60.4 [47.7; 72.2]		118	66.7 [50; 83.3]		111	60.7 [46.4; 78.6]		114	72.5 [55; 95]		95	93.8 [75; 100]		80	48.9 (21.3)		84	58.3 [41.7; 75]	
USF-A	82	73.6 [60.9; 80.6]		141	87.5 [70.8; 95.8]		135	78.6 [64.3; 89.3]		138	80 [60; 95]		116	87.5 [75; 100]		117	56.4 (21.9)		115	75 [50; 83.3]	
USF-B	210	72.9 [62.5; 81.3]		349	83.3 [70.8; 91.7]		341	75 [64.3; 89.3]		345	85 [70; 95]		292	93.8 [75; 100]		289	55.6 (22.4)		293	75 [50; 91.7]	

a: Mann-Whitney test. b: linear correlation test for Spearman coefficient. c: t-test for 2 independent samples. d: linear correlation test for Pearson coefficient. e: Kruskal-Wallis test. f: One-way Anova test. rs: Spearman coefficient. rP: Pearson coefficient. S: summary measures.

As can be seen in Figure 2, the ACeS is associated with the domains *team environment* ($p<0.001$), *safety climate* ($p<0.001$), *job satisfaction* ($p=0.042$), *management perception* ($p=0.011$), *working conditions* ($p<0.001$) and with the Total SAQ-Short Form 2006 PT score ($p=0.009$).

Multiple comparisons with Bonferroni adjustments were performed. The differences found, for each of the domains, considering the variable *workplace*, are shown in Figure 2 and presented in the following sections.

- *Team environment*
 “4. ACeS Alto Trás-os-Montes – Nordeste” and “17. ACeS Grande Porto V – Porto Ocidental” ($p=0.007$); “4. ACeS Alto Trás-os-Montes – Nordeste” and “21. ACeS Matosinhos” ($p=0.010$); “4. ACeS Alto Trás-os-Montes – Nordeste” and “8. ACeS Cávado III – Barcelos / Esposende” ($p=0.010$); “4. ACeS Alto Trás-os-Montes – Nordeste” and “7. ACeS Cávado II – Gerês / Cabreira” ($p<0.001$); “22. ACeS Tâmega I – Baixo Tâmega” and “7. ACeS Cávado II – Gerês / Cabreira” ($p=0.002$) and “23. ACeS Tâmega II – Vale do Sousa Sul” and “7. ACeS Cávado II – Gerês / Cabreira” ($p=0.019$).
- *Safety climate*
 “4. ACeS Alto Trás-os-Montes – Nordeste” and “13. ACeS Grande Porto I – Santo Tirso/Trofa” ($p=0.007$) and “4. ACeS Alto Trás-os-Montes – Nordeste” and “7. ACeS Cávado II – Gerês / Cabreira” ($p=0.001$).
- *Job satisfaction*
 “4. ACeS Alto Trás-os-Montes – Nordeste” and “13. ACeS Grande Porto I – Santo Tirso/Trofa” ($p=0.023$).
- *Management perception*
 No differences were found between pairs of categories.
- *Working conditions*
 “22. ACeS Tâmega I – Baixo Tâmega” and “16. ACeS Grande Porto IV – Póvoa do Varzim / Vila do Conde” ($p=0.027$) and “22. ACeS Tâmega I – Baixo Tâmega” and “17. ACeS Grande Porto V – Porto Ocidental” ($p=0.010$).
- Total SAQ-Short Form 2006 PT score
 “4. ACeS Alto Trás-os-Montes – Nordeste” and “13. ACeS Grande Porto I – Santo Tirso/Trofa” ($p=0.040$).

