

Swiss Learning
Health System

Strategic and organizational response of Ticino's hospital system facing the COVID-19 emergency: three case studies

Rapid Response Review for the COVID-19 emergency in
Switzerland

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Strategic and organizational response of Ticino's public and non-profit multi-hospital system facing the COVID-19 emergency

Keywords

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Executive Summary

Overview

In 2020, the SARS-CoV-2 pandemic hit the world. It started in China in December 2019 and reached Europe in January 2020. On February 25th, Switzerland reported its first case in the Canton of Ticino, after which the virus rapidly spread across the country. Shortly after, the Swiss Federal Council declared the situation as “extraordinary” and issued increasingly restrictive measures aimed to safeguard public health, with Ticino complementing or even anticipating some federal measures. The epidemiological peak in Ticino was reached in the end of March and on April 16th, the Federal Council decided to start easing measures starting from April 27th.

Aim

The aim of this rapid review is to conduct an in-depth analysis of the response organized by the three providers of the cantonal hospital system that acted on the front line of the pandemic in Ticino and to define strategies that will enable effective responses to similar crises, while maintaining essential core services. The review firstly addresses the rationale and the challenges of setting a specific acute sector response at the cantonal level, involving several actors (public and private). Secondly, it analyzes the responses of the hospital management confronted with different logistic challenges, highlighting similarities and differences emerging from evidence.

Methods

The rapid review relies on the relevant literature available and the selected media news to develop semi-structured interviews administered to key informants of the hospital system in Ticino. The main data sources are the interviews conducted and the materials shared during face-to-face or virtual discussions. The review presents three case studies based on the interviews and the subsequent in-depth analysis of those interviews conducted with management of three hospitals in the canton of Ticino: (1) Ospedale Regionale di Locarno (ODL); (2) Cardiocentro Ticino (CCT); (3) Clinica Luganese Moncucco (CLM). In the first two organizations at least two researchers conducted in-person interviews with the General Director, the Medical Director, the Head of the Nursing Service, the responsible of the Psychological Service, and the Head of the Technical and Logistical Service. The Clinica Luganese Moncucco allowed a virtual interview with the General Director.

Main Findings and Recommendations

The findings from the three case studies suggest that collaboration towards a common goal, constant communication, and pre-existing personal connections among key actors of the hospital system played a critical role to cope with the crisis. The emergency also highlighted the importance of managing the dependence from other countries both in terms of skilled personnel and supplies. Based on the evidence collected through the case studies, the authors identified some actionable recommendations:

Recommendation 1: Recognize the importance of public-private partnerships to reach effective collaborations when an emergency threatens the health of the whole population. To this extent, defining a legal and institutional framework might ensure the efficient application of the rules and principles when roles and responsibilities of each party must dramatically change due to unexpected contingencies.

Recommendation 2: Consider the importance of economies of scale associated with the concentration of technologies and personnel. Such an approach also fosters the resilience of the health system in case of an intra-hospital nosocomial outbreak.

Recommendation 3: Find the right balance between “control”, with the high-level authorities defining uniform rules and processes, and “participation” of local actors. The final goal consists of fostering efficiency while maintaining a grip on the real developments of the phenomenon.

Recommendation 4: Consider revision of inventory and supply chain management, as usual supplier conditions, product requirements, and lead times are considerably challenged in such a contingency. Hospitals' management rules and practices should be inspired not only by efficiency principles but should also account for the likely shortage of equipments necessary to cope with a pandemic and the demand and price changes occurring in such circumstances.

Recommendation 5: Care about the psychological effects on the “two populations” hit by the crisis: the patients and the hospitals' personnel. Developing interventions designed to tackle the indirect social and psychological effects of the pandemic is of paramount importance to foster systemic resilience.

Recommendation 6: Prepare for potential future waves of the pandemic or further pandemics. Building hospitals' logistic and organizational preparedness is very important to be ready for being able to deal with eventual re-configurations in a short timeframe.

Abbreviations

CCT	Cardiocentro Ticino
CLM	Clinica Luganese Moncucco
COVID-19	Coronavirus disease 2019
DSP	Divisione della Salute Pubblica
DSS	Dipartimento della Sanità e della Socialità
EOC	Ente Ospedaliero Cantonale
EONOSO	EOC Infection Prevention and Personnel Medicine Service
FOPH / UFSP	Federal Office of Public Health
FOS	Federal Office of Statistics
FTE	Full Time Equivalent
ODL	Ospedale Regionale di Locarno "La Carità"
ORL	Ospedale Regionale di Lugano ("Civico" e "Italiano")
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SWISSNOSO	National Center for Infection Control

Background on emergency

Introduction

In 2020, the SARS-CoV-2 (hereafter COVID-19) pandemic hit the world. Starting in China, where the first outbreak was identified in the region of Wuhan in December 2019, the pandemic reached Europe with its first three cases detected in France (January 24th, 2020) and its first three Italian cases four days later. On February 25th, Switzerland diagnosed its first case in the canton of Ticino.^{1,2}

From a geographic point of view, Switzerland shares borders with France and Italy, respectively, in the west and in the south. Incidentally, the French speaking regions (in particular, the cantons Geneva and Vaud) and the canton of Ticino were the most affected regions in Switzerland. In particular, two public events may have triggered the observed outbreaks in the bordering Lombardy (Italy) and Ticino (Switzerland): the soccer match Atalanta vs. Valencia taking place in Milan (Italy) on February 19th and the Carnival procession in Bellinzona (Ticino, Switzerland) on February 23rd. At that time, no restrictions had been in place yet.

Table 1: Timelines of implementation and easing of COVID-19 related restrictions as of July 6th, 2020

Date of Entry into Force	Implementation and easing of COVID-19 related restrictions
28.02.2020	Ban on demonstrations with more than 1000 people
13.03.2020	Ban on public and private demonstrations with more than 100 people. Limitation of 50 people in restaurants and bars, including personnel. Ban on entry to Switzerland for people coming from countries and regions at risk, unless fulfilling specific conditions.
14.03.2020	Clarification: the ban also applies to ski areas
16.03.2020	Ban on classroom teaching
17.03.2020	Ban on public and private demonstrations, including sporting events and corporate activities. Closure of facilities accessible to the public. The imposed ban and closure did not apply to facilities that sell goods and services for daily use.
19.03.2020	Ban on shopping tourism
21.03.2020	Ban on gatherings of more than 5 people. Obligation to keep a distance of more than 2 meters in gatherings of more than 5 people.
25.03.2020	Ban on healthcare facilities, in particular on hospitals, clinics, dental clinics and medical practices, to perform non-urgent tests, treatments and medical interventions.
16.04.2020	Announcement of the Swiss Government of the progressive easing of measures (in two phases).
27.04.2020	Phase 1 Green light for the reopening of:

¹ UFSP. "Nuovo coronavirus in Svizzera e nel Principato del Liechtenstein: bilancio epidemiologico intermedio, Stato al 27.04.2020, ore 8:00", Accessed at www.bag.admin.ch on April 27th, 2020.

² UFSP. "Nuovo coronavirus COVID-19: primo caso confermato in Svizzera", Accessed at www.bag.admin.ch on February 27th, 2020.

	<ul style="list-style-type: none"> • DIY and gardening centers, including nurseries and florists; • commercial operations offering services with physical contact, such as hairdressers, massage practices, tattoo studios and beauty centers (escort or prostitution services and erotic clubs had to stay closed); • self-service facilities such as solariums, car wash plants or flower fields. <p>Green light for the execution of all outpatient interventions, including non-urgent ones.</p> <p>Withdrawal of the limitation that only the close family circle could attend funeral ceremonies.</p>
11.05.2020	<p>Phase 2</p> <p>Green light for:</p> <ul style="list-style-type: none"> • classroom teaching in compulsory schooling (elementary and lower secondary schools) • classroom teaching with groups of no more than 5 people in upper secondary, tertiary and in other training centers • exams at educational institutions (excluding elementary and lower secondary schools) <p>Green light for the reopening of shops, markets, travel agencies, museums, libraries and sport facilities.</p> <p>Green light for sporting activities (max. five people, not involving physical contact), competitive and professional sport in groups of up to 5 people or teams.</p> <p>1st phase of restaurants reopening: limited to seated groups of four and parents with their children.</p> <p>1st easing phase of entry restrictions to Switzerland.</p>
28.05.2020	Easing of ban on religious services
01.06.2020	Green light for the collection of signatures in public spaces
06.06.2020	<p>Gatherings of max. 30 people in public spaces</p> <p>Demonstrations, political demonstrations and assemblies of companies of max. 300 people.</p> <p>Resumption of classroom teaching in secondary schools, professional schools and universities, as well as in other training centers.</p> <p>2nd phase of restaurants reopening: for groups of more than four people, tracing client details whenever the distance is smaller than prescribed. Opening of discoteques, dance clubs and night clubs (tracing client details when distance is smaller than prescribed).</p> <p>2nd phase of openings in the sports sector (max 300 spectators).</p> <p>Opening of swimming pools, wellness centers, botanical gardens and animal parks, cinemas, gig venues, theaters, casinos, ski lifts, leisure facilities for the summer tourism, holiday camps for children and adolescents (up to 300 people), campings and erotic clubs.</p>

	Easing of rules for people at higher risk.
15.06.2020	2 nd easing phase of entry restrictions to Switzerland: opening of borders with Germany, France and Austria.
20.06.2020	Abrogation of the limit of 300 participants on public demonstrations and introduction of new obligation to wear face masks.
22.06.2020	Minimum distance of 1.5 meters between individuals Repeal of: (a) max. number of 30 people in public spaces, (b) obligation of consumption when seated in restaurants, bars, discoteques, etc., (c) obligation for restaurants, bars, discoteques, etc. to close between 00.00 am and 06.00 am, (d) specific rules for the sports sector, (e) rules for people at higher risk. (f) protection measures in construction and manufacturing sites.
06.07.2020	Obligation to wear face masks in public transports. Quarantine for travelers coming from countries or regions at high risk of contagion.

Source: Adapted from UFSP “Nuovo coronavirus in Svizzera e nel Principato del Liechtenstein: bilancio epidemiologico intermedio, Stato al 27.04.2020, ore 8:00”, Accessed at www.bag.admin.ch on April 27th, 2020, and UFSP “Allentamenti e rafforzamenti dei provvedimenti, Stato al 01.07.2020”, Accessed at www.bag.admin.ch on August 7th, 2020.

From the confirmation of the first case the virus rapidly spread across Switzerland. Consequently, on February 28th and March 16th, the Federal Council declared the situation as, respectively, “particular” and “extraordinary”³, and issued more and more restrictive measures aimed at safeguarding public health (see Table 1). In Ticino, some federal measures were complemented or even anticipated to tackle the specificities of the local context. In particular, the canton decided to expand the intensive care capacities.

After the peak of cases was reached on March 23rd, the number of hospitalizations and deaths started decreasing, with the number of intensive care cases back to a level compatible with ordinary capacity. On this ground, on April 16th, the Federal Council decided to ease the measures starting from April 27th.⁴

In the next subsections, we are presenting a description of the the epidemic in Switzerland and in Ticino, based on the Federal Office of Public Health’s (FOPH) monitoring from February 25th to May 11th, 2020 (when for the second consecutive day zero positive cases were reported) and a brief description of the the hospital system in Ticino and a description of its key actors.

It is important to note that during the emergency, only severe cases requiring hospitalization, patients considered at high risk as well as healthcare workers or people in close contact with patients at risk were considered eligible for testing. As of mid-April, recommendations on test eligibility included also subjects with mild symptoms. Therefore, such changes must be taken

³ According to the 2016 Law on Epidemics (LEp; RS 818.101).

⁴ UFSP. “Nuovo coronavirus in Svizzera e nel Principato del Liechtenstein: bilancio epidemiologico intermedio, Stato al 27.04.2020, ore 8:00”, Accessed at www.bag.admin.ch on April 27th, 2020.

into consideration when interpreting epidemiological data as presented in the next section, especially the number of positive cases.⁵

Epidemiological outlook

As of May 10th, the FOPH reported 30,305 positive cases in Switzerland and the Principality of Liechtenstein, meaning a prevalence of 353 cases per 100,000 inhabitants, with overall 309,595 tests performed (12% of which turned out positive – however, more than one test can be performed per person)⁶. The peak in the trend of the COVID-19 contagions was reached on March 23rd with 1,464 positive cases detected in one day. Elderly subjects were significantly more affected than younger people and men accounted for 46% of total cases. However, among the age group of people younger than 60 years women were more often affected than men, while men were more often affected than women in the age group of people being older than 60 years.

In Ticino, as of May 11th, the FOPH reported 3,238 positive cases, meaning a prevalence of 916 cases per 100,000 inhabitants. As shown in Figure 1, the peak in the number of positive cases in Ticino was reached on March 27th with 287 cases detected, based on data from the Division of Public Health (Divisione della Salute Pubblica, DSP) of the Department of Health and Society (Dipartimento della Sanità e della Socialità, DSS) of the Canton of Ticino.⁷

As emerging from FOPH data, the peak in the number of COVID-19 hospitalizations in Switzerland was reached on March 27th, with 203 hospitalizations, after which the number started to fall steeper than it has risen. Men represented 60% of the total hospitalized cases and the elderly were significantly more often hospitalized than younger people. Across all age groups, men were consistently more hospitalized than their female counterparts.

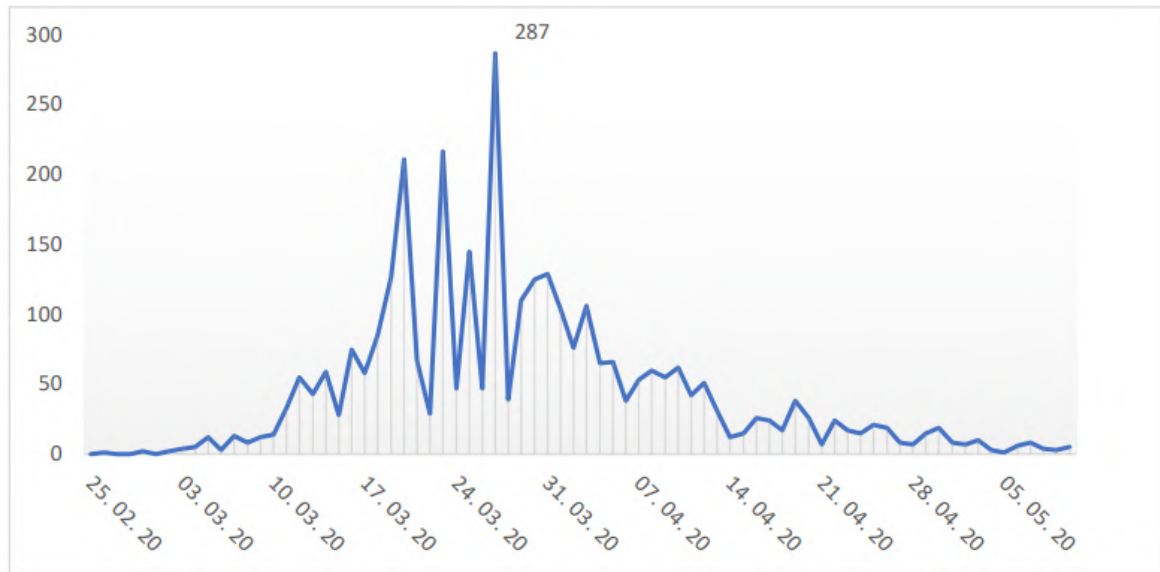
Figure 2 shows the trend of all-cause hospitalizations and, among them, the cases that accessed ICUs (with or without ventilation), based on data from the DSP of the Canton of Ticino (as of May 10th). In Ticino, the peak of hospitalizations was reached on March 30th (415 cases), on the same day the highest number of deaths was recorded. The peak in the number of ICUs and ventilated beds was reached on April 1st (76 beds) and April 2nd (73 beds) respectively.

⁵ Ibid.

⁶ UFSP. "Rapporto sulla situazione epidemiologica in Svizzera e nel Principato del Liechtenstein, Stato al 10.05.2020, ore 8:00", Accessed at www.bag.admin.ch on May 10th, 2020.

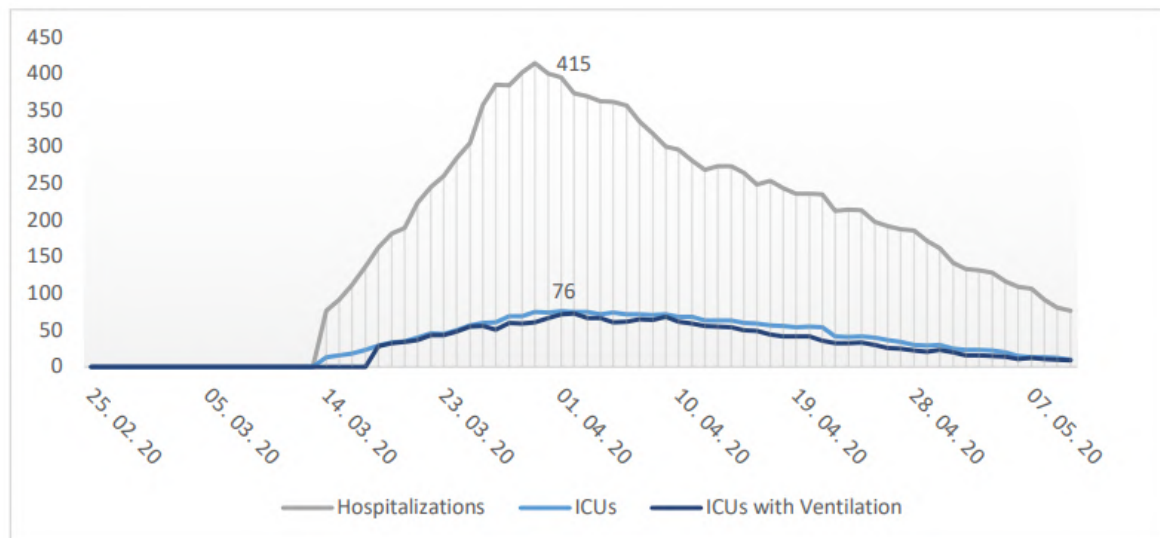
⁷ <https://www4.ti.ch/dss/dsp/covid19/home/>, accessed on May 11th, 2020.

Figure 2: COVID-19 cases detected in Ticino over time



Source: DSS and DSP

Figure 1: All-cause hospitalizations, among which cases accessing intensive care in Ticino over time

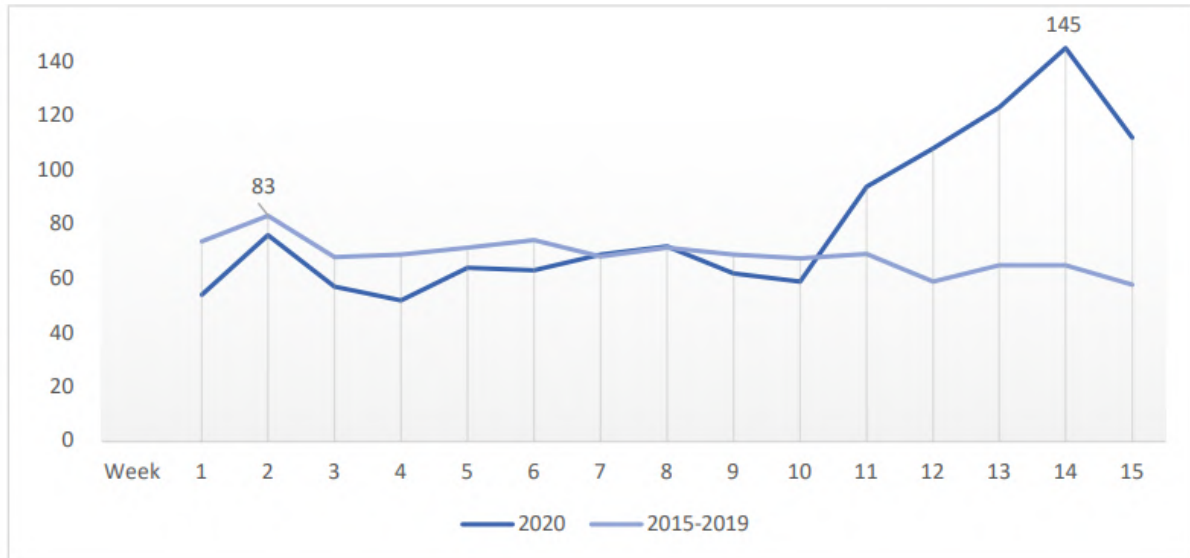


Source: DSS and DSP, ICUs=Intensive care unit cases

In Switzerland, the first death associated with COVID-19 was recorded on March 5th and, as of May 10th, the cumulated number of deceases equaled 1,538 (FOPH data, as of May 11th). Figure 3 allows appraising the magnitude of COVID-19 mortality in Ticino by comparing all-cause mortality during the first 15 weeks of 2020 with the average mortality observed during the same period in the previous five years. The figure is based on data from the Federal Statistical Office (FSO) as of April 22nd. In Switzerland, and even more in the Canton of Ticino, there was

an unusual increase in the number of all-cause deaths from week 11 onwards, reaching a peak in week 14 (March 30th – April 5th) and then starting to decline.

Figure 3: All-cause deaths in Ticino: 2020 vs. average 2015-2019

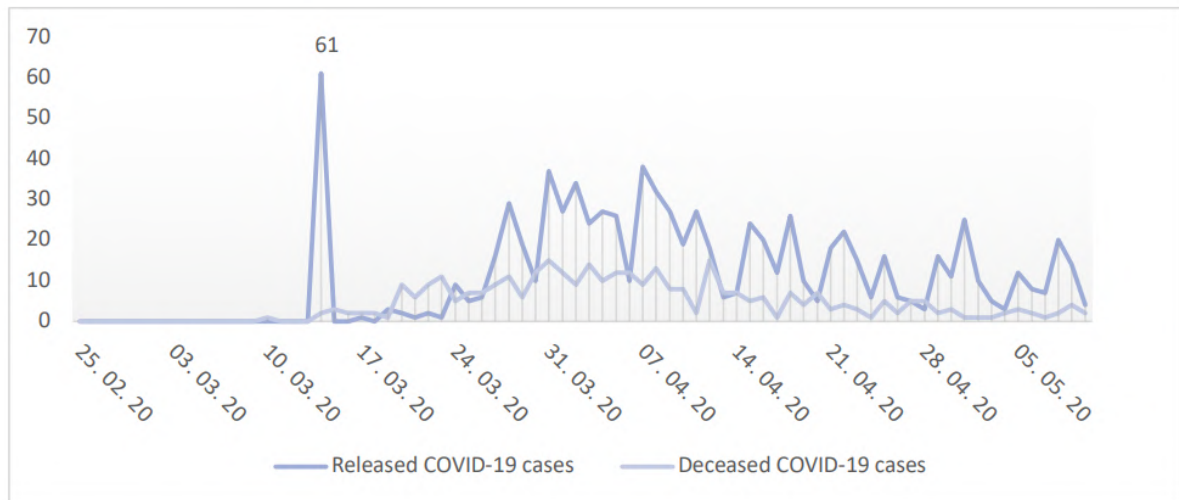


Source: FOS

As far as the trend of the COVID-19 deaths in Switzerland is concerned, the peak was reached with 58 deaths on March 30th (5-6 days after the peak of positive cases). After this date, the figures started their fall albeit at a slower rate than their rise (FOPH data, as of May 11th). According to the FOPH data on age- and sex-specific COVID-19 mortality rates in Switzerland (the number of cases per 100,000 inhabitants), overall men represented 58% of total deaths and the death rate was consistently higher for men than for women across all age groups.

Figure 4 shows the current released and deceased COVID-19 cases in Canton Ticino, as of May 10th, based on the data of the DSP.

Figure 4: Released and deceased COVID-19 cases in Ticino over time

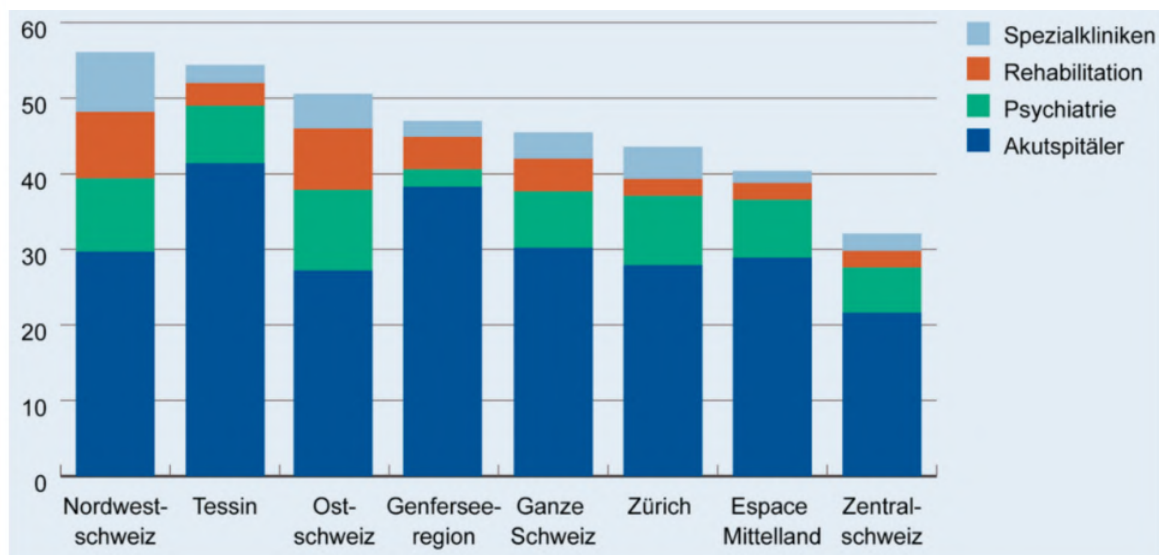


Source: DSS and DSP

Overview of the hospital system in Ticino

Based on data from the Federal Statistical Office (FSO), Ticino is the second region in Switzerland with the highest number of hospital beds, with 54.4 beds per 10,000 inhabitants – following North-West Switzerland (with 56 beds per 10,000 inhabitants), while it scores first in terms of acute-care beds density (41.4), followed by the Lac Lemman Region (38.3). The Canton of Ticino, moreover, scores second in terms of the average number of inhabitants served by an emergency service (59,000), compared with the Swiss average equal to 70,500 inhabitants.⁸

Figure 5: Number of hospital beds by Region of Switzerland (per 10,000 inhabitants)



Source: H+ (2020) "H+ Spital- und Klinik-Monitor", based on Federal Statistics Office 2015 data

⁸ H+ (2020) "Monitoraggio di H+ degli ospedali e delle cliniche". Accessed at www.hplus.ch on May 2020.

Another peculiarity of the delivery system of health services in Ticino is the fact that about 42% of beds are managed by private organizations⁹, while the Swiss average is below 20%¹⁰, which creates a relevant difference between the public and private sectors in Ticino. More specifically, there is one public multi-site hospital in Ticino: the Ente Ospedaliero Cantonale (EOC), consisting of some acute and rehabilitation structures. In addition, there are several private clinics providing acute or rehabilitation services. An updated list of the structures involved in the Cantonal planning is reported below and graphically illustrated in the map below (Figure 6):

- Ente Ospedaliero Cantonale (EOC), with the following hospital sites:
 - Ospedale Regionale di Bellinzona e Valli “San Giovanni”, in Bellinzona
 - Ospedale Regionale di Locarno “La Carità”, in Locarno
 - Ospedale Regionale di Bellinzona e Valli, in Faido
 - Ospedale Regionale di Bellinzona e Valli, in Acquarossa
 - Ospedale Regionale di Lugano “Civico”, in Lugano
 - Ospedale Regionale di Lugano “Italiano”, in Lugano
 - Ospedale Regionale di Mendrisio “Beata Vergine”, in Mendrisio
 - Clinica di Riabilitazione EOC, in Novaggio and Faido
- Cardiocentro Ticino, in Lugano
- Clinica Luganese Moncucco, in Lugano
- Clinica Sant’Anna “Salus Medica”, in Sorengo
- Clinica Santa Chiara, in Locarno
- Ars Medica Clinic, in Gravesano
- Clinica Fondazione Giorgio Varini, in Orselina
- Ospedale Malcantonese, in Castelrotto
- Clinica Hildebrand “Centro di riabilitazione Brissago”, in Locarno

An important note regards the Cardiocentro Ticino, which has been an autonomous private non-profit organization specialized in cardiology since its establishment in Lugano in 1995. However, it has worked in strict collaboration with the EOC since the beginning. The buildings of the EOC hospital site “Civico” and Cardiocentro Ticino are adjacent and usually share the same entrance. In 2019, the EOC and the specialized center signed an agreement to define a common governance while ensuring clinical, management, and financial autonomy to Cardiocentro Ticino.

⁹ Data 2017, USTAT. Accessed at <https://m3.ti.ch/DFE/DR/USTAT/index.php?fuseaction=dati.home&tema=54>.

¹⁰ Slightly below 20%, according to the OECD Review of Health Systems: Switzerland, 2006: p.46.

Figure 6: Map of Ticino Hospitals and Clinics



Scope and objective of the review

This rapid review aims to conduct an in-depth analysis of the response organized by the three providers of the cantonal hospital system that acted on the front line of the pandemic in the Canton of Ticino. More specifically, the study firstly addresses the rationale and the challenges of setting up a specific acute sector response at the cantonal level, involving several actors (public and private). Secondly, it analyzes the managerial response of the hospital management that has been confronted with different logistical challenges, highlighting similarities and differences emerging from the interviews.

Methods

This case study concerns an exceptional event, with a global magnitude never experienced by modern health systems before. In mid-April 2020, a first search of the literature focused on how health systems that had experienced epidemic outbreaks before had prepared hospitals to respond to those outbreaks or what hospitals that had faced epidemic outbreaks had learnt (using “outbreak”, “hospital”, “emergency”, “response”, “preparedness” as main search terms in academic databases such as PubMed, CINAHL, ScienceDirect). Overall, the search showed few results that would be relevant to the current pandemic, except for a few in-press contributions that were often characterized by either a clinical focus and/or sub-organizational perspectives (e.g., emergency service, pediatric department). Based on the little available literature and selected media news, it was decided to conduct semi-structured interviews with key informants of the hospital system in the Canton of Ticino. Key informants were recruited via a network of professional contacts that had been established over the past 20 years through an executive education program in the healthcare sector at the University of Lugano, Ticino, Switzerland.¹¹

Three case studies were developed based on the in-depth analysis of the interviews conducted with the management of three hospitals in Ticino: (1) Ospedale Regionale di Locarno; (2) Cardiocentro Ticino; (3) Clinica Luganese Moncucco. The interviews were conducted either face-to-face or virtually and occurred between May 15th and May 28th, 2020. In the first two organizations at least two researchers conducted in-person interviews with the General Director, the Medical Director, the Head of the Nursing Service, the responsible of the Psychological Service, and the Head of the Technical and Logistical Service. On average, the researchers dedicated about six hours of interviews (including the site visit) to each case at the first two organizations. The Clinica Luganese Moncucco allowed for a 75-minute virtual interview with the General Director, and later provided comments and additional information based on the case study draft received and specific questions aimed to foster comparability with the other two cases. All the interviews were type-recorded and transcribed within 72 hours after the interviews had been conducted. The three organizations received the predefined questions in advance – organized by topics – to prepare for the interviews. However, the researchers solicited further information during the interview, if deemed necessary.

During the period March-April 2020 the authors of the review constantly monitored the main local news media (main news outlets being: Corriere del Ticino, Regione, Ticinonline, Il Caffè) and the official websites of the Department of Health and Society (DSS) of the Canton of Ticino and the Federal Office of Public Health (FOPH). This allowed the researchers to reduce the information asymmetry with their interviewees and be able to ask for confirmation regarding unclear aspects of contradictory information.

¹¹ Specifically, we refer to the Master of Advanced Studies “Net-MEGS” (www.net-megs.usi.ch)

Ticino hospital system reconfiguration during the emergency

The hospital managers initially relied on the responsibility of the Federal Office of Public Health (FOPH) and the Cantonal Public Health Office ("Ufficio del Medico Cantonale") to provide guidelines on how to manage the threat of an epidemic and to detect cases. However, the situation changed with the first diagnosed case in Italy that had been transmitted within the country.

At the beginning of the emergency in Ticino (mid-February), the canton decided to dedicate the Italian hospital in Lugano, which is the smallest site of EOC to care for infected patients, using the EOC hospital "La Carità" (the EOC site in Locarno – hereafter ODL) as a buffer capacity structure. The Italian hospital is usually equipped with three intensive care beds, and the plan was to double its capacity to face the emergency. Meanwhile, the canton decided to maintain the Cardiocentro Ticino (CCT) as COVID-free center. This was intended as a strategy to preserve the only center for cardiopathic patients in Ticino, especially considering the risk of not being able to transfer any patient to Zurich (in fact, there were rumors about closing the Gotthard road tunnel, connecting Ticino with the German-speaking part of Switzerland, to tackle the epidemic). In this respect, rigorous rules about the usage of personal protection equipment to use were applied to all the people entering the CCT.

From February 20th till the beginning of March, the hospitals of Ticino autonomously started communicating to foster a coordinated response. Therefore, in this period, the response basically followed a bottom-up approach, with the FOPH and the Cantonal Public Health Office hardly able to foresee the needed changes and consequently issuing clear decisions or guidelines. At the beginning of March, also based on the dramatic developments of the epidemic in Lombardy, the ODL was established as COVID center for the canton, with the Italian hospital in Lugano becoming a backup structure. All the necessary technology and personnel were moved from the EOC sites of Bellinzona and Mendrisio to the ODL, and all the ODL's non-COVID patients were transferred to the other EOC sites.

After two weeks, also the private hospital "Clinica Luganese Moncucco" (CLM) in Lugano became a COVID center, serving the "Sottoceneri" region¹², the Southern region of the canton, to deal with the risk of the ODL's capacity saturation. A week later, the CCT became a mixed structure (the only one in the canton) with two isolated patient pathways – COVID vs. non-COVID – and some of its intensive care professionals were temporarily transferred to ODL.

During the emergency (until April 27th) all non-urgent ambulatory and surgical activities were stopped, and external visitors were not allowed in the hospital, with exceptions for end-of-life patients and maternity cases.

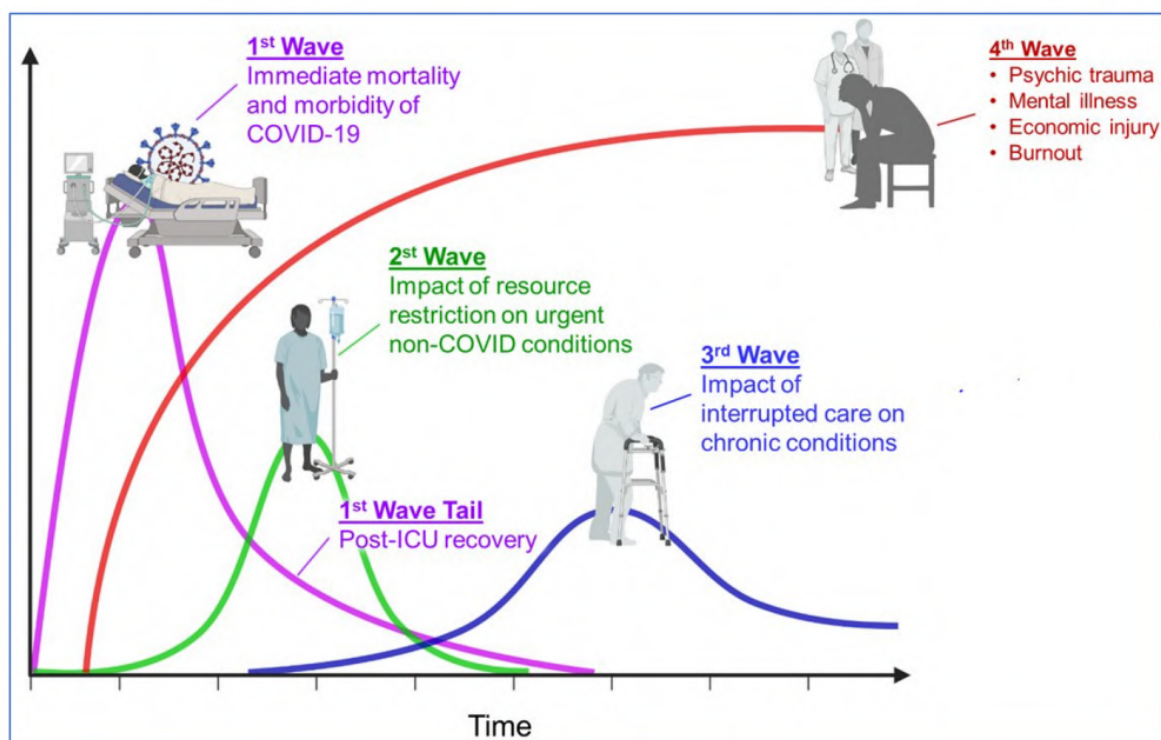
The logic behind the COVID-center's creation strategy relies on three main pragmatic points: (a) chances of intra-hospital outbreaks, which was not so far-off considering the news from the nearby Lombardy, Italy and which would have limited the structures of the cantonal system involved; (b) the concentration of technologies and personnel allows to take advantage of relevant economies of scale and learning; (c) the necessity of ensuring safe care to non-

¹² The "Sottoceneri" is the region of Canton Ticino including the districts of Lugano, Mendrisio, and Chiasso.

infected – or non-COVID – patients (Figure 13). The downside of such a strategy consisted of transferring professionals and patients to different hospital sites, which had to be in line with the professional needs and the epidemiologic compartmentalization.

The selected strategy aimed to cope with four “waves”: an interpretative model of the pandemic is shown in Figure 7. The first wave consists of the morbidity and mortality of COVID-19, while the other three waves are aftershocks: (i) the resource restrictions on non-COVID urgent acute conditions (2nd wave); (ii) the impact of interrupted care of non-COVID chronic conditions (3rd wave); (iii) psychic trauma, mental illness, burnout, and more (4th wave). The reconfiguration of the hospital system was mainly intended to deal with the first and second wave, while the other two waves were to be addressed also with initiatives at the micro level.

Figure 7: Health footprint of the pandemic (four waves)



Source: Victor Tseng's Twitter post (on March 30th, 2020)

The COVID-19 patient care management was organized around 5+1 levels of care: (1) intensive care; (2) acute care; (3) “less-acute” care, including patients coming from the emergency service, those coming from the previous levels or those needing palliative care; (4) post-acute care – though the distinction between the third and fourth level is often not precise; (5) neurologic or pulmonary rehabilitation for those patients who are still in need of it; (6) recovery, for patients who still need to recover because they are fragile or are lacking a social network. The last level was mentioned by the media but could not be confirmed during the interviews. Transitions from one level to the other are not always sequential.

The major capacity building effort concerned the expansion of intensive care beds (level 1) and dedicating beds for COVID-19 cases requiring acute care (level 2). As the pandemic progressed, further levels of care were activated, involving both public and private structures. Table 2 summarizes the capacity dedicated to COVID-19 patients, with the first two levels reporting the values during the peak of the crisis.

The reorganization of the hospital system, with COVID-19 acute care beds concentrated in three centers, required a careful triage of all the citizens showing health needs during the emergency. On March 25th, four checkpoints opened (in Mendrisio, Agno, Lugano and in Giubi-

Table 2: Capacity allocated during the emergency peak, by level of care

Structure	Level 1 (intensive care)	Level 2 (acute care)	Level 3 (less acute care)	Level 4 (post-acute care)	Level 5 (rehabilitation)
EOC-ODL (Covid center)	45+25*	180	<i>n.a.</i>		
EOC-CCT	6	10			
<i>Clinic of Moncucco</i>	30	200			
EOC-Italian hospital			80		
<i>Clinic Santa Chiara</i>			58		
EOC-Faido			70		
<i>Clinic Malcantonese</i>				(26)	
<i>Clinic Ars Medica</i>				(60)	
EOC-Novaggio					26
<i>Clinic Hildebrand</i>					32+9**

* Intermediate care beds, composing the so called “weaning unit” (see case study “La Carità” for details).
In brackets, reserve beds (not used during the emergency); In italic, private providers (anyone but EOC).

** Beds dedicated to tracheotomized patients requiring special clinical supervision.

asco) and on April 6th, two additional centers opened (in Locarno and in the Tre Valli). Citizens could access checkpoints only via telephonic referral of the family doctor, the doctor on duty (Medico di picchetto), the Ticino General Practitioners Association’s (Ordine dei Medici del Canton Ticino) hotline, any hospital’s emergency service, the Alarm Station 14413 (Centrale d’Allarme 144), or the first aid station (Guardia Medica).

The description of the temporary reconfiguration of the hospital system sheds light on the important role played by the collaboration between public and private providers for the effective response to the emergency. This emphasizes the relevant role of the private sector in the cantonal health system in Ticino. The collaboration initially involved the CLM in Lugano, a private hospital, as a buffer structure to prevent the saturation of ODL’s beds capacity, especially to cope with the need of intensive care beds. Later also the CCT was activated to deal

¹³ The Ticino Soccorso 144 is the alarm station of the Canton Ticino and the districts of Mesolcina and Calanca. It is active 356 days per year 24/7 for all health emergency situations.

with cardiopathic patients, who represent a group of cases requiring the specialist care of the only cardiologic center in Ticino.

At the beginning of April, a project of home monitoring for COVID-19 patients was launched, allowing a real-time remote control of patients positively diagnosed but not hospitalized. The project involves CCT, Fondazione Ticino Cuore, Ticino Soccorso 144, Clinica Luganese, Ordine dei Medici del Canton Ticino.

Table 3 provides a summary of the main changes regarding hospitals implemented in Ticino during the emergency.

Table 3: Timeline of measures implemented and loosened in Ticino hospitals

Date	Measures Implemented or Loosened in Ticino
<i>1 March</i>	<ul style="list-style-type: none"> • The ODL opens its activity to COVID-patients
<i>6 March</i>	<ul style="list-style-type: none"> • DDPS decree requiring hospitals to report on a daily basis the number of intensive-care beds
<i>16 March</i>	<ul style="list-style-type: none"> • The CLM opens its activity to COVID-patients
<i>23 March</i>	<ul style="list-style-type: none"> • The CCT opens its activity to COVID-patients
<i>25 March</i>	<ul style="list-style-type: none"> • Federal Council approves and extends the reorganization of Ticino's hospitals network • Opening of four checkpoints
<i>30 March</i>	<ul style="list-style-type: none"> • Hospitals reorganization enters into force
<i>1 April</i>	<ul style="list-style-type: none"> • Launch of project of home-monitoring
<i>6 April</i>	<ul style="list-style-type: none"> • Opening of two more checkpoints
<i>15 April</i>	<ul style="list-style-type: none"> • Clinica Luganese di Moncucco reopens its normal ER and inpatient activity (internal medicine, geriatric, oncology and immuno-rheumatology)
<i>20 April</i>	<ul style="list-style-type: none"> • Clinica Luganese di Mucucco reopens its urgent orthopedic and surgery activity
<i>27 April</i>	<ul style="list-style-type: none"> • Beginning of Phase 2: Hospitals reopen elective surgery and outpatient activity, excluding Ospedale Italiano di Lugano and Ospedale La Carità di Locarno
<i>4 May</i>	<ul style="list-style-type: none"> • Cardiocentro closes COVID-19 department, leaving only five COVID-19 beds

Three cases of hospital response in Ticino

Introduction

The COVID-19 pandemic forced hospitals to face the many new challenges associated with a lack of pre-existing scientific evidence and experience. Therefore, it is important to build preparedness by analyzing the actual responses of organizations, with the goal of defining strategies enabling to respond effectively to current and future crises, while maintaining essential services.¹⁴ In this respect the Ticino's hospital system decided to undergo a considerable reorganization aimed to contain the dramatic effect of an eventual hospital outbreak, while protecting care capacity for non-infected patients. At the institutional and organizational level, several aspects deserve attention to understand the dynamics and overall effectiveness of the response:

- **The logistic requires relevant and prompt decisions.** Dedicating clinical spaces for COVID-19 patients plays a paramount role to reduce exposure risks among already vulnerable patient groups and helps allay fears about seeking needed services during the crisis. However, any space reorganization or improvement needs to be supplemented with clear communication to guide people through safe access to services, as well as appropriate screening, triage, and infection prevention and control strategies to reduce the chance of diffusing the pathogen.¹⁵
- **The impact of the pandemic on the mental well-being of the healthcare workforce is a major concern.** Physicians, nurses, paramedics and other healthcare workers could develop high rates of anxiety, depression, acute stress and, eventually, post-traumatic stress as a result of their experiences being at the front lines of the pandemic.^{16,17}
- **The barriers imposed for safety reasons resulted in dramatic restrictions introduced for patients' relatives, with limitations (e.g., the use of personal protective equipment) or prohibitions of visits.** This caused a surreal atmosphere, especially for palliative care and end-of-life situations, in which the presence of a family member next to the patients is paramount.¹⁸ Therefore, ensuring special support to patients and families is a relevant area of adaptation in time of a pandemic. In particular, hospital staff made impressive efforts to help families spend time together using technology.¹⁹

¹⁴ Peiffer-Smadja N., Lucet J.-C. et al. (2020) "Challenges and issues about organizing a hospital to respond to the COVID-19 outbreak: experience from a French reference centre", *Clinical Microbiology and Infection*, 26(6): 669-672.

¹⁵ Krubiner C., Madan Keller J., & Kaufman J. (2020) "Balancing the COVID-19 Response with Wider Health Needs: Key Decision-Making Considerations for Low- and Middle-Income Countries", CGD Note, May 2020, Accessed at www.cgdev.org on May 2020.

¹⁶ Mock J. (2020) "Psychological Trauma Is the Next Crisis for Coronavirus Health Workers", *Scientific American*, June 1st, 2020, Accessed at www.scientificamerican.com on June 2020.

¹⁷ WHO (2020) "Mental health and psychosocial considerations during the COVID-19 outbreak", Accessed at www.who.int on April 2020.

¹⁸ Mercadante S., Adile C. et al. (2020) "Palliative Care in the Time of COVID-19", *Journal of Pain and Symptom Management*, (in press).

¹⁹ Anand P. & Sharpless J. (2020) "The Pandemic Is Changing How We Die—And Not Just for COVID-19 Patients", *Time*, May 13th, 2020, Accessed at <https://time.com> on May 2020.

- **The effectiveness and rapidity of response (sometimes two aspects not easy to disentangle in the analyzed circumstances) might depend on social capital and trust, which play an important role in fostering collective and coordinated responses.** This is likely true at several levels (state, inter-organizational, community)^{20,21} and might represent a contagious source of motivation for all the actors involved with different roles.
- Linked to the previous point, the **response capacity and the results are also grounded in the model of governance and inter-institutional cooperation**, such as public-private partnerships.²²

In the following three sub-sections, we present the case studies resulting from in-depth analyses of relevant experiences of hospitals on the front line of the pandemic. The narrative is mainly structured around the key aspect previously outlined.

²⁰ Wu C., Rima W., et al. "Social capital, Trust, and State Coronavirus Testing", Context, Accessed at <https://contexts.org> on April 2020.

²¹ Knack S. (1999) "Social capital and the quality of government: Evidence from the United States." *American Journal of Political Science* 46: 772-785.

²² Cepiku D., Giordano F., Meneguzzo M. (2020) "An integrated approach to the fight of the COVID-19: Italy and Switzerland", Mecosan, (in press).

Case study 1: Hospital "La Carità" of Locarno

Logistical and organizational changes

The ODL operated as COVID center from the beginning of March until mid-April 2020. In this period the hospital closed all non-COVID activities – including the Emergency Service²³ – except for few services, performed in a dedicated external structure, targeting non-COVID patients who could not postpone their treatments (e.g., ambulatory activities for patients in need of "life-saving" weekly infusions). Once the Canton of Ticino appointed the ODL as a cantonal COVID center, the hospital gradually transferred its non-COVID patients to the EOC hospital site of Bellinzona and converted all its specialist settings into internal medicine units, doubling the initial number of ward beds up to 200 (level 2: acute care), and created four additional ICUs (level 1: intensive care). Thus, increasing the number of ventilated beds by almost 1000%. These changes aimed at facing the expected surge in the number of people hospitalized due to the pandemic, foreseeing many cases with severe developments of the disease and a high mortality of patients admitted to the intensive care. The palliative care service also expanded its beds, which were placed in a dedicated area of the hospital, close to lounges set up for the meetings between the treating physicians and the relatives of those patients in very critical conditions.

This logistic reconfiguration required more space than the sum of all the existing wards. Therefore, additional space was created by moving the emergency service outside the hospital building, placing it in a new pavilion and leaving only one operating theatre active to cope with urgent surgeries potentially needed by hospitalized patients.

The ODL gynecologists moved to the Santa Chiara clinic, a local private hospital in Locarno, while other professionals were transferred to the EOC site of Bellinzona. The transfer of professionals and patients were the two main challenges associated with the creation of a cantonal COVID center. The hospital cafeteria was one of the first spaces prohibited to visitors, and seats were arranged to respect the safety distance between the personnel when eating. The transformation of the hospital "La Carità" into a COVID center was a complex task. In the initial phase, in fact, differentiated COVID/non-COVID pathways had to change several times (e.g., in the Emergency Service) according to the rapidly changing number of COVID and non-COVID patients in the hospital.

Inventiveness and originality played a paramount role in creating new logistic solutions, due to the limited time and alternatives available. Often there were no operating alternatives, and it was often a process of "learning by doing", standards usually strictly respected had to be relaxed. An example is the creation of an external tent for the Emergency Service, whose infrastructure was continuously upgraded and improved. Another example concerned the newly set-up intensive care unit, not always equipped with isolated floors and other standard technical support devices.

Managerial approaches

The emergency situation was continuously generating practical problems and calling for constant coordination. Therefore, the management replaced the ordinary weekly meetings with

²³ Although a separate non-COVID service was arranged to care for emergency patients coming autonomously and avoid double transfers.

three daily “open meetings” (at 8.15am, 11.45am and 4.45pm). The “open” qualification meant that: (a) the whole personnel was invited in order to have all the skills and knowledge available in a single place; (b) consecutive roundtables allowed anyone to ask or suggest anything considered relevant, with a shared rule of open-minded listening without judgement. On average 70-100 people used to participate in each meeting. The meetings aimed at raising awareness about existing issues, foster creativity, and match any problem with an appropriate shared solution. It was inspired by the model of adhocracy (or flatarchy), meaning that each meeting involved a large number of people following few shared communication rules and disregarding hierarchic roles. The “flatness” allowed employees of any hierarchical level to suggest new ideas also creating ad-hoc teams (e.g., the “pronation” teams further described). Minutes of the discussions were always taken during the meetings, and the decisions were quickly shared via email. A peculiar aspect emphasizing the importance of communication consisted of the adoption of a more direct and efficient communication style. For instance, when an employee called a colleague by phone, she/he did not start the conversation with greetings or excuses for interrupting in order to save precious seconds and get straight to the point.

In addition to the internal communication, the ODL established daily meetings with the Clinica Luganese Moncucco (CLM) and with the EOC Crisis Cell (“Cellula di Crisi”). The meetings with the CLM became routine more quickly than the meetings with the EOC Crisis Cell, because of an initial struggle regarding the managerial style in the EOC. The EOC expected that the ODL executed top-down decisions, for the sake of efficiency and timeliness, while ODL expected a participatory approach to decisions (based on a direct exchange of information and experiences to exploit the inherent flexibility of a multi-site hospital). In this respect, the ODL's management reported that they were missing a close link with key actors of the Ticino's health system during the first two weeks of the emergency. This aspect, in particular, was perceived as a barrier to share a sense of urgency to take decisions and act at a pace coherent with the illness' speed, as experienced daily. Therefore, ODL's management decided to meet in person with the EOC Crisis Cell, the CLM in Lugano, the EOC site in Bellinzona, and so forth. These initial meetings were opportunities to share personal experiences and perceptions, including the aforementioned sense of urgency often interpreted as panic by external stakeholders (e.g., public authorities or hospitals in other cantons). This initial situation of misalignment also had implications regarding the definition of a common ethical framework to cope with a scenario of capacity shortage (as explained in more detail further down below).

Equipment and new operating solutions

The EOC centrally managed the procurement of medical equipment (e.g., personal protective equipment), and the transfer of technologies and personnel. In particular, the EOC Direction managed the coordination with the Confederation, the army and the Civil Protection. In this respect, the ODL's management reported satisfaction in terms of both quantity and timing. However, when the Swiss oxygen suppliers and wholesalers of oxygen ran out of inventory, as a result of the high demand, the ODL had to sort out solutions in collaborations with other hospitals, which supplied the ODL with their own inventories. When even those inventories turned out to be insufficient, the ODL's technical service staff visited non-COVID hospitals to personally ask for further rationing the stocks already in use in their wards and transfer all the oxygen not strictly necessary to the ODL.

A relevant innovative solution coming out from the aforementioned daily “open meetings” was the setting up of 25 beds equipped with home fans where patients discharged from intensive care (level 1) could more quickly recover and be moved to the acute care ward (level 2). Such patients had to undergo a tracheotomy, but their recovery time was reduced from four to two-

three weeks, with consequent positive impact on the intensive care beds turnover. The innovation – called “weaning unit” by the personnel – resulted from the opportunity of sharing knowledge and skills practiced by some professionals abroad.

Human resources management

When the ODL became a COVID center, the operating model became 24h/24h 7/7, with shifts extended to 12 hours each and no differentiation in terms of patient-professional ratio for either nights or weekends.

The personnel expanded from about 900 to 1,400 full time equivalents (FTEs), with about 150 professionals transferred from other EOC hospital sites and all part-time employees and collaborators temporarily employed full-time to provide the necessary support in the ODL. However, a critical threat was presented by the fact that a relevant proportion of the personnel consisted of foreign professionals residing in Italy (cross-border workers, locally called “frontalieri”). Motivating those people to remain in Ticino during the crisis – temporarily leaving their families in Italy – was a necessary condition for any sustainable response to the pandemic.

Therefore, the ODL offered them to pay for their accommodation, an additional contract compensating for their stay during their free time (including holidays), and a monthly allowance. Conditioned on the fact that Italy did not call up its residents to support its overwhelmed health system. Many of those employees accepted and the organization expressed gratitude for their generous availability. The ODL also provided its whole staff with several supporting initiatives, as further explained in detail.

The middle management reported that all the aforementioned drastic changes did not cause resistance among the personnel. On the contrary, employees often showed willingness to go beyond the requests because of an emerging strong call for cooperation to achieve a “common goal”. This was common also among workers coming from different hospitals and settings who never worked together or in the ODL.

The personnel working in the logistics, supported the nurses as much as possible when deaths occurred and rooms had to be sanitized. This was usually a nursing staff's task, but the exceptional workload generated by the crisis led people to do their best to “let the nurses do the nurses”. This meant expanded work shifts for the cleaning service too, but it was commonly interpreted as an opportunity to make a difference toward a common goal. When the hospital restarted admitting non-COVID patients, the expanded shifts were also useful to support the radiology department for the sanitization process of the only CT scan equipment that had to be used for both COVID and non-COVID patients.

The top management did not decide to employ soldiers in the direct patient management. However, 5-6 soldiers have been employed to support auxiliary services: the logistic unit in the hotel management (supporting the management of accommodations for all the collaborators coming from other hospitals and for the employees of the ODL who stopped commuting during the emergency), the laundry department, the waste management, and also the kitchen and the cafeteria.

Supporting initiatives for the personnel

The ODL's management cared about providing its personnel with both psychological support and well-being services to alleviate their stress and establish an empathic relationship of mutual support. These two initiatives were considered complimentary, though they showed a different level of participation from the personnel.

When the ODL started to transform into a COVID-center, the General Director, together with the Medical Director and the Head of the nursing service, discussed with the psychologist of the geriatric area the need to provide psychological support to the whole staff, not only to physicians and nurses but also to administrative, housekeeping and technical staff. The psychologist agreed with the idea and made himself available to hold meetings on request. The management sent a short message via email to raise staff's awareness about the unpredictable emotional impact that the situation could have on them, with an invitation to contact the psychologist in case of need.

During the following two weeks, there were few requests. Therefore, the psychologist, together with the Head of the nursing service, introduced himself to the staff of those wards where he was not well-known and informed all the teams about the availability of a psychological support service. The psychologist realized that the personnel, while recognizing the importance of such support, was eager to go home and rest once finished with their professional duties because of the cumulated stress. After those two weeks, the General Director decided that it was necessary to propose more practical activities concerning self-care and personal well-being. This led to the implementation of the SoStare project, integrating well-being and psychological support as described in the box below.

The SoStare project

The SoStare project was an idea based on the literature and information from China and Italy, and it relied on the belief that, during an emergency situation, even more important than receiving a psychological support, is the opportunity for employees to get back to normality and foster awareness of their body and pleasant sensations. Therefore, the management of the ODL decided to provide employees with activities concerning self-care and personal well-being on top of the psychological support. In a week, almost twenty new collaborators (including psychologists, osteopaths, hairdressers, a massage therapist, and a chromotherapist) joined the SoStare project, followed by staff from the traditional Chinese medicine. Professionals were selected based on their skills and willingness to serve, providing them with a temporary contract so that services were free for the staff of the ODL. To benefit from these services, people had to call and book. Every Friday the SoStare schedule for the following week was published. The demand was extremely large, and services were highly appreciated by both the staff who already worked in the ODL and the staff coming from the other EOC hospital sites.

The east wing of the first floor of the hospital was dedicated to the SoStare services, that were provided in four workstations: two for massages, osteopathy, etc., one for hairdressing, and one for psychological support. In addition, one room was filled with deck chairs where collaborators could come to rest. There was also an atrium with colored sofas, one plant, a coffee machine, and one computer. The kitchen regularly provided drinks, snacks, and lots of sweets, chocolates, and biscuits (received as gifts from people and shops outside the hospital). In this space the staff regularly came to relax during breaks, and it represented an opportunity to meet, chat, and have a "little island" of normality in the midst of the crisis. In the meantime, several requests for psychological support arrived also thanks to the psychologists' rounds around the different wards. The housekeeping team, then followed by other professional teams, was the first to benefit from this service. The main aim of the group meetings was to allow the participants to reflect and take full consciousness of the

experience of the emergency. There were also occasional requests from particularly frightened or worried patients and meetings with patients' relatives, although the palliative care staff was mainly responsible for them.

Once a week a one-hour video conference was held among all the psychologists to coordinate their activities, and meetings were also organized between the ODL's psychologists and the other SoStare's project collaborators (hairdressers, massage therapist, etc.). These meetings aimed at dealing with the fact that they were not used to work in a context of suffering. During the first days of the emergency, all the people who had a managerial role within the ODL (team leaders, coordinators, middle managers, etc.) were quite fatigued not only because of the situation but also because of the load of responsibility for their teams. In general, the problems most frequently identified were burnout, anxiety, insomnia, nightmares, fear of getting sick and not being able to perform professional duties. Later, as the pace of work decreased and physical fatigue fell upon the people, many of them felt sadness, fear, and anger.

Most of the requests for psychological support came from nurses, domestic staff, and nursing assistants. The administrative staff also asked for support, as they were under stress since they were the ones who had to timely formalize contracts, look for housing, etc. in a very short time. Medical students and training nurses also received support. The professional figures who made the least use of the service were the physicians. Once the critical period was over, a psychologist stayed in the hospital for a few more weeks to listen to the requests for support and help to elaborate the psychological problems still present in some people (anxiety, insomnia, etc.).

Overall, the SoStare project lasted seven weeks and reached 120-150 average weekly activities. Whatever service was offered, it was likely taken. The only service that did not always go overbooked was the psychological support. One of the few criticisms that the psychologists received concerned that people would have liked psychologists to be in the ward since the beginning of the crisis, instead of having to look for their support.

Palliative care and family support

Among the professionals transferred to the ODL from other EOC hospital sites was the medical nursing team from the EOC Palliative Care Clinic. The palliative care service was an important element for appropriately managing end-of-life cases, working closely with the team of intensive care and internal medicine specialists to provide the best psychosocial and spiritual support to patients and their relatives. Two physicians and two nurses specialized in palliative care, three chaplains and two spiritual assistants were involved in providing palliative care to COVID patients. There were meetings between physicians and patients' relatives, organized in dedicated lounges, aimed to foster human touch when explaining the situation, thus "accompanying" patients' families toward the foreseen end-of-life. During the meetings, physicians were always supported by the staff of the palliative care service. In addition, everyday patients' families were informed by phone about the patients' health status or, eventually, her/his decease.

Another task of the palliative care team consisted of timely organizing the meetings with family members for patients whose health conditions worsened after their hospitalization (in compliance with the visitors' strict personal protection measures) and required intensive care. In such cases, before the patients' admission to the intensive care (where relatives could not access), their relatives were allowed to greet them. Similar meetings were organized when, for

various reasons, admitting patients to intensive care was considered a therapeutic obstinacy, thus allowing the families to come for a last farewell. In these circumstances, chaplains and spiritual assistants played a very important role in providing comfort and listening to the patients and their relatives. For any meeting, the family members were guided to the patient's room with a spiritual assistant or a chaplain and a palliative care nurse (no more than two visitors at a time) and always assisted to wear the protective equipment before entering the ward.

Visits were not allowed in the "weaning unit", except for end-of-life situations. Nevertheless, there was constant attention to create a familiar environment by surrounding patients' bed with different personal belongings (e.g., photos, letters, postcards). In addition, the palliative care team facilitated video calls between the patient and the family whenever possible.

In the lack of specific guidelines to deal with the emergency situation, the palliative care team, together with the internal medicine specialists, created an assessment tool called '3D-TiCoS'. This tool aimed at identifying fragile patients with different comorbidities who would receive conservative, palliative or end-of-life care. It supported physicians' decisions to take in charge patients who were not candidates for intensive care.

Ethical aspects

Initially, the ODL's management perceived a different level of awareness about the extent of the emergency, both within its own personnel and compared with external subjects. The Medical Director reported such discrepancy in the perception of emergency when contacting his colleagues working in other cantons, especially at the beginning of the emergency.

This worried the management also in relation to the eventual necessity of adapting the care standard in case of a shortage of the hospital's intensive care capacity. They needed reference criteria from a higher-level authority to cope with a possible shortage of capacities. As for other matters, the adopted strategy consisted of intensifying contacts with external stakeholders, including in the private healthcare sector in Ticino, as well as with the healthcare sector in Italy (where the awareness regarding the potential ethical problems due to the emergency situation was higher due to the worse epidemiologic situation), and with scientific societies in Switzerland in order to push the topic at the national decision-making level.

The networking activities were followed by a national decision from the Swiss Academy of Medical Sciences regarding common ethical guidelines to cope with the necessity of adapting the standard according to the level of pressure over medical capacity, and the eventual necessity of rationing healthcare services. However, the ODL's management did not report the occurrence of any intensive care rationing during the crisis.

Social capital: trust and community engagement

The local population as a whole and the voluntary associations in particular, showed willingness to help. However, especially considering the average age of the volunteers, they could not access the hospital for safety reasons. In fact, the canton issued a regulation forbidding non-professional subjects to work or volunteer within the hospitals.

Nevertheless, several interviewees mentioned that the local community represented a source of material and emotional support during the health emergency. Evidence of such support were the daily donations (such as food and other sorts of presents) received by the ODL during that period. Moreover, a point that has been stressed as being very relevant in managing of the emergency was the role that informal social networks played. Without personal connections and contacts some urgent and practical tasks would have unlikely been carried out. One simple example concerns the additional personal lockers that had to be found for the workers

transferred to ODL from other hospitals, in order to provide all of them with the necessary space to store their belongings. Since all shops were closed and it was hard to find short-time solutions, the ODL's logistic service managed to find 60 lockers from the Sport Center of Locarno and the padlocks of the lockers from a hardware store in the surroundings, via personal contacts.

Discussion

The case of the ODL emphasizes some relevant aspects worth of further discussion.

First, the institutionalization of public-private collaborations was an effective mean to face the emergency²⁴. In the reconfiguration of the cantonal hospital system during the emergency, the leading providers (such as the ODL) initially relied on the informal relations of their top managers and on a peer-to-peer intense professional exchange of information with other hospitals. Later, the reconfiguration was institutionalized by the canton to formalize roles and stabilize mutual expectations.

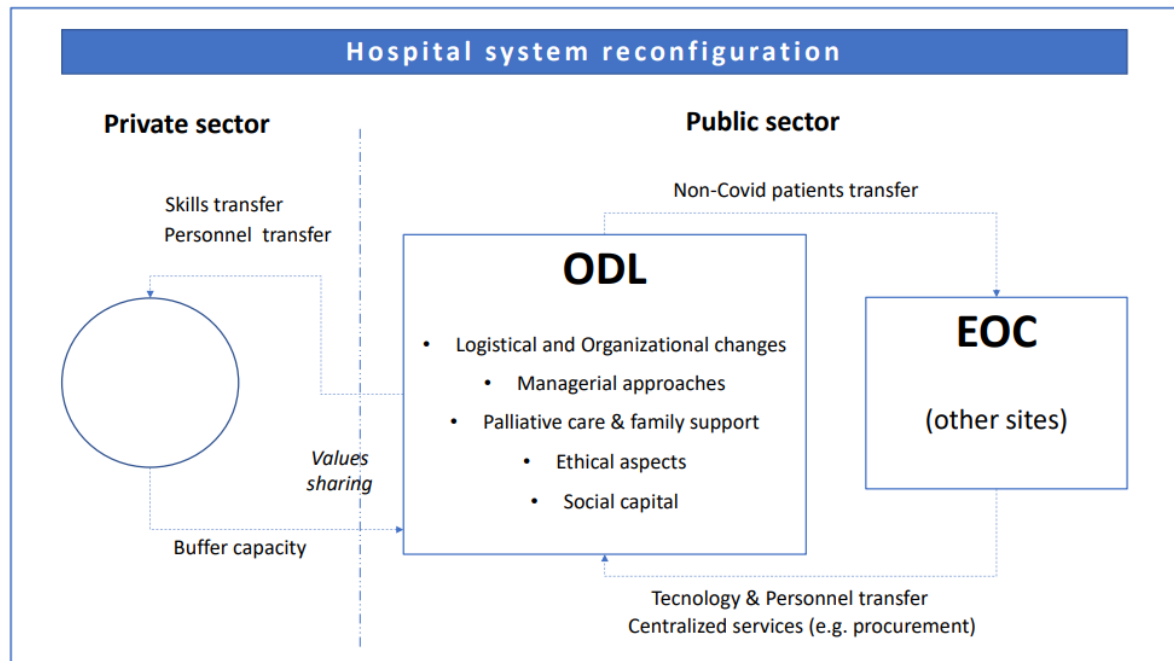
Second, the experience of the ODL highlights the potential of operating in a context of intra- and inter-organizational cooperation, as summarized in Figure 8. As far as the intra-organizational relationships are concerned, the compartmentalization of COVID patients in the ODL, which required a coordinated transfer of patients across the different EOC hospital sites and a concentration of all the medical technologies and professionals, resulted in an efficient management of the intensive care (level 1) and acute care (level 2) beds dedicated to COVID patients. As far as the inter-organizational relationships are concerned, the sharing of knowledge and practices between the ODL and the other public and private hospitals fostered the appropriate care of patients across the structures designated to treat COVID cases. In addition, the sharing of values of the ODL's top management with other structures, such as other EOC sites as well as other private structures, in particular the Cardiocentro Ticino and the Clinica Luganese di Moncucco was the premise to set common ethical principles to stimulate an official statement from higher-level authorities to cope with the potential need to adapt the standards of care in case of shortage of capacities. Finally, at the EOC level, the centralization of certain services might have played a strategic role to effectively cope with, for instance, the procurement challenges that occurred during the emergency.

In addition, the effectiveness of the logistical and organizational response of the ODL was complemented by bottom-up internal communication flows, as well as by a certain level of inventiveness and originality, both resulting from the more direct and efficient communication style adopted on a daily basis. Further, the relevant increase of human resources in the ODL and their strong commitment played a crucial role in the achievement of the overall organizational response. Such commitment was likely fostered by the significant effort of the ODL's management to care for its personnel (e.g., the SoStare project) during the emergency.

²⁴ See pages 14-15 for a list of private and public hospitals in Ticino.

Finally, the local community played an important role as a source of material and emotional support during the health emergency.

Figure 8: ODL's role and relationships in the hospital system of Ticino



In general, the adaptation process to the emergency has been defined (or described) as being “fluid” in different interviews, as priorities and objectives were requiring continuous adjustment over time, following a “learning by doing approach”. In this respect, the managerial approaches adopted, the preexisting assets of personal relationships among key actors, and the diffuse feeling of a shared responsibility toward a common goal played an important role.

The fact that there were no deaths among hospital professionals during the emergency and that the infection rate among the hospitals’ personnel was aligned with the Swiss average (5-6%) may be considered an indicator of the effective implementation of good personal protection practices during the emergency.

Case study 2: Cardiocentro Ticino

Logistical and organizational changes

A few weeks after the outbreak of the pandemic, the initial decision of not involving the Cardiocentro Ticino (CCT) in managing COVID cases changed because of the need to care for infected cardiopathic patients. From the beginning of the emergency, those patients had been treated either by the ODL or the CLM. The CCT did not operate as a *pure* COVID center, as it maintained its ordinary services for non-COVID patients, though completely separated from the services dedicated to infected patients. In fact, the CCT's building consists of two floors and the infrastructure is designed and equipped to activate the ventilation and constant monitoring of patients in any room. On March 18th, after a careful evaluation, the CCT decided to dedicate the second floor to COVID patients and isolated that space from the rest of the hospital, to minimize the risk of contamination. This has been possible by rearranging offices, dedicating one elevator to the personnel caring for COVID patients, and in general reorganizing the hospital processes and flows by isolating COVID patients and personnel from their non-COVID counterpart.

As a matter of fact, it would have been more convenient to manage the COVID-related activities on the first floor, where ordinary hospital activities take place, and the ICUs are available. However, this would have prevented a strict isolation of COVID patient flows, leading to potential issues of contamination. The Technical Service was able to create pressure differentiations between rooms, corridors and the nursing stations. Yellow and red zones were defined, the red ones being the patient's room where no one could enter unless properly equipped with masks, gowns, covers and other personal protection means, while the yellow zones being the corridor, where the nurses would get dressed and undress to get in/out of the red zone. The greatest risk lay in the exit, especially because the space of the clinic did not allow the creation of appropriate "middle-spaces" between the red zone and the rest of the space. However, as recommended by EONOSO (Infection Prevention and Personnel Medicine Service), all the procedures were implemented in the most rigorous way coherent with the characteristics of the clinic (bypassing rules only if strictly necessary). Despite the lack of "middlespaces", the CCT was able to implement a rooms-depressurization system – for which effectiveness was validated through a technical test using smokes.

An additional change was implemented to foster isolation. In normal conditions, the CCT and hospital "Civico" (ORL) are adjacent and connected by means of a corridor, thus sharing the main entrance. During the outbreak, as the ORL was a non-COVID hospital, the CCT decided to use a different entrance and created a tent dedicated to the triage of its personnel, to avoid overcrowding and the consequent risk of contaminations.

Finally, specific changing rooms along with specific offices were set up for the COVID personnel, and the spaces formerly used as waiting rooms were transformed into storage areas. In particular, the staff of Technical Service, who used to work in a single office (with four people), was split in two separate offices (with two people each), as an additional protective measure aimed to ensure that one couple would stay healthy should someone of the other group fall sick. Before opening the COVID ward, a meeting was organized with a delegation of the ODL's Crisis Cell, who made a site visit to share information for the safety and protection of collaborators and patients that was based on their experience. For instance, when the Technical Service of the CCT met its counterpart from the ODL, the ODL suggested the CCT to install cameras and baby-control systems as a means of supervising the COVID patient from outside the room. Considering the high risk in entering the rooms, such solutions proved to be very cost-effective

because it enabled both a visual and an audio supervision of the patients, as well as an active communication with the patient when necessary.

The staff of the CCT completed all the logistical changes in a few days, with the COVID ward ready by March 23rd: six intensive care beds (ventilated) in three rooms, six beds for intermediate care in another three rooms, and two further rooms for suspected COVID patients waiting for the results of the diagnostic test. The new logistical configuration, with two ICUs (COVID vs. non-COVID) lasted till the beginning of May without ever reaching a saturation of the capacity. Therefore, during this period, a few non-cardiopathic patients in serious conditions were transferred to the CCT from the ORL, instead of transferring them to a COVID center. In contrast to what was reported by the ODL, which stressed the importance of creativity in enabling a timely response to the crisis, the CCT instead emphasized a strong focus on the importance of logic, followed by technical knowledge and the pursuit of clearly defined objectives.

Managerial approaches

From February 15 to 16th, the CCT (and EOC) started developing management guidelines for COVID patients because about 50% of the CCT activities were emergency cases, for which time represents a critical life-saving factor. The guidelines became official on February 21st.

During the following weekend, news about the outbreak in the Codogno hospital (in Lombardy, Italy) reached the EOC management and the reconfiguration of the hospital system in Ticino changed. To cope with the emergency, the CCT created a Crisis Cell composed of four members: the Executive Director, the Medical Director, the Head of the Nursing Staff and the Head of the Technical Service and Safety Group (each one with a designated substitute). The Crisis Cell held a meeting on a regular basis (every Monday) to share updated information about the pandemic situation and to make decisions. All the decisions resulted from the close interactions with the Crisis Cell of the EOC – where the CCT General Director was personally involved – and the Crisis Cell of the CLM (interactions with the latter regarded mainly as an opportunity of transferring specific cases).

The second phase (from April 27th) was more challenging than the initial phase of the pandemic. While during the crisis all the personnel looked for top-down decisions – perhaps as it was an unknown situation – the easing of the restrictions also required a communication effort to set clear (weekly or daily) steps to ensure a prudent re-opening of the activities (e.g., limited number of daily visits, surgical interventions). This period lasted about three weeks and the top management experienced several pressures to quicken the re-opening process. In particular, professionals had to ensure observable outcomes (i.e., avoidance of waiting rooms, constant respect of social distance, enhanced hygiene) while providing ambulatory care. At the end of May, volumes were close to the pre-crisis levels (during the two months of crisis the CCT worked at 50% of the ordinary level with an estimated loss of 10% of the revenues)²⁵.

The preparedness for a further emergency is currently (as of May 2020) based on the constant availability of one isolated intensive care room and an architectural change aimed to enable the prompt isolation of two rooms (as the equipment used for the COVID ward is already available and ready for a rapid re-set-up of a COVID-area (in practice, it would take less than the

²⁵ Note: the reimbursement (Swiss-DRG) for COVID patients is not different from ordinary cases.

officially granted 48 hours). In addition, the second floor is going to be modified – in terms of architecture and equipment – to enable the creation of an isolated ward with a capacity proportional to the actual needs (i.e., not necessarily the whole floor) and with two isolated nursing stations. By the end of June, this investment will allow, if needed, the recreation of the described emergency logistic configuration in 48 hours, eventually without any interference with the non-COVID activities. In addition, the CCT is going to eliminate the tent for the triage of the personnel and install thermo-scanners at the entrance. A second measurement would be undergone in case of a first high-temperature positive result and in case of a positive second measurement, a phone to call to the staff in charge of undertaking a manual measurement would eventually verify whether the person can or cannot actually access the hospital. Finally, another ongoing change consists of the installation of mask dispensers in strategic places of the building, as their prompt distribution was experienced to be a challenge especially for external people.

Equipment and new operating solutions

The logistical changes described were facilitated by the recent dismantling and substitution of some machinery. This allowed the Technical Service to requalify and put some equipment back into operation very quickly. In fact, the presence of machines in stock saved a lot of time, considering the difficulty to find ventilators during the emergency.

Retrieving materials other than the machineries, on the other hand, was reported as very challenging because such, at the time, rare items were being requested by many clinics simultaneously and receiving such supplies could even take months.

For the safety of the CCT's personnel and of people transitioning out of the building, a cheap but effective method was implemented to make sure that the air expelled from the patients' rooms would be filtered, thus avoiding the expulsion of infectious pathogens. Specifically, the CCT adopted the same filters used for SARS some years before to clean the air pushed outside the red zone spaces. In this respect, the CCT did not report cases of infections among the nursing staff.

Access to newly developed safety guidelines was made easy by publishing them in a dedicated section of the CCT's intranet, which became a reference point for the personnel.

Human resources management

On March 7th, there were rumors about the possibility that borders could close. This would have meant a serious shortage of clinical personnel. The top management estimated the financial effort to ensure an at least one-month availability of the personnel (e.g., accommodation) needed for the operation of the hospital. Already before midnight on the same day, all necessary professionals who were residing in Italy were moved to Ticino. The personnel were accommodated in a four-star hotel during the whole emergency. All the personnel gained access for smart working and was invited to conduct at home all the activities that did not require physical presence at the CCT (e.g., typewriting documents, research). This measure was intended to reduce the risk of contagion among the personnel. From the beginning of the pandemic, the CCT decided to maintain the eight-hour shifts during the whole crisis period to avoid excessive workload. This was intended as an approach to limit the stress for the personnel already facing unusual and challenging circumstances.

Initially, the nursing staff showed some resistance to work in the COVID ward, due to the contrasting messages and images coming from abroad. The Cell Crisis decided not to force nursing

personnel's decision in this respect: each nurse could voluntarily choose to serve on the COVID ward. However, over the course of the emergency, attitudes changed, and many staff members provided their proactive contribution (even for a whole month), despite the initial fear of working with patients infected by the new disease. There was such a strong commitment that some staff had to be excluded. In total, around 40 to 50 nurses worked in the COVID ward during the emergency. It was reported that what made nursing staff choose to serve on the COVID ward was a kind of pride to be able to engage in the emergency activities and to learn the new procedures to take care of COVID patients.

Some nurses (e.g., medical practice assistants) were trained to support the ICUs, while some physicians who could not perform their ambulatory activities were either involved in the CCT emergency operations or transferred to the ODL. The training was based on the CCT's pre-existing networks with Swiss professional societies (e.g., SWISSNOSO) and small internal groups engaging in training activities (e.g., during the crisis there were repeated training sessions on the use of personal protection equipment or handwashing). For these activities the CCT took advantage of the ODL's experience in the previous two weeks. In fact, a CCT delegation went to Locarno in order to learn from the experience of the EOC COVID center, also recording practical procedures.

The CCT also transferred some of its skilled personnel to the ODL: specifically, two intensive care nurses and two intensive care physicians. This decision was based on the top-down information from the cantonal Crisis Cell to ensure overall coordination of resources across the hospitals. In particular, the medical specialization of the CCT made a naturally available abundance of skilled professionals dedicated to the care of COVID patients.

Supporting initiatives for the personnel

The need for psychological support for the personnel was not underestimated by the CCT Crisis Cell. When the COVID ward opened an internal "Psychological Emergency Service" was set up for the personnel in collaboration with the cardio-psychotherapy service of the CCT.

The service consisted of one CCT counselor and one psychologist. Although it was addressed to the staff, it was also available for patients (COVID and non-COVID) and their relatives. Because of the emergency and risk of contagion, psychological support to the person/s requesting help was given through telephone calls. As a matter of fact, not many personnel's requests for support were reported.

Palliative care and family support

During the emergency, patients could not welcome visitors due to the rigid safety policy. Therefore, the CCT made several tablets available in all the wards, including the COVID ward. By using the tablets, patients could receive "virtual visits" from their relatives. This initiative was highly appreciated and allowed families to feel closer to their loved ones though remotely. Exceptionally, in some end-of-life cases, the CCT patients could receive a visit from one of their closest relatives. However, there were also people who preferred to see their loved ones through the new technology since they worried about the risk of infecting someone.

In this respect, according to the CCT's nursing personnel, the health emergency highlighted the importance of discussing in advance people's end-of-life wishes.

Social capital: trust and community engagement

In the canton of Ticino physicians, nurses, and other front-line healthcare workers were celebrated as heroes during the COVID pandemic. During the health emergency, citizens and

institutions constantly showed acts of kindness and solidarity towards the CCT staff, who benefited of little gifts, as well as gastronomic and other in-kind donations. In addition, priceless gestures of closeness helped the staff to perceive the situation as more bearable. The CCT has used social media and its own official website to publicly thank all the community.²⁶

Discussion

During the emergency, the investments into infrastructure were rather low, compared to the other two COVID centers. However, the CCT made ex-post investments to prepare for eventual further pandemics.

The serious problems in finding personal protection equipment, especially considering the market prices during the emergency, emphasized the importance of reviewing inventory management practices in hospitals. In fact, ordinarily, inventory stocks are managed mainly to foster efficiency, at the expenses of safety in case of unexpected market conditions.

Like the ODL, also the CCT operated in a context of intra- and inter-organizational cooperation. Its recent agreement with the EOC made this private organization, on the one hand, closely linked to the public hospital and, on the other hand, still allowed it to take autonomous decisions. The involvement of the CCT's General Director in the EOC Crisis Cell, the transfer of highly skilled personnel and the close interaction with the ODL were signs of the strategic and operational alignment of the two management coalitions.

Case study 3: Clinica Luganese Moncucco

Logistical and organizational changes

The Clinica Luganese Moncucco (CLM) was a designated COVID center from mid-March until mid-April 2020. In this period the hospital closed all non-COVID activities including the ER, except for a few services targeting non-COVID patients who could not postpone their treatments (namely, oncology, geriatrics, neurology, radiotherapy, cardiology and urology). The non-COVID activities ran at 20-30% of the normal level and were performed in a specific block ("Blocco B"), while COVID patients were located in a separate block ("Blocco A"). As far as the emergency service is concerned, an external triage had been set up in the ambulance hangar. The space was split into a checkpoint aimed to triage COVID-patients and an area where the ambulance could stop. In addition, they extended the opening hours of the emergency service from 7-22h/7 to 24h/7.

The initial plan consisted of converting CLM into a COVID center around March 21st. The management decided to reorganize all the activities in few days (the decision was taken on March 12th and fully implemented four days later, when the first COVID patient was admitted around noon). The conversion required accelerating some discharges and transferring some patients to other private clinics or to the EOC. The decision aimed at supporting the ODL that was saturating its maximum capacity, considering the ongoing epidemiological developments. With neither a federal directive assigning them to the role of a COVID center nor clarifications on what such a change would have meant financially, on March 16th the CLM activated four COVID wards, redefining the normal activities by merging, from a clinical and organizational point of view, the usually separated internal medicines (geriatrics, cardiology and

²⁶ Rusconi A. (2020) "Come il Cardiocentro Ticino ha affrontato il COVID-19", Project Work for the MAS NetMEGS, Università della Svizzera Italiana (unpublished).

reumatology) into a unique multidisciplinary context. Such a redefinition also concerned the internal medicine personnel which was complemented by the arrival of external specialists (i.e., pneumology and nephrology). This way the CLM has been able to increase the number of intensive care beds from six to 30.

During the peak of the emergency, the CLM provided intensive care for 23 to 24 patients. In case of necessity, they could have managed up to 30 to 32 intensive care beds (or 34 to 36 but with some compromises in terms of quality of care). As for the acute beds (level 2), the CLM reached an occupation of 180 beds out of 200 available (or 240 with some compromises, such as converting single rooms into double or triple rooms).

Ex-post, the General Director reported that the initially prospected need for increased capacity was somewhat overestimated. From the beginning of April, after the peak had been reached, the drop of hospitalizations occurred faster than expected. After mid-April, the CLM started a backward transition to normality by slowly reopening the non-COVID activities and serving both COVID and non-COVID patients.

Managerial approaches

The CLM Crisis Cell was composed of the following members: the Director, two infectious disease specialists (one of whom is also the Health Director), the Heads of the three nursing units, the three managers of the acute care (emergency service, intensive care and anesthesia), the Head of the pharmacy, the Head of procurement, the Head of quality and patient safety, and the Head of human resources. Later, the Head of communication joined the Crisis Cell to help managing the media relations.

Daily plenary meetings (taking place at 7:30 am) were introduced and were open to all the personnel of the hospital. They were reported to be a very important part of the daily organization. The main goal of such meetings, other than passing on the day-night duties, was to circulate clear messages, clarify changes and evaluate the importance of various aspects of patient care. In addition, the Crisis Cell also used to meet daily to discuss managerial issues.

From a clinical and organizational perspective, the normal activities were completely upset by the merge of the usually separate internal medicine specialties (geriatrics, cardiology and rheumatology) – to obtain the necessary economies of scale – and by the arrival of several external specialists belonging to other internal medicine specialties (e.g., pneumology, nephrology). However, this proved to be helpful when it soon became clear that COVID-19 did not only concern the respiratory system but also other organs, thus requiring the support of other specialists, such as cardiologists and immunologists.

As far as external communication is concerned, the relationship with the media was initially problematic due to the journalists' – what one might term – “obsessiveness” for new information, along with a lack of technical knowledge on the topic. The situation, however, improved over time with the Head of communication being able to efficiently filter requests and coordinate responses coherent with the CLM's vision and strategy.

Equipment and new operating solutions

The hospital was able to rent some machinery from their traditional suppliers and initially the staff temporarily used the ventilators usually adopted in the anesthesia unit. Such a solution worked well despite some limitations, until some ventilators were provided by the army, thus allowing a further increase in the number of ventilated beds.

However, during the crisis, it was reported being very hard to find personal protection materials, such as medical gowns and masks. Such goods were both rare and expensive and because the CLM did not want to increase the burden on the Cantonal Pharmacy – which itself was

running out of stock – the management tried to find alternative solutions by collaborating with the EOC procurement services to search and contract with private facilities outside Ticino.

Human resources management

The shifts were extended to twelve hours each to address the continuous high volume of activities and to face the issue of commuters living in Italy. In fact, they were running the risk of being unable to cross the Italian border due to the situation in Lombardy, Italy. This was a serious problem for the hospital operations, as one third of the personnel at the CLM consists of commuting employees (especially in the areas of intensive care, anesthesiology and emergency)²⁷. From March 7th to mid-April/beginning of May, about 40 contracts of professionals were modified with an additional compensation and accommodation provided to make sure they would commit to stay in Ticino during the emergency. Another important change regards the fact that the majority of the doctors are normally employed at 50% FTE at CLM, with the remaining time available to run a private practice. During the emergency, however, professionals agreed to increase their working time up to 100% FTE (the same applied to the nursing team) – with a proportional increase in their salary. Since the hospital never reached the expected occupation levels, normal working shifts were guaranteed (with three consecutive days of work and two resting days) and changes were well accepted and even interpreted as an opportunity for professional growth by most of the workers.

The majority of the personnel working in intensive care was transferred from the surgery area (mainly anesthesiology physicians and nurses, surgery nurses) to cope with the initial increase in COVID-related capacity. When intensive care beds further increased, the CLM also received support from personnel of other private clinics in Ticino (overall 13 FTEs): in particular, two physicians and some nurses experienced in intensive care or anaesthesiology. In addition, the CLM set up a temporary (10 days) exchange of physicians and nurses with the Clinic Hirslