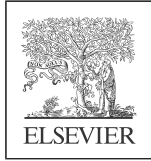




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A mixed methods study of an organization's approach to the COVID-19 health care crisis

Francesco Zaghini^{a,*}, Jacopo Fiorini, PhD^a, Lucilla Livigni, MD^b, Gemma Carrabs, MD^b,
Alessandro Sili, PhD^a

^aDepartment of Nursing Professions, University Hospital of Rome Tor Vergata, Rome, Italy

^bOccupational Health Service, University of Rome Tor Vergata, Rome, Italy

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ABSTRACT

Background: Healthcare emergency can increase work-related stress and reduce nurses' job satisfaction and quality of life. Managerial decisions and proactive interventions implemented to react to the emergency ensure the best patient outcomes.

Purpose: The purpose of this study was to verify whether a proactive organizational approach can limit nurses' work-related stress and help preserve their job satisfaction and quality of life during a health emergency.

Methods: A longitudinal mixed methods study was conducted. Data were collected before and after the transformation into a SARS-CoV-2 Hospital and the implementation of organizational interventions. Focus groups were conducted to investigate quantitative data.

Findings: After the implementation of interventions and as the pandemic progressed, work-related stress decreased and job satisfaction and quality of life increased.

Discussion: Through proactive organization, even during an emergency, nurses are prepared for working, and work-related stress due to changes is reduced. Nurses are motivated and satisfied with their organization and management, and quality of life increases.

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Background

"The future comes in us, modifying our environment, long before its most evident signs can be grasped" (Rilke, 2000). The great contemporary challenge is to identify signs coming from the reference scenario and promptly grasp the opportunities that can be turned into an advantage. Modern organizations have developed an anticipatory way of working, oriented toward change and self-initiative, called "proactivity". Proactive behavior allows organizations to plan activities, to

be competitive, to organize their business and move from a mechanistic (cause-effect) management to an "intelligent system" capable of interacting with the external environment. A proactive organization can flexibly recalibrate work processes (Grant & Ashford, 2008) to adapt to contingent situations, transform threats into opportunities, and always obtain the best possible outcomes (or at least, limit the damage).

Health emergencies take hospitals by surprise, especially those located in the places where epidemics occur first. Managerial decisions and interventions implemented in a health emergency play a key role in

*Corresponding author: Francesco Zaghini, Policlinico di Tor Vergata, Viale Oxford, 81, 00133, Rome, Italy.

E-mail address: francesco.zaghini@ptvonline.it (F. Zaghini).

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modern policy in ensuring a prompt response from the health system to the multiple healthcare needs of citizens (Gilbert et al., 2017; Miller & Apker, 2002; Scuffham et al., 2016). In December 2019, a new coronavirus, called SARS-CoV-2, emerged in China. In March 2020, the World Health Organization, by its widespread diffusion, declared a global pandemic. In Italy, the first official news of a SARS-CoV-2 patient arrived on February 20th, 2020. Following this, cases increased exponentially, so much so that the Italian government ordered the first closures of services and commercial activities from early March up to the full lockdown of 10th March 2020.

The Italian health system (and all healthcare professionals who form part of it) was severely put to the test. Initially, about 90% of patients were hospitalized, with 10% of cases requiring intensive care (www.salute.gov.it). Healthcare professionals involved in the process of caring for SARS-CoV-2 patients have been exposed to new and insidious risks, difficult situations of uncertainty and lack of clarity, including the risk of contagion, emotional overload, pressing work shifts, physical fatigue, resource reduction and organizational precariousness (Ahn et al., 2020; Ulrich et al., 2020). In the absence of specific protocols and procedures, many nurses, regardless of their clinical skills and abilities, have been called to work in care settings other than those to which they belong. They face critical conditions and the skills and experience required of them are greater than those they possess. Despite this, nursing staff has been working incessantly, caring for patients and displaying a strong sense of responsibility (Liu et al., 2016).

Furthermore, these new conditions have exponentially increased work-related stress, to which healthcare professionals are already known to be exposed (Sarafis et al., 2016; Saridi et al., 2016; Vagni et al., 2020), so much so that among forty nurses who died as a result of SARS-CoV-2 in Italy, two were suicides, probably induced by emotional overload, work pressure and work-related stress factors (Federazione Nazionale Ordini Professioni Infermieristiche, 2020). Besides, literature has shown that, in addition to counterproductive work behavior in nurses (Sili et al., 2014; Zaghini, Biagioli, et al., 2020), stress can cause physical pathologies (Zaghini, Vellone, et al., 2020), such as coronary heart disease (Sara et al., 2018) and musculoskeletal pain (Giorgi et al., 2018; Hassard et al., 2018), as well as psychological and mental pathologies, such as anxiety and depression (Bakker & Heuven, 2006; Huang & Zhao, 2020; Marcatto et al., 2016; Pinar et al., 2012; Su et al., 2009; Walker, 2007), that can lead to psychiatric disorders (An et al., 2020). It has also been shown that work-related stress can significantly reduce nurses' quality of life and job satisfaction (Sarafis et al., 2016; Su et al., 2009; Taghavi et al., 2014; Trivellas et al., 2013). Sarafis and colleagues (2016) have verified how high workloads and interpersonal conflicts with colleagues and superiors can significantly affect both the physical and mental dimensions of quality of life. The changes that have taken place during the SARS-CoV-2

