







Evaluating Polish nurses' working conditions and patient safety during the COVID-19 pandemic

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Abstract

Aim: To study the relationship between Polish nurses' working conditions and their attitudes towards patient safety during the COVID-19 pandemic.

Background: Facing the COVID-19 pandemic, caused by the SARS-CoV-2 virus, healthcare worldwide has been reorganised. How these changes affected patient safety for hospitalised persons is not well understood.

Introduction: Difficult working conditions related to the outbreak of the COVID-19 pandemic may affect the provision of safe and effective care by healthcare staff.

Methods: This observational research was performed on the group of 577 nurses working during the COVID-19 pandemic in isolation infection wards ($n = 201$) and non-infectious diseases wards ($n = 376$) in Polish hospitals. The evaluation of working conditions was performed with an author's questionnaire, while the evaluation of factors influencing attitudes towards safety of the hospitalised patients was performed using Safety Attitudes Questionnaire. The STROBE checklist was used to report this study.

Results: The procedures developed by management in advance for COVID-19 patient treatment had a statistically significant influence on nurses' 'evaluation of teamwork climate, safety climate, job satisfaction, perception of management and work conditions'. Providing management with the ability to perform a swab polymerase chain reaction SARS-CoV-2 test for hospital staff in the workplace, and psychological support from professionals and employers were statistically significant for higher ratings of 'teamwork climate, safety climate, job satisfaction, stress recognition, perception of management and work conditions' by the Polish nurses. Hospital workload during the COVID-19 pandemic was significantly correlated with lower evaluation of work conditions.

Discussion: Our study reinforces the existing literature on many fronts and demonstrates how even when operating under the COVID-19 pandemic conditions, some factors remain critical for fostering a culture of patient safety. Reinforcing patient safety practices is a imperative under these conditions.

Conclusions and implications for nursing: Working conditions influence nurses' attitudes towards safety of the hospitalised patients. These are largely modifiable factors related to the workplace and include prior preparation of procedures, restrictions to extending daily work hours and psychological counselling for the staff.

KEYWORDS

attitudes to safety, COVID-19, nurses, patient safety, work conditions

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INTRODUCTION

As a result of the COVID-19 pandemic caused by the SARS-CoV-2 virus, healthcare worldwide has been reorganised (e.g. Lal et al., 2021). The first COVID-19 patient in Poland was registered on 4 March 2020 (Ministry of Health, 2020). From 14 to 20 March 2020, the epidemic threat loomed large in Poland. Since 20 March 2020, Polish healthcare system have been operating in a state of COVID-19 pandemic crisis management. Scheduled admissions and procedures were cancelled in order to focus on the care for patients afflicted by the new lesser-known infectious disease. The COVID-19 pandemic, led to significant changes in the delivery of healthcare resulting in an increased workload and relocation of the staff to other places to ensure care delivery. In the course of the current development of the pandemic, almost all healthcare branches have modified diagnostic and therapeutic algorithms to test treatments in an attempt to contain the spread of the disease and to protect healthcare employees while treating patients (Driggin et al., 2020; Firew et al., 2020).

Based on the records maintained by the Main Council of Nurses and Midwives (Polish: NRPIP), in 2021 there were 230 433 professionally active nurses in the country (Report by the Main Council of Nurses and Midwives, 2020). In Poland, on average there are 5.1 nurses per 1000 inhabitants, which places Poland on the 31st position of the 44 states. What is more worrying is the fact that since the year 2000, this ratio has not increased while in most other OECD (Organisation for Economic Cooperation and Development) countries, an increase in the number of nurses has been noted over that period of time (OECD, 2017). The data collected 'by the Main Council of Nurses and Midwives show that the average age of nurses in Poland is 52.59. According to the data from the Central Registry of Nurses and Midwives (Polish: CRPIP), as many as 40 000 nurses are over 56 years of age (the Report by 'the Main Council of Nurses and Midwives', 2020), which means that within the next 4 years, this group will become eligible for retirement. Currently, in Poland 'the retirement age is 60 years for women and 65 years for men' (*Journal of Laws year, 2020a*, item 53).

Nursing practice in a COVID-19 pandemic, posed many challenges. The risks associated with provision of service to a patient infected with COVID-19, include the fear of infection, unpredictability of events, feeling of helplessness, isolation of patients, high death rates and anxiety to perform professional duties in such conditions. The pandemic period has also been affected by staff shortages despite the fact that a large percentage (44%) of nurses are double-employed (Malinowska-Lipień et al., 2021). The shortage of nurses in the Polish healthcare system was a serious threat even before the occurrence of the COVID-19 pandemic. Reports show that as many as 72% of hospitals in Poland suffer from shortage of nurses.

Insufficient nursing staff forced changes within the law during the COVID-19 pandemic. The act of law of 31 March 2020 (*Journal of Laws year, 2020b*, item 567) introduced a shorter duration of training for nurses, who took a break from profession longer than 5 years. The refreshed period was short-

ened from 4 to 6 months to 2 weeks. Currently, nurses after a 2-week training, working under the supervision and in cooperation with another nurse can start working in the facility where they have been trained. Additionally, until 31 December 2021 there are no norms for nursing employment in hospitals in Poland (*Journal of Laws year, 2021*, item 638). Previously, that is from 1 January 2019, hospital wards were subjected to the nursing employment norms, where in medical wards there were 0.6 nurses per one hospital bed, and in surgical wards there were 0.7 nurses; while in paediatric wards there were 0.8 nurses in a medical ward and 0.9 nurses in a surgical ward (*Journal of Laws year, 2018*, item 2012). The revocation of the norms by the Ministry of Health for the time of the COVID-19 pandemic, aimed to ensure that the healthcare system functions properly during the pandemic. The management staff was also empowered to flexibly shift staff to different departments in the hospital, as well as to change the scope of duties and working hours. Such solutions were forced by the necessity to provide care for hospitalized patients.

