DIGITAL PLATFORMS IN HEALTH CARE: EVALUATING WORKERS' EXPECTATIONS AND PROFILES DURING PANDEMIC TIME[*]

Alfonso Marino [1], Paolo Pariso [2], Michele Picariello [3]

[1,2,3] *Università degli Studi della Campania "L. Vanvitelli" – Dipartimento di Ingegneria, Via Roma, 29 – Aversa (CE), Italy*

E-mails:[1] alfonso.marino@unicampania.it ; [2]paolo.pariso@unicampania.it; [3]michele.picariello@unicampania.it

Abstract. After the COVID-19, the search for innovative organizational and occupational change are essential to the achievement of sustainable health and economic targets. Instead, to fight the pandemic, one of the remedies is precisely to isolate one's own. The treatment for the most serious infections is treated in hospital, with working hours and emotional loads, not previously known by doctors and nurses. The study's aim is to examine the various expectations and profiles of doctors and nurses during a pandemic. The study's aim is to identify, using a regression analysis, the elements that both concerned health workers and those who assisted in supporting and overcoming this extended crisis. The data analysis highlights the strategic significance of the organization in the sector, specifically in respect to structures and services. In the context of the complex health organization, the conclusions suggest possible activities to be performed in order to execute an organizational change.

Keywords: digital platforms; health workers; management; quantitative data; pandemic time; regression analysis; COVID-19 Pandemic

1. Introduction

More than half of the world's population has been in isolation and 90 countries that are preparing for re-start phase but, social distancing is a rule to which it is not possible to transgress, if we do not observe this rule the contagion can restart quickly and cause damage above phase 2, 3 and 4. Italy, after China, was the first country in Europe to be under pressure for COVID-19. Communities has been isolated and slowly need to recover, avoiding a new

---

[*] *As part of the Research Program V: ALERE – Università della Campania Luigi Vanvitelli, Italy*

epidemiological health contagion. At macro level, all countries are very vulnerable to the COVID-19 pandemic, in part because of the lack of international support to achieve health and economic sustainability targets (Strielkowski et al., 2021). Yet the mounting financial burden, not only in developing countries, but also in Europe, in South Europe, several European Member States is facing the COVID-19 health crisis with high government debt and high interest payments. The legacy of the past has a negative impact on the management of the current crisis and affects the future prospects of the Countries. The search for innovative organizational and occupational change are essential to the achievement of sustainable health and economic targets (Lorincová et al., 2020; Mashhady et al., 2021). This involves developing affordable policies that make immediate progress on a number of issues and harmonizing economic incentives for long-term action. At micro level, within work groups, i.e. doctors and nurses, there have been, large changes in terms of job type, accumulated stress, expectation placed on doctors and nurses by all citizens. In the doctors and nurses jobs, there have been changes and within the hospital are initiating new relation and changing at work, between these two professional figures. Numerous studies and research have been conducted on COVID-19, with a focus on health and managerial issues (Taburchak, et al., 2021; Mikołajczak, 2021; Kopencova et al., 2021). During the pandemic, these two issues have a strong relationship as the theme of monitoring and social distancing has changed both social and job rules. Isolation is a mode that, until COVID-19, was envisioned, for example, as punishment for those who broke the law or a choice to understand because it is far from a common lifestyle. Instead, to fight the pandemic, one of the remedies is precisely to isolate one's own, to deprive one of the social and economic connections. At the same time, the treatment for the most serious infections is treated in hospital, intensive care, with working hours and emotional loads, not previously known by doctors and nurses. The reliance on information technology only fully solves this problem because in areas afflicted by the digital divide (Iqbal & Ahmad, 2022; Khan et al., 2022) as opposed to digital age, this solution also presents its difficulties and weaknesses. The presence of the digital divide also determines difficulties to implement geographic information system pandemic time. It is evident that in this case, smart hospital (SH) and digital platforms (Marino & Pariso, 2021c; Burinskas & Tvaronavičienė, 2021), as an information system implementation represents an important but unrealized domain. During this coronavirus period, the communication (Sanders et al., 2020) with support of information technologies is a strategic resource. These weaknesses are also present from a health care assistance point of view, with tensions that are developing global risk in times of coronavirus (Marino & Pariso, 2021; Nevskaya, N.A., 2021). Here too, the World Health Organization (2020) and the pandemic policy highlight at macro level, the weakness of different national governments and at micro level the changes emerging as profiles in health professionalism (Di Martino et al., 2020; Keakde & Muddana, 2022; Bhamare et al., 2019). Linked to this debate, but, a different World Health Organization point of view, highlight the political approach in coronavirus, time. This debate, take into account not only both, social and economic approach, but highlight a long term question related to health as a universal value. Furthermore, the Coronavirus, in terms of relations between people, propose a different model of development (Jašková, 2019; Okunola & Fakunle, 2021, Marino & Pariso, 2022; Chakhvadze, 2022, Grenčíková et al, 2020), in which the structured inequalities are emerging more than in the past. At this stage of the debate, it may be worth considering the possibility of rethinking health in terms of social, economic and institutional rules and objectives. These multipurpose is summarized in strengthen public health. At the micro level it is important, in order to carry out this action, to understand the following research question (RQ): what are the elaborations, of both doctors and nurses during the period of the pandemic, in relation to their work? The absence of this assessment risks not achieving the declared objective: to strengthen the public health and public choice system. The research we present in the paper develops in this logic. COVID has certainly modified the medical and nursing staff, how has the vision of their profession changed? This is the research question that the paper intend to answer at a stage in which dialogue with staff is possible, thanks to the success of vaccines and the decrease in ICU admissions and people who have died from the pandemic in Europe. The exit strategy is complicated; without involve the hospital staffs, including the Italian one. The sustainability of declaration that we must live with the virus is possible only understanding how medical work has changed. The relevant information is still insufficient to define active monitoring programs by medical personnel. There are cognitive limits to the phenomenon. Therefore, it is necessary to implement statistical tools for evaluating and predicting the