pandemic (which shattered the usual relational and communication patterns of healthcare companies) have led to an increase in these stressful elements. Furthermore, as verified by Trivellas et al. (2013), and already described in a meta-analysis (Blegen, 1993), high workloads (Hegney et al., 2019; Van Bogaert et al., 2013), staff cuts (Aiken et al., 2002; Sasso et al., 2015, 2016) and interpersonal conflicts (Spector & Fox, 2005), as well as a lack of autonomy in decision-making, are typical stressful elements that have taken on new forms during the SARS-CoV-2 pandemic in all healthcare companies (Fernandez et al., 2020; Huang & Zhao, 2020; Sun et al., 2020; Yin & Zeng, 2020), significantly reducing nurses' job satisfaction.

However, it must be taken into consideration that the situation of infections in Italy began and developed in precise geographic areas (where "patient zero" was identified); in other areas, the pandemic arrived with a delay of a few weeks. During this latent period, healthcare managers and nursing directors reorganized services with a proactive mentality and prepared them for effective emergency care management. If we are certain of the impact of the measures adopted by health organizations on patient care outcomes (Aiken et al., 2002, 2014, 2017; Sasso et al., 2015, 2016), the impact of this proactive organizational approach on nurses is unknown. It can therefore be hypothesized that the proactive approach of healthcare organizations that are not immediately involved in the SARS-CoV-2 pandemic, preparing structures and professionals for increasing workloads and for the changes required to respond to the emergency, may impact nurses' work-related stress, and consequently on their job satisfaction and quality of life.

To verify this hypothesis, a study was conducted with the aim of longitudinally verifying whether a proactive organizational approach, through specific and targeted interventions, can limit nurses' work-related stress level, and help preserve job satisfaction and quality of life during a health emergency like the SARS-CoV-2 pandemic. Furthermore, through a qualitative approach, this phenomenon has been evaluated and studied about the personal experience of the nurses directly involved in the healthcare emergency.

Method

Following the pandemic's arrival in Italy, an experimental mixed methods study was conducted in a University Hospital transformed during the pandemic into a SARS-CoV-2 Hospital. From 19 and 29 February 2020, data relating to nurses' work-related stress, job satisfaction and quality of life were collected through a self-report questionnaire. The specific and targeted interventions, planned by the organization in which the study was conducted, were implemented starting 2 March 2020 for managing the repercussions of the SARS-CoV-2 on nursing staff. From 6 to 19 July 2020, the self-report questionnaire was again administered

to the nursing staff and focus groups were conducted for qualitative data collection relating to the nurses' experience lived during the health emergency. The study is therefore built on two sequential phases: a descriptive-observational phase, followed by explanatory focus groups. First, researchers collected quantitative data, then qualitative information was collected to explain or to better understand the results previously learned (Johnson & Onwuegbuzie, 2007; Ostlund et al., 2011).

Recruitment

All nurses directly working on caring for SARS-CoV-2 positive patients were enrolled in the study after reading the information and spontaneously providing their informed consent. A power analysis requiring a minimum sample size of 140 respondents was conducted. Nurses were enrolled in the study, regardless of age, gender, marital status, training experience, hours of work, and shifts performed.

Quantitative data collection and analysis

In the quantitative phase, a self-report questionnaire was administered for detecting levels of work-related stress, job satisfaction and quality of life, before (T0) and after (T1) the implementation of the interventions planned by the organization for transformation into a SARS-CoV-2 Hospital. In both phases of the survey, in the same operating units where there were no differences in practices, each nurse had four days to correctly fill in the questionnaire and return it in a prepared urn located in their operating unit, ensuring data anonymity. To allow the data comparison in T0 and T1, each participant had two stickers with the same alphanumeric identification code, respectively marked by the acronyms T0 and T1. Before inserting the completed questionnaire in the urn, each participant affixed his or her sticker code relating to time T0 on the title page. The same operation was also envisaged for the completion and delivery of the T1 questionnaire.

The participants' socio-demographic and occupational characteristics were analyzed using descriptive statistics. Pearson's correlation (r) was used to verify the relationship between all the variables under study and to evaluate possible correlations with the socio-demographic variables and quantitative variables in terms of work; while evaluating the differences between the means of the evaluated variables and the dichotomous ones (such as gender or having children or not), the t-test for independent samples was used; finally, to verify the difference between the means of the evaluated variables and the qualitative ones (marital status and shifts), Tukey's ANOVA test with post hoc was used. To verify the differences in the means of the evaluated variables, the t-test for paired samples was used at time T0 and T1. The SPSS Ver 25 statistical package was used for the analysis.

