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Unlocking organizational change: a deep dive through a data triangulation in healthcare

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Abstract

Purpose – The outbreak of the COVID-19 pandemic has significantly impacted healthcare systems, presenting unforeseen challenges that necessitated the implementation of change management strategies to adapt to the new contextual conditions. This study aims to analyze organizational changes within the total hip replacement (THR) surgery pathway at multiple levels, including macro, meso and micro. It employs data triangulation from various sources to gauge the complexity of the change process and comprehend how multi-level decision-making influenced an unexpected shift.

Design/methodology/approach – A multicentric, single in-depth case study was conducted using a mixed-methods approach. Data sources included patient-reported outcome measures specific to the THR pathway and carefully structured in-depth interviews administered to managers and clinicians in two healthcare organizations serving the same population.

Findings – Decisions made at the macro level resulted in an overall reduction in surgical activities. Organizational changes at the meso level led to a complete cessation or partial reorganization of activities. Micro-level actions for change and adaptation revealed diverse and fragmented change management strategies.

Practical implications – Organizations with segmented structures may require a robust and structured department for coordinating change management responses to prevent the entire system from becoming stuck in the absorptive phase of change. However, it is important to recognize that absorptive solutions can serve as a starting point for genuine innovations in change management.

Originality/value – The utilization of data triangulation enables the authors to visualize how specific changes implemented in response to the pandemic have influenced the observed outcomes. From a managerial perspective, it provides insights into how future innovations could be introduced.

Keywords Change management, COVID-19, Mixed-method, Organizational change, Orthopedic surgery, PROMs

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Introduction

Organizations are dynamic entities that continuously evolve and cannot be considered static over time. They must be adaptable to changing contextual contingencies. When systems no longer meet everyday needs, they require organizational changes. Studying these changes and their complexities can guide organizational decision-making in the most practical manner possible (Da Ros *et al.*, 2023). However, the value of change management, since it is difficult to measure and replicate, is often underappreciated and not fully captured (Amis and Greenwood, 2020). Therefore, gaining a comprehensive understanding of its mechanisms, structure and implementation strategies through data presents a valuable opportunity to develop theoretical and practical change management models that explain why certain organizations survive.

This is particularly relevant in healthcare organizations. The COVID-19 pandemic has abruptly transformed the lives of people worldwide, especially in the healthcare sector. In response to the pandemic, healthcare organizations have made significant changes to ensure the sustainability of the healthcare system and the continuity of services (Tuzovic and Kabadayi, 2020). The pandemic necessitated rapid reconfiguration of healthcare service delivery, with mandatory strategies based on the essentiality of healthcare services. Initially, the focus shifted to COVID-19 patients with acute symptoms, leading to the postponement, cancellation or redirection of a substantial portion of healthcare services. Notably, this reorganization reduced surgical capacity, resulting in a decrease in elective planned surgical procedures.

This manuscript aims to analyze the organizational changes implemented to manage osteoarthritis patients requiring elective surgery in the post-COVID-19 era, considering various organizational levels and the range of services provided throughout the patient's care journey (Randau *et al.*, 2020). The proposed data triangulation methodology goes in the direction to revolutionize and streamline value in health operations (such as in safety, equity and quality) while enhancing productivity, preparedness and readiness levels significantly (Mills *et al.*, 2017; Skelton *et al.*, 2022). To illustrate these advantages in terms of management, this study concentrates on elective total hip replacement (THR) services provided within the regional public healthcare system of Italy, one of the first Western nations to grapple with a major COVID-19 outbreak. The case is interesting because, despite variations in virus prevalence across the country, the Italian government implemented a comprehensive and uniform set of national-level interventions (Berardi *et al.*, 2020).

Theory and literature insights

Change is defined as an attempt, or a series of attempts, to modify an organization's structure, goals, technology or work tasks in response to disruptions (Yousef, 2017). These changes can range from minor everyday adjustments to significant alterations resulting from a single event, but they invariably constitute a multi-dimensional and complex process (Arazmjoo and Rahmanseresht, 2020). As proposed by Alessi and colleagues (Alessi *et al.*, 2018), different types of change occur based on the intensity and duration of disruptions to the system. Initial responses to disruptions involve maintaining stability through the absorptive capacity of the system, while adaptive capacity indicates the system's flexibility. Prolonged exposure to disruptions or high-impact perturbations necessitates transformative change. The process of change, whether it is an involuntary adaptation or a deliberate introduction of changes, has long been a central theme in management. Given the importance of organizational change, effective change management has become an essential managerial skill (Senior, 2002). To make innovation thrive, it is crucial to attempt to guide change towards a favorable scenario for the sustainability and performance of the organization, even when the change is not initially desired or planned.

Change management is considered a set of tools to guide the steps of change and adapt to evolving needs, as illustrated in Lewin's Three-Step Model (Parastuty *et al.*, 2015). In 1946,

Lewin proposed a theoretical framework that views change as a stage of instability between a predefined situation and a reshaped one in response to various stimuli. The literature is replete with practical models for implementing change in a step-by-step manner. Numerous research studies emphasize the recurrence of various variables that influence change management, with interactions that yield different outcomes depending on the context (Da Ros *et al.*, 2023; Will and Mueller, 2020).

The literature suggests that organizational change is influenced by (1) individual characteristics, (2) organizational characteristics and (3) contextual characteristics in which it occurs (Kimberly and Evanisko, 1981). Consequently, analysis has been proposed at different levels: micro (individuals and their groups, teams or units), meso (the organization) and macro (the healthcare system) (Da Ros *et al.*, 2023; Will and Mueller, 2020). The three-level framework allows us to examine different layers of change within a process, with effects occurring at each level. These levels mutually influence one another and can modify each other's effects.

In particular, variables in the cause-effect relationship of change are mediated and moderated by other variables. The literature classifies these variables into contextual, process and content categories (Pettigrew, 1985). Although there is no definitive evidence to pinpoint which variables are most critical within these categories, the context is often considered the determining factor.