effectiveness of the monitoring activities of the changes taking place. These elements, job changes of both doctors and nurses, and assessments of it, are of primary importance for directing decision-making and making the best use of available resources (Marino & Pariso, 2021b). It is essential to develop sampling methods applied to monitoring these elements. The evaluation of the Italian Government is to start with active surveillance, not only of the virus but also the changes in public health professionalism. This concept may be summarized, as "surveillance is the systematic collection, storage, analysis and interpretation of data, followed by a dissemination of information to all the people who provided it and to those who must decide to undertake any interventions" (WHO, 2019). Active surveillance is identified as information for action. The information for action support organizational changes. In this context the National Health System, (NHS), play a strategic role in terms of information, active surveillance and healthcare. Italian health workers are the focal point of these three strategic targets. These targets, in pandemic time, may be realized with adequate skills, competencies and technologies. Italian health workers displays possible experimentation but also, bottlenecks and opportunity. The doctors and nurses is one of it and is considered by Italian Government as a strategic organizational asset related to exit of the pandemic time. The topic at international level, is focused from the same point of view, in relation to the technological potentiality and its adoption. From economic point of view, underline the strategic importance linked to doctors and nurses rules. These analyses should be integrated with doctors and nurses point of views. The Italian health workers offers an ample chance for experimentation. The research focuses on doctors and nurses of Italian hospitals. Its strength is linked to the richness of cultural assets of the country in medical fields, but also to the organizational bottlenecks and the high incidence of political decision, makers constitute the sector's negative features. After the introduction, section 2 displays literature review, section 3 results, discussion are in section 4, before conclusion in section 5. The paper is suitable for both the researcher and the operator interested in the study of the doctor and nurses profiles in and out the pandemic time.

2. Literature review

In the last European report linked to health sector (EU 2020) there are interesting evaluations and projections relating to the public sector, both on the technological and organizational side, with quantitative and qualitative elaborations but, the evaluation of what are the possible paths of public health workers in hospital in the post Covid phase in Europe is completely absent. This reflection opens the review of the literature because it highlights the need to deepen the issues related to health personnel working in hospitals. On the one hand, technological issues are summarized in a definition of the term "smart hospitals" may thus be: "A smart hospital is a hospital that relies on optimized and automated processes built on an ICT environment of interconnected assets, particularly based on Internet of things (IoT), to improve existing patient care procedures and introduce new capabilities" (Enisa, 2016, p. 9). On the other, efficient healthcare as well as an organized flow of patients, is able to reduce waiting times and the duration of hospital stays, thus also increasing revenues and the degree of patient satisfaction (Jankelová & Joniaková, 2021). The digital platforms in pandemic time (Marino & Pariso, 2021a; Marino et al., 2022a) can, also be implemented to identify, analyze and resolve the bottlenecks that could arise, thus contributing to the achievement of an efficient healthcare and patient flow in pandemic time. This stream of research is certainly important but not sufficient to understand how changing health workers are in pandemic time. It is strategic to investigate doctor and nurse roles and behaviors. It is interesting to note that there are numerous study linked to the topic but to the single Country. It is difficult to find comparative studies on the subject. It is probable that given the phenomenon still underway, albeit mitigated, it is difficult to propose comparative studies and perhaps it is more useful to deepen the study in individual countries to understand which are the common variables in individual countries and then evaluate the comparison between countries. The availability of information at all stages from the date of entry to the exit and future checks is, in the hospital, managed by ICT. The optimization of acceptance, planning and other processes will result in a significant reduction, if not total elimination, of interruptions in the flow of patient management. This approach has been widely implemented in pandemic time. In this approach, beyond technologies, doctors and nurses are also two other strategic pillars for the functioning of a smart hospital. It is useful to remember that doctors and nurses have

been stressed for over 18 months to ensure the necessary care. Some hospitals, such as intensive care, are the trenches in which health personnel work (Capone et al., 2020). It is interesting to note, however, that the changes related to how health professionals understand their work, expectations, are not within the technology or the technologies they use. How they understand the work, and the expectations? Starting from these assumptions, or, if the care and assistance in the long-term work stresses the health workers. How are the expectations of these figures changing? In the following paragraphs, we focus our attention on Italy. The Italy is one of first European countries (Gavurová et al., 2021, Leonov et al., 2021) to entry in pandemic phase with numerous deaths, hospitals and health personnel involved with numerous deaths even among hospital staff. Some geographical areas of Italy were particularly affected but at the same time Italy was one of the first European countries to have emerged from the pandemic phase.

2.1 Italian health policy
A competitiveness-enhancing reform should be based on professional skills, management capabilities and technological needs to be implemented but the process is still ongoing. Italian health workers, can be a driving force for to manage of the Italian hospital. As expanding sector, health, is a traditional economic activity and enhances cultural specificities, offering people new opportunities for employment. Moreover, numerous studies have shown that a timely analysis may be supportive to overcoming obstacles. Motivational factors and fitting in a group, working organization are essential as congruence between the functionality of services and organizational outcomes. Furthermore, following this research stream, knowing how and why to motivate employees is an important managerial skill. Furthermore, policy is strategic in order to formulate an integrated care and regulatory framework for the sustainable development of national health and health workers. Health system performance, is also an important element. Moreover, investment in information technology linked to health technology assessment. The organizational level, is not expressly addressed by the constitutional law, but is indirectly effected though the constitutional specification of the State's exclusive competence over civil law and social welfare, the State and the regions' concurrent jurisdiction over workplace safety and the professions. The regions regulate the organization and staff. All these organizational leverage may represent strategic tools for managing change. The limits upon regional power are not very clear, and the Constitutional Court has not provided uniform guidelines. Some decisions hold that the legal and economic status of health workers is the residual competence of the regions. Thus, in the exercise of this competence, the regions may even enact norms that are different from the national ones.