Proactive management interventions (Figure 1)

Before the arrival of the first SARS-CoV-2 patients in the University Hospital where the study was carried out, the following interventions were implemented, following the main areas highlighted by Paguio et al. (2020) and Lai et al. (2020):

Nurses' environment: Reorganize care settings through the adoption of organizational models aimed at the real care of patients affected by SARS-CoV-2, including the structuring of new wards (e.g., increasing intensive care beds, establishing dedicated paths in the emergency rooms for immediate access to care), procedures (e.g., procedure for admitting suspected and positive patient in the Accident and Emergency, cleaning and disinfection wards and patients' unit or COVID19 respiratory care management) and the reorganization of internal paths within the structure for separating SARS-CoV-2 positive patients from negative patients (Bagnasco et al., 2020; Paguio et al., 2020; Yoshioka-Maeda et al., 2020);

Nursing staffing and workload: before the pandemic, the ratio of nurses to patients in medium care intensity was 1:9 and in high-intensity units 1:4. After the hospital transformation, resources were redistributed to ensure adequate staffing levels, maintaining a ratio of nurses to patients, over 24 hours, of 1:6 in SARS-CoV-2 units with medium care intensity and 1:2 in high-intensity units (Aiken et al., 2002; Bagnasco et al., 2020; Sasso et al., 2015, 2016; Yoshioka-Maeda et al., 2020).

Competence and learning promotion: Updating nurses' clinical knowledge and abilities to comply with specific health needs of SARS-CoV-2, including training on the correct use of individual protection devices. A specific online section was also created on the organization network where the study was conducted to make the material on SARS-CoV-2 available for all staff to consult: reporting guidelines, pathways and updated information issued by the Italian government, such as the "national epidemiological trend" (Paguio et al., 2020; Yoshioka-Maeda et al., 2020); **participatory approach and autonomy:** participatory approach, enthusiasm and conscientiousness were promoted among nurses through continuous clinical and organizational audits, lectures, and workshops. In these occasional meetings in person or online, nurses and other healthcare professionals had the opportunity to discuss potential adjustments or report the critical situation to improve patients' care. (Paguio et al., 2020); **process-focused unit level interventions for SARS-CoV-2:** organizational support aspects that literature identified as critical during the SARS-CoV-2 period were applied in each ward; among them, training (Labrague & De los Santos, 2020), involvement (Mo et al., 2020), and the enhancement of skills and psychological support (Ahn et al., 2020) with the establishment of a psychological help desk for staff, available every day both on-site and remotely (Bagnasco et al., 2020; Paguio et al., 2020; Ulrich et al., 2020; Yoshioka-Maeda et al., 2020); **healthcare nurses' surveillance:** nurses and staff exposed to the SARS-

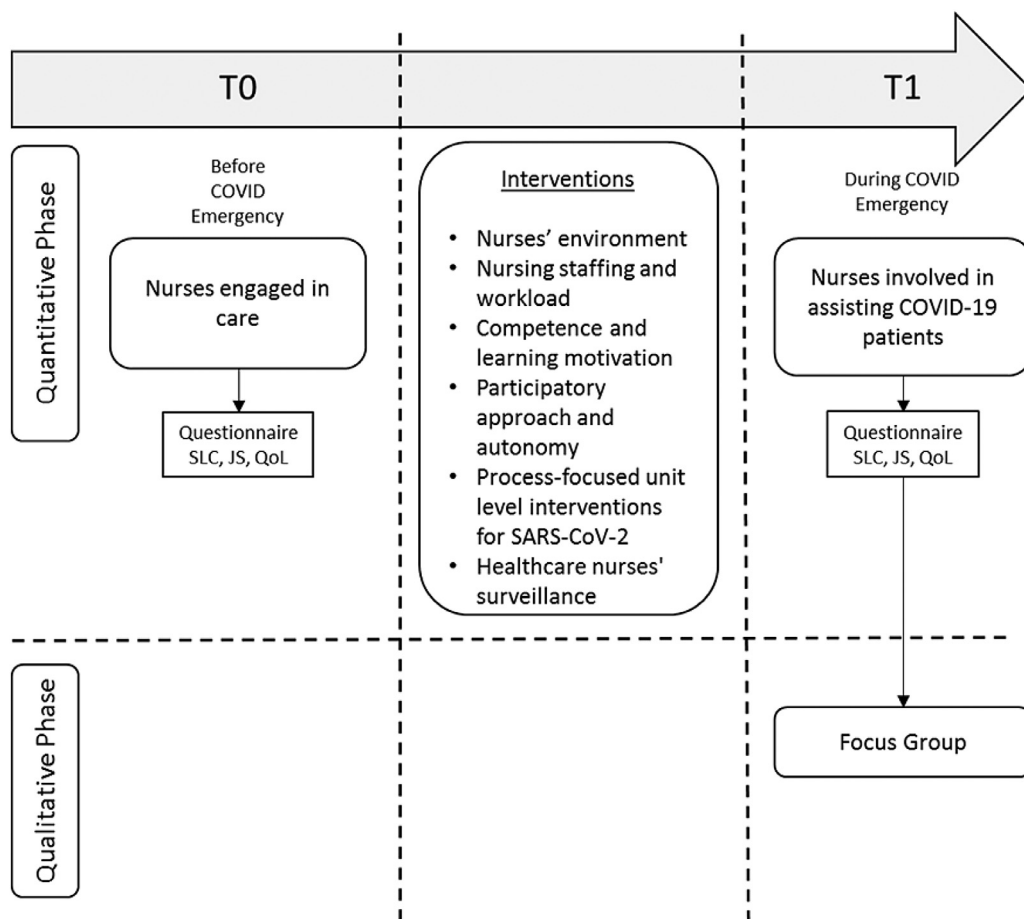


Figure 1 – Research design.