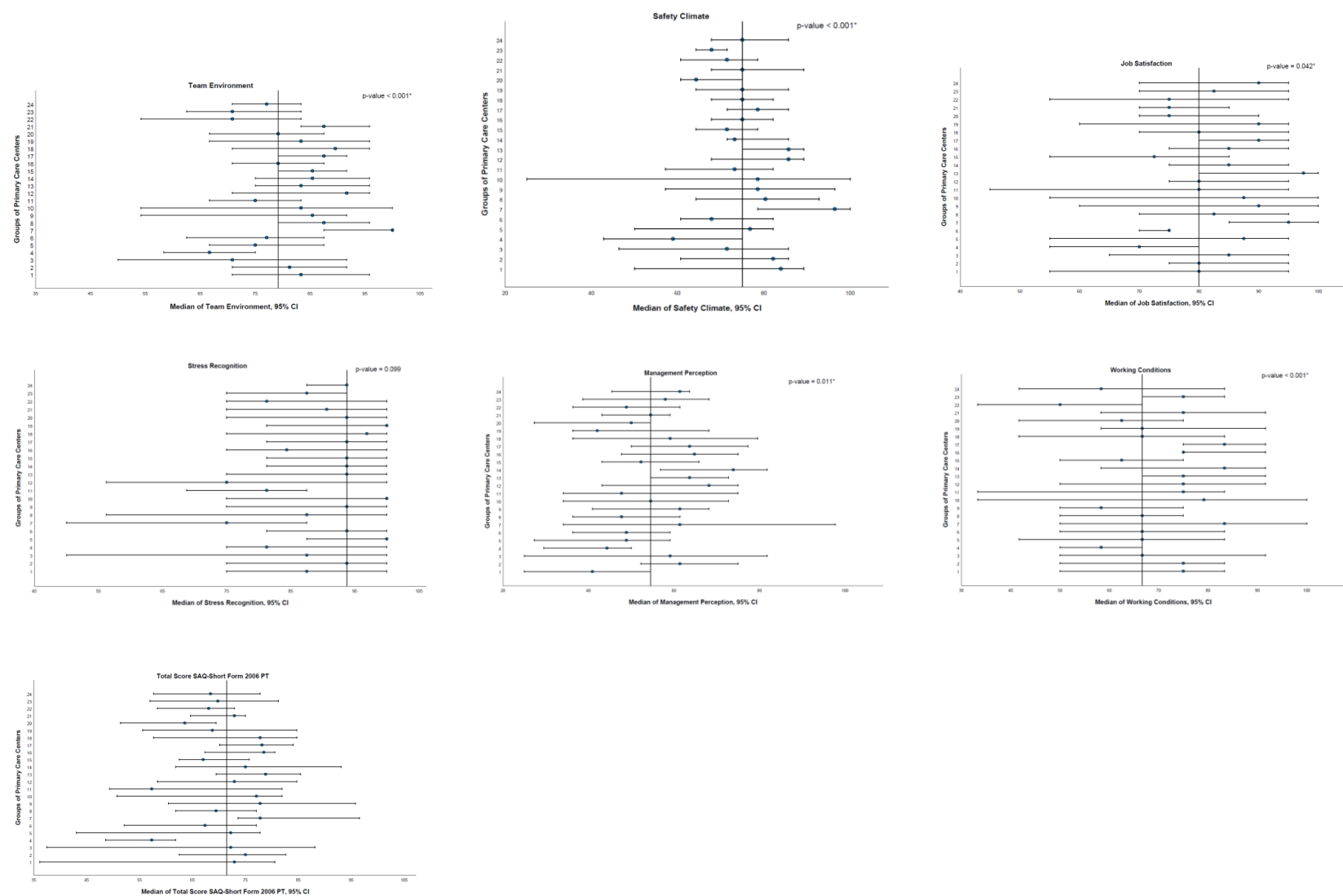


Figure 2. Medians and respective 95% CI of the six domains and Total SAQ-Short Form 2006 PT Score by ACeS. The Kruskal-Wallis test was used. *: significant at 5%.