2.2 Italian health workers
The Italian National Health Service, was established in 1978 to grant universal access to a uniform level of care throughout Italy, free at the point of use, financed by general taxation. Beyond this, Italy's 20 regions are responsible for the actual planning and delivery of services. In recent years, 2018 - 2020, however, many regional health budgets ran into substantial deficit, leading to central authorities to imposing Recovery Plans on ten of them, of which eight are ongoing. These plans signaled the introduction of a dominant new player in national health care policy – the Ministry of Finance. Although the Ministry of Health maintained its role in ensuring that essential levels of care were provided at regional level, the Ministry of Finance became actively involved in designing and approving health care delivery. A large extent, then, the focus of this abrupt resumption of central control was financial and quality of care, risked becoming secondary. Many Italian health workers have had experienced a long stress related to performance but also to staff shortages due to lack of staff turnover. This absence of turnover has favored the aging of the staff with the possibility of withstanding short-term peaks of care and concentrated over time, the opposite of what happened in the pandemic period: long-term and continuous peaks of care over time. The Italian health workers are not the result of the simple addition of the performance, of single units. On the contrary, it depends on the relationship, which exists among all units, and the decisions linked to it, among the different targets and between these and the organizational and managerial actions. Starting from this assumption means to consider the expectations of doctors and nurses in the 20 Italian regions. In this context, (Italian health policy and Italian health workers) Italian health workers will be investigated. Although we are in

disjointed interests between administrative, organizational and managerial aspects health workers have responded to the pandemic with competence and quality ensuring the provision of emergency services related to the pandemic. This is an Italian peculiarity, the lack of clarity of the employment relationship even if public and the guarantee of the quality of the service, which can influence the choices of health personnel. Understanding what the implications are in this context for healthcare workers can initiate a broader path of accumulation knowledge also for the literature review related to the topic. Following this literature review the research question (RQ) highlight that, (H1): COVID has certainly modified the medical and nursing staff, but, how has the vision of their profession changed?

3. Methodology

A quantitative approach will be developed in order to answer the research question: Covid has certainly modified the medical and nursing staff, how has the vision of their profession changed?

3.1 *Dependent variable*

Starting from characteristics of doctors and nurses work' the performance has been measured. The performance has been divided in three categories: quality, time and cost performances. Each category involves indicators expressed by observable variables. The quality performance and the time performance are composed by observables variables that take into account the health workers expectation during pandemic time. Instead the cost performance is composed by internal organizational variables. Quality performance analyzes how the health services are provided and the perception of health workers. The variables "Age of each doctors and nurses", "Percentage of free time", "quality of relationships with other colleague's", "Workers friendliness" and "Info possibilities" are basic variables and assess the quality performance in terms of service and perception. "Time performance" expresses the quality of expectations in relation to its timing. The four variables, involved in this category, evaluating the averages of "length of service", "frequency of deaths treated", "shared information" and "system speed to support workers" are able to explain the degree of stress experienced by health workers. The category of "Cost Performance" involves internal variables of the organization aimed to the efficiency and effectiveness of the costs. The costs of cost of health personnel, cost of adopting technologies and cost of maintaining technologies are variables attributable to the efficiency in sense that measure the provider's ability to deliver service outputs within the limits of service inputs. A normalization (Singh & Singh, 2020) was performed for each index using the min-max method, which consists of a linear projection of each index on a scale from 0 to 10:

$$z = \frac{x - \min(x)}{\max(x) - \min(x)}$$

The beginning of the hypothesis test leads us to verify the existence of a linear relationship between all single indicators are standardized on a 0 to 10 scale (10 denoting the best performance). The three indices quality, cost and time, creating a general performance index, are created by equally weighting the components of each dimension with a linear regression model: (Figure 1)
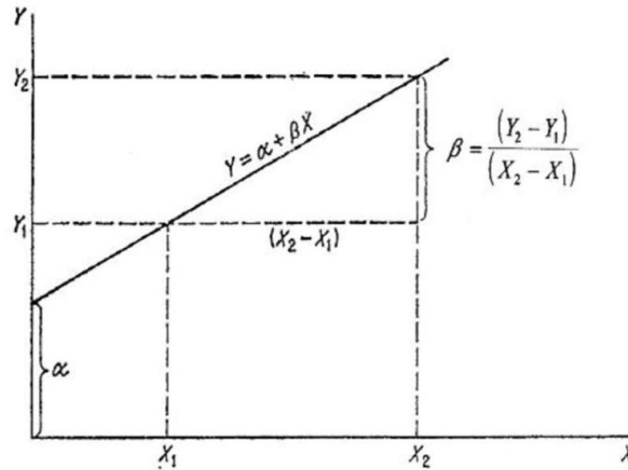
Figure 1. Relationship between all single indicators

Source: own making

Where Y is dependent variable and $X_1, X_2, ..., X_p$ are independent variables. The statistical link implied by the model is not symmetrical. It is the independent variables that fix the dependent variable and not vice versa. The model is statistically validated using the Pearson coefficient (r) to assess the existence of the linear correlation between the variable.

$$r = \frac{Cov_{xy}}{s_x s_y}$$

The collected data were statistically analyzed using the Statistical Package for the Social Sciences (SPSS) version 24.0. The data were collected at the end of June.

3.2 Independent variable
Starting from 20 privileged witnesses, the regional health councilors of the 20 Italian regions that make up the sector at legal, administrative and organizational level. On the basis of these 20 interviews, February - June 2022, has been elaborated a questionnaire, the same for doctors and nurses even if they were administered individually and separately for the 1600 interviewed, utilizing the follow topics:

Table 1. Questionnaire variables

	Surname
	First Name
	Age
	Sex
Social variables and personal data	Degree
	Years in the sector
	Years in the organization
	Marital status; (Married? How many children?)
	Previous work experience
	If Yes (Wich sector? How many years? Which role?)
	Check of resources
Tangible Resource Assessment	Health method applying during pandemic time
	The utility of diagnosis to prevent the Covid-19

Intangible Resource Assessment	The importance of analysis carried out, of your internal competences
	Method applying.
	Widespread skills in your organization.
	Evaluate the organizational process during pandemic time.
	Implemented processes to reengineer the organizational process in the last five months.
	(If yes) new balance between the organizational units.
	New levels of coordination implemented during pandemic time.
	New levels of integration implemented during pandemic time.
	New levels of control implemented during pandemic time.
	New behavior patterns acquired and consolidated during pandemic time.
	New decision patterns acquired and consolidated during pandemic time.
	New forms of learning in the organization during pandemic time
Change management process	At single level;
	As group;
	Between singles health workers;
	Between health workers groups;
	Between single and group
Changes shared in the organization	Between doctors;
	Between nurses;
	Between doctors and nurses
The elements that have been developed	In the group and its structure
	Leader and leadership
	Communication network
	Work group
	Social Identity
	Relation and discrimination between the groups
	Relation and discrimination between the single workers
	Processes of categorization and relational dynamics
	Motivational approach
	Actions related to aggression
	Situational approach
Cultural collective practices been created as a result of the changes	
Well managed and valued as a result of the changes	
The organization, implementing the changes, is able to give people a greater sense of belonging	
The degree of trust that workers manifest to those who govern the organization	
How many doctors - nurses, after implementing these changes, are still in the department?	
How many have changed department?	
How many have passed within the sector in department with different characteristics from the one of origin?	

Source: own making

Starting from these topics, a questionnaire has been elaborated (Hair et al, 1995) and a number of 1600 doctors and nurses employed in intensive care, were interviewed, based on 5000 contacts representing 10% of the total population, 800 from each category (doctors and nurses) divided by the 20 Italian regions, therefore, the total of the regions. A number of 40 doctors and 40 nurses were interviewed for each region (80 interviewees). The interviewees belong to the four geographical areas into which each region was divided (north, south, east, west) and within each area we chose the hospitals with the highest number of COVID-19 cases treated in the last six months before of the interview period. The questionnaire comprised 30 pre - developed, 15 for each part, Likert statements, designed to measure the five different areas of the questionnaire. Specifically, respondents were asked to indicate the level of criticism on a seven point scale, ranging from "strongly criticizes" (7) to "low criticizes" (1) on different items. The 30 Likert statements were explored by principal components factor analysis and varimax rotation, elaborated by Statistical Package for Social Science, version 28.0, which resulted in a linear regression. The interview have been carried out in basket. Each interview lasted about 65 minutes. It was not possible to obtain a list of all the doctors and nurses present in the hospitals of the Italian regions. The choice of the sample was non-probabilistic. The sample is drawn from the target population. Also with this type of sampling, it is possible to obtain estimates of the fundamental characteristics of the phenomenon being studied. The most used methods to carry out non-probabilistic sampling are: reasoned choice sampling, the statistical units to be included in the sample are chosen in a reasoned way (for example, based on the opinion of experts with specialist knowledge of the problem or on the literature) to select only those that best meet the research objectives. Sampling by shares, the statistical units to be included in the sample are selected so that the sample respects the proportions present in the population under study based on some variables (for example, gender, age group, geographical area). In this way we arrive at the definition of the quotas, which is the number of statistical units that must be included in the sample for each region.

4. Results

4.1 Sample profile doctors
The sample had 69% male and 31% female. The respondents were mainly married, between the ages of 56 and 65 (65%) over 65. The Education, Degree and Master have been declared of all doctors. Annually income is over 30.000. Therefore, our sample is representative of the Italian doctors in a pandemic time (Table 2).
.

Table 2. Demographic profile of respondents (Doctors N=800)

Variable		Frequency	Percentage
Gender	Male	550	69 %
	Female	250	31 %
Marital Status	Married	738	92 %
	Single	62	8 %
	Divorced	0	0 %
Age	18 – 25	0	0 %
	26 – 35	18	2 %
	36 – 45	26	3 %
	46 – 55	241	30 %
	56 – 65	490	62 %
	Over 65	25	3 %
Education	Degree	800	100 %
	Master	800	100 %
Annualy Income	Over 30.000 Euro	800	100 %

Source: own making

4.2 Sample profile nurses

The sample had 59% male and 41% female. The respondents were mainly single, between the ages of 26 and 35 (628%) with a consistent percentage, 24% between 56 - 65 and 34 – 45 with 22%, moreover, over 65 are 4%. The Education Degree have been declared of all nurses. Annually income is under 30.000. Therefore, our sample is representative of the Italian nurses in a pandemic time (Table 3).