CoV-2 were kept under observation with nasopharyngeal swabs and successive serological samples (Bagnasco et al., 2020; Yoshioka-Maeda et al., 2020).

Tools

The questionnaire used for quantitative data collection was composed of scales already validated and present in the literature, specifically: the *Health and Safety Executive Management Standards Work-Related Stress Indicator Tool* (HSE-IT - Marcatto et al., 2015) was used to assess work-related stress. It consists of 35 items relating to specific work events and evaluates how often they occur. It is a model based on seven key dimensions, recognized in the literature as correlating to work-related stress (demand, control, support from colleagues, support from superiors, relationships, role, change) rated on a 5-point Likert-type response scale (from 1 "Never" to 5 "Always"); The scale of positive and negative indicators of the Nursing Questionnaire on Organizational Health (QISO - Sili et al., 2010) was used to assess job satisfaction. The QISO in the validation study showed good psychometric characteristics of validity and reliability in measuring organizational health in the nursing setting. The scale includes a total of 4 dimensions, of which 3 were used for detecting the nurses' satisfaction with their organization in general, with

management and with their operating unit, while the fourth dimension referring to dissatisfaction was not used. It consists of 18 items rated on a 4-point Likert-type response scale (from 1 "Never" to 4 "Often").

The Nursing Quality of Life scale (NQoLs - Sili et al., 2018) was used to assess quality of life. It is a questionnaire consisting of 28 items relating to various aspects of daily life. Participants express their degree of satisfaction on a four-point Likert scale (from 1 "Very Dissatisfied" to 4 "Very Satisfied"). The questionnaire presents valid psychometric characteristics with decidedly satisfactory reliability as regards the total internal consistency and the individual factors. The questionnaire investigates 4 different dimensions: psychological functionality, physical functionality, work and social functionality.

Qualitative data collection and Analysis

The qualitative phase of data collection was carried out through 6 focus group, followed by the quantitative phase in T1. Specifically, and with common experience as a point of departure, the discussion was stimulated and directed to bring out the participants' various interpretations, emotional reactions and critical evaluations (Zammuner, 2003). The focus groups, which were invaluable in providing a more reasoned

interpretation of quantitative data, following the principles of Grounded Theory (Strauss & Corbin, 1994), made it possible to help build the theory starting with the data collected (bottom-up approach). The focus groups (definable as "full groups"), meeting for an hour and a half each (Zammuner, 2003), involved a maximum of 8 people participating in the quantitative phase of the study. Participants were voluntarily enrolled. We emailed all the nurses involved in the quantitative study and the first 48 subjects who signed up were included. Privacy was protected throughout the meeting so that participants felt free to communicate their emotions, ideas and beliefs with no filters and without fear of retaliation. The moderator and observers were professionals experienced in conducting focus groups, and external to the organization, thus avoiding any influence on the participants. The themes discussed followed the evaluated variables of the questionnaires submitted in both T0 and T1 (work-related stress, job satisfaction and quality of life).

After participants had left, the research team debriefed and shared their overall and specific impressions of how the focus group went, including the major topics and group characteristics. They then proceeded to transcribe words, emotions and notes as soon as possible, and as thoroughly and accurately as possible, and to identify initial level codes and themes. Significant statements were extracted from the transcripts and codes were applied to statements that shared commonalities. This process continued at several levels until saturation had been reached (Ostlund et al., 2011).

Ethical approval and consent

This study was approved by the Ethics Committee of the hospital where the study was conducted (prot. 80/20). The study was conducted following the principles of the Declaration of Helsinki. Each participant received detailed oral and written information about the study aim, methods, adherence, risks, benefits, confidential handling of the collected data, and the freedom to withdraw from the study at any time (National Health and Medical Research Council, 2018). Each participant also had the opportunity to discuss the study with the researchers and to reflect on whether or not to participate in the study. Written, dated and signed informed consent was issued before proceeding with data collection. All data have been treated with consistency and responsibility, kept and saved in a safe place with limited access. Finally, the collected data were also processed through electronic tools in compliance with current legislation on privacy. To protect the participant's identity, the list that allows identification codes to be associated with the nominative data of the study subjects was kept by the Principal Investigator (Ministerial Decree of 15 July 1997 - Legislative Decree 196/2003 - GDPR 679/2016).

