Healthcare provider perceptions of safety culture: A multi-site study using the safety attitudes questionnaire

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ABSTRACT

Introduction: Patient safety culture, the way in which members of a healthcare organisation think about and prioritise safety, has been linked to positive patient outcomes. The aim of this study was to use the Safety Attitudes Questionnaire (SAQ) to measure the safety culture in a variety of healthcare settings located in the province of Munster of Ireland.

Methods: The SAQ was applied in six healthcare settings in the Munster province of Ireland between December 2017 and November 2019. The attitudes of healthcare staff towards six domains of safety culture were assessed over 32 Likert-scaled items. The mean, median, interquartile range and percent positive scores for each domain were calculated for the study population, and subgroup analyses were carried out between study sites and professions. Results for each setting were compared to international benchmarking data. Chi-Squared tests were used to determine whether study site or profession were related to domain scores. Reliability analysis was carried out using Cronbach's alpha.

Results: Study participants ($n = 1749$) comprising doctors, pharmacists, nurses, and healthcare assistants, were found to have positive attitudes towards patient safety culture but scored poorly in the domains *Working Conditions* and *Perceptions of Management*. Perceptions of safety culture were more positive in smaller healthcare settings, and amongst nurses and HCAs. The survey had acceptable internal consistency.

Conclusions: In this study investigating the safety culture of healthcare organisations in Ireland, study participants had generally positive attitudes towards the safety culture in their organisation, however working conditions, perceptions of management, and medication incident reporting were identified as key areas for improvement.

1. Introduction

Safety culture refers to the way safety is thought about and implemented within an organisation.[1] Patient safety culture, defined as *'the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management'*, has been used worldwide to describe healthcare organisations' commitment to patient safety.[2-4] Positive safety culture has been shown to be associated with positive patient outcomes such as reduced rates of HAPU, hospital acquired pneumonia and medical errors.[5]

In 2017, the World Health Organisation (WHO) announced that its third Global Patient Safety Challenge, *'Medication Without Harm'*, would focus on medication safety, aiming to reduce the global rate of medication errors by 50% within five years. Medication errors, defined as *'any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer'*, can occur at any stage during the prescribing, compounding, dispensing, administration, monitoring, and use of medicines.[6] In 2022, five years since *'Medication Without Harm'*, medication errors remain a leading cause of preventable harm worldwide, however the challenge has been further complicated by the COVID-19 pandemic.[7] Rapid reorganisation and the implementation of significant workflow changes in healthcare systems were necessary to ensure the continued delivery of healthcare during the pandemic.[8]

Even before the pandemic, underfunding and the after-effects of the 2008 global financial crisis had placed major strain on the Irish healthcare system.[9] A 2018 study reported a high prevalence of burnout amongst Irish healthcare staff, and a 2017 study linked the large-scale emigration of doctors since the financial crisis to poor working conditions in Irish hospitals.[10,11] Reported medication errors are thought to represent only a fraction of actual medication errors occurring in Irish hospitals each year.[12]

The Safety Attitudes Questionnaire (SAQ) is a widely used and validated tool for the measurement of safety culture, which measures attitudes towards safety culture over six domains: *Safety Climate, Teamwork Climate, Job Satisfaction, Stress Recognition, Perceptions of Management* and *Working Conditions.* International benchmarking data are available for the survey, which allows safety culture to be compared across healthcare organisations and countries.[13] In a study published in 2020, this research group used the SAQ to measure the safety culture in a large teaching hospital in the province of Munster in Ireland. The hospital scored above the SAQ international benchmark in five out of six domains, indicating a positive overall safety culture, but scored below the international benchmark in the domain *Working Conditions.*[5] The SAQ was subsequently administered in five other healthcare settings in the Munster region, to gain a better understanding of attitudes towards patient safety at different levels of the Irish healthcare system, and provide a more representative picture of safety culture across the country.

The aim of this study was to use the SAQ to investigate the safety culture in a number of healthcare settings in the province of Munster in Ireland and compare the results to the international benchmark.

2. Methods

2.1. Study design and setting

This was a cross-sectional, descriptive, multi-centre survey study which aimed to investigate the safety culture in various healthcare settings in Munster, Ireland. The short-form version of the SAQ was distributed to all healthcare staff (both patient-facing and non-patient-facing) in six study sites at various times between December 2017 and November 2019.[13] Although the length of time surveys were left with respondents before collection varied across sites, most surveys were collected 4–8 weeks after distribution. A combination of hard copies and an electronic version of the survey was distributed in all sites. The study was carried out in the following settings: one community healthcare organisation (site A), one psychiatric hospital (site B), one large public voluntary hospital (site C), one small public voluntary hospital (site D), one maternity hospital (site E), and one large university teaching hospital (Site F, results published previously and included for comparison purposes).[5] These sites were included because pharmacists in each site expressed interest in measuring safety culture in their workplace. Therefore, there was internal support for the study at each site which, combined with the fact that the survey was anonymous, meant there was good uptake of the survey at each site. Ethical approval for the study was granted by the local research ethics committee prior to study commencement.

2.2. Questionnaire

The short-form version of the SAQ is a 32-item, Likert-scaled questionnaire which measures caregiver attitudes towards safety culture across six domains: *Safety Climate* (perceptions of a strong and proactive commitment to safety), *Teamwork Climate* (perceived quality of collaboration between personnel), *Job Satisfaction* (positivity about the work experience), *Stress Recognition* (acknowledgement of how performance is affected by stressors), *Perceptions of Management* (approvement of managerial action) and *Working Conditions* (perceived quality of the work environment and logistical support). In 2006, benchmarking data for these six domains was published by the research group who developed the survey; data was collected from 10,843 healthcare providers in 203 clinical areas across 3 countries, allowing comparisons between other healthcare organisations and an international 'average'.[13] The questionnaire ends with a free-text question: *'What are your top 3 recommendations for improving patient safety in your clinical area?'*. Before distribution, the survey was adapted to suit the Irish healthcare context, for example by replacing the word 'attending physician' with the word 'Consultant'. The survey was also specifically adapted between settings, for example by replacing the word 'hospital' with the word 'service' in the community healthcare organisation (site E). A variety of survey distribution methods were used across the study sites; some sites distributed surveys electronically, some distributed paper copies, and some used a combination of paper and electronic methods. Due to an administrative error, respondents from site C did not complete any of the questions in the domain *Teamwork Climate*. Permission to use the short form of the SAQ was received from the Centre for Healthcare Quality and Safety (CHQS), University of Texas, prior to survey adaptation and distribution.[14]

2.3. Data analysis

Questionnaire results were analysed using SPSS® version 24.[15] Responses were coded as follows: *'Strongly Disagree'* = 1, *'Disagree Slightly'* = 2, *'Neutral'* = 3, *'Agree Slightly'* = 4, *'Agree Strongly'* = 5, *'Not Applicable'* = 6. As questions 2, 11, and 32 in the survey were negatively worded, the scores for these questions were reversed.[13] To maintain consistency with previous research, the following formula was used to calculate respondents' scores for each domain: *Domain Scale Score for a Respondent = (((Mean of domain items)-1) * 25)*.

The mean, median and interquartile range of the domain scores for the sample population were calculated. The median was calculated because the scale scores for the domains *Teamwork Climate, Safety Climate, Job Satisfaction,* and *Stress Recognition* were not normally distributed, however the mean score for each domain was also included to allow comparison to other studies and to the international benchmark.[16] The percent positive score, i.e. the percentage of the sample who responded positively to each domain, was found by calculating the percent of respondents who received a scale score of 75 or higher. Subgroup analyses were carried out to determine whether domain scores differed between study sites or professions. The percentage of study participants who responded *'Strongly Disagree'*, *'Slightly Disagree'*, *'Neutral'*, *'Slightly Agree'*, *'Strongly Agree'* and who did not respond to each individual statement was also calculated. Chi-Squared tests were used to determine whether study site or profession were related to positive domain scores. Effect size was measured using the Cramer's V test, the results of which were interpreted using the method put forward by Cohen.[17] Reliability analysis using Cronbach's alpha was conducted on 31 statements across six domains. An alpha coefficient of ≥ 0.7 was considered to indicate acceptable internal consistency, while an alpha coefficient of ≥ 0.8 was considered to indicate very good internal consistency.

Responses to the free-text question *'What are your top 3 recommendations for improving patient safety in your clinical area?'* were analysed using conventional content analysis.[18]

3. Results

3.1. Demographics

In total, 1749 surveys were completed by healthcare staff across all sites; the respondent demographics are displayed in Due to the variety of methods used to distribute the surveys across the study sites it was not possible to calculate a response rate. Sites A, E and F were larger and employed more staff than Sites B, C and D, therefore there was a greater number of surveys completed in these sites.

Table 1. Due to the variety of methods used to distribute the surveys across the study sites it was not possible to calculate a response rate. Sites A, E and F were larger and employed more staff than Sites B, C and D, therefore there was a greater number of surveys completed in these sites.

3.2. Safety culture domain scores

The mean, median, interquartile range, and standard deviation for the study population in each of the six safety culture domains are displayed in Table 2, along with the international benchmark mean score for each domain. The study population scored above the international benchmark in five domains, *Teamwork Climate, Safety Climate, Job Satisfaction, Stress Recognition* and *Perceptions of Management,* and slightly below the international benchmark for the domain *Working Conditions.*

Table 1

Demographics.

Demographic characteristics	Frequency (n = 1749)	Percent (%)
Setting		
Site A	460	26.3
Site B	92	5.3
Site C	131	7.5
Site D	85	4.9
Site E	213	12.2
Site F	768	43.9
Profession		
Physician (comprising Consultants, NCHDs and Junior Doctors)*	330	18.9
Nurse	688	39.3
Health and Social Care Professional (e.g. dietician, speech and language therapist)	191	10.9
Pharmacist	11	0.6
Clerical/Admin	45	2.6
Other	181	10.3
Healthcare Assistant	125	7.1
Home Help	42	2.4
Midwife	74	4.2
Missing	62	3.7
Time Spent Working in Healthcare Organisation		
<1 Year	317	18.1
1–5 Years	407	23.3
5–10 Years	189	10.8
>10 Years	760	43.5
Missing	76	4.3

Totals may not add to 100% due to rounding and missing data.