Table 3. Demographic profile of respondents (Nurses N=800)

Variable		Frequency	Percentage
Gender	Male	450	59 %
	Female	350	41 %
Marital Status	Married	238	29 %
	Single	562	71 %
	Divorced	0	0 %
Age	18 – 25	40	5 %
	26 – 35	218	28 %
	36 – 45	176	22 %
	46 – 55	141	17 %
	56 – 65	190	24 %
	Over 65	35	4 %
Education	Degree	800	100 %
Annualy Income	under 30.000 Euro	800	100 %

Source: own making

4.3 Post COVID Phase and paths of public health workers: doctors

Table 4 contains essential information about doctors as public health workers. The ideal types of work, specifically tangible resource assessment, intangible resource assessment, change management process, changes shared in the organization, elements developed, and cultural collective practices created as a result of the changes, do not occur in pure form; however, differences along the defined criteria are observable, albeit in slightly more nuanced form. These changes were noted by doctors between the ages of 55 and65, who make up the majority of Italian doctors as well as our sample. The layering of public health reforms, reforms that were not completed and were replaced by others, did not create a climate of trust in the change processes, distancing most doctors from the ideal type of work, substitute, from personal motivational incentives that would have weighed heavily on a positive response in the pandemic phase. This mental attitude manifests itself in actual actions such as the quality of the service offered, the amount of time worked, and the costs incurred. The remaining 30%, who are between the ages of 46 and 55, have attitudes and behaviors that are very similar to their older counterparts. It's worth noting that the two age groups, 46-55 and56-65, account for 92 percent of the sample. Consistent with this type of response, the assessments regarding: well managed and valued as a result of the changes, the organization, implementing the changes, is able to give people a greater sense of belonging, the degree of trust that workers manifest to those who govern the organization; and how many doctors remain in the department after implementing these changes. How many people have changed departments? How many people have moved through the sector in departments with distinct characteristics from the one of origin? They are strongly related to past doctoral evaluations.

Table 4. Regression analysis: doctors

Questionnaire Doctors	Gener Performance Index	Quality Performance Index	Time Performance Index	Cost Performance Index
Social variables and personal data	-0,611*(0.239)	-1552(0.417)	-1177(0.264)	1.835**(0.583)
Tangible Resource Assessment	-0.372(0.234)	-0.244(0.377)	-0.005(0.272)	-0.664(0.127)
Intangible Resource Assessment	-0.217(0.210)	-0.218(0.234)	-0.319(0.341)	-320(0.237)
Change management process	-0.208(0.202)	-0.212(0.226)	-0.315(0.339)	-313(0.227)
Changes shared in the organization	-0.213(0.206)	-0.215(0.229)	-0.311(0.335)	-315(0.230)
The elements that have been developed	-0.112(0.318)	-0.215(0.132)	-0.312(0.241)	-0.113(0.175)
Cultural collective practices been created as a result of the changes	-0,521*(0.189)	-1432(0.365)	-1268(0.295)	1.854**(0.635
Well managed and valued as a result of the changes	-0.452(0.355)	-0.352(0.487)	-0.012(0.298)	-0.534(0.99)
The organization, implementing the changes, is able to give people a greater sense of belonging	-0,534*(0.205)	-1336(0.334)	-1156(0.212)	1.672**(0.510)
The degree of trust that workers manifest to those who govern the organization	-0.434(0.327)	-0.365(0.498)	-0.032(0.385)	-0.521(0.127)
How many doctors -nurses, after implementing these changes, are still in the department?	-0,311*(0.339)	-1552(0.417)	-1177(0.264)	1.644**(0.456)
How many have changed department?	-0.372(0.234)	-0.254(0.326)	-0.034(0.152)	-0.434(0.112)
How many have passed within the sector in department with different characteristics from the one of origin?	-0.123(0.115)	-0.232(0.234)	-0.344(0.364)	-419(0.185)
Intercept	5.624**(0.546)	5.534**(0.571)	5.354**(0.567)	5.657**(0.301)
R^2	0.3751	0.354	0.530	0.327
Adj. R^2	0.213	0.184	0.204	0.162
N	800	800	800	800
* Significant at the 5% error level. ** Significant at the 1% error level Standard errors in brackets				

Source: own making

4.4 Post COVID Phase and paths of public health workers: nurses

Table 5 contains pertinent information about nurses as public health workers. Despite the fact that the sample has a majority of singles, in accordance with national data, in the age groups 26 - 35 and 36 - 45 (50 percent), the most crucial factors also indicated by nurses are very comparable to medical workers. When we add the percentage of those aged 56 to65, which differs significantly from the views made by fellow nurses included in the 50 percent, we find that 74 percent of nurses express a homogeneous internal evaluation that is not dissimilar to that of the doctors. In this case, the ideal types of work, specifically tangible resource assessment, intangible resource assessment, change management process, changes shared in the organization, elements that have been developed, and cultural collective practices that have been created as a result of the changes, do not occur in their pure form. Consistent with this type of response, the assessments regarding: well managed and valued as a result of the changes, the organization, implementing the changes, is able to give people a greater sense of belonging, the degree of trust that workers manifest to those who govern the organization; and how many nurses remain in the department after implementing these changes. How many people have switched departments? How many

people have moved through the sector in departments with characteristics that differ from the one of origin? They are significantly related to the prior ratings stated by nurses

Table 5. Regression analysis: nurses

Questionnaire Nurses	Gener Performance Index	Quality Performance Index	Time Performance Index	Cost Performance Index
Social variables and personal data	-0,601*(0.229)	-1452(0.407)	-1167(0.254)	1.735**(0.573)
Tangible Resource Assessment	-0.362(0.224)	-0.234(0.367)	-0.318(0.242)	-0.564(0.117)
Intangible Resource Assessment	-0.207(0.210)	-0.208(0.224)	-0.309(0.331)	-310(0.227)
Change management process	-0.202(0.201)	-0.202(0.216)	-0.305(0.319)	-303(0.217)
Changes shared in the organization	-0.203(0.203)	-0.205(0.219)	-0.301(0.315)	-305(0.220)
The elements that have been developed	-0.102(0.308)	-0.205(0.122)	-0.302(0.231)	-0.103(0.165)
Cultural collective practices been created as a result of the changes	-0,511*(0.179)	-1422(0.355)	-1258(0.285)	1.754**(0.535)
Well managed and valued as a result of the changes	-0.442(0.345)	-0.342(0.477)	-0.011(0.278)	-0.434(0.79)
The organization, implementing the changes, is able to give people a greater sense of belonging	-0,524*(0.201)	-1326(0.324)	-1146(0.202)	1.572**(0.410)
The degree of trust that workers manifest to those who govern the organization	-0.424(0.317)	-0.355(0.488)	-0.022(0.365)	-0.421(0.117)
How many doctors -nurses, after implementing these changes, are still in the department?	-0,301*(0.329)	-1542(0.407)	-1167(0.254)	1.544**(0.356)
How many have changed department?	-0.362(0.224)	-0.244(0.316)	-0.024(0.142)	-0.334(0.102)
How many have passed within the sector in department with different characteristics from the one of origin?	-0.113(0.105)	-0.222(0.224)	-0.334(0.354)	-319(0.175)
Intercept	5.614**(0.536)	5.524**(0.561)	5.344**(0.557)	5.557**(0.271)
R^2	0.3651	0.344	0.520	0.317
Adj. R^2	0.203	0.174	0.194	0.152
N	800	800	800	800
* Significant at the 5% error level. ** Significant at the 1% error level Standard errors in brackets				