The combination of nursing shortages, changes to the laws, workplace health risks associated with working with people infected with COVID-19, caused by the SARS-CoV-2, mental safety risks in the workplace, along with chronic work-related stress during the current pandemic COVID-19 poses a threat to the maintenance of patient safety practices in hospitals (Hu et al., 2020; Lai et al., 2020).

According to Greenberg et al., this situation may lead to both severe loss of moral motivation and problems with the mental health of healthcare employees, which may affect patient safety and quality of the provided care (Greenberg et al., 2020). The research by Lai et al. (2020) demonstrated the existence of high fear, anxiety and sleep deprivation in the group of healthcare employees working during the COVID-19 pandemic. An organisation's patient safety culture has the potential to mitigate the threats posed by the operational uncertainties that accompany nurses working during the current pandemic. Analysing the relationships between the values and attitudes of hospital staff associated with safety culture allows insight into factors that are positively or negatively related to the safety of hospitalised patients (Ree & Wiig, 2020).

AIM OF RESEARCH

The purpose of this study was to examine the relationship between working conditions in Polish hospitals during the COVID-19 pandemic, and nurses' attitudes towards factors promoting patient safety.

METHODS

Design

This was a cross-sectional study of hospital nurses working in the Małopolska region of Poland.

Setting

Participants worked in infectious wards or those transformed into infectious wards and in non-infectious diseases wards.

Instrument

The study used the lead author's questionnaire and the Safety Attitudes Questionnaire (SAQ) questionnaire in the Polish adaptation by Malinowska-Lipień et al. (2021). The SAQ reliability had Cronbach's alpha of 0.98. Before performing the analysis, validity of the Polish adaptation of SAQ-SF, the Kaiser test was used to check whether the data meet the requirements of the factor analysis. The Kaiser–Mayer–Olkin value, being the measure of the adequacy of the sample selection, was estimated at the level of 0.87 ($df = 8630$, $p < 0.001$). This model explained 68% of the total variance of the analysed set of variables (Malinowska-Lipień et al., 2021). The SAQ questionnaire facilitated the evaluation of nurses' attitudes towards factors promoting patient safety. It consists of 41 entries divided into two parts; the first contained 36 questions divided into six subscales, the second contained 5 questions concerning socio-demographic data of the participants. The first part covered: '1/teamwork climate (TC) (questions from 1 to 6)' – evaluates the perception of cooperation quality among co-workers; '2/safety climate (SC) (questions from 7 to 13)' – evaluates the perception of organisational involvement of the employees in favour of safety; '3/job satisfaction (JS) (questions from 15 to 19)' – evaluates subjective positive perception related to work experience; '4/stress recognition (SR) (questions from 20 to 23)' – evaluates the influence of stressors on work efficiency; '5/perception of management (PM)' – evaluated at the level of ward and hospital (questions from 24 to 28); and '6/work conditions (WCs) (questions from 29 to 32)' – the perception of quality of environmental and logistic support in the workplace (i.e. appliances, equipment and professionals), as well as five questions not included in any of the subscales, that is, question 14 related to the evaluation 'of the managing person for safety provision, and questions from 33 to 36 concerning' the evaluation of conflict occurrence and cooperation among the members of the interdisciplinary team, that is, nurses, physicians, pharmacists. The answers were assessed on the 5-point Likert scale (1 = strongly disagree (A); 2 = rather disagree (B); 3 = neutral answer (C); 4 = quite agree (D); 5 = strongly agree (E)), with questions 2, 11 and 36 with reverse scoring. For each question, the questionnaire authors included the 'does not concern' option. While calculating the score according to the diagnostic key, the conversion to the 100-point was implemented, that is: 1 = 0; 2 = 25; 3 = 50; 4 = 75; 5 = 100. The final score of the questionnaire takes the value between 0 and 100 points, where 0 means the worst and 100 points the best attitudes towards factors conditioning patients' safety. Scores at the level of 75 points and higher are considered as a positive attitude in the area covering a particular subscale (Sexton et al., 2006).

The author's original questionnaire focussed on socio-demographic and professional data (including gender, age, marital status, education, seniority). It also included questions asking to describe and rate WCs, that is, development of procedures related to the treatment of COVID-19-diagnosed patients, training in dressing and undressing of protective clothing, provisions of personal safety means, possibility to perform COVID-19 tests in the workplace (nasopharynx swab and marking by the reverse transcription polymerase chain reaction (RT-PCR) method or antigen test), subjective assessment of stress resulting from working in a COVID-19 pandemic, and psychological support from professionals, co-workers and employers. The survey assessed the perception of stress in relation to the COVID-19 pandemic, insufficient nursing staff due to the COVID-19 pandemic, the necessity to do overtime and the number of hours in shifts. Questions about the work-related stress, experienced by nurses during the COVID-19 pandemic, and the support received were consulted by three independent psychologists. The questionnaire forms were individually filled out by nurses who were informed about the aim of the survey in writing and consented to participate.

Sample, recruitment and data collection

The study was performed using an online survey addressed to nurses working in hospitals. The survey was anonymous and voluntary. The nursing staff was recruited through the website of 'Małopolska District Chamber of Nurses and Midwives' (Polish: MOIPiP), and the link to the questionnaire survey along with the introductory letter was sent to the Chamber's representatives working in healthcare facilities.

The inclusion criteria to participate in the study were as follows: 1) consent to participate in the research; 2) active work as a nurse during the current pandemic, at least from March 2020 (i.e. from the moment the pandemic was declared in Poland). The exclusion criteria were as follows: 1) lack of consent to participate in the research; 2) nurse working on other than hospital healthcare facilities; 3) no active employment as a nurse (i.e. retired, disabled, suspended, maternity/childcare leave); 4) not working as a nurse after 4 March 2020.