Organizational change initiatives vary depending on the type of change under consideration. All three categories (contextual, process and content) play distinct roles at different interconnected levels (Parastuty *et al.*, 2015). To capture the effects of organizational changes in response to the COVID-19 pandemic on the organizational models of the THR surgery pathway, we propose an integrated study of these three levels.

As mentioned earlier, due to the multidimensionality and complexity of the change process (Arazmjoo and Rahmanseresht, 2020; Da Ros *et al.*, 2023; Will and Mueller, 2020), this analysis does not aim to be exhaustive or universally applicable. Instead, it serves as an example of organizational change analysis across three detailed levels in response to external factors. Triangulating data from diverse sources and measuring aspects at different organizational levels of the system can be a valuable approach for managing the complexities of the change process. For instance, it can help elucidate how specific changes made in response to the pandemic have impacted outcomes, guiding future decisions despite the disruptions caused by change.

Total hip replacement (THR) case

This study investigates organizational changes in the provision of services related to THR, a cost-effective surgical intervention (Kamaruzaman *et al.*, 2017), which offers benefits such as functional restoration, improved quality of life and potential gains in work productivity for individuals suffering from osteoarthritis.

Osteoarthritis (OA) is a degenerative joint disease often associated with aging. OA ranks among the top ten most disabling diseases in developed countries. The World Health Organization (WHO) reports that 80% of OA patients face mobility limitations, and 25% experience impairments in their daily activities. OA is a leading cause of work absence in many Western countries, resulting in significant healthcare costs and a substantial societal impact. Given the demographic shift toward an aging population, the economic burden of OA is self-evident. Ensuring a swift and effective restoration of functionality and quality of life for patients undergoing elective arthroplasties, such as THR, through appropriate service combinations in the post-surgery pathway (e.g. rehabilitation services), becomes crucial.

General hypothesis and research question

The proposed data triangulation approach seeks to elucidate how organizational changes were managed by examining data from variables at micro, meso and macro levels. The triangulation measures the complexity of the change process to understand how the multi-level decision-making affected an unexpected change. This methodology offers insights into how specific decisions made in response to an organizational change in healthcare influenced observed outcomes and, from a managerial perspective, how to create future value. The central research question guiding this study is:

- RQ1.* What organizational changes were implemented in the THR surgery pathway in 2020, after the onset of COVID-19, compared to 2019, in two geographically and demographically similar healthcare organizations?

Research design and methods

A multicentric in-depth case study has been conducted by using a mixed-methods approach (Mele and Belardinelli, 2019). The different methods were selected to triangulate results and have a broader dataset in addressing the research question (Greene *et al.*, 1989).

Setting

The Italian healthcare system is a public universal decentralized system managed at regional level. The national government is responsible for national strategies and for the identification of core health outcomes and goals to be equally granted across the country. Each of the 20 regional healthcare systems has a common organization that meets healthcare needs at the territorial level, through the integration of public Local Healthcare Authority (LHA) with Teaching Hospital (TH) or Institute for Treatment and Research (IRCCS) that have different levels of specialization. The TH is defined “teaching” because part of its mission is to conduct research activities and produce scientific product for evidence-based medicine.

For this study, we selected two healthcare organizations in Tuscany Region, an LHA and a TH situated in different cities of the same province. We selected these two organizations because they insist in the same geographical territory and they serve the same population.

In 2019, LHA had 208 and TH 305 THR surgeries; in 2020, the THR surgeries were 143 in the LHA and 194 in the TH.

The healthcare organizations both provide THR and collect patient-reported outcome measures (hereafter PROMs) within a regional observatory on the total hip joint replacement (De Rosi *et al.*, 2021). Both hospitals were deputed as COVID-19 centers. Therefore, they both reorganized to find the balance between ordinary and extraordinary healthcare activities starting from 2020. In Tuscany Region, administrative data from SDO (Italian acronym for the hospital discharge form administrative data flow) highlight that in 2020 healthcare organizations performed 933 THR surgeries less than in 2019 (−31.5%). Similarly, to the regional trend, the selected LHA hospital had a surgery activity reduction of the 31.3% and the TH of the 36.3%.

With a preliminary documentary search, we identified international and national guidelines on how healthcare organizations should cope with the re-organization, at the macro level. We mainly found documents of reference through the formal channels of communication of the Italian Ministry of Health and the Tuscany Region and national associations of orthopedics. The focus has been on priority setting decisions, with reference to the selection of patients' groups and priority classes for access to elective surgery, as a proxy of the re-organization at the national level. Box 1 reports a summary of the documental analysts' outputs.

Box 1. Measures related to joint arthroplasties to face the COVID-19 pandemic emergency in Italy: national and regional guidelines impacting elective surgery [1]**Before COVID-19 outbreak**

National plan of the waiting lists (PNGLA) 2019–2021

- Four priority classes: A, B, C and D
 - Class A: urgent, surgery within 30 days
 - Class B: severe, surgery within 60 days
 - Class C: not severe, surgery within 180 days
 - Class D: deferrable, without maximum waiting time or within 12 months

COVID-19 outbreak

National Guidelines for caring COVID-19 patients – 29 February 2020, and Government circular on hospital beds and emergency management – 1st March 2020

- Suspension of elective surgery
- Reference to the priority classes for risk-benefit evaluations (only class A)

Tuscany Region, Regional Measures for preventing and managing the COVID-19 emergency, no.8 06 March 2020

- Suspension of not essential surgeries

After the first COVID-19 wave

National Decree no. 34 19 May 2020

- Recovery of activities
- Funds and human resources' recruitment

National guidelines on elective prosthesis surgery

- Gradual restart of activities on the basis of priority classes

Tuscany Region, Regional Decree no. 8390 5 June 2020

- Adoption of national guidelines on elective arthroplasty

Construct validity: the system's three levels of change

We selected some proxies at each level to identify and measure organizational changes at different levels of change interdependence. The variables selected for the change analysis in the THR surgery path during COVID-19 pandemic are at the macro level the priority setting in the different urgency classes, at the meso level the PROMs and at the micro level the rehabilitation path organization. Altogether the three variables, in addition to synthesizing measures of different hierarchical levels, are also the mirror of the main characteristic of the THR surgery pathway. In particular, the broader macro level of analysis gives an idea of the contextual framework within which the change process occurred. The variable at the meso level has been chosen because it shows how decisions at the organizational level impacted on a homogenous group of patients. Finally, the variable at the micro level highlights how the single professionals' team behaved to contribute at the meso level inside the macro boundaries.