Source: own making

The regression model suggests that there are a number of issues associated to the pandemic phase that, while observed and experienced by healthcare staff, have yet to be handled, and a change management process has not been launched.

5. Discussion

According to the literature, no change management procedure for health personnel has been established. At a specific level, health workers, while representing a resource for each country, have played a strategic role in terms of quality of service, working hours, and expenses during the epidemic. Concerning the medical personnel, it was determined that 490 of them, or 62 percent, are between the ages of 56 and 65 age group. The high age and thus the stay in the dated structure, on the one hand, does not show an immediate response to the new coordination, integration, and control levels of health work in the pandemic phase, on the other hand, these doctors have a

strong experience in diagnosis but this is insufficient to begin a process of change management in one phase as Covid 19. It is worth noting that there are no significant differences between the geographic locations studied. Despite the pandemic's dynamic phase, it should be recognized that these changes have affected individual workers rather than the organizational dimension as a whole as a response to the new phase. In this sense, we might highlight a static structure that does not support or anticipate medical personnel's anxiety. In terms of the nursing staff, 218 of them, or 28 percent, are between the ages of 26 and 35. Adding the age of the next range, we find that 50% of nurses are under the age of 45, making them younger than doctors. Regardless of this distinction, the essential topics indicated by this professional figure are comparable to those of doctors. In fact, despite the fact that the nurses' differing roles and responsibilities, on the one hand, do not demonstrate an immediate response to the new coordination, integration, and control levels of health work in the pandemic phase, on the other hand, these nurses do not have extensive experience in support work. In the case of nurses, their younger age, when compared to medical staff, was not used as a change agent. Indeed, during the epidemic, it was difficult to handle support activities in diagnosis and treatment. In these hospitals, personnel emphasize a number of obstacles related to quality, time, and cost of care during a pandemic. Doctors with a large presence in the structure, 490, and nurses (190) of the same age group, highlight these bottlenecks regardless of geographical location or type of role they perform in the department, as medical or nursing staff. These 680 health professionals have also contributed to the value of the epidemic, but they feel detached, as if they do not belong to the system, despite the fact that much has been accomplished in terms of personal skills and motivation. When evaluating Italian health care through the eyes of these workers, it is possible to notice that some common elements, typical of a culture with high permanence in the role, attention to the rules and procedures and only to the formality of its implementation, with bottlenecks highlighted in terms of quality, time, and costs. It is worth noting that these characteristics are identified by health workers as hospital bottlenecks that impede the process of change management. These health-care workers could be viewed as organizational leverage in order to contaminate other staff and establish a long-term change management process. In reality, the identified essential areas concern components that Italian hospitals should recognize and enhance. In the case of Italian hospital organizations, organizational leverage might mean the difference between success and failure of any reform attempt. Healthcare personnel were frequently left alone during the pandemic phase, and it is unclear whether they will be supported not only financially, but also psychologically and professionally in the coming phase. Based on the data analyzed, hospital ownership based on individual will may show to be a significant problem for the development of Italian hospitals. One of the key reasons that emerges is the lack of a change management process under pressure, as well as the low importance of workers in this change management. As others have noted the health organization must be examined in the context of the specific service conditions that they manage. Through this pandemic environment, quality change management may be addressed in consumer emotions and customer–employee relationships. There are no degrees of connection and communication between how medical professionals lived and how patients experienced the pandemic in Italian hospital organizations. We are still caught in the realm of medical care, with little attention paid to the phenomenon's organizational, psychological, and social dimensions. Furthermore, citizen associations are not only heard during the planning phase; in this situation, there is a gap between services supplied and services expected. Following the epidemic, hospitals are failing to meet a strategic condition: the congruence between service functionality and organizational outcomes. These similarities are not the result of an evolutionary framework; rather, the profile of health workers emphasizes competencies that might improve both services and costs. In this manner, the functional scope of structure is greatly expanded. Our results show that this profile does not consider service as general performance, and the single benefit beats the advantages of structure and service, which include the ability to manage and improve service quality, time, and cost. This is due to two factors. First, within pandemic time, the characteristics of interest articulation and the discussions between diverse interests are less complicated and autonomous, allowing more custom for service. The second reason is that the hospital might be regarded as a zone of flow for services rather than a space of conflict. The slowing evolution of pandemic time may affect the hospital in the conflict arena, taking into account the organization's lack of support action during epidemic time. The service and flow space are linked to pandemic skills and competences. These experiences can be used to modify the structural

composition and organizational setting based on the health of the personnel. The involvement of health staff, with special attention to attitudes and expectations, is a strategic distinction between hospitals before, during, and after a pandemic. This means that not only should the hospital's planning and provision not be divided among multiple actors, but also a quality of service must be implemented on a continual basis, increasing the possibilities of a more efficient and effective service. The decision-making process in hospital structures should constantly be closer to the needs of the client. From a more specific standpoint, our findings can be interpreted along two lines of thought. The health personnel appear to be appropriate in terms of not only the qualities of the service in pandemic times, but also the service delivery expectations. From this vantage point, health personnel have frozen their expectations and worked to battle the pandemic, but both motivation and expectation elements may shift after this fight. The service was returned to be delivered in a static manner. In contrast, in epidemic time, the service and its user demand are dynamic, and different components of the service must be considered at different stages of the process. As a result, the structure demonstrates intriguing and relevant competencies related to service planning, as well as obstacles related to quality, service time, and cost solutions. During a pandemic, the hospital's quality and planning operations are organized around the needs of the patients. This experience was stressful for the staff, but there was also an exciting learning process associated with working in the hospital. This might be an intriguing beginning point for Italian and European healthcare, as it should collect the experiences of healthcare personnel in various Member States. Unfortunately, as seen by the study of literature, Europe lags behind in expanding on these concerns. The European Union's investments are important for all member countries, but they relate to the dimension of development and growth of the health service, also with a logic of reorganization, but nothing has been addressed in terms of psychological support to the new expectations that arise, are determined in the time of the pandemic. This design flaw could provide significant challenges in the material restructuring of the one national health care. It is feasible to imagine a stronger healthcare system in terms of technology but a weaker workforce motivation. This type of gap does not result in care-oriented healthcare, which was essential during the epidemic and was based on the motives and expectations of healthcare personnel. Europe is made up of 27 member states, each of which has its own national health system as well as a set of regulations and objectives that are shared at the European Union level. Building the European Health Union is not easy, but the epidemic has proved that it is important.

Conclusions

Rescheduling the idea of hospital in pandemic time, starting from health workers can affect in the short term, with positive actions in terms of organization and management. The outcome of database, highlight that without these actions, may be amplified the severity of unresolved both organization and management problems. Furthermore, the deferral involves a high risk level if the pandemic time come back with unknown intensity. The fallout on health workers could be out of control requiring a rescheduling attentive to equity and efficiency healthcare services. Hospitals are complex network with multiple objectives and expectations. Several variables interact within Italian hospitals, which must be better understood and developed. These elements can help to improve the interaction between health workers and the organizations for which they work. The outcome of debates, related to research findings, rejects a perspective in which Italian and European health personnel are viewed as ultimately unchangeable. It must instead be viewed as always evolving and re-interpreting. The role of health workers is an open question, and the roles of health workers are strategic in order to strengthen the health sector and its performance.

References

Burinskas, A., & Tvaronavičienė, M. (2021). The market structure simulation of heterogenous firms. *Economies*, *10*(1), 9. https://doi.org/10.3390/economies10010009

Bhamare, B. R., Jeyanthi, P., & Subhashini, R. (2019, September). Aspect Level Sentiment Analysis Approaches. In *2019 5th International Conference On Computing, Communication, Control And Automation (ICCUBEA)* (pp. 1-5). IEEE. https://doi.org/https://doi.org/10.1109/ICCUBEA47591.2019.9128706

Capone, V., Marino, L., & Donizzetti, A. R. (2020). The English Version of the Health Profession Communication Collective Efficacy Scale (HPCCE Scale) by Capone and Petrillo, 2012. *European Journal of Investigation in Health, Psychology and Education*, 10(4), 1065-1079 https://doi.org/10.3390/ejihpe10040075

Chakhvadze, M. (2022). Social Capital in the Digital Age: Vocational Education and Training (VET) System in Georgia. https://www.socialcapitalresearch.com/social-capital-in-the-digital-age/

Di Martino, B., Marino, A., Rak, M., & Pariso, P. (2020). Optimization and Validation of eGovernment Business Processes with Support of Semantic Techniques. In: Barolli, L., Hussain, F., Ikeda, M. (eds) Complex, Intelligent, and Software Intensive Systems. CISIS 2019. *Advances in Intelligent Systems and Computing*, 993. Springer, Cham. https://doi.org/10.1007/978-3-030-22354-0_76

Enisa (2016) Smart Hospitals www.enisa.europa.eu

Gavurová, B., Belás, J., Rowland, Z., & Kubák, M. (2021). The impact of agreement on government procurement use on the competition in Slovak healthcare sector. *Administratie si Management Public*, 36, 102-115. https://doi.org/10.24818/amp/2021.36-06

Grenčíková, A., Kordoš, M., & Berkovič, V. (2020). The impact of industry 4.0 on jobs creation within the small and medium-sized enterprises and family businesses in Slovakia. *Administrative Sciences*, *10*(3), 71. https://doi.org/10.3390/admsci10030071

Hair, J.F., Anderson, R.E., Tatham, R.L. & Black W.C. (1995). Multivariate data analysis with readings. Hemel Hempstead: Prentice-Hall. ISBN 0-13-187715-1

Iqbal, T., & Ahmad, S. (2022). Transparency in humanitarian logistics and supply chain: the moderating role of digitalisation. *Journal of Humanitarian Logistics and Supply Chain Management*. https://doi.org/10.1108/JHLSCM-04-2021-0029

Jašková, D. (2019). Assessment of social development in Slovakia in the context of human resources. *Central European Journal of Labour Law and Personnel Management*, 2(2), 21-32. ISSN: 2644-4542

Jankelová, N., & Joniaková, Z. (2021, March). Communication skills and transformational leadership style of first-line nurse managers in relation to job satisfaction of nurses and moderators of this relationship. *Healthcare*, 9(3), 346. https://doi.org/10.3390/healthcare9030346

Keakde, M. K., & Muddana, A. (2022). Study and analysis of various sentiment classification strategies: A challenging overview. *International Journal of Modeling, Simulation, and Scientific Computing*, 13(01), 2250001. https://doi.org/10.1142/S1793962322500015