The research was approved by the Bioethical Commission of Jagiellonian University (approval KBEUJ) no. 1072.6120.346.2020. The study was performed from 20 December 2020 to 28 February 2021.

Data analysis

The analysis was performed using the TIBCO STATISTICA 13.3 software package (StatSoft, Inc., Tulsa, OK, USA). The descriptive statistics for each SAQ subscale were presented as a mean value (\bar{X}) and standard deviation (SD). The mean results for each respondent were individually calculated within each SAQ subscale. In the case of the 'does not concern' answer pointed by the respondents, this answer was ignored while



calculating the mean result for the scale. The analysis of the significance of differences between mean values in the compared groups was performed by observing the rules of the selection of statistic tests. To do so, the spread of the variables was assessed using the Shapiro–Wilk and Kolmogorov–Smirnov tests, and then the equalities of within-group variances were checked using Levene’s test or Fisher–Snedecor *F*-test. The assessment of different significance between the two groups was performed using the Student *t*-test or Mann–Whitney *U*-test. One-way multi-dimensional analysis of variances (MANOVA) was used; if the result of the one-way MANOVA was statistically significant, the one-way ANOVA analysis was performed. In all analyses, the *p*-value was set to less than 0.05 ($p < 0.05$).

RESULTS

Of the 706 nurses who returned completed questionnaire, 129 forms were excluded from analysis (125 were filled in by nurses not working in the hospital and 4 participants did not consent to participate in the study). The final sample included 577 nurses, with 201 nurses working in isolation wards, the other persons worked in non-infectious diseases wards ($n = 376$). Most participants were women ($n = 560$; 97.05%). The age of the participants ranged from 22 to 66. The average age was 41 (SD = 11.84). The largest groups of surveyed nurses were between 41 and 50 years of age ($n = 184$; 31.89%), and between 22 and 30 years of age ($n = 167$; 28.94%). Most nurses had a university diploma, 311 nurses (53.9%) had a master’s and 182 (31.54%) a bachelor’s degree. Almost half of the surveyed nurses ($n = 273$; 47.32%) had been working in the profession for more than 21 years (Table 1).

The results of the SAQ questionnaire showed that the nurses, working in hospitals during the COVID-19 pandemic, evaluated WCs at the lowest level –53.27 points, while SR at the highest –75.83 points (Table 2).

Nurses who worked in isolation wards obtained similar mean results in particular subscales of the SAQ questionnaire compared to nurses working in non-infectious diseases wards ($p > 0.05$). There were no statistically significant associations regarding the participants’ gender and the results of particular SAQ subscales. Age significantly influenced nurses’ evaluation of safety in hospital wards ($p < 0.05$). The youngest nurses (aged 22–30) received the highest mean value (64.15 points) in the area of TC, while nurses aged between 41 and 50 received the lowest mean value (57.95 points). Within JS, the highest values were scored by nurses aged 51–66 (71.91 points). In the subscale measuring SR, the highest values were indicated for the younger nurses, that is (aged 22–30 and 31–40), who scored 79.15 and 79.48 points, respectively. The highest mean values in the area of PM were received by nurses from the oldest group, that is, 51–66 years (66.95 points). Marital status was statistically significant for the evaluation of SR and WCs ($p < 0.05$). Unmarried and divorced participants received higher results (81.61 and 81.62 points, respectively) in the SR subscale compared to other participants in an informal

TABLE 1 Research group profile

	Nurses (<i>N</i> = 577)	
	<i>n</i>	%
Type of ward		
	Infectious diseases ward	201 34.84
	Non-infectious diseases ward	376 65.16
Gender		
	Women	560 97.05
	Men	17 2.95
Age		
	22–30 years	167 28.94
	31–40 years	85 14.73
	41–50 years	184 31.89
	51–66 years	141 24.44
Marital status		
	Married	391 67.76
	Single	103 17.85
	Informal relationship	55 9.53
	Divorced/separated	17 2.95
	Widowed	11 1.91
Education		
	Medical secondary education	82 14.21
	Bachelor degree in nursing	182 31.54
	Master degree in nursing	269 46.62
	Higher education, degree obtained in a faculty other than nursing	42 7.28
	Nurse with Ph.D. degree	2 0.35
Seniority		
	<Year	16 2.77
	From 1 to 5 years	147 25.48
	From 6 to 10 years	54 9.36
	From 11 to 20 years	87 15.08
	From 21 to 30 years	156 27.04
	>30 years	117 20.28

Abbreviation: *n*, number.

relationship (77.05 points), married people (74.07 points) and widowed ones (69.32 points); $p = 0.011$. Similarly, in the WC subscale, the highest results were received by single unmarried participants (58.19 points). Nurses with a university diploma declared a higher impact of SR on patient safety than certified nurses ($p = 0.011$). The analysis indicated a statistically significant influence of work experience (seniority) on SR, PM and WCs, $p < 0.05$. Nurses who have been working for less than a year obtained the highest scores (Table 2).

Advanced knowledge of the procedures for treating COVID-19 patients, training in the area of treatment of COVID-19 patients, type of protection equipment, rules for dressing and undressing of protective clothing had a

TABLE 2 Nurses' attitudes towards factors conditioning patient safety (SAQ) in reference to socio-demographic data

	Teamwork climate (TC)	Safety climate (SC)	Job satisfaction (JS)	Stress recognition (SR)	Perception of management (PM)	Work conditions (WCs)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Attitudes of nurses working in infectious and non-infectious diseases wards towards factors affecting patient safety (SAQ)	60.84 (19.27)	60.16 (18.72)	66.18 (21.88)	75.83 (21.05)	60.71 (24.24)	53.72 (21.93)
Type of ward						
Infectious (<i>n</i> = 201)	63.64 (16.15)	64.66 (16.61)	64.97 (22.42)	73.72 (23.96)	54.91 (22.72)	48.25 (22.06)
Non-infectious (<i>n</i> = 376)	65.20 (17.39)	64.63 (17.95)	63.94 (23.07)	78.12 (21.37)	56.4 (21.47)	49.23 (22.59)
Stat	$F(1, 575) = 3.061, p = 0.080$	$F(1, 575) = 0.695, p = 0.405$	$F(1, 575) = 0.008, p = 0.930$	$F(1, 575) = 3.015, p = 0.083$	$F(1, 575) = 0.004, p = 0.948$	$F(1, 575) = 1.067, p = 0.302$
Gender						
Women (<i>n</i> = 560)	61.07 (19.12)	60.31 (18.42)	66.34 (21.66)	75.83 (21.12)	60.64 (23.99)	53.83 (21.77)
Men (<i>n</i> = 17)	52.94 (23.14)	55.25 (27.32)	60.88 (28.63)	76.10 (19.17)	62.94 (32.21)	50.00 (27.15)
Stat	$F(1, 575) = 2.945, p = 0.086$	$F(1, 575) = 1.205, p = 0.273$	$F(1, 575) = 1.026, p = 0.312$	$F(1, 575) = 0.003, p = 0.957$	$F(1, 575) = 0.148, p = 0.700$	$F(1, 575) = 0.502, p = 0.478$
Age						
22–30 years (<i>n</i> = 167)	64.15 (18.25)	62.04 (19.44)	65.96 (22.31)	79.15 (19.18)	60.90 (25.50)	54.68 (22.10)
31–40 years (<i>n</i> = 85)	58.63 (17.99)	58.49 (18.94)	64.47 (18.08)	79.48 (19.08)	57.29 (24.13)	52.57 (22.29)
41–50 years (<i>n</i> = 184)	57.95 (19.67)	57.61 (17.25)	62.77 (22.19)	72.11 (22.11)	57.33 (23.16)	51.19 (20.89)
51–66 years (<i>n</i> = 141)	62.00 (20.37)	62.28 (19.57)	71.91 (22.35)	74.56 (21.57)	66.95 (23.10)	55.56 (22.45)
Stat	$F(3, 573) = 3.6099, p = 0.013$	$F(3, 573) = 2.552, p = 0.055$	$F(3, 573) = 4.995, p = 0.002$	$F(3, 573) = 4.403, p = 0.004$	$F(3, 573) = 4.970, p = 0.002$	$F(3, 573) = 1.796, p = 0.147$
Marital status						
Married (<i>n</i> = 391)	61.29 (19.32)	60.28 (18.17)	66.23 (21.82)	74.07 (21.89)	61.01 (23.52)	53.05 (22.23)
Single (<i>n</i> = 103)	59.95 (17.83)	59.85 (18.66)	66.84 (21.29)	81.61 (16.92)	58.30 (25.44)	58.19 (18.57)
Informal relationship (<i>n</i> = 55)	63.03 (21.59)	61.43 (21.97)	63.82 (23.73)	77.05 (20.13)	63.18 (26.67)	54.89 (24.93)
Divorced/separated (<i>n</i> = 17)	56.62 (18.40)	58.82 (21.43)	70.29 (20.19)	81.62 (23.12)	61.47 (28.38)	42.65 (18.91)
Widowed (<i>n</i> = 11)	48.48 (17.51)	54.55 (19.50)	63.64 (25.11)	69.32 (17.33)	59.09 (20.47)	46.59 (22.07)
Stat	$F(4, 572) = 1.6252, p = 0.166$	$F(4, 572) = 0.34196, p = 0.849$	$F(4, 572) = 0.37004, p = 0.830$	$F(4, 572) = 3.3073, p = 0.011$	$F(4, 572) = 0.42716, p = 0.789$	$F(4, 572) = 2.6022, p = 0.035$
Education <i>n</i> (%)						
Medical secondary education (<i>n</i> = 82)	61.74 (18.58)	60.50 (17.03)	68.11 (22.20)	68.60 (25.44)	61.40 (23.36)	54.42 (18.72)
Bachelor degree in nursing (<i>n</i> = 182)	60.26 (19.46)	60.93 (19.08)	65.52 (20.65)	75.24 (20.59)	61.59 (23.81)	51.48 (20.57)
Master degree in nursing (<i>n</i> = 269)	60.73 (19.46)	59.41 (18.87)	64.70 (22.64)	78.02 (19.40)	58.98 (24.91)	53.86 (23.46)
Higher education, degree obtained in a faculty other than nursing (<i>n</i> = 42)	61.41 (19.97)	60.37 (20.52)	74.29 (20.52)	77.98 (19.71)	66.19 (21.90)	60.27 (22.03)
Nurse with Ph.D. degree (<i>n</i> = 2)	77.08 (2.94)	73.21 (2.52)	75.00 (7.07)	87.50 (17.68)	70.00 (42.43)	71.87 (13.26)
Stat	$F(4, 572) = 0.451, p = 0.772$	$F(4, 572) = 0.433, p = 0.785$	$F(4, 572) = 2.043, p = 0.087$	$F(4, 572) = 3506, p = 0.008$	$F(4, 572) = 1.031, p = 0.390$	$F(4, 572) = 1.787, p = 0.130$

(Continues)

TABLE 2 (Continued)

	Teamwork climate (TC)	Safety climate (SC)	Job satisfaction (JS)	Stress recognition (SR)	Perception of management (PM)	Work conditions (WCs)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Seniority						
<Year (<i>n</i> = 16)	61.11 (15.35)	73.21 (13.98)	72.50 (17.70)	81.64 (16.37)	75.94 (19.51)	73.05 (12.85)
1-5 years (<i>n</i> = 147)	62.13 (17.82)	60.76 (19.78)	64.66 (23.00)	79.00 (18.51)	58.54 (26.39)	53.23 (21.69)
6-10 years (<i>n</i> = 54)	60.34 (18.98)	59.39 (17.36)	68.52 (19.68)	80.09 (22.26)	55.19 (26.04)	54.98 (22.43)
11-20 years (<i>n</i> = 87)	59.63 (19.44)	59.27 (20.15)	63.05 (20.82)	75.86 (22.09)	61.44 (21.95)	52.66 (21.00)
21-30 years (<i>n</i> = 156)	58.42 (19.28)	58.17 (16.90)	64.84 (21.62)	71.63 (21.30)	58.53 (22.85)	51.84 (22.19)
>30 years (<i>n</i> = 117)	78.64 (15.37)	61.29 (19.27)	70.26 (22.62)	74.68 (22.13)	58.53 (22.85)	54.38 (22.39)
Stat	$F(5, 571) = 3.513$, $p = 0.004$	$F(5, 571) = 2.099$, $p = 0.064$	$F(5, 571) = 1.831$, $p = 0.105$	$F(5, 571) = 2.700$, $p = 0.020$	$F(5, 571) = 3.6484$, $p = 0.003$	$F(5, 571) = 2.8713$, $p = 0.014$

Abbreviations: SD, standard deviation; Stat, statistics.

statistically significant influence on the evaluation of 'TC, SC, JS, PM and WCs' by nurses; $p < 0.05$. Sufficient provisions of personal protection means – possibility to use them without limitations had a statistically significant influence on the nurses' evaluation of 'TC, SC, JS, PM and WCs'; $p < 0.001$. A possibility to perform a COVID-19 test (nasopharynx swab and marking by the RT-PCR method or antigen test) in the workplace, as well as psychological counselling had a statistically significant influence on the nurses' higher evaluation of all safety aspects assessed with the SAQ questionnaire, that is, 'TC, SC, JS, SR, PM and WCs'; $p < 0.05$. The employer's and co-workers' support had a statistically significant influence on nurses' higher evaluation of 'TC, SC, JS, PM and WCs'; $p < 0.001$. Over-work and working above employed hours during a day shift caused statistically significantly lower evaluation of WCs, $p = 0.011$. Insufficient nursing staff in COVID units was correlated with lower evaluation of 'TC, SC, JS, PM and WCs' by nurses; $p < 0.05$. Being forced to do overtime and the number of hours in one shift were statistically significant for lower evaluation of WCs by nurses; $p < 0.05$ (Table 3).

DISCUSSION

Our study demonstrates how even when operating under pandemic conditions, some factors remain critical for fostering a culture of patient safety. COVID-19 pandemic revealed imperfections of work organisation in healthcare facilities and organisation security gaps which pose a threat to patient safety. It further reinforced the importance that hospital management plays in adjusting working conditions and staff's attitudes towards necessary changes in the functioning of the hospital when responding to the current challenges (Wagner et al., 2019). In work environments where a patient safety-oriented programme is being implemented, the managing personnel may positively influence the staff's work effectiveness, their conscience level and engagement in the improvement of care quality and safety (Wagner et al., 2019).

The results obtained in the six SAQ subscales were similar regardless of the nurses working in infectious wards, wards converted into infectious or non-infectious wards, which suggests that the workplace does not determine a specialised nursing attitude to patient safety during the COVID-19 epidemic. Therefore, uniform organisational policies have got new significance in terms of improving perceptions of workplace safety.

The personnel evaluated WCs the lowest, while SR was evaluated the highest. SR refers to nurses' awareness of the impact of work-related stressors on the results of the performed duties. Unlike other fields of the SAQ questionnaire, which require nurses to evaluate various factors influencing safety culture in the workplace, SR is solely based on self-evaluation, thus being subject to certain limitations (Soh et al., 2017). Whilst subjective, it seems to be adequate for the current epidemic situation. Managers play a significant role in the improvement of care safety and quality (Pannick et al., 2016). The PM importance for patient safety by nurses aged 51–66 was much higher than in the case of nurses aged 31–40 ($p = 0.002$). These results do not differ from the previous research done before the COVID-19 pandemic, in Sweden, Palestine or Turkey, in which the attitudes of older nurses towards the importance of management for patient safety were rated higher than by younger colleagues (Danielsson et al., 2019; Elsous et al., 2017; Ongun et al., 2017). This observation may result from the fact that nurses with less work experience might be better prepared for critical self-evaluation concerning patient safety, while older nurses pay more attention to supervisors' decisions.

There are no Polish studies evaluating working conditions in hospitals and patient safety evaluated with the SAQ, hence results reported here represent some of the first data on the topic. International publications offer few studies which used the SAQ to evaluate nurses' attitudes towards factors conditioning patient safety during the current COVID-19 pandemic. The research performed in Singapore on a group of healthcare employees (nurses, physicians, supporting staff, administration staff) of four hospitals ($n = 3075$) showed that

TABLE 3 Nurses' attitudes towards factors conditioning patient safety (SAQ) in relation to work conditions in hospital during the pandemic

Work conditions	Teamwork climate Mean (SD)	Safety climate Mean (SD)	Job satisfaction Mean (SD)	Stress recognition Mean (SD)	Perception of management Mean (SD)	Work conditions Mean (SD)
COVID-19 procedures developed in the ward						
Yes (<i>n</i> = 545)	61.48 (18.87)	61.06 (18.31)	67.04 (21.41)	75.54 (21.16)	61.69 (23.92)	54.74 (21.74)
No (<i>n</i> = 15)	47.50 (23.72)	41.43 (16.79)	52.67 (26.25)	77.50 (20.43)	35.33 (22.64)	27.92 (16.00)
I don't know (<i>n</i> = 17)	51.72 (22.44)	47.90 (21.28)	50.59 (24.49)	77.50 (20.43)	51.76 (22.91)	43.75 (16.09)
Stat	$F(2, 574) = 5.899$, $p = 0.003$	$F(2.574) = 12.241$, $p < 0.001$	$F(2, 574) = 7.769$, $p < 0.001$	$F(2, 574) = 1.326$, $p = 0.266$	$F(2, 574) = 10.135$, $p < 0.001$	$F(2, 574) = 13.264$, $p < 0.001$
Organised training in treating a COVID-19 patient, as well as dressing and undressing of protective clothing						
Yes (<i>n</i> = 354)	64.46 (18.61)	64.35 (17.94)	69.42 (21.43)	75.55 (21.12)	64.89 (23.76)	59.07 (21.09)
I don't know (<i>n</i> = 23)	63.02 (22.67)	60.42 (20.77)	67.29 (18.77)	70.05 (23.53)	67.08 (25.10)	53.39 (24.31)
No, I had to learn everything myself (<i>n</i> = 199)	54.10 (<i>n</i> = 18.26)	52.67 (17.55)	60.28 (21.90)	77.04 (20.58)	52.51 (22.92)	44.22 (19.90)
Stat	$F(2, 574) = 19.779$, $p = 0.000$	$F(2.574) = 27.036$, $p < 0.001$	$F(2, 574) = 11.561$, $p < 0.001$	$F(2, 574) = 1.266$, $p = 0.283$	$F(2, 574) = 18.533$, $p < 0.001$	$F(2, 574) = 32.403$, $p < 0.001$
Sufficient provision of personal safety means in the ward						
Yes (<i>n</i> = 401)	64.19 (18.81)	63.31 (17.86)	69.81 (20.67)	74.94 (21.39)	64.73 (23.52)	58.39 (20.67)
No (<i>n</i> = 176)	53.17 (18.15)	53.00 (18.73)	57.90 (22.38)	77.88 (20.17)	51.56 (23.41)	43.08 (21.04)
Stat	$F(1, 575) = 42.899$, $p < 0.001$	$F(1.575) = 39.506$, $p < 0.001$	$F(1, 575) = 38.622$, $p < 0.001$	$F(1, 575) = 2.3894$, $p = 0.123$	$F(1, 575) = 38.423$, $p < 0.001$	$F(1, 575) = 66.365$, $p = 0.000$
Possibility to use personal safety means freely, without limitations						
Yes (<i>n</i> = 387)	64.15 (19.37)	63.60 (18.13)	69.74 (21.04)	75.00 (21.04)	65.50 (23.54)	58.38 (21.20)
No (<i>n</i> = 190)	54.08 (17.26)	53.16 (17.98)	58.92 (21.83)	77.53 (21.02)	50.95 (22.71)	44.21 (20.31)
Stat	$F(1, 575) = 36.940$, $p < 0.001$	$F(1.575) = 42.510$, $p < 0.001$	$F(1, 575) = 32.874$, $p = 0.000$	$F(1.575) = 1.8476$, $p = 0.175$	$F(1, 575) = 49.867$, $p = 0.000$	$F(1, 575) = 58.515$, $p = 0.000$
Possibility to take swab in workplace						
Yes, without problems (<i>n</i> = 308)	63.87 (18.86)	63.58 (18.55)	68.91 (20.94)	73.70 (22.07)	65.68 (23.25)	57.39 (21.42)
Yes, but I had to struggle for this (<i>n</i> = 114)	57.68 (20.30)	55.54 (18.20)	61.67 (23.53)	81.58 (15.17)	54.47 (23.98)	49.62 (21.62)
No, because there was no permission from the employer (<i>n</i> = 142)	57.25 (17.46)	56.89 (18.23)	64.19 (21.49)	76.67 (21.50)	55.28 (24.17)	48.86 (21.82)
No, because there is no swab point (<i>n</i> = 13)	55.77 (27.46)	55.49 (18.53)	62.69 (26.19)	66.83 (26.32)	56.92 (26.97)	55.77 (23.73)
Stat	$F(3, 573) = 5.632$, $p = 0.001$	$F(3.573) = 7.701$, $p < 0.001$	$F(3, 573) = 3.771$, $p = 0.011$	$F(3, 573) = 4.847$, $p = 0.002$	$F(3, 573) = 9.740$, $p = 0.000$	$F(3, 573) = 6.7626$, $p < 0.001$
Support from the employer						
Yes (<i>n</i> = 318)	68.26 (17.18)	67.74 (16.70)	72.86 (19.00)	75.24 (21.62)	71.67 (20.79)	61.36 (20.83)
No (<i>n</i> = 259)	51.71 (17.47)	50.85 (16.80)	57.97 (22.44)	76.57 (20.35)	47.26 (21.23)	44.33 (19.50)
Stat	$F(1, 575) = 128.72$, $p < 0.001$	$F(1, 575) = 145.22$, $p < 0.001$	$F(1, 575) = 74.488$, $p = 0.000$	$F(1, 575) = 0.571$, $p = 0.450$	$F(1, 575) = 193.02$, $p = 0.000$	$F(1, 575) = 101.02$, $p = 0.000$
Counselling of a psychologist						
Yes (<i>n</i> = 157)	65.00 (18.59)	65.58 (18.09)	72.13 (18.24)	77.13 (19.95)	69.24 (21.88)	60.71 (21.65)
No (<i>n</i> = 420)	59.27 (19.32)	58.14 (18.58)	63.95 (22.72)	72.37 (23.46)	57.52 (24.33)	51.10 (21.48)
Stat	$F(1, 575) = 10.221$, $p = 0.001$	$F(1, 575) = 18.617$, $p = 0.000$	$F(1, 575) = 16.397$, $p = 0.000$	$F(1, 575) = 5.881$, $p = 0.016$	$F(1, 575) = 27.933$, $p = 0.000$	$F(1, 575) = 22.757$, $p = 0.000$