The following sections offer a detailed description of the reason for variables' choice as change proxies. Then, in the method section, we show how they have been operationalized. The choice of many other proxies has been examined and then discarded due to their lower capacity to capture the modifications introduced in a scenario catalyzed by unpredicted changes.

Macro level

During the pandemic, the decisions regarding priority setting for allocating resources have been of crucial importance, as shown by the preliminary documental analysis presented in

the setting paragraph. According to Klein, the priority setting can be classified in three levels: macro, meso and micro. At the micro level, Klein chooses specific interventions in the same health program, among different settings or techniques to provide the same treatment, and among different target groups of patients. At the meso level, Klein identifies the choices among areas within a geographical context or alternative healthcare programs. At the macro level, Klein puts the choices among different sectors relevant to public health (i.e. healthcare, environment, education).

During the pandemic, the key decisions in terms of priority setting in healthcare, especially in public provision, have been taken by the government and the regions at the macro level, with national policies and acts. Healthcare organizations had to assure healthcare service continuity and maintain priority functions and operations accordingly. On the one hand, the priority setting has been a matter of balance between the allocation of resources for facing the emergency (COVID-19), and for maintenance and continuity of the provision of ordinary services (non COVID-19). On the other hand, within the management of ordinary services' maintenance, there has also been a need to prioritize among different groups of procedures and patient targets.

Meso level

At the meso level, we investigated the outcome produced to patients by healthcare organizations. Outcomes are meant as a proxy measure of the organization's performance (Donabedian, 1988). Outcomes produced to patients operated in a homogeneous territorial area are the overall result produced by the inputs, processes and organizational models of an organizational structure. Usually, the outcomes of surgical activities are measured in terms of access to emergency-department for reasons related to the surgery, re-hospitalization, re-intervention, mortality. However, since the key outcomes of an elective surgery such as THR are mainly related to quality of life and functionalities, the patient-reported measures are a proper tool for measuring the value produced to patients, considering the abovementioned dimension of their health status as related to the OA (Harris *et al.*, 2016). Patients' measures have been increasingly integrated into clinical practice to be translated into valuable information to guide and improve the quality and value of patient care (Nuti *et al.*, 2018; Prodingler and Taylor, 2018). PROMs' value in evaluating outcomes after surgery is gaining recognition, and the need to integrate these into clinical practice is becoming increasingly important as a healthcare management tool (Tew *et al.*, 2020).

Micro level

At the micro level, the changes are measured in terms of individual behaviors put into practice by the single team of healthcare professionals. In healthcare, professionals have an irreducible autonomy in the organization of healthcare services' provision. Thus, professionals can organize the provision of several services that are often considered ancillary in respect to the surgery, such as the rehabilitation during the hospital stay. Each individual team determines the specific organizational model adopted in the unit at the individual organization level. For the aims of this research, the proxy we considered is the rehabilitation model applied right after the orthopedic surgery. This implies a specific organization of physiotherapy inside the ward (i.e. professionals' availability, adopted model/guidelines for physiotherapy sessions, etc.). Despite mixed evidence and several possible models are available, literature mainly suggests that the sooner the patients start their rehabilitation, the better it is (Zhang and Xiao, 2020).

Quantitative and qualitative data sources

Data were collected and analyzed: (1) to detect elements of difference between the pre- and post-pandemic periods and between healthcare organizations; (2) to collect in-depth data on the re-organization of the surgical and post-surgical activities in hospitals as a response to the pandemic spreading. This research is based on different data sources as presented below.

PROMs Observatory of Tuscany for arthroplasty elective pathways was the source to measure the changes in patients' health status. PROMs are proposed as a proxy that reflects the re-organization at the territorial level according to the national guidelines, and the variability among different organizations. The Observatory is a systematic continuous initiative based on a prospective, multi-site, cohort study. It encompasses longitudinal surveys monitoring both outcomes and experience with care as reported by patients. The key measure of THR outcome collected by the PROMs Observatory is the Oxford Hip Score (OHS) scale. It is monitored four times per patient (De Rosi *et al.*, 2021; Murray *et al.*, 2007): Enrollment before surgery after clinical evaluation (T0), 30 days after surgery (T1), 6 months after surgery (T2) and 12 months after surgery (T3). Some other questions explore pre- and post-operative patient experience with several aspects, including rehabilitation.

In-depth semi-structured interviews were administered to two orthopedic surgeons, two organizations' managers and one regional director of the two selected hospitals. The interviews were aimed at better exploring organizational elements, as response to the COVID-19 spreading at the three identified organizational levels. The choice to interview different hierarchical figures reflects the three change layers of analysis. The regional director represents the higher decision-making level that connects the national and regional contexts. The director is the common denominator among the two healthcare organizations analyzed. The organizations' managers are the key figures that turn down the regional directives and operationalize them in each of their hospital. Finally, the orthopedic surgeons represent the individual decision-making level. Healthcare professionals are the last fundamental piece of the decision-making chain that addresses the final decision on which resides the THR provision and management, by organizing the activities in their team and unit.

Variables and measures' operationalization

For investigating the macro level, we used data from a quantitative statistical analysis of the pre- and post-pandemic distribution of the assigned patients' priority setting class by clinicians, from the PROMs Observatory. The interview to the regional director of surgery paths was used to integrate the quantitative data at this macro level. We also included a question for professionals during the interviews to verify their awareness of the guidelines (Box 1).

At the meso level, we referred to the interviews and to the variables based on the OHS, as imputed using data from the PROMs Observatory.