4. Discussion

4.1. Principal Findings

This was the first study to evaluate the safety climate in PHC, in Portugal. A score ≥ 75 indicates a strong safety environment (13), a cutoff value not accomplished as the mean and median SAQ-Short Form 2006 PT total scores were 69.23 (SD=15.73, range 22.22–100.00) and 71.53 [59.03; 79.86], respectively.

The total SAQ-Short Form 2006 PT median scores were higher in women, in *workplace* “13. ACeS Grande Porto I – Santo Tirso/Trofa” and in *type of primary care unit* USF-A and USF-B. On the opposite the lowest median values were found in men, in “4. ACeS Alto Trás-os-Montes – Nordeste” and in UCSP. The *workplace* “13. ACeS Grande Porto I – Santo Tirso/Trofa” has been considered, in the last years, one of the best in terms of performance in North Regional Health Administration (Bi-CSP@: bicsp.min-saude.pt, access in 14.09.2022), a fact that might be related to safety. “4. ACeS Alto Trás-os-Montes – Nordeste” obtained a lower score in terms of performance, in North Regional Health Administration, although it was not the *workplace* with the lowest rate (Bi-CSP@: bicsp.min-saude.pt, access in 14.09.2022). These facts may suggest an association between the safety climate and the level of performance although it remains to be investigated. USF-A and USF-B have organizational, functional and technical autonomy, that might explain the achievement of a better total SAQ-Short Form 2006 PT score in comparison to the UCSP.

The scores obtained in the domains *team environment*, *safety climate*, *job satisfaction* and *stress recognition* indicate a strong safety environment. On the opposite, the scores obtained in the domains *management perception* and *working conditions*, below the threshold of 75, alert to the need for improvement.

The differences obtained in SAQ-Short Form 2006 PT domain scores allow the identification of areas that require further intervention and are discussed in the following sections.

- *Team environment*

In the *team environment* domain were obtained lower median scores in the categories Nurse, Technical Assistant and UCSP. These might point the need for investment in activities that promote communication skills and teamwork, especially with Nurses, Technical Assistants and in UCSP.

- *Safety climate*

In the *safety climate* domain was obtained a lower median score in UCSP. This might be due in part to the fact that USF-A and USF-B establish, as a goal, the sharing and discussion of incidents at meetings. It should occur in an open, non-punitive environment and on a regular basis.

- *Job satisfaction*

In the *job satisfaction* domain were obtained lower scores in men and UCSP. It is important to mention that USF-A and USF-B have, as previously mentioned, organizational, functional and technical autonomy which might increase job satisfaction and contribute to professional fulfillment. It is also important to mention that professionals working in USF-B have a better salary, when compared to UCSP or USF-A, also probably justifying the results obtained.

- *Stress recognition*

In the *stress recognition* domain as the *age* of the respondent increases, the SAQ-Short Form 2006 PT median score obtained decreases and as the *length of service at the respondent's current workplace increases*, so does the score obtained. In this domain were also obtained lower scores in the categories Nurse and Technical Assistant. Health care professionals should be able to recognize excessive workload and fatigue in

order to improve safety climate and promote effectiveness. Keeping this concept in mind is especially important as professionals' *age* increases, for shorter *length's of service at the current workplace* and in the categories Nurse and Technical Assistant. Self-care might also help and should be promoted.

- *Management perception*

The score obtained in the *management perception* domain was below the threshold of 75, indicating the need for improvement. In this domain were obtained lower median scores for men and for UCSP. UCSP has less autonomy than USF-A and USF-B and that might influence management perception. The implementation of measures that promote transition from UCSP to USF might improve this result.