(Continues)



TABLE 3 (Continued)

Work conditions	Teamwork climate Mean (SD)	Safety climate Mean (SD)	Job satisfaction Mean (SD)	Stress recognition Mean (SD)	Perception of management Mean (SD)	Work conditions Mean (SD)
Support from co-workers						
Yes (<i>n</i> = 522)	62.84 (18.47)	61.77 (18.22)	67.96 (21.25)	75.92 (20.97)	61.92 (24.22)	54.78 (21.80)
No (<i>n</i> = 55)	41.74 (16.11)	44.87 (16.56)	49.27 (20.71)	75.00 (21.98)	49.27 (21.40)	43.64 (20.78)
Stat	$F(1, 575) = 66.400$, $p < 0.001$	$F(1, 575) = 43.550$, $p = 0.000$	$F(1, 575) = 38.646$, $p = 0.000$	$F(1, 575) = 0.096$, $p = 0.758$	$F(1, 575) = 13.841$, $p < 0.001$	$F(1, 575) = 13.109$, $p < 0.001$
Work load						
Yes (<i>n</i> = 493)	60.33 (19.35)	60.24 (18.48)	65.60 (22.06)	76.01 (20.77)	60.03 (24.03)	52.60 (21.87)
Hard to evaluate (<i>n</i> = 63)	63.10 (19.75)	59.18 (20.96)	68.97 (20.36)	73.02 (23.86)	65.32 (25.56)	61.01 (20.48)
No (<i>n</i> = 21)	65.87 (15.29)	61.22 (18.26)	71.43 (21.80)	80.06 (18.39)	62.86 (24.57)	58.04 (23.97)
Stat	$F(2, 574) = 1.3225$, $p = 0.267$	$F(2, 574) = 0.124$, $p = 0.883$	$F(2, 574) = 1.290$, $p = 0.276$	$F(2, 574) = 1.005$, $p = 0.366$	$F(2, 574) = 1.416$, $p = 0.244$	$F(2, 574) = 4.589$, $p = 0.011$
Feeling higher intensity of stress in relation to the pandemic						
Yes (<i>n</i> = 561)	60.90 (19.15)	60.12 (18.66)	66.19 (21.82)	75.86 (21.05)	60.61 (24.20)	53.58 (21.99)
Hard to evaluate (<i>n</i> = 6)	50.00 (31.07)	54.76 (23.76)	58.33 (26.96)	75.00 (28.23)	60.83 (21.78)	60.42 (16.14)
No (<i>n</i> = 10)	63.33 (18.61)	66.07 (20.08)	70.00 (24.04)	75.86 (21.05)	66.00 (29.42)	57.50 (22.20)
Stat	$F(2, 574) = 1.035$, $p = 0.356$	$F(2, 574) = 0.748$, $p = 0.473$	$F(2, 574) = 0.537$, $p = 0.584$	$F(2, 574) = 0.013$, $p = 0.987$	$F(2, 574) = 0.241$, $p = 0.786$	$F(2, 574) = 0.439$, $p = 0.645$
Nursing staff insufficiency						
Yes (<i>n</i> = 491)	59.92 (18.98)	59.20 (18.65)	64.89 (21.67)	75.67 (21.07)	59.61 (24.06)	51.65 (21.78)
Hard to evaluate (<i>n</i> = 22)	59.09 (22.10)	59.10 (18.30)	72.27 (21.92)	73.86 (25.12)	68.41 (23.43)	56.53 (16.97)
No (<i>n</i> = 64)	68.35 (19.15)	67.92 (17.90)	73.98 (21.84)	77.73 (19.54)	66.48 (24.90)	68.55 (18.73)
Stat	$F(2, 574) = 5.597$, $p = 0.004$	$F(2, 574) = 6.278$, $p = 0.002$	$F(2, 574) = 5.875$, $p = 0.003$	$F(2, 574) = 0.370$, $p = 0.691$	$F(2, 574) = 3.458$, $p = 0.032$	$F(2, 574) = 18.001$, $p = 0.000$
Working overtime in relation to the pandemic						
Yes (<i>n</i> = 340)	61.02 (18.92)	60.21 (18.48)	67.53 (22.09)	75.79 (21.50)	60.66 (24.22)	51.95 (21.59)
No (<i>n</i> = 237)	60.55 (18.81)	60.09 (19.10)	64.24 (21.47)	75.87 (20.43)	60.78 (24.31)	56.25 (22.21)
Stat	$F(1, 575) = 0.087$, $p = 0.768$	$F(1, 575) = 0.005$, $p = 0.943$	$F(1, 575) = 3.165$, $p = 0.075$	$F(1, 575) = 0.003$, $p = 0.952$	$F(1, 575) = 0.003$, $p = 0.953$	$F(1, 575) = 5.413$, $p = 0.020$
Number of work hours during the pandemic						
7.35-hour shifts (<i>n</i> = 48)	64.06 (19.31)	62.94 (19.72)	71.97 (17.74)	75.52 (19.84)	65.31 (20.84)	66.93 (21.61)
12-hour shifts (<i>n</i> = 371)	59.97 (19.35)	59.25 (18.08)	65.20 (21.75)	76.24 (21.62)	60.32 (23.75)	52.04 (21.65)
12- and 24-hour shifts (<i>n</i> = 85)	60.29 (19.62)	59.37 (20.24)	64.76 (24.53)	76.17 (17.74)	58.70 (28.16)	51.98 (21.48)
24-hour shifts (<i>n</i> = 71)	63.20 (18.34)	63.58 (19.38)	68.59 (21.40)	73.15 (22.71)	62.25 (24.05)	54.93 (21.20)
>24-hour shifts (<i>n</i> = 2)	81.25 (8.84)	75.00 (5.05)	82.50 (17.67)	87.50 (17.68)	52.50 (17.68)	78.12 (22.09)
Stat	$F(4, 572) = 1.371$, $p = 0.242$	$F(4, 572) = 1.433$, $p = 0.221$	$F(4, 572) = 1.617$, $p = 0.168$	$F(4, 572) = 0.484$, $p = 0.747$	$F(4, 572) = 0.729$, $p = 0.572$	$F(4, 572) = 5.896$, $p = 0.000$