The OHS ranges from 0 to 48 points and is computed from a 12-item patient-reported scale, to assess function and pain of patients undergoing hip replacement surgery. It is short, reproducible, valid and sensitive to clinically significant changes (Murray *et al.*, 2007).

We used another additional measure based on the OHS, namely the Improvement index. The Improvement index classifies the outcomes in three groups based on the delta index's positive, equal, or negative value. The delta score is equal to the absolute difference between 30-days and 6 months results and baseline data (1,2). In case of a positive difference > 5 , we have an improvement. In case of a difference in the range of $-5/+5$, we have a stable status. In case of a negative difference < 5 , we have a worsening of health conditions (Dawson *et al.*, 2010).

At the micro level, from the PROMs Observatory we used as a proxy variable the number of days after the surgery in which the patient began the rehabilitation. This measure is

computed from the first follow-up questionnaire's experiential section (patient-reported experience measures – PREMs) (De Rosiis *et al.*, 2020). Specifically, patients are asked to answer to the following single-response question: “During the hospitalization, after how many days did you begin the rehabilitation?”, with the following option of answer “The same day of the surgery”, “The day after the surgical intervention”, “From the third to the seventh day after”, “After a week from the surgery”, “I did not have rehabilitation during my hospitalization”.

Statistical data analysis for PROMs data

As above described, data from the PROMs Observatory have been used to measure three proxy variables, one per each level: (1) at the macro level, to compare priority setting of patients in the different classes; (2) at the meso level, to compare OHS outcomes and (3) at the micro level, to compare rehabilitation models of individual healthcare professionals' teams.

Two cohorts of patients were identified considering the first spreading of COVID-19. The cohorts are used to compare the selected variables as proxies of change at the macro, meso and micro levels. We considered patients who were enrolled in the PROMs Observatory for a THR and underwent a THR: (1) from January 2019 to February 2020; (2) From March 2020 to December 2020.

These periods are referred to the advent of COVID-19 as stated, that was officially recognized in Italy by the end of February, 2020.

Descriptive statistics on the number and type of procedures and patients' characteristics were extrapolated comparing the above-mentioned cohorts. *T*-tests and Chi-square tests were performed to detect statistically significant differences on the three proxy variables for the macro, meso and micro levels. Delta Score and Improvement Index were compared between the two cohorts of patients. All the analyses were conducted using the software STATA15.

Data analysis of the interviews

All the interviews were conducted through an online platform by two researchers. Each encounter was video and audio recorded with the professionals' agreement for collecting further insights. The recordings were transcribed and independently analyzed by the same two researchers.

After five interviews we reached the saturation of the emerged themes and stopped the data collection. The choice to interview representatives of different decision-making levels lets the analysis highlights commonalities and differences among the two hospitals' organizations at the three different levels. Preliminary results were discussed with a third researcher to ensure that all the valuable elements were detected. Consolidated results presented below come from further discussions in focus groups held during periodic workshops within PROMs Observatory's stakeholders with the participation of orthopedics, orthopedics residents, healthcare organizations managers and Tuscany Region representatives. The workshop is a meeting organized twice per year in which the researchers share and discuss the continuously collected data with the abovementioned stakeholders to improve the quality and safety of the regional healthcare system.

Findings

Descriptive statistics

Patients enrolled in the PROMs Observatory for a THR considered in the current case study are 530, 283 in the LHA and 247 in the TH. The 73% of patients underwent a THR in the pre-COVID-19 period (54% in LHA and 46% in TH), the 27% (51% in LHA and 49% in TH) in the post-COVID-19 advent. The average age of the considered patients is 67 years.

The average age for the cohort of patients that underwent the THR in the COVID-19 period is lower than the mean (66 years) with a broad standard deviation. While the most represented age group is between 65 and 79 years, both in the pre- (50%) and post- (43%) pandemic period, notably, the group range over 79 years has increased in the COVID-19 period (from 10 to 13,5%). This change is followed by fewer patients between 55 and 64 years (from 34 to 27%). Overall, participants in the PROMs Observatory are equally distributed regarding sex (female = 50.47%; male = 49.53%). In the pandemic period, the respondents are mainly female (62.16%). Regarding the educational level, the low is the most represented level (50.44%).

There are not statistically significant differences in the two cohorts of patients considered when testing the socio-demographic characteristics of patients, except for a slightly significant difference in sex.

Quantitative and qualitative analysis

In the following paragraphs, quantitative and qualitative data from the two selected hospitals highlighted different change management strategies. The comparison between the pre- and the post- COVID -19 period is possible at each of the three level of change detailed in quantitative data. In qualitative data the focus is set on the emerged themes at each level in the post- COVID-19 experience.

Quantitative and qualitative results are presented together on each level. [Figure 1](#) summarizes the findings of the quantitative data analysis from PROMs Observatory as proxy of organizational change at the three system's levels.

Results emerged from the qualitative interviews with professionals and the local and regional managers are summarized in [Table 1](#). The themes that emerged during the interviews have been also confirmed by the stakeholders of the periodic workshops within PROMs Observatory.