The *management perception* domain median score was also calculated separately for ACeS and for UCSP/USF, with lower values being found for ACeS management. In USF management is not hierarchical and develops in a cooperative atmosphere which might have contributed to the better result obtained in UCSP/USF. The health care professional's perceive that, managers of ACeS and UCSP/USF, need to improve their compromise with patient safety, management performance, support of professional's efforts, constructive personnel problem solving and assure appropriate human resources. The lack of appropriate human resources is particularly evident as it was obtained a negative score in this item (29). The need for improvement in support of professional's efforts and constructive personnel problem solving is particularly evident for ACeS management as it were obtained negative mean scores for these items (24. b e 27. b). This domain is decisively calling for managers attention and intervention.

- *Working conditions*

The SAQ-Short Form 2006 PT median score obtained in *working conditions* domain was also below the threshold of 75, indicating the need for improvement. In this domain were found lower scores for Technical Assistant and UCSP calling for improvement in personnel training and appropriate clinical decision support tools.

It is interesting to verify that the category UCSP obtained lower median scores in several domains: *team environment*, *safety climate*; *job satisfaction*; *management perception* and *working conditions*. According to Bi-CSP® data (bicsp.min-saude.pt, access in 31.01.2022), the *workplace* "4. ACeS Alto Trás-os-Montes – Nordeste" is the only one in the North Regional Health Administration totally constituted by UCSP (Appendix D) and was identified in the present study as having the lower total SAQ-Short Form 2006 PT score. This does not reflect all variables inherent to each *workplace* nor the quality of work developed.

The item "7." obtained the highest mean score, reflecting a positive perception of the professionals about patient care provided; the item "24. b)" obtained the lowest mean score of reflecting a perceived need for more support from the ACeS leadership.

In four items were obtained mean scores below 3: "36.", an item that is to be inversed, but still with low scores, indicating a need for communication improvement; "29.", reflecting the perception of an insufficient ratio of professionals considering the number of patients; "27. b)" and "24. b)", reflecting a perceived need for improvement in management of problems related to professionals and more support from the ACeS leadership.

The item "35." raised the highest percentage of "indifferent" responses. These results might be explained by difficulties in interpreting the question since, in most situations, pharmacists are not integrated in PHCs but are present through community pharmacies. The item "34." gathered the highest percentage of positive responses "Agree" or "Strongly agree", indicating a positive perception of collaboration with staff physicians. The items "2." and "11." obtained the highest percentage of negative responses "Disagree" or "Strongly disagree", a result to be inversed but still with potencial for improvement. The item "24. b)" obtained the third highest percentage of negative responses "Disagree" or

“Strongly disagree” – pointing out the perception of need for more support from the ACeS management, as previously mentioned.

Some of the items included in the *management perception* domain (items 24–29) are among those with higher percentage of negative answers “Disagree” or “Strongly disagree” calling for leadership investment in communication, problem solving and professionals support.

4.2. Comparison with Prior Work

There have been several papers published so far to assess the safety climate. However, comparative analysis is limited because most of them were conducted in hospitals or with different study populations and some use a different assessment instrument, other than SAQ-Short Form 2006. Another limitation has to do with the differences between the validated SAQ- Short Form 2006 questionnaires, used in different countries, since the items included in each domain are not always the same.

Sexton *et al.*, in 2006, conducted a study in ambulatory clinics in the USA and found lower mean scores: *team environment* 69.7 (vs 77.41% in the present study); *safety climate* 69.9 (vs 71.91 in the present study); *job satisfaction* 70.6 (vs 75.61 in the present study); *stress recognition* 66.7 (vs 83.42 in the present study); *working conditions* 61.6 (vs 66.55 in the present study) except for *perceptions of management*: 55.3 (vs 54.66 in the present study) (9).

McGuire *et al.*, in 2010, conducted a study in a large practice with a primary care core in the USA, staffed by clinicians in family medicine, pediatrics and internal medicine, and found higher mean scores: *team environment* 88.9 (vs 77.41% in the present study); *safety climate* 87.8 (vs 71.91 in the present study); *job satisfaction* 86.2 (vs 75.61 in the present study); *stress recognition* 74.8 (vs 83.42 in the present study); *perceptions of executive management* 72.6 and *perceptions of local management* 86.0 (vs *management perception* 54.66 in the present study); *working conditions* 84.9 (vs 66.55 in the present study) (15).

Lousada *et al.*, conducted a study in 2019, in six primary care centers in Brazil, and found lower mean scores: total SAQ-Short Form 2006 score 62.6 [vs 69.23 in the present study]; *team environment* 69.4 (vs 77.41 in the present study); *safety climate* 59.5 (vs 71.91 in the present study); *job satisfaction* 75.1 (vs 75.61 in the present study); *stress recognition* 65.8 (vs 83.42 in the present study); *management perception* 54.5 (vs 54.66 in the present study); *working conditions* 51.2 (vs 66.55 in the present study) (16).

Differences between studies are expected as safety climate evaluates the perceptions of safety status, held by professionals, in relation to their organization (9).

4.3. Strengths and Limitations

This was the first study to evaluate the safety climate in PHC, in Portugal. It aimed to be comprehensive, involving all the public PHC units of the North Regional Health Administration, and inclusive, in which physicians, doctors in pre-career training, nurses and technical assistants could participate. The sample obtained was representative of the population studied. The questionnaire SAQ is a widely used instrument with good psychometric qualities, and the consistency of the data gathered in this study supports its validity. SAQ, by identifying different domains in safety climate, highlights critical points and possible areas of intervention.

As limitations it is important to mention that this study is a self-reported survey, depending on the respondents' recall, and might be affected by reporting bias. The opportunity to participate in the study, by filling in a form exclusively available online, may represent a barrier to participation. The results may reflect, at least partially, effects of COVID19 pandemic. The cross-sectional type of study does not measure the evolution that may exist. This study also analyses only a part of safety culture focusing on professional's perceptions.

Studies in this area are still scarce, calling for attention of researchers.

5. Conclusions

This was the first study to assess the safety climate in PHC in Portugal. The median total SAQ-Short Form 2006 PT score obtained was 71.53 [59.03; 79.86], below the threshold of ≥ 75 , pointing safety deficits. The lower median scores were found in the domains *management perception* and *working conditions*. Further studies are needed to determine which factors might influence safety climate in a positive or in a negative way, its association with performance and with the occurrence of incidents.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethical Committees of the North Regional Health Administration (approval code N°67/CES of 10-05-2022), Alto Minho Local Health Unit (approval code N°28/CES of 02-06-2022), Matosinhos Local Health Unit (approval code N°46/CES/JAS of 13-05-2022) and Northeast Local Health Unit (approval code N°67/CES of 25-05-2022).

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

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

Appendix B
Descriptive analysis of the population – Workplace and function.
 (Bi-CSP®: bicsp.min-saude.pt, access in 31.01.2022)

Workplace						Function
	Physicians	Doctors in pre-career training	Nurse	Technical Assistant	Total	
	n	n	n	n	n	%
1. ACeS Alto Ave - Guimarães, Vizela e Terras de Basto	142	52	157	114	465	6,3
2. ACeS Alto Minho	173	62	173	136	544	7,3
3. ACeS Alto Trás-os-Montes - Alto Tâmega e Barroso	68	31	82	75	256	3,4
4. ACES Alto Trás-os-Montes – Nordeste	145	30	155	112	442	6
5. ACeS Ave/Famalicão	75	25	71	50	221	3
6. ACeS Cávado I – Braga	119	77	117	85	398	5,4
7. ACeS Cávado II – Gerês / Cabreira	68	25	69	56	218	2,9
8. ACeS Cávado III – Barcelos / Esposende	94	27	95	70	286	3,9
9. ACeS Douro I – Marão e Douro Norte	68	27	80	67	242	3,3
10. ACeS Douro II – Douro Sul	50	17	59	43	169	2,3
11. ACeS Entre Douro e Vouga I – Feira e Arouca	93	40	96	72	301	4,1
12. ACeS Entre Douro e Vouga II – Aveiro Norte	68	28	70	53	219	2,9
13. ACeS Grande Porto I – Santo Tirso/Trofa	70	18	69	49	206	2,8
14. ACeS Grande Porto II – Gondomar	96	63	92	76	327	4,4
15. ACeS Grande Porto III – Maia / Valongo	127	43	125	85	380	5,1
16. ACeS Grande Porto IV – Póvoa do Varzim / Vila do Conde	85	56	87	63	291	3,9
17. ACeS Grande Porto V – Porto Ocidental	106	59	99	72	336	4,5
18. ACeS Grande Porto VI – Porto Oriental	68	40	72	52	232	3,1
19. ACeS Grande Porto VII – Gaia	104	35	91	62	292	3,9
20. ACeS Grande Porto VIII – Espinho / Gaia	100	33	112	79	324	4,4
21. ACeS Matosinhos	104	47	108	84	343	4,6
22. ACeS Tâmega I – Baixo Tâmega	105	23	110	97	335	4,5
23. ACeS Tâmega II – Vale do Sousa Sul	100	41	104	75	320	4,3
24. ACeS Tâmega III – Vale do Sousa Norte	90	30	93	67	280	3,8
TOTAL	2318	929	2386	1794	7427	100

Obrigado por preencher o questionário – agradecemos imenso o seu tempo e a sua participação.

POR FAVOR NÃO EScreva NESTA ÁREA.

☐ ○○○○○○○○○○○○○○○○○○○○○○○○○○

Appendix D**Descriptive analysis of North Regional Health Administration by type of primary care unit (Bi-CSP®: bicsp.min-saude.pt, access in 31.01.2022)**

Workplace	Type of primary care unit					
	USF		UCSP		Total	
	n	%	n	%	n	%
1. ACeS Alto Ave - Guimarães, Vizela e Terras de Basto	22	95,7	1	4,3	23	100,0
2. ACeS Alto Minho	17	68,0	8	32,0	25	100,0
3. ACeS Alto Trás-os-Montes - Alto Tâmega e Barroso	3	30,0	7	70,0	10	100,0
4. ACES Alto Trás-os-Montes – Nordeste	0	0,0	15	100,0	15	100,0
5. ACeS Ave/Famalicão	10	71,4	4	28,6	14	100,0
6. ACeS Cávado I – Braga	18	90,0	2	10,0	20	100,0
7. ACeS Cávado II – Gerês / Cabreira	8	66,7	4	33,3	12	100,0
8. ACeS Cávado III – Barcelos / Esposende	12	66,7	6	33,3	18	100,0
9. ACeS Douro I – Marão e Douro Norte	9	75,0	3	25,0	12	100,0
10. ACeS Douro II – Douro Sul	3	27,3	8	72,7	11	100,0
11. ACeS Entre Douro e Vouga I – Feira e Arouca	12	70,6	5	29,4	17	100,0
12. ACeS Entre Douro e Vouga II – Aveiro Norte	9	75,0	3	25,0	12	100,0
13. ACeS Grande Porto I – Santo Tirso/Trofa	9	81,8	2	18,2	11	100,0
14. ACeS Grande Porto II – Gondomar	14	93,3	1	6,7	15	100,0
15. ACeS Grande Porto III – Maia / Valongo	16	84,2	3	15,8	19	100,0
16. ACeS Grande Porto IV – Póvoa do Varzim / Vila do Conde	14	100,0	0	0,0	14	100,0
17. ACeS Grande Porto V – Porto Ocidental	15	100,0	0	0,0	15	100,0
18. ACeS Grande Porto VI – Porto Oriental	9	90,0	1	10,0	10	100,0
19. ACeS Grande Porto VII – Gaia	11	84,6	2	15,4	13	100,0
20. ACeS Grande Porto VIII – Espinho / Gaia	14	77,8	4	22,2	18	100,0
21. ACeS Matosinhos	11	78,6	3	21,4	14	100,0
22. ACeS Tâmega I – Baixo Tâmega	8	40,0	12	60,0	20	100,0
23. ACeS Tâmega II – Vale do Sousa Sul	14	82,4	3	17,6	17	100,0
24. ACeS Tâmega III – Vale do Sousa Norte	12	75,0	4	25,0	16	100,0
TOTAL	270		101		371	

UCSP: Customized Health Care Unit; USF: Family Health Unit.

[Note that USF includes USF-A and USF-B. Some UCSP are divided into extensions, which are not presented here].

References

1. TA B, LL L, NM L, L H, AR L, AG L, et al. Incidence of adverse events and negligence in hospitalized patients. Results of the Harvard Medical Practice Study I. *N Engl J Med*. 1991 324:370-6.
2. LL L, TA B, N L, AG L, AR L, BA B, et al. The nature of adverse events in hospitalized patients. Results of the Harvard Medical Practice Study II. *N Engl J Med*. 1991;324:377-84.
3. LT K, JM C, MS D. *To Err is Human: Building a Safer Health System*. . Institute of Medicine (US) Committee on Quality of Health Care in America, Washington (DC): National Academies Press (US). 2000.
4. L. D. An organisation with a memory. . *Clin Med (Lond)*. 2002;2:452-7.
5. Organization WH. *WORLD ALLIANCE FOR PATIENT SAFETY FORWARD PROGRAMME*. 2004.
6. D P, L D. Clean care is safer care: the first global challenge of the WHO World Alliance for Patient Safety. . *Am J Infect Control*. 2005;33:476-9.
7. Saraiva DMRF, Almeida AAd. Validation of the Safety Attitudes Questionnaire - Short Form 2006 to Portugal. *International Journal of Nursing*. 2015;2:103-12.
8. Organization. GWH. *Global patient safety action plan 2021–2030: towards eliminating avoidable harm in health care*. 2021.
9. Sexton JB, Helmreich RL, Neilands TB, Rowan K, Vella K, Boyden J, et al. The Safety Attitudes Questionnaire: psychometric properties, benchmarking data, and emerging research. *BMC Health Services Research*. 2006;6:44.
10. Panesar SS, deSilva D, Carson-Stevens A, Cresswell KM, Salvilla SA, Slight SP, et al. How safe is primary care? A systematic review. *BMJ Quality & Safety*. 2016;25:544-53.
11. M P, K K, RN K, A A, D P, E K, et al. Prevalence, severity, and nature of preventable patient harm across medical care settings: systematic review and meta-analysis. . *BMJ* 2019;17.
12. Gens-Barberà M H-VN, Vidal-Esteve E, Mengibar-García Y, Hospital-Guardiola I, Oya-Girona EM, Bejarano-Romero F, Castro-Muniain C, Satué-Gracia EM, Rey-Reñones C, Martín-Luján FM. Analysis of Patient Safety Incidents in Primary Care Reported in an Electronic Registry Application. *Int J Environ Res Public Health*. 2021;18:8941.
13. Saraiva DMRF, Almeida AAd. Patient Safety Environment: Perception of Health Care Professionals. *International Journal of Nursing*. 2016;3:73-80.
14. Biscaia AR, Heleno LCV. Primary Health Care Reform in Portugal: Portuguese, modern and innovative. *Ciência & Saúde Coletiva*. 2017;22:701-11.
15. McGuire MJ, Noronha G, Samal L, Yeh H-C, Crocetti S, Kravet S. Patient Safety Perceptions of Primary Care Providers after Implementation of an Electronic Medical Record System. *J Gen Intern Med* 2012 28:184-92.
16. Lousada LM, Oliveira NLLd, Dutra FCdS, Bastos IB, Carvalho REFLd. Patient safety culture in primary and home care services. *BMC Family Practice* 2020:21-188.