Findings

Characteristics of the quantitative phase sample

Of the 350 questionnaires administered, 322 were correctly completed, with a response rate of 92%. The sample consisted mainly of female nurses ($n = 241$; 75.5%) with a mean age of 43.4 years ($SD = 8.3$). Furthermore, 63% ($n = 170$) of participants said they are married, while 25.2% ($n = 68$) are single and 11.5% ($n = 31$), separated. The majority of participants work full-time shifts ($n = 212$; 65.9%), 19.8% ($n = 64$) morning or evening shifts, 7.7% ($n = 25$) early shifts, and the remaining 6.6% ($n = 21$) work part-time. 63.1% of participants have at least 1 child ($n = 186$), while 36.9% ($n = 109$) have none. On average, interviewed nurses work 12.8 overtime hours per month ($SD = 13.4$) at T0 and 11.9 overtime hours per month ($SD = 18.4$) at T1. While they have been working for an average of 18.7 years ($SD = 8.2$), they have been working in the current organizational context for an average of 12.1 years ($SD = 6.2$).

T0-T1 comparison of the means of the whole sample

In general, from the results conducted on the whole sample, as can be seen in Table 1, a statistically significant relation has been verified ($p < .001$). Specifically, the average work-related stress score in T0 is higher

Table 1 – Mean differences of evaluated variables between T0 and T1 (N = 322)

Variables	ALL			
	T0 Mean (SD)	T1 Mean (SD)	t	p
JRS	2.46 (.40)	2.32 (.50)	4.42	<.001
Demands	2.81 (.48)	2.79 (.58)	.52	
Control	2.76 (.67)	2.65 (.65)	2.35	.601
Su_Manager	2.34 (.88)	2.17 (.98)	2.34	.020
Su_Colleagues	2.12 (.67)	1.93 (.69)	3.31	.020
Role	1.71 (.52)	1.69 (.60)	.26	.001
Change	2.98 (.49)	2.46 (.79)	8.46	.798
Relations	2.23 (.88)	2.04 (.68)	3.42	.001
JS	2.89 (.54)	3.05 (.55)	-4.32	<.001
Organization	2.99 (.58)	3.09 (.58)	-3.68	
Management	2.73 (.70)	2.95 (.69)	-4.14	<.001
Ward	3.14 (.57)	3.19 (.59)	-1.33	<.001
QoL	2.92 (.38)	3.00 (.44)	-3.04	.003
Physical	2.50 (.56)	2.59 (.61)	-2.59	.010
Emotional	3.13 (.49)	3.16 (.52)	-.97	.334
Working	2.95 (.59)	3.08 (.51)	-2.84	.005
Social	3.17 (.55)	3.24 (.59)	-1.70	.092
Working day	54.4 (17.9)	61.9 (13.7)	-3.42	.001

Note: JRS, job-related stress; Su_Manager, manager support; Su_Colleagues, colleagues support; JS, job satisfaction; Organization, organization satisfaction; Management, management satisfaction; QoL, quality of life.

than in T1, and job satisfaction and quality of life scores are on average higher in T1 than the values in T0 (respectively $p < .001$ and $p < .01$). The stress scores due to control ($p = .020$), lack of support from the boss ($p = .020$) and colleagues ($p = .001$), change ($p < .001$) and relationships ($p = .001$) decreased during the SARS-CoV-2 emergency. In contrast, the average satisfaction scores reported by the nurses increased during the emergency period ($p < .001$); satisfaction referring specifically to the organization ($p < .001$) and management ($p < .001$). Also, about quality of life, we were able to verify that participants reported higher values on average ($p = .003$) during the SARS-CoV-2 emergency period. Quality of physical life due to physical performance ($p = .010$) and work activity ($p = .005$) would increase. Finally, an important result was found by comparing the working presence (days) of participants, which during the healthcare emergency was on average significantly higher than in the previous period ($p = .001$).

Correlation between socio-demographic and working variables

As can be seen in Table 2, from the correlation analysis between the evaluated variables and the quantitative socio-demographic characteristics of the sample, no statistically significant correlations emerged.

On the contrary, statistically significant differences emerged from the inferential analysis between the investigated variables and the qualitative socio-demographic and working characteristics (Table 3). Statistically significant relationships did not emerge from the dichotomous variables, such as gender or having children or not, while for the qualitative variables we were able to verify that there is an average difference in stress at time T1 between nurses who are separated and those who are single or married ($p = 0.29$), as well as a difference between nurses who work full time (on morning, evening and night shifts) and those who work exclusively on the early shift ($p = .013$). Therefore, nurses who are separated and work on off-shifts are less stressed.

Findings of the focus groups

48 nurses participated in the 6 focus groups. With an average age of 38.33 years ($SD = 8.6$), participants were predominantly female ($n = 35$; 73.2%). 62.5% ($n = 30$) of the participants said they were married, while 31.3% ($n = 15$) are single. 51.3% of the interviewees had at least 1 child ($n = 25$). On average, nurses worked 8.06 overtime hours per month ($SD = 10.7$). They had been working for 14.7 years ($SD = 9.3$), but in the current organizational context for 9.4 years ($SD = 7.2$). Finally, most focus group participants were nurses working full-time shifts ($n = 43$; 90%).

Characteristics of the focus group participants

From the analysis carried out on the qualitative data collected, it was possible to organize the nurses' experience of the SARS-CoV-2 pandemic in two distinct time points "Initial Shock" and "During the pandemic", which seem to have different characteristics in terms of work-related stress, job satisfaction and quality of life.

The "Initial Shock" moment, which corresponds to the first days (perhaps weeks) of caring for SARS-CoV-2 positive patients, is described by nurses as "organizational disorientation" and as "groping/navigating by sight/going to war without weapons". At this stage, nurses describe themselves as disoriented while caring for highly contagious patients, including patients with clinical instability. In particular, they report conflicting information on the methods of virus transmission and contagion, the difficulty of caring for patients who are isolated from their families and the sudden transformation of the hospital into a SARS-CoV-2 Hospital. In this first phase, there is also strong emotional disorientation, linked to the fear of infecting someone else and of becoming infected ("bringing the virus home"), but also to doubts regarding effectiveness ("we did not know if our work was really useful"), to the experience of inadequacy that has characterized most of the nursing staff coming from other departments such as internal medicine and outpatients clinics ("Some of us were unaware of how to use

Table 2 – Correlation Analysis Between the Investigated Variables and the Socio-Demographic and Working Quantitative Variables

Variables (quantitative)	Mean (SD)	T0						T1					
		JRS		JS		QoL		JRS		JS		QoL	
		r	p	r	p	r	p	r	p	R	p	R	
Age	43.4 (8.3)	.06	.444	.08	.318	-.01	.907	-.04	.599	.13	.093	.01	
Working years	18.7 (8.2)	.10	.196	.02	.797	.01	.905	-.01	.850	.13	.076	-.01	
Years in current organization	12.1 (6.2)	.11	.133	-.06	.458	-.13	.088	.10	.186	-.01	.876	-.10	
Extra hours	11.9 (18.4)	.03	.722	-.02	.834	-.11	.167	-.10	.200	-.08	.352	-.06	
Absence	3.52 (6.57)	.01	.895	-.02	.812	-.01	.870	.06	.453	-.06	.415	-.07	

Note: JRS, job-related stress; JS, job satisfaction; QoL, quality of life.

Table 3 – Univariate Correlation Analysis Between the Investigated Variables and the Socio-Demographic and Working Qualitative Variables

Variables (qualitative)	N (%)	T0				T1							
		JRS		JS		JRS		JS		QoL			
		M (SD)	p	M (SD)	p	M (SD)	p	M (SD)	p	M (SD)	p		
Gender													
Male	81 (24.5)	2.45 (.39)	.938*	2.88 (.55)	.941*	2.99 (.49)	.255*	2.22 (.55)	.152*	3.05 (.62)	.982*	3.11 (.45)	.057*
Female	241 (75.5)	2.51 (.40)		2.89 (.54)		2.89 (.35)		2.36 (.42)		3.05 (.53)		2.96 (.43)	
Marital status													
Single	68 (25.2)	2.49 ^a (.35)	.068**	2.97 ^a (.50)	.236**	2.88 ^a (.46)	.964**	2.39 ^a (.50)	.029**	2.97 ^a (.63)	.495**	2.93 ^a (.49)	.795**
Separated	31 (11.5)	2.23 ^a (.26)		3.04 ^a (.45)		2.88 ^a (.30)		2.04 ^b (.41)		3.18 ^a (.48)		2.99 ^a (.35)	
Married	170 (63)	2.47 ^a (.42)		2.83 ^a (.57)		2.90 ^a (.35)		2.36 ^c (.43)		3.04 ^a (.55)		2.98 ^a (.41)	
Children													
Yes	186 (63.1)	2.43 (.39)	.142*	2.92 (.52)	.484*	2.93 (.35)	.598*	2.27 (.44)	.062*	3.10 (.52)	.280*	3.02 (.38)	.636*
No	109 (36.9)	2.52 (.42)		2.86 (.59)		2.90 (.45)		2.41 (.48)		3.00 (.59)		2.98 (.53)	
Working shift													
Early	25 (7.7)	2.31 ^a (.36)	.435**	3.20 ^a (.65)	.095**	2.90 ^a (.39)	.757**	2.01 ^a (.41)	.013**	3.47 ^a (.38)	.001**	2.89 ^a (.61)	.780**
Morning/evening	64 (19.8)	2.45 ^a (.36)		2.89 ^a (.45)		2.89 ^a (.40)		2.24 ^{ab} (.43)		3.17 ^{ab} (.56)		3.03 ^a (.40)	
Full time	212 (65.9)	2.49 ^a (.41)		2.84 ^a (.54)		2.91 ^a (.39)		2.39 ^b (.45)		2.94 ^b (.55)		3.00 ^a (.45)	
Part time	21 (6.6)	2.42 ^a (.41)		3.00 ^a (.56)		3.03 ^a (.35)		2.28 ^{ab} (.40)		3.32 ^{ab} (.30)		2.99 ^a (.36)	

* t-test for independent sample.

** ANOVA for repeated measures, statistically different means correspond to different apexes according to the Tukey post hoc test. JRS, job-related stress; JS, job satisfaction; QoL, quality of life.

mechanical ventilators or of the complexity of caring for infectious patients"). During the "Initial" period, the qualitative data, therefore, shows an increase in the level of work-related stress, linked mainly to a perceived deterioration in respect to work demands. In particular, nurses reported two elements: a) high workload ("we found ourselves continually working very long hours and with greater responsibility than in our regular daily work") (Favretto, 1999; Karasek, 1979; Kerr et al., 2009); b) novelty, unpredictability and the "SARS-CoV-2" stress factor (Stora, 2004).

In the "During the Pandemic" period, on the other hand, or in the weeks following the very first emergency, there is an improvement in the situation (despite increased demand) and emerges the efficacy of the interventions implemented. This fact, stated by all nurses participating in the meetings, can be traced to two main dimensions: (a) "autonomy and control" and (b) "support" among peers and managers. In other words, what characterized the "During the Pandemic" moment was a general call for collective responsibility, with an unusual and appreciated space dedicated to individual initiative ("suddenly we were autonomous professionals in a process that was unfamiliar to everyone; they asked us for opinions and gave us the opportunity to experiment with solutions that we found independently, in order to manage the emergencies that continually appeared in the workplace"). In other words, nursing staff perceived in this next phase a greater control of the working process ("slowly we understood what we must do to limit infection and transmission"; "in a short time we became competent in things we had never seen or heard"), greater possibilities for exercising one's autonomy, discretion and initiative ("doctors and managers had never asked us our opinion on how to perform a certain intervention on a patient, but in the SARS-CoV-2 context, they did!"). In addition, staff discovered a great resource in the working group (composed of multidisciplinary professionals), more valuable still as it belongs to both the individual sphere ("the more competent among us taught others without professional envy and jealousy"), and to the organizational/work sphere ("as a working group we were able to discuss everything, and we overcame every situation together").

Furthermore, from the results, it was possible to record an increase in job satisfaction, thanks above all too sudden social recognition, due to which the whole nursing staff felt empowered ("finally everyone realized what we were doing; we experienced solidarity from everyone, and recognition of our value both within and outside the healthcare organization").

Discussion

This study aimed at verifying—through a sample of nurses who work in a healthcare company with a proactive approach that has promptly implemented

interventions to deal with the health emergency due to the SARS-CoV-2 pandemic—how the levels of work-related stress, job satisfaction and quality of life change, and attempting to understand the reasons that lead to these changes. The results obtained are unique, extremely important, and innovative, because they demonstrate longitudinally how in an organization with a proactive mindset, the employees—in our case nurses—are ready to work effectively, with dedication and a spirit of sacrifice even during health emergencies. This result, explained by the qualitative data collected, is in line with previous cross-sectional research (Buselli et al., 2020) and demonstrates that it is possible to significantly limit stress deriving from changes (Schaufeli & Taris, 2014; Verhaeghe et al., 2006) by keeping employees motivated and satisfied with their work through specific organizational approaches (Al-Hussami, 2008; Mcglynn et al., 2012; Paguio et al., 2020). In fact, during a healthcare emergency, such as the SARS-CoV-2 pandemic, as stated by the participants in the study, "despite the increased work demand, in terms of workload, responsibility and cognitive/emotional load", nursing staff dealt optimally with the required changes, "thanks to an improvement in the dimensions of autonomy, control over the working process, peer and manager support (head nurse, department heads, nursing and health management)". In fact, after an initial period of inevitable confusion facing a stressful working situation that was new to everyone, job satisfaction also increased unexpectedly, due chiefly to "wide social recognition of the nursing profession" (Chiang et al., 2007; Smith et al., 2020).

Furthermore, from the results of the study we were able to verify that during healthcare emergency management, compared to the previous period, the average levels of work-related stress, job satisfaction and quality of life reported by the nurses not only did not diminish but improved. This unique result is very surprising and significant for the scientific community. In fact, during the emergency period, the strategic interventions implemented (increased staffing, psychological support and targeted training) have reduced work-related stress levels in almost all its dimensions (except for the Demands and the Role) and have improved job satisfaction and quality of life. Moreover, the results support the thesis that when managers can share a proactive mentality with their staff, providing them with all the necessary support (in terms of training and resources available) and reorganizing using precision paths, protocols and procedures in a participatory approach (Kang et al., 2018; Paguio et al., 2020; Zhang et al., 2020), they generate, in the personal sense of belonging (Cortese, 2007; Ríos-Risquez & García-Izquierdo, 2016), greater safety and competence (Annisa, 2017; Asiri et al., 2016). Consequently, this allows them to experience contingent situations with greater tranquility and to be more prepared for them. At the same time, the fact that the stress deriving from the requests made by the company (Demands) and the