Macro level

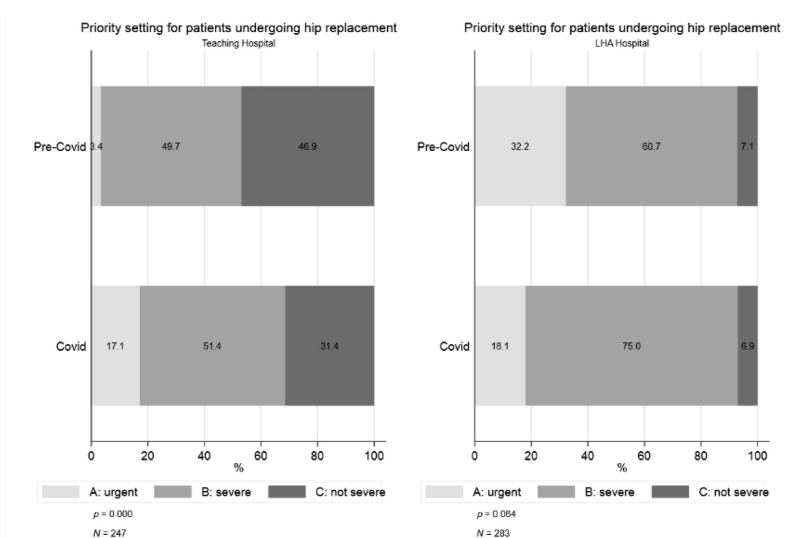
Since March 2020, a selective postponement for elective surgery was suggested from international guidance documents in response to the COVID-19 spreading ([Jonayed, 2020](#); [Phillips et al., 2020](#)). The postponement was necessary to prevent the further need for healthcare resources (human and physical) ([Table 1](#)). In less than a month, the recommendations shifted to a complete postponement suggestion. In fact, during the first wave, the Italian National Government closed the elective surgery activity except for very urgent needs ([Box 1](#)). During the interviews emerged that healthcare organizations had just to adopt practices to follow the national and regional indications.

During the first lockdown, we had a 25% level of productivity. Indeed, after a total stop of the first seven/ten days, we suspended all the elective surgical activity except for priority. A interventions for femoral head necrosis, hip implant infections, and oncological surgery [Professional of TH]

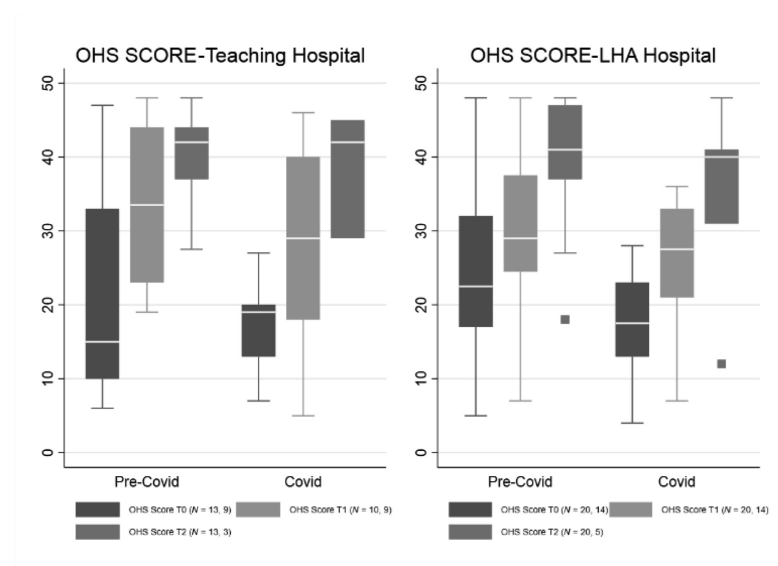
Volumes were substantially reduced, giving priority to class A surgery and oncological patients that could not be postponed [Organization manager of the LHA hospital].

This is confirmed by the analysis of quantitative data. Overall, the two analyzed healthcare organizations had a very inhomogeneous application of priority setting classes in the pre-COVID-19 period, while they present a more similar pattern in the post- COVID-19 one for what concerns the class A indication.

Specifically, LHA hospital has a proportion of class A surgery decreasing (from 32.2 to 18.1%) and a class B increasing (from 60.7 to 75.0%) with a statistically significant difference level of $p = 0.064$ ([Figure 1](#), panel a). Class A indication had a reduction of 14.1% and class C



Panel a. Priority setting pre- and post- COVID-19 period, for patients undergoing THR by Healthcare Organization.



Pannel b. OHS score pre- and post-surgical COVID-19 period for THR patients by Healthcare Organization and questionnaires time administration.

Figure 1.
Result from PROMs
observatory data
analysis

(continued)

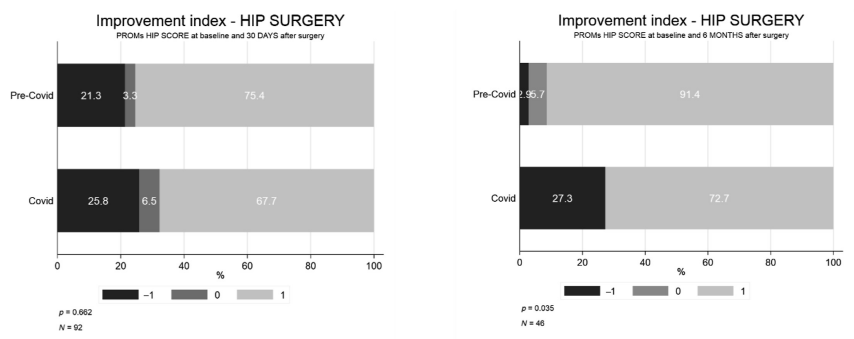


Figure Panel c1. Improvement index pre- and post- COVID-19 period, for patients undergoing THR by the regional cohort of patients at 30 days after surgery.

Panel c2. Improvement index pre- and post- COVID-19 period, for patients undergoing THR by the regional cohort of patients at 6 months after surgery.

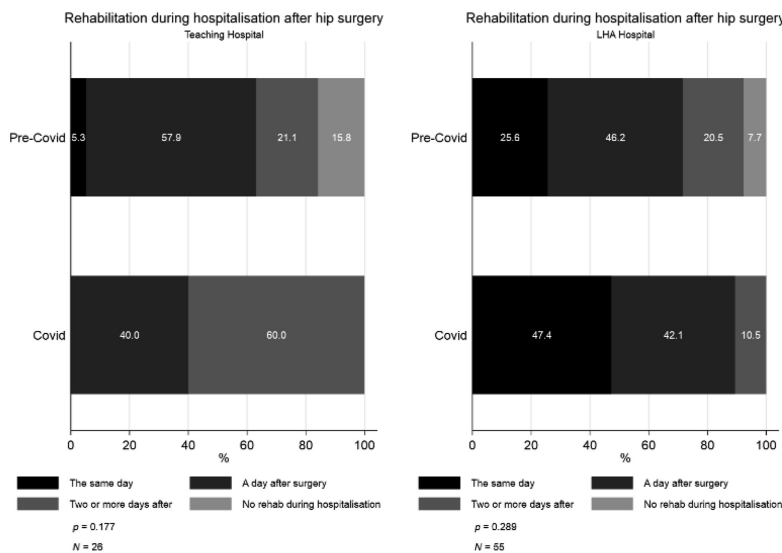


Figure 1.