* Non Consultant Hospital Doctors (NCHDs).

As displayed in Fig. 1, Site D had the highest median score for the domains *Teamwork Climate* (87.50) and *Perceptions of Management* (75.00), sites B and D had the same median score for the domains *Job Satisfaction* (90.00), *Safety Climate* (85.71) and *Working Conditions* (75.00), and site F had the highest median score for the domain *Stress Recognition* (87.50). Site E had the lowest median score in the domains *Teamwork Climate* (70.83), *Safety Climate* (67.86), and *Stress Recognition* (68.75), site F had the lowest median score for the domain *Perceptions of Management* (45.00), and sites E and F both had the lowest median scores for the domains *Job Satisfaction* (75.00) and *Working Conditions* (50.00). Four study sites had mean scores equal to or above the international benchmark in every domain. Sites E and F scored below the international benchmark in the domain *Working Conditions*. The mean, median, interquartile range, standard deviation and percent positive score for each study site in the six safety culture domains are presented in Appendix A.

Subgroup analysis revealed a statistically significant relationship between percent positive domain scores and study site. A strong relationship was found between study site and percent positive domain scores for *Stress Recognition* (χ^2(5, n = 1720) = 96.5, $p \leq 0.001$, Cramer's V = 0.237), *Perceptions of Management* (χ^2(5, n = 1692) = 154.9, $p \leq 0.001$, Cramer's V = 0.303), and *Working Conditions* (χ^2(5, n = 1734) = 83.9, $p \leq 0.001$, Cramer's V = 0.220).

As displayed in Fig. 2, all professions had mean scores above the international benchmark for the domains *Safety Climate* and *Job Satisfaction*. Nurses had the highest median score for the domain *Teamwork Climate*

(87.50), HCAs had the highest median score for the domains *Perceptions of Management* (77.50) and *Working Conditions* (62.50), nurses and HCAs had the same median score for the domain *Safety Climate* (82.14), home helps had the highest median score for the domain *Job Satisfaction* (94.38), and physicians had the highest median score for the domain *Stress Recognition* (87.50). Midwives had the lowest median score in the domains *Teamwork Climate* (70.83), *Safety Climate* (71.13), *Perceptions of Management* (45.00) and *Working Conditions* (43.75), home helps had the lowest median score for the domain *Stress Recognition* (66.67), and midwives, AHPs and physicians had the lowest median scores for the domains *Job Satisfaction* (75.00). Midwives had mean scores slightly below the international benchmark for the domains *Teamwork Climate* and *Perceptions of Management*. Midwives and home helps had mean scores below the international benchmark for the domain *Stress Recognition*, and midwives, home helps and physicians had mean scores below the international benchmark for the domain *Working Conditions*. The mean, median interquartile range, standard deviation and percent positive score for each profession in the six safety culture domains are presented in Appendix B.

A strong relationship was found between profession and percent positive domain scores for *Safety Climate* (χ^2(7, n = 1677) = 81.6, $p \leq 0.001$, Cramer's V = 0.221), and *Perceptions of Management* (χ^2(7, n = 1636) = 88.8, $p \leq 0.001$, Cramer's V = 0.233).

3.3. Internal consistency

The Cronbach's α values for the six domains are displayed in Table 3. The internal consistency of the six domains had Cronbach's α values ranging from 0.74 (*Working Conditions*) to 0.87 (*Job Satisfaction*), indicating that all six domains had acceptable internal consistency, and four domains (*Teamwork Climate*, *Safety Climate*, *Perceptions of Management*, and *Job Satisfaction*) had very good internal consistency.

3.4. Free-text comments

Content analysis of free-text comments led to the development of six broad themes: 1) Staffing Issues, 2) Patient Care, 3) Working Conditions, 4) Communication, 5) Incident Reporting and 6) Training and Education. Table 4 presents a selection of free-text comments illustrative of each theme.

4. Discussion

The aim of this study was to use the SAQ to investigate the perceptions of Irish healthcare staff across Munster towards patient safety culture in their clinical area. The study was carried out in a selection of diverse healthcare settings to give an indication of patient safety culture across the Irish healthcare system, from community healthcare to acute hospital care. In general, study participants were found to have positive attitudes towards patient safety culture but scored negatively in the domains *Working Conditions* and *Perceptions of Management*. Safety culture domain scores were found to be dependent upon both healthcare setting and profession, and some interesting differences were identified between subgroups. For example, Sites B and D, a small psychiatric hospital and small public hospital, had the highest median scores for five of the six safety culture domains. In contrast, sites E and F, a large maternity hospital and a major university teaching hospital, had the lowest median scores between them for each of

Table 2

Safety culture domain score descriptive statistics.

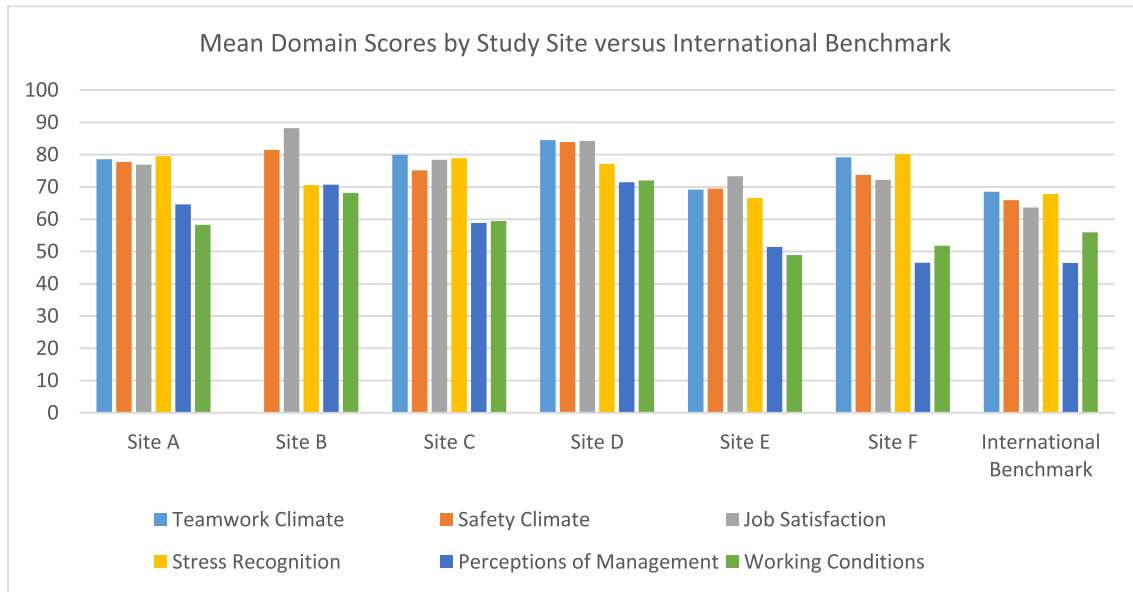|	Teamwork Climate	Safety Climate	Job Satisfaction	Stress Recognition	Perceptions of Management	Working Conditions
Mean	78.1	74.9	74.8	77.8	54.3	54.9
Median	83.3	78.6	80.0	81.3	55.0	56.3
Interquartile	29	26	33	33	40	38
Standard Deviation	19.6	19.3	22.7	21.6	26.4	24.9
International Benchmark (Mean)	68.5	65.9	63.6	67.8	46.4	55.9

Fig. 1. Mean Domain Scores by Study Site versus International Benchmark.
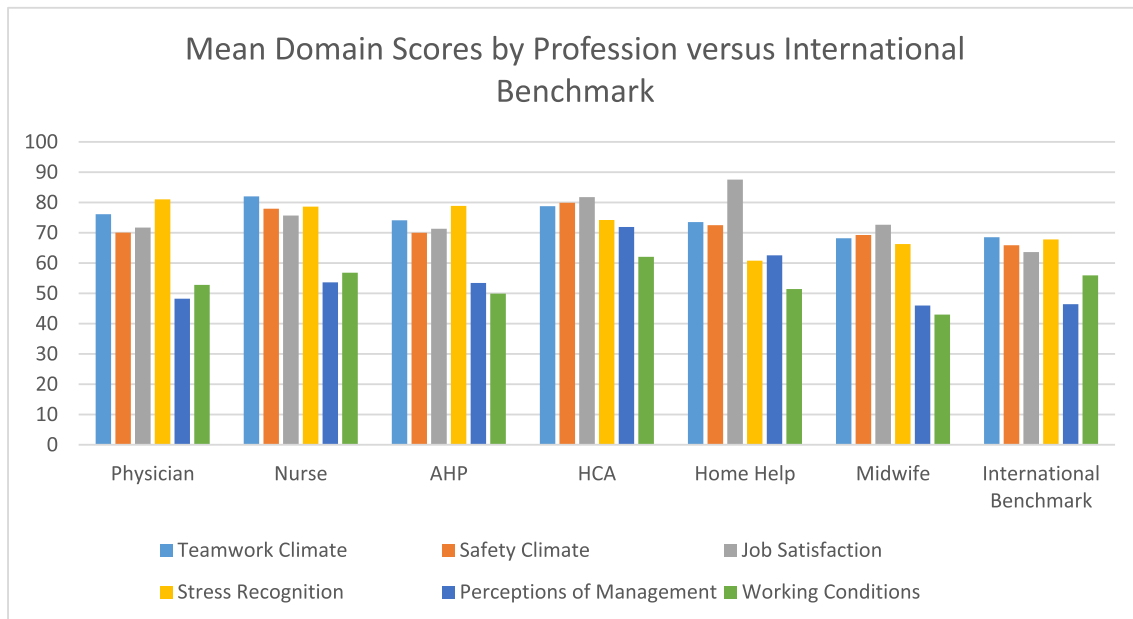

Fig. 2. Mean Domain Scores by Profession versus International Benchmark.

the safety culture domains. It is possible that staff in smaller hospitals have more positive perceptions of safety culture, perhaps because interpersonal communication, which is considered a key aspect of patient safety, is easier in a smaller workplace.[4] Similarly, nurses and HCAs scored well in the

Table 3
Internal consistency.

Domain	No. of Items	Cronbach's α
Teamwork Climate	6	0.80
Safety Climate	7	0.81
Job Satisfaction	5	0.87
Stress Recognition	4	0.77
Perceptions of Management	5	0.86
Working Conditions	4	0.74

domains *Teamwork Climate* and *Safety Climate*, which could be attributed to the fact that they work on the front line and tend to work in teams.

Healthcare workers in the Munster region of Ireland were found to have positive attitudes towards teamwork, patient safety, job satisfaction and stress recognition, but had considerably more negative views towards management and working conditions. Similar SAQ results have been reported in studies form other countries; in studies carried out by Nguyen et al. in hospitals in northeast Italy,[19] Kaya et al. in Turkish hospitals,[20] hospitals scored well on the domains *Teamwork Climate*, *Safety Climate*, *Job Satisfaction* and *Stress Recognition*, and received lower scores in the domains *Perceptions of Management* and *Working Conditions*. Growing levels of dissatisfaction with hospital working conditions in Ireland have been evident in recent publications in both the scientific literature and in the Irish media.[9,11] Ireland has seen large-scale outward migration of medical professionals since the 2008 global financial crisis. Outward migration of medical

Table 4
Selection of free-text comments.

Theme	Illustrative Comments
Staffing Issues	"*Staffing levels are inadequate to safely treat patients. Current staff are overworked and fatigued*" (Staff Nurse F60)
	"*Improve the skills mix amongst staff*" (Clinical Nurse Manager (CNM) B11)
	"*Reduce staff turnover especially nurses and doctors. Need good mix of experience and younger and older staff*" (Health and Social Care Professional (HSCP) C1)
	"*Staff complements when people out sick and on holidays - staff constantly asked to work overtime to cover these*" (Staff Nurse A1)
Patient Care	"*Ensure patient-centred care at all times*" (Other D17)
	"*Give more time to our clients*" (Home Help A2)
	"*Better patient education*" (Staff Nurse F194)
	"*Appropriate pathways in place on site for escalation of care*" (Other D16)
	"*Proper documentation of patient information*" (SHO D7)
	"*Handwriting obliged to be legible/understandable or in capital letters from all the staff*" (Clinical Nurse Manager (CNM) F25)
	"*Electronic health records*" (Pharmacy Technician D2)
Working Conditions	"*[Management] need to be more approachable so that staff can speak with them if they have any problem*" (Staff Nurse A12)
	"*Hospital management has to appreciate nurses for their efforts, which is not happening*" (Staff Nurse F41)
	"*Speak with the frontline staff about things that affect the frontline staff*" (CNM E13)
	"*Building and equipment need upgrade.*" (HSCP A19)
	"*Provide the IT department with adequate resources to implement and oversee a complete IT support service*" (Other F86)
	"*Respect the staff [we] have, if treated better would not be leaving*" (Staff Nurse D10)
Communication	"*Communication between nursing staff and medical staff, need more effort to ensure patient safety*" (CNM F33)
	"*Improve communication channels across clinical areas and from/to management*" (Physiotherapist C3)
	"*More/better communication between different disciplines*" (Midwife E21)
	"*Ensure good communication links between acute and primary care services*" (HSCP A12)
	"*Effective communication between all disciplines, patients and families*" (Other F89)
Incident Reporting	"*Non-blame-laying systems of reporting errors*" (SHO F9)
	"*[Recognise] human error is possible, no one is perfect. Use errors as a way of reflecting and finding solutions together as a team to help repeat errors.*" (CNS B3)
	"*Having open disclosure and not being reprimanded or punished for mistakes*" (Staff Nurse E21)
	"*[Share] lessons learned from patient safety events with all staff*" (Assistant Director of Nursing (ADON) B3)
	"*Forum to admit to errors without being penalised/judged*" (Staff Nurse F153)
Training & Education	"*Ongoing education and upskilling staff on patient safety*" (Staff Nurse A23)
	"*Regular (protected) time allocated for education/training of staff*" (Staff Nurse F86)
	"*Some staff have expressed interest in studying other areas and they should be encouraged to do so*" (Healthcare Assistant (HCA) C2)
	"*Proper training for junior staff*" (Staff Nurse F42)

professionals has been partly attributed to the comparatively poor working conditions in Irish hospitals.[21] Ireland has a relative shortage of doctors per 1000 population compared to other Organisation for Economic Co-operation and Development (OECD) countries (3.0 vs 3.5 in 2017), and is one of only four countries in the OECD that has seen the nursing numbers decrease in recent years, from 13.6 per 1000 population in 2008 to 12.2 per 1000 population in 2017.[9,22] Suboptimal working conditions, and over-whelming workloads, can cause staff to feel unsupported by management, leading to poor working relationships between management and frontline staff.[23]

In keeping with the quantitative results, a common theme that emerged from analysis of free-text comments was the need for better staffing levels and improved working conditions. According to study participants, inade-quate staffing levels were causing healthcare workers to report feeling overworked and fatigued, which in turn could compromise their ability to provide safe care to their patients. Respondents also suggested that improving working conditions would have a positive impact on both job satisfaction and patient safety; a large number of comments requested new equipment and updated clinical areas. Ireland is under-resourced in terms of staffing, medical equipment, and hospital beds.[9,22,24,25] A 2007 study by Stone et al. found that nurse working conditions were associated with a number of patient safety outcomes including 30-day mortality.[26] Despite spending the fifth highest amount of money per capita on health globally, the number of hospital beds per 1000 population in Ireland is still below the OECD average (3.0 vs 4.7 in 2017).[22]

Finally, a key finding from the free-text comments was the need for a more open incident reporting culture in Irish healthcare organisations. The importance of a non-blame culture has been a crucial aspect of patient safety research in recent years. As early as 2000, Reason outlined two approaches to error, the person approach and the systems approach. The person approach focuses on blaming the individual, while the systems ap-proach focuses on the conditions under which the individual was working when the error occurred.[27] High reliability organisations, such as aviation, understand that some degree of error is inevitable, but put in place organisational structures to minimise the risk and impact of these errors.[13] In 2005, Waring described how a '*blame culture*' discourages incident reporting, even when doctors generally accept error to be an inevitable as-pect of medical practice.[28] Waring also described other barriers to incident reporting, including anti-bureaucratic sentiment and a rejection of exces-sive administrative duties. A systematic review by this research group, published in 2020, identified reporting system format (i.e., electronic or paper-based) and a non-punitive culture as important factors in the design of an incident reporting system.[29] The debate regarding a '*just culture*' and what sanctions, if any, are appropriate following medical error, is still ongo-ing in 2022.[30] The negative impact of a punitive culture on workplace moral, performance, and incident reporting is well documented.[27,28,30] The COVID-19 pandemic has been a period of significant change and upheaval for healthcare organisations, in which the everyday pressures faced by frontline staff were brought sharply into public focus. As the world reckons with the long-term impacts of the pandemic, healthcare organisations should consider its effects on patient safety culture.

4.1. Strengths and limitations

This study has some limitations. Recruitment and data collection methods varied between study sites. Data were collected over a period of two years; attitudes towards safety culture may vary at different times of year, for example during periods of overcrowding. The international bench-mark data was originally published in 2006 and global attitudes towards patient safety culture may have changed since its publication.[13] Selection bias may also have been introduced by the fact that staff with an interest in patient safety may have been more likely to part in the study. Nonethe-less, to the best of our knowledge this is the largest study of patient safety culture carried out in Ireland to date. Despite the limitations listed above, we believe this study provides important insights into the attitudes of healthcare staff towards patient safety culture in Irish healthcare organisa-tions.

4.2. Future research

This study provides a baseline measurement of patient safety culture in Irish healthcare organisations. The COVID-19 pandemic had a massive im-pact on workflow and culture in healthcare organisations; future research should focus on examining the effects of the pandemic on safety culture and attitudes towards medication incident reporting, using both survey and qualitative research methods.

5. Conclusions

The aim of this survey study was to use the SAQ to examine the attitudes of healthcare staff towards patient safety culture in a number of healthcare

organisations in the south-west of Ireland. This paper reports the SAQ responses of 1749 healthcare workers across 6 healthcare organisational sites. Study participants had generally positive attitudes towards the safety culture in their organisation, however working conditions, perceptions of management, and medication incident reporting were identified as key areas for improvement. Future research should focus on the impact of the COVID-19 pandemic on safety culture in Irish healthcare organisations.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Safety culture domain scores by study site

		Teamwork Climate	Safety Climate	Job Satisfaction	Stress Recognition	Perceptions of Management	Working Conditions
	Mean	78.58	77.73	76.90	79.51	64.57	58.24
	Median	83.33	82.14	81.25	83.33	65.83	58.33
Site A	Interquartile Range	29.17	28.57	30.00	33.33	43.75	32.81
	Standard Deviation	22.12	20.12	22.74	22.27	27.45	26.03
	Percent Positive (%)	69.90	66.30	67.80	72.20	41.10	31.50
	Mean		81.46	88.21	70.54	70.71	68.15
	Median		85.71	90.00	75.00	72.50	75.00
Site B	Interquartile Range		36.61	16.25	38.54	21.25	12.50
	Standard Deviation		16.45	13.39	21.66	15.67	15.47
	Percent Positive (%)		75.00	79.30	66.30	42.40	42.40
	Mean	79.94	75.14	78.38	78.92	58.87	59.44
	Median	83.33	75.00	80.63	81.25	60.00	62.50
Site C	Interquartile Range	20.83	21.43	30.00	31.25	30.00	37.50
	Standard Deviation	16.22	15.99	19.58	20.99	23.56	24.10
	Percent Positive (%)	71.00	55.70	64.10	68.70	29.80	29.80
	Mean	84.49	83.89	84.26	77.08	71.44	71.99
	Median	87.50	85.71	90.00	83.33	75.00	75.00
Site D	Interquartile Range	18.75	21.43	25.00	37.50	32.50	25.00
	Standard Deviation	17.35	15.00	18.06	23.71	21.65	21.79
	Percent Positive (%)	80.00	77.60	77.60	65.90	50.60	58.80
	Mean	69.17	69.49	73.32	66.56	51.38	48.87
	Median	70.83	67.86	75.00	68.75	50.00	50.00
Site E	Interquartile Range	20.83	17.86	20.00	18.75	25.00	31.25
	Standard Deviation	18.34	14.83	17.54	16.63	18.54	19.92
	Percent Positive (%)	42.30	39.00	60.60	38.50	13.60	12.70
	Mean	79.19	73.71	72.17	80.13	46.49	51.78
	Median	83.33	78.57	75.00	87.50	45.00	50.00
Site F	Interquartile Range	26.15	28.57	40.00	31.25	40.00	35.42
	Standard Deviation	18.53	20.38	24.48	21.38	25.71	24.76
	Percent Positive (%)	67.20	56.30	55.10	71.20	17.40	24.00

Appendix B. Safety culture domain scores by profession

Profession	Statistic	Teamwork Climate	Safety Climate	Job Satisfaction	Stress Recognition	Perceptions of Management	Working Conditions
	Mean	76.12	70.03	71.72	81.04	48.23	52.78
	Median	79.17	71.43	75.00	87.50	50.00	56.25
Physician	Interquartile Range	20.83	28.57	30.00	31.25	35.00	31.25
	Standard Deviation	17.61	19.81	22.96	19.61	23.82	22.43
	Percent Positive (%)	61.20	47.60	57.10	71.90	18.00	22.00
	Mean	82.01	77.92	75.70	78.62	53.64	56.83
	Median	87.50	82.14	80.00	83.33	55.00	58.33
Nurse	Interquartile Range	25.00	28.57	32.50	33.33	40.00	37.50
	Standard Deviation	18.15	18.84	22.61	21.82	27.38	25.81
	Percent Positive (%)	74.80	66.60	63.10	68.90	29.10	31.60
	Mean	74.12	69.99	71.32	78.88	53.42	49.87
	Median	79.17	71.43	75.00	83.33	55.00	50.00
AHP	Interquartile Range	29.17	25.00	28.75	33.33	32.50	31.25
	Standard Deviation	21.13	20.14	23.41	21.11	21.14	23.45
	Percent Positive (%)	58.40	45.50	59.90	69.80	22.20	18.30
	Mean	78.75	79.89	81.76	74.21	71.89	62.05
	Median	83.33	82.14	90.00	75.00	77.50	62.50
HCA	Interquartile Range	29.17	21.43	35.00	37.50	41.25	40.10
	Standard Deviation	18.68	16.49	19.86	24.56	24.42	26.17
	Percent Positive (%)	65.50	72.80	71.20	66.10	56.60	39.50
	Mean	73.51	72.51	87.53	60.76	62.55	51.39
	Median	75.00	76.79	94.38	66.67	72.50	50.00
Home Help	Interquartile Range	42.08	42.71	17.81	51.04	70.94	26.56
	Standard Deviation	29.67	24.74	15.93	33.58	32.58	24.49
	Percent Positive (%)	73.80	64.30	85.70	60.00	53.80	41.50
Midwife	Mean	68.16	69.25	72.64	66.29	45.97	43.00
	Median	70.83	71.13	75.00	67.71	45.00	43.75

(*continued*)

Profession	Statistic	Teamwork Climate	Safety Climate	Job Satisfaction	Stress Recognition	Perceptions of Management	Working Conditions
	Interquartile Range	12.50	14.29	21.88	18.75	20.00	25.00
	Standard Deviation	17.51	13.37	17.46	15.59	18.78	18.18
	Percent Positive (%)	41.70	35.60	58.90	39.70	11.00	6.80

References

1. The Health Foundation. *Measuring Safety Culture*. The Health Foundation. 2011.Accessed July 27, 2022: https://www.health.org.uk/publications/measuring-safety-culture.
2. Kaya S, Barsbay S, Karabulut E. The Turkish version of the safety attitudes questionnaire: psychometric properties and baseline data. Qual Saf Health Care 2010;19(6):572–577. https://doi.org/10.1136/qshc.2008.032003.
3. Nguyen G, Gambashidze N, Ilyas SA, Pascu D. Validation of the safety attitudes questionnaire (short form 2006) in Italian in hospitals in the northeast of Italy. BMC Health Serv Res 2015;15:284. https://doi.org/10.1186/s12913-015-0951-8.
4. Boussat B, Kamalanavin K, François P. The contribution of open comments to understanding the results from the Hospital Survey on Patient Safety Culture (HSOPS): a qualitative study. PLoS One 2018;13(4), e0196089. https://doi.org/10.1371/journal.pone.0196089.
5. Gleeson LL, Tobin L, O'Brien GL, et al. Safety culture in a major accredited Irish university teaching hospital: a mixed methods study using the safety attitudes questionnaire. Ir J Med Sci 2020;189(4):1171–1178.
6. National Coordinating Council for Medication Error Reporting and Prevention. *About Medication Errors*. NCC MERP. 2014.Accessed June 9, 2021: https://www.nccmerp.org/about-medication-errors.
7. Fournier JP, Amélineau JB, Hild S, et al. Patient-safety incidents during COVID-19 health crisis in France: an exploratory sequential multi-method study in primary care. European Journal of General Practice 2021;27(1):142–151. https://doi.org/10.1080/13814788.2021.1945029.
8. Lewins K, Morrissey AM, Remorini C, et al. The "Knock-on" effects of COVID-19 on healthcare services. In: *Vindrola-Padros C, Johnson GA, eds*. Caring on the Frontline during COVID-19: Contributions from Rapid Qualitative Research. Springer; 2022. p. 253–291. https://doi.org/10.1007/978-981-16-6486-1_12.
9. Turner B. Putting Ireland's health spending into perspective. The Lancet 2018. https://doi.org/10.1016/S0140-6736(18)30461-6. Published online.
10. Hannan E, Breslin N, Doherty E, McGreal M, Moneley D, Offiah G. Burnout and stress amongst interns in Irish hospitals: contributing factors and potential solutions. Irish Journal of Medical Science 2018. https://doi.org/10.1007/s11845-017-1688-7. Published online.
11. Humphries N, Crowe S, McDermott C, McAleese S, Brugha R. The consequences of Ireland's culture of medical migration. Human Resources for Health 2017. https://doi.org/10.1186/s12960-017-0263-7. Published online.
12. Rafter N, Hickey A, Conroy RM. et alThe Irish National Adverse Events Study (INAES): the frequency and nature of adverse events in Irish hospitals—a retrospective record review studyBMJ. Quality & Safety 2017;26:111–119.
13. Sexton JB, Helmreich RL, Neilands TB, et al. The safety attitudes questionnaire: psychometric properties, benchmarking data, and emerging research. BMC Health Serv Res 2006;6:44. https://doi.org/10.1186/1472-6963-6-44.
14. Centre for Healthcare Quality and Safety. University of Texas. https://med.uth.edu/chqs/survey/.
15. IBM Corp. *IBM SPSS Statistics for Windows, Version 24.0*. Armonk, NY: IBM Corp. 2016. [Published online 2016].
16. Relihan E, Glynn S, Daly D, Silke B, Ryder S. Measuring and benchmarking safety culture: application of the safety attitudes questionnaire to an acute medical admissions unit. Ir J Med Sci 2009;178(4):433–439. https://doi.org/10.1007/s11845-009-0352-2.
17. Cohen J. *Statistical Power Analysis for the Behavioural Sciences*. Hillside. NJ: Lawrence Earlbaum Associates. 1988. https://doi.org/10.1111/1467-8721.ep10768783. Published online.
18. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res 2005;15(9):1277–1288. https://doi.org/10.1177/1049732305276687.
19. Nguyen G, Gambashidze N, Ilyas SA, Pascu D. Validation of the safety attitudes questionnaire (short form 2006) in Italian in hospitals in the northeast of Italy. BMC Health Services Research 2015. https://doi.org/10.1186/s12913-015-0951-8. Published online.
20. Kaya S, Barsbay S, Karabulut E. The Turkish version of the safety attitudes questionnaire: psychometric properties and baseline data. Quality and Safety in Health Care 2010. https://doi.org/10.1136/qshc.2008.032003. Published online.
21. Humphries N, McAleese S, Matthews A, Brugha R. "Emigration is a matter of self-preservation. The working conditions… Are killing us slowly": qualitative insights into health professional emigration from Ireland. Human Resources for Health 2015. https://doi.org/10.1186/s12960-015-0022-6. Published online.
22. OECD. *OECD Indicators: Health at a Glance 2019*. 2019.
23. O'Mahony N. Nurse burnout and the working environment. Emergency Nurse 2011. https://doi.org/10.7748/en2011.09.19.5.30.c8704. Published online.
24. Thomas S, Burke S, Barry S. The Irish health-care system and austerity: sharing the pain. The Lancet Published online 2014. https://doi.org/10.1016/S0140-6736(14)60744-3.
25. Wall M. Acute hospital system is at breaking point, say consultants. Irish Times 2019;2.
26. Stone PW, Mooney-Kane C, Larson EL, et al. Nurse working conditions and patient safety outcomes. Medical Care 2007. https://doi.org/10.1097/MLR.0b013e3180383667. Published online.
27. Reason J. Human error: models and management. BMJ 2000;320(7237):768–770. https://doi.org/10.1136/bmj.320.7237.768.
28. Waring JJ. Beyond blame: cultural barriers to medical incident reporting. Soc Sci Med 2005;60(9):1927–1935. https://doi.org/10.1016/j.socscimed.2004.08.055.
29. Gleeson L, Dalton K, O'Mahony D, Byrne S. Interventions to improve reporting of medication errors in hospitals: a systematic review and narrative synthesis. Res Soc Adm Pharm 2020;16(8):1017–1025.
30. Cribb A, O'Hara JK. Waring JImproving responses to safety incidents: we need to talk about justice. BMJ Quality & Safety 2022;31:327–330.