ambiguity of the role (Role) are not significantly different compared to the previous period, as also verified by the focus groups, further supports the results of the study and proves its reliability; during an emergency such as the one caused by SARS-CoV-2, many nurses had to change habits, departments and activities, and they certainly received requests to work harder, faster and in a different way than in the previous period, causing fatigue and disorientation. Despite this, average levels of stress due to these circumstances have not decreased, showing overall resilience. Finally, as also emerges from the results obtained from the qualitative data of the study, the evidence is now consolidated in the literature that in facing difficult working conditions, the perception of work-related stress is attenuated if there is a good level of autonomy and control over work and where there is, in addition, good support from peers and managers (Dhondt et al., 2014; Kerr et al., 2009; Ulrich et al., 2020; Wong et al., 2012). All the participants declare an extraordinary and encouraging ability to work in a group cohesively and harmoniously, supporting each other emotionally, as well as operationally. Also, in teaming up with doctors and medical trainees, they find themselves united against the various difficulties encountered (Fernandez et al., 2020; Jackson et al., 2020). The rediscovery of being united and integrated into a group (even with the same fears and fragilities) represents a powerful stress management lever that involves the entire healthcare team, regardless of the professional role ("we worked in great agreement with doctors, support operators, trainees"; "we rediscovered ourselves as equals and accomplices in the face of this great emergency"). Moreover, in literature, numerous models explain how social support between peers and superiors is an element that mitigates exposure to work-related stress and how it is possible to mitigate emotional exhaustion in particularly complex working periods through the mobilization of new personal and work resources (Bakker & Demerouti, 2014; Gilbert et al., 2017).

Besides, in our sample, we were able to verify a higher job satisfaction ($p < .001$), concerning the organization in particular ($p < .001$), and to management ($p < .001$), underlining that in difficult periods when hard work is necessary, health management plays a key role. As evidenced by other qualitative studies conducted in the nursing field (Cortese et al., 2010), in the pandemic period, and also in our sample, there was a concurrence of factors that may have determined the increase in job satisfaction and engagement at work, such as support from superiors and colleagues, confirmation of trust from patients and family members, empowerment and autonomy, and relations with head nurses (Fernandez et al., 2020; Jackson et al., 2020; Paguio et al., 2020; Yin & Zeng, 2020). A surprising fact is that professional satisfaction seems to have increased even in situations where there were organizational difficulties in managing family life (Sun et al., 2020), above all due to the presence of school-age

children at home ("almost all of our families have collaborated to make the organization of shifts and work easier for us"). This experience is most likely attributable to the participatory approach, to the family and social solidarity from which people have most often benefitted (Paguio et al., 2020).

Finally, it is not too surprising that the QoL of the nurses in our sample improved during the SARS-CoV-2 pandemic period ($p = .003$) compared to the previous period, in particular, physical QoL ($p = .010$) and QoL at work ($p = .005$), and is in line with the results obtained for stress and previous research, which have shown that in a less stressful organizational environment, individuals report a higher quality of life (Akter et al., 2018; dos Santos et al., 2018).

Limitations

The results of this research, deriving from the first longitudinal study conducted during the SARS-CoV-2 pandemic, must be considered in light of some limitations. In the first place, the monocentric nature of the study cannot exclude the interference of the particular characteristics of the organization on the results obtained such as the number of beds, staffing levels, assisted population, etc. In the second, the period of exposure to organizational stressors, which lasted only four-month, may not have had the time to caused damage to nurses in terms of work-related stress, reduction of job satisfaction and quality of life. Finally, there are some differences in the characteristics among the participants at the quantitative and the qualitative phases of the study, and this could have affected the qualitative findings of the study (Figure 1).

Conclusions

This study is the first to present the results of longitudinal mixed methods research on the impact of proactive management interventions, implemented during a health emergency, on JRS, JS and QoL of nurses. The results were collected in a dynamic, active organization with a proactive approach to problem-solving, which has undertaken a series of interventions to make nurses as ready as possible to face the SARS-CoV-2 pandemic. We were able to see that the levels of JRS, JS and QoL of nurses during this health emergency have improved (JRS decreased, and JS and QoL increased). Nurses themselves confirmed the results during the focus groups, reporting greater safety, preparation and support from colleagues and superiors, and attesting the effectiveness of the implemented interventions. These results are extremely important for healthcare managers and nursing profession directors in identifying the interventions to implement for reviewing and restructuring organizations to make them more flexible, dynamic and based on a proactive mentality, and for preparing healthcare professionals

to face changes and unforeseen events, even during health emergencies. In this way, healthcare systems always offer the best possible care to patients and guarantee the best outcomes. Furthermore, the study results could lay the foundations for a new, structured and clear model—currently lacking in literature—for responding to strains arising from emergencies (Rahman & Plummer, 2020).

Author contribution

Zaghini F.: Conceptualization, Methodology, Visualization, Writing – Original Draft, Data Curation, Investigation, Formal analysis, Software.

Fiorini J.: Conceptualization, Methodology, Visualization, Validation, Writing – Original Draft, Data Curation, Investigation.

Livigni L.: Methodology, Investigation, Formal analysis, Writing - Original Draft.

Carrabs G.: Methodology, Investigation, Formal analysis, Writing - Original Draft.

Sili A.: Conceptualization, Methodology, Validation, Writing – Original Draft, Visualization, Project administration, Supervision.

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