Panel d. Patient reported number of days to begin the rehabilitation during the hospitalization pre- and post- COVID-19 period, for patients undergoing THR by Healthcare Organization.

Source(s): Author's own work

of 0.2%, while class B increased about 14%. At the same time, the TH, which had a lower use of class A priority in the pre-pandemic period (3.4%), increased (17.1%) the use of class A during the COVID -19 pandemic and reduced the use of class C (from 46.9 to 31.4%, $p = 0.000$).

The disaggregated data of patients' OHS score (Figure 1 panel b) supports the change in priority setting classes use. Since the hospitals can operate only classes A, TH increased the use of class A and let patients with better mean perceived health status undergo surgery in the post- COVID-19 period than in the pre- COVID-19. On the other hand, the LHA that

	LHA	TH
<i>Macro level</i>		
Feeling of unpreparedness	x	
Role and impact of legislation on the meso and micro-organization	x	
Guidelines from regional commission in line with national and international documents	x	
Prioritization of class a and oncologic patients with consequent remodeling of beds number and surgical capacity	x	x
Need to plan flexible solutions to recover postponed and delayed activities	x	x
Unmet needs for other pathologies or less urgent patients	x	x
<i>Meso level</i>		
Care provision reorganization through new spaces and flexible agendas, it services, blood availability, volume of traumas, sanitization and triage procedure	x	x
Feeling of lack of human resources		x
Misalignment between human and logistical resources	x	x
Need for implementation of elasticity and flexibility among professionals	x	x
Care provision outsourcing	x	
<i>Micro level</i>		
Lack of flexibility in the organization of daily/weekly agendas and tasks		x
Synergy with the territory care for rehabilitation	x	
Fragmentation and inhomogeneity in the organization of physiotherapy		x
Lack of human resources	x	
Sense of fatigue	x	
Need for individual and team flexibility	x	
Human resource sharing between different teams and wards	x	
Care provision outsourcing	x	
Creation of task force with colleagues	x	
Presence of initial resistance to change (i.e. technological tools)		x
Source(s): Authors' own work using data from the PROMs Observatory coordinated by the MeS Lab		

Table 1.
Emerged themes from
the interviews divided
by macro, meso and
micro level and by
LHA and TH

reduced the use of class A, was able to operate only more urgent patients. The median pre-surgery OHS score of patients that underwent THR surgery in the LHA hospital after COVID-19 pandemic is lower than in the pre- COVID-19 with a statistically significant level ($p = 0.080$) (Figure 1 panel b).

Meso level

At the organizational level, the suspension of elective activities was full in both the hospitals. From the interviews it emerged that the re-organization of elective surgery has been quite impossible due to the lack of human resources (i.e. anesthesiologists and nurses), while the operating theater and the equipment were available (Table 1).

Elective surgery was not reactivated until June because of personnel shortage and lack of adequate spaces to operate and for the recovery of patients. The anesthesiologists were all working in COVID-19 wards and specialised nurses that generally work inside surgical teams were reallocated in the same COVID-19 wards due to the need of their expertise. [Professional of the LHA hospital]

The hospital is no more like before. The surgery workload is reduced because the anesthesiologists and specialized nurses that worked in COVID-19 wards in the last months now need to take vacation. [Professional of TH]

Notwithstanding the difficulties during the first wave, the LHA hospital organized to exploit the private sector as a partner with extra resources in terms of spaces and personnel, to continue with surgical activities and rehabilitation. TH did not arrange a partnership with the

private sector, but it tried to improve the organization with its own resources. COVID-19 pandemic exacerbated the different organization's direction and vision. In fact, while the LHA has an extensive network on his territory and a global view on his population, the TH has a high sectorial specialization with a more rigid and less integrated view on the global population.

There were many organizational changes, surgical activity was diverted to a private hospital that is accredited from the public system establishing a stable collaboration. [Organization manager of LHA]

COVID-19 pandemic thought us to quickly re-think the organization and to never allow waiting times. We extended the outpatient care service along 12 hours a day. [Organization manager of TH]

The results of the quantitative analysis add some insights on the outcomes of the suspension of elective activities. Figure 1 panels c1 and c2 reports that the Improvement Index at 30 days and 6 months after surgery has worsened in the post- COVID-19 period. This result highlights that a lower percentage of patients reported a better health condition during the pandemic. Specifically, at 30 days, the Improvement Index had a higher percentage of improved scores in the pre- COVID-19 (75.4%) than the post- COVID-19 (67.7%). Conversely, the percentage of worsened patient OHS scores has increased (from 21.3 to 25.8%). The stable index has doubled. These differences are not statistically significant ($p = 0.662$). At 6 months after surgery, the differences pre- and post- COVID-19, are statistically significant ($p = 0.035$). Data illustrate a reduction in the percentage of improved scores (from 91.4 to 72.7%) and an increase of worsened scores (from 2.9 to 27.3%). This pattern is also seen at the health organization level.

Micro level

At the hospital unit level, healthcare professionals reported that physical therapists were allocated in intensive care units and in the medical ward, where patients with COVID-19 were hospitalized (Figure 1 panel d). On the other side, the LHA hospital continued to have minimal surgical activity and maintained the physical therapy after the intervention (Figure 1 panel d).