Abbreviations: SD, standard deviation; Stat, statistics.

the individual gave the highest scores to JS, and the lowest to SR out of all SAQ areas (Denning et al., 2020; Scott et al., 2020; Tan et al., 2020). Collectively, the literature has begun to highlight how initiatives promoting SC, including WCs and team work, may be beneficial to the range of staff's attitudes impacting patient safety.

Our study, which included nurses working in hospital wards during the COVID-19 pandemic illustrated how nurses' attitudes concerning safety were also substantially connected

with the possibility to perform a swab PCR SARS-CoV-2 test. Our results are consistent with multi-facility studies by Scott et al. (2020) performed between 22 March and 18 June 2020 on the group of 1590 nurses working during the COVID-19 pandemic (Scott et al., 2020). The possibility to perform tests protectively influenced also the staff's mental health. The research by Scott et al. (2020) did not succeed in determining whether safety attitudes were a factor contributing to professional burnout, fear and depression, or whether those condi-



tions led to weaker attitude to patient safety (Scott et al., 2020). It is however important as we know that the personnel attitudes concerning patient safety can be modified at a workplace. Our research has shown that the possibility to perform a COVID-19 test was interpreted as a signal of a well-managed organisation; employees supported by the employer were positively inclined towards WCs and PM, which contributed to the increase in overall safety.

Our study also confirmed the importance of support for nursing staff by the employer, co-workers and psychologists as organisational factors that support positive patient safety cultures. Similar results were obtained by Denning et al. (2020) who studied in the United Kingdom the impact of the COVID-19 pandemic on hospital personnel's attitudes towards factors influencing patient safety. That research group included 455 persons – medical and administrative staff including 183 nurses. The findings showed that both training of nurses ($p < 0.001$) and support ($p < 0.001$) for nurses while moving them to work at wards where COVID-19-diagnosed patients were treated were correlated with higher SAQ results (Denning et al., 2020). In their systematic review, Kisely et al. (2020) indicated that the mental well-being of the personnel during the COVID-19 pandemic was positively influenced by such initiatives as communication, access to personal safety means, sufficient rest and mental counselling.

The problem of the wards filled with COVID positive patients, visible during the currently increasing consecutive wave of the COVID-19 pandemic, insufficiency in staffing, equipment and personal safety means, have led to the appearance of negative emotions among medical personnel. The appearance of difficulties in the workplace may result in increased tension and anxiety among employees. Bostan et al. (2020) defined anxiety as a state of unpleasant agitation (Bostan et al., 2020) and indicated that the more a person perceives the event as a threat, the more anxious they feel (Soh et al., 2017). This is why it is so important for hospital managers, especially in a pandemic period, to develop appropriate nursing policies and proper team relations in advance and inform the team about them, because such steps help ultimately to maintain a higher level of patient safety and better treatment outcomes.

CONCLUSIONS AND IMPLICATIONS FOR NURSING AND HEALTH POLICY

WCs which affect nurses' attitudes towards safety factors of hospitalised patients mostly constitute modifiable factors related to the workplace. They include, primarily, proper training of employees, limitation of daily overtime and psychological counselling for the staff. Subsequent strategies implemented in reference to the ongoing pandemic should be based on best practices of human resources and care management, providing optimum safety for a patient, as well as for nursing staff. Workplace policies should be revisited for how they support patient safety whilst regional or national governing bodies can take steps towards developing poli-

cies that reward organisations for outcomes tied to patient safety.

RESEARCH LIMITATIONS

The first limitation of this study is that it was performed in 1 of 16 regions in one country site, which might reflect the unique aspects of healthcare delivery in this region or in the particular country. Another limitation to this research is a lack of reference to results from the pre-pandemic situation in Poland thereby limiting our ability to compare results or measure the extent of change. Since SAQ has proven to be a reliable tool for studying patient safety attitudes in different countries and cultures, the current data seem worth extending to a larger group of domestic as well as international nurses.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

All authors participated in the design and conduct of the research, writing and/or editing of the manuscript. *Study design:* Iwona Malinowska-Lipień and Tadeusz Wadas. *Data collection:* Iwona Malinowska-Lipień and Tadeusz Wadas. *Data analysis:* Iwona Malinowska-Lipień and Tadeusz Wadas. *Study supervision:* Iwona Malinowska-Lipień, Allison Squires, Tomasz Brzostek, Teresa Gabryś, Maria Kózka and Agnieszka Gniadek. *Manuscript writing:* Iwona Malinowska-Lipień, Allison Squires, Tomasz Brzostek, Teresa Gabryś. *Critical revisions for important intellectual content:* Allison Squires, Tomasz Brzostek, Maria Kózka, Agnieszka Gniadek and Teresa Gabryś.

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SUPPORTING INFORMATION

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