Khan, M., Parvaiz, G. S., Ali, A., Jehangir, M., Hassan, N., & Bae, J. (2022). A Model for Understanding the Mediating Association of Transparency between Emerging Technologies and Humanitarian Logistics Sustainability. *Sustainability*, 14(11), 6917. https://doi.org/10.3390/su14116917

Kopencova, D., Rak, R., & Hudecova, V. (2021). Global phenomenon of threats and risk management in management and information technologies. *Issues in Information Systems*, 22(1), 75-83. https://doi.org/10.48009/1_iis_2021_75-83

Leonov, S. L., Bilan, S., Yarovenko, H. M., Ostasz, G., & Kolotilina, O. V. (2021). Country's health profile: social, economic, behavioral and healthcare determinants. *Economics & Sociology*, 14(3) https://doi.org/10.14254/2071-789X.2021/14-3/17

Lorincová, S., Čambál, M., Miklošík, A., Balážová, Ž., Gyurák Babeľová, Z., & Hitka, M. (2020). Sustainability in business process management as an important strategic challenge in human resource management. *Sustainability*, 12(15), 5941. https://doi.org/10.3390/su12155941

Marino, A., & Pariso, P., (2021) The Global Macroeconomic Impacts of Covid-19: Four European Scenarios, *Academy of Strategic Management Journal*, 20(2), 1–21 https://doi.org1544-1458

Marino, A., & Pariso, P. (2021b). Human resource management in public transports: organizational typologies and research actions. *VINE Journal of Information and Knowledge Management Systems* (51), 22-32 https://doi.org/10.1108/VJIKMS-01-2021-0006

Marino, A., & Pariso, P. (2021c). Digital economy: Technological, organizational and cultural contexts for the development of cooperation in Europe. *Entrepreneurship and Sustainability Issues*, 9(2), 363. http://doi.org/10.9770/jesi.2022.9.3(21)

Marino, A. & Pariso, P. (2021a). E-tourism: How ICTs Help the Local Tourist District Drive Economic Vitality. The Case of Campania, Italy. *International Journal of Innovation and Technology Management (IJITM)*, 18(03), 1-25. https://doi.org/10.1142/S0219877021500097

Marino, A., Pariso, P., & Picariello, M. (2022). Information Networking and e-Government in United Nations and Europe. In International Conference on Advanced Information Networking and Applications (pp. 115-120). Springer, Cham. https://doi.org/10.1007/978-3-030-99619-2_11

Marino, A., & Pariso, P. (2022a). The Digital Platform Experience of a Leading Country in Wine Tourism: From COVID-19 to the New Era. *International Journal of Innovation and Technology Management*, 2250021. https://doi.org/10.1142/S0219877022500213

Mashhady, A., Khalili, H., & Sameti, A. (2021). Development and application of a service design-based process for improvement of human resource management service quality. *Business Process Management Journal,* 27(2). https://doi.org/10.1108/BPMJ-04-2020-0164

Nevskaya, N. A. (2021). Post-COVID Economic Revival: Financial Aspects of Reform. In *Post-COVID Economic Revival,* I, 191-202). Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-83561-3_13

Mikołajczak, P. (2021). What affects employment by NGOs? Counteraction to precarious employment in the Polish non-profit sector in the perspective of COVID-19 pandemic crises. *Oeconomia Copernicana*, 12(3), 761-788.

Okunola, J. L., & Fakunle, S. O. (2021). Community participation: a pragmatic solution to negative impacts of COVID-19 on household's socioeconomic lives. *Insights into Regional Development*, 3(4), 21-33. https://doi.org/10.9770/IRD.2021.3.4(2)

Strielkowski, W., Firsova, I., Lukashenko, I., Raudeliūnienė, J., & Tvaronavičienė, M. (2021). Effective management of energy consumption during the COVID-19 pandemic: The role of ICT solutions. *Energies*, 14(4), 893. https://doi.org/10.3390/en14040893

Sanders, K., Nguyen, P. T., Bouckenooghe, D., Rafferty, A., & Schwarz, G. (2020). Unraveling the what and how of organizational communication to employees during COVID-19 pandemic: Adopting an attribution allens. *The Journal of Applied Behavioral Science*, 56(3), 289-293. https://doi.org/10.1177/0021886320937026

Singh, D., & Singh, B. (2020). Investigating the impact of data normalization on classification performance. *Applied Soft Computing*, 97, https://doi.org/10.1016/j.asoc.2019.105524

Taburchak, A. P., Bychkova, S. M., & Butina, A. A. (2021). Analysis of Risk Factors for Applied Projects in the Ecosystem of Digitalization of the Economy, Transformation of science and business in new economic reality, International Scientific Conference, https://doi.org/10.15388

WHO. (2019). Communicable disease surveillance and response systems Guide to monitoring and evaluating WHO, 16-17 https://data.unaids.org/publications/irc-pub04/surveillancestandards_en.pdf

We declare that, the work has not been published previously, that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder.

Author Contributions: All authors have contributed equally to the production of the paper.

Alfonso MARINO, professor digital economy, (Università della Campania – Luigi Vanvitelli, Italy) degree in business economics with specific competencies in sustainability and digital economy. Head of the Laboratory of Economics Applied to Engineering.
ORCID ID: https://orcid.org/0000-0003-1722-0539

Paolo PARISO, PhD in business economics, (Università della Campania – Luigi Vanvitelli, Italy) degree in business economics, with specific competences in SMEs.
ORCID ID: https://orcid.org/0000-0003-1066-4102

Michele PICARIELLO, research fellow, (Università della Campania – Luigi Vanvitelli, Italy) degree in Engineering, with specific competences in innovation technology.
ORCID ID: https://orcid.org/0000-0002-2481-1559

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810