There was a unit of rehabilitation inside our ward and it was closed during the whole COVID-19 period. Patients were invited to find autonomous solutions once back home and this determined a higher burden on caregivers and a very negative impact on the recovery of patients. [Professional of TH]

We changed the rehabilitation settings, promoting home and ambulatory care sessions when possible. Everyone had their rehabilitation pathway. [Professional of the LHA hospital]

Regarding the rehabilitation during the hospitalization, PREMs data do not show any statistically significant differences. The descriptive results show that the two hospitals follow different rehabilitation models. The TH usually does not provide rehabilitation the same day of the THR surgery, while the LHA hospital is used to provide a faster begin protocol (Figure 1 panel d). These different models were maintained, were possible, in the two healthcare organizations.

During the interviews several examples of possible long-running innovations introduced by the pandemic emerged. For instance, professionals and managers referred to (1) the consciousness and willingness to better use the public resources through shared and flexible work scheduling (working conditions seven days per week and 24 h a day), (2) the use of face mask during each influenza season to prevent infection spreading, (3) the creation of a hospital network with shared resources, (4) the possibility to increase the provision of

teleconsultation and telemedicine through the population digital skills improvement and (5) the strengthening of public and private collaboration.

At the start, it is difficult to overcome the resistance of those who do not feel the need for change, but when the benefits are as important as those made possible by technological devices during the pandemic, it is impossible to go back because they really improve organizational capacity. [Organization manager of TH]

It is not possible to organize the same hours in a Covid and a non-Covid ward. 1,500 m cannot be run at the same intensity and speed as 100m. We should think outside of the lines and find new opportunities.[Professional of the LHA hospital]

Discussion

The provided case study exemplifies an analysis of organizational change. The structured presentation of data across three levels facilitates the comprehension and capture of the cascade effects and value generated by organizational change. Each level influences the others, creating a dynamic process that allows for reciprocal modifications (Amis and Greenwood, 2020). The triangulation of data analysis reveals how specific decisions made in response to the COVID-19 have shaped the observed outcomes. The study's comprehensive approach, encompassing various data sources and employing both qualitative and quantitative methods, effectively mirrors the intricacies of the analyzed change process. Moreover, the mix of qualitative and quantitative data ensures consistencies and inconsistencies to emerge among levels. The interviews better contextualize quantitative patient-reported data. The data analysis split into the three levels also allows making a comparison among micro, meso and macro levels, to have a multidimensional and complete organizational view. The results presented about two hospitals that serve the same territory are iconic of the different approaches to the same changed scenario.

The pandemic advent has impacted on the THR surgery organization pathway. As others in the world (Phillips *et al.*, 2020), in Tuscany many procedures were postponed due to the need of redefining healthcare priorities to allocate resources in managing COVID-19 spreading. A small number of the studies we reviewed were based on data from several organizations, each undergoing a different type of change. A primary reason for the limited number of studies with organization-level variables is that such studies require a different kind of data from multiple organizations, which are logistically challenging to obtain.

While at the macro level, the regional data showed a stable pattern pre- and post-COVID-19 priority setting (class A) (Figure 1 panel a), the two analyzed organizations applied different approaches at the meso and micro levels of organizational change that gave different outcomes (Figure 1 panels b and d). Both professionals and managers highlighted how the advent of the pandemic spreading deepened the already existing problems in terms of human resources availability and allocation (Barchielli *et al.*, 2020; Magro *et al.*, 2020). In change management, individuals' reorganization and choices play a pivotal role (Oreg *et al.*, 2011). LHA and TH had two very different approaches in the priority setting use in the pre-COVID-19 period, but after top-down strong impositions, they showed a re-alignment in the use of priority setting classes as in a mechanism of isomorphic change (Greenwood and Meyer, 2008). COVID-19 pandemic emergency has been an opportunity in giving more homogeneity at the national indications. This realignment in the use of priority setting classes could provide more equity in the resources access and in their distributions according to patients' needs. In fact, PROMs show that the patients who underwent surgery during the first COVID-19 advent were more in-need or urgent, since they reported a worst health status before surgery and were older compared to the pre-COVID-19 pandemic. However, a question about the length of this realignment emerges: will it last and be a real change or will it wane

and be only a form of transient system flexibility? To reinforce change in the hierarchical professional setting of healthcare, a real professionals' engagement needs to be reached for an effective value co-creation (Sorrentino *et al.*, 2017). Moreover, a future step to be addressed is the management of the unsatisfied demand that is still today waiting for a response from the system. Managers are informally still debating on which solutions to implement in addressing this point and in the meanwhile guaranteeing the wellbeing of the already overwhelmed health professionals.

Meso-level data have confirmed the effects of the macro-reorganization with class A patients' surgery priority. The comparison between the two considered organizations highlights that the patients operated at TH had a slower recovery (Figure 1) than those that have been operated at the LHA hospital. A possible explanation is rooted in the reorganization conducted by the LHA hospital for the surgery activity and the joint efforts with the private sector highlighted in the interviews. In fact, the micro-level data suggest that in the COVID-19 period, the LHA hospital strongly pursued the model in use before the pandemic promoting a timely rehabilitation. On the other side, the TH has lengthened its times. This result supports the choice's usefulness to strengthen rehabilitation settings outside the hospital for accelerating patients' recovery (Wang *et al.*, 2018).

The triangulation of data supports that an organizational change has occurred in response to the COVID-19 pandemic, accordingly to previous organizational culture, with a clear impact on patients' life. LHA, with a big picture on its own territory and population to be served, emerged to have been flexible. Even if interviews related to LHA reported feelings of unpreparedness, despite the role and impact of guidelines and legislation, as well as sense of fatigue and lack of resources in addressing the crisis, LHA has taken advantage of its population-based approach and a broader network within which to move. There was a shared "framework" within which LHA professionals could act in relative autonomy based on endorsed evidence. On the other side, more specialized and compartmentalized organizations, as TH, mainly managed to absorb the shock through activity escalation and suspension program. Based on the data from the presented case, it is evident that an effective organizational change requires a hybrid approach. This approach involves combining centralized solutions with a certain degree of professional prerogative and autonomy granted to professionals. The micro contexts are different from each other although immersed in the meso and macro panorama. The findings, derived from a comparison of organizations closely aligned in focus, suggest a meticulous management of change.

In these terms, we suggest that LHA has had a more resilient approach than TH. Resilience is the word used to describe the capacity to overcome a shock, respond and adapt positively to a disruptive organizational change (Stewart and O'Donnell, 2007). While resilience is the ability to improvise to continue the organization's activity during the advent of change force, it also embodies the possibility of learning (Stewart and O'Donnell, 2007). Learning, by continuously creating new evidence, is one way to cope with a change and it also emerged in the current case study's interviews. A further concept to be developed in theoretical and applied research could be the innovation resilience, meaning the ability in investing to improve stability and adaptability that contributes to a constant innovation process linked with adaptability to eventual changes. An example is the LHA professional's proposal to transform the experience of joined efforts with the private sector in a real and long-running change management innovation. Analyzing and recognizing effective micro-level strategies employed during crises, then rationalizing and extending them to the meso and macro levels, could significantly enhance overall resilience and preparedness in a system or organization. The adoption of hybrid and collaborative governance structures emerges as a crucial strategy for healthcare systems and organizations aiming to formulate proactive measures against future shocks. A resilience-focused approach should involve the establishment of mechanisms for hybrid collaborative change management approaches,

which can facilitate in identifying local weaknesses and strengths, and, simultaneously, designing effective solutions by using all the available resources. A systematic process of analyzing and disseminating the good practices and change management strategies at the meso and macro levels could additionally serve the role of proposing those solutions for the whole system and for the future.

Moreover, the 2020 pandemic experience, leveraging on new socio-behavioral norms and emerging needs, has suggested using virtual technologies – already used in everyday life – to support the healthcare world. This innovation process was catalyzed by COVID-19 spreading, which allowed to implement in a quick and effective way many of the already existing solutions as telemedicine, diffused home care, improved organization of ambulatory care in terms of time and spaces, etc. (Bini *et al.*, 2020; Vainieri *et al.*, 2021). The real challenge will be to maintain this stimulus even at the end of the pandemic phase (Magro *et al.*, 2020). Managers should continuously check the changes introduced in their organizations to ensure the pushing forward of the innovations introduced as a response to contingent necessities (Jonayed, 2020). In fact, ambidexterity is a concept dealing with the ability to adapt to change and tackle with current issues that should characterize organizations to embrace change that looks beyond the short-term and ensure the long-term sustainability of the system (Mom *et al.*, 2019).

Conclusion

The evidence presented in this paper sheds light on how healthcare organizations, managers and professionals managed change to ensure continuity of care even in case of emergency through shock absorption, adaptation and final change. In this process, a fundamental role is played by a systematic measurement system that can guarantee monitoring of structures, processes and outcomes useful to adjust and experiment interventions of organizational change. A data collection and analysis apparatus is essential when decisions have to be made for organizational change, even more in a situation of complexity and urgency (Brown *et al.*, 2012; Donabedian, 1988; Nuti *et al.*, 2017). Further attention should be placed on the change mechanism structure. Despite the similarities between the two healthcare organizations and the centrality of unpredicted change, the final performance has been different. Compartmentalized organizations could need a stronger structured department for emergency response coordination to ensure that the whole organization does not get stuck in the absorb phase of change. In contrast, hospitals with a broader vision could highlight best practices of organizational change management due to more intrinsic flexibility and ambidexterity.

These findings have implications for decision-makers at different levels and offer a foundation for further research to advance the understanding of change processes in healthcare settings.

Theoretical implications

At the macro level, the reduction in surgical activities resulting from macro-level decisions underscores the importance of considering the broader organizational context in healthcare management. This aligns with theories of organizational change and strategic management.

The meso level change highlights the need for flexibility and adaptability in healthcare organizations. Theoretical perspectives on organizational behavior and change management can be explored to better understand these dynamics.

Strategies at micro level present diversity and fragmentation of change management practices suggesting that there may not be a one-size-fits-all approach to managing change in healthcare organizations. This finding can contribute to the development of more nuanced theories of change management in healthcare settings.

Managerial implications

For top-level decision-makers, our results suggest the need for a careful consideration of the broader consequences of macro actions because there is a potential ripple effect of macro-level decisions on the organization's operations at meso and micro level.

Leaders responsible for organizational changes at meso level should focus on developing adaptive strategies that can accommodate both complete cessation and reorganization of activities. Effective communication and employee engagement are crucial in effectively managing these transitions.

At the micro-level, practitioners need to be equipped with a range of change management strategies to address the diverse needs and challenges that may arise during organizational transitions. Training and support for these individuals are essential.

Limitations and potential avenues for future research

The specific context of the presented study may limit the generalizability of our findings to other healthcare organizations or industries. Specifically, the main weighted limitation is the choice of some constructs from many others. Other scholars may have different data to manage from which other choices may emerge. As Professor Duflo stated,

[...] researchers do not come to sweeping conclusions about the potential impact of a program based on any single experiment. Instead, each experiment is like a dot on a pointillist painting: on its own it does not mean much, but the accumulation of experimental results eventually paints a picture that helps make sense of the world, and guides policy (Duflo, 2020).

However, the data triangulation presented provides a scheme to learn from complexity and add value in organizational change situations.

Future research could involve comparative studies across multiple healthcare organizations to explore variations in change management strategies and their outcomes. This could help identify best practices and variability that could lead to innovation and transformation in the sector. For example, how the integration of technology, such as telemedicine or advanced surgical tools, influences the dynamics of change management in healthcare organizations. Examining the key factors contributing to successful solutions and recognizing their value should be of interest at all levels. This is vital for institutionalizing or proposing these solutions where similar results have not been achieved. Moreover, incorporating them into the toolbox can enhance the preparedness and future resilience of organizations when they encounter change.

Finally, future research may focus on the investigation of the long-term effects of macro level decisions, meso level changes and micro level strategies on the overall performance and sustainability of healthcare organizations during a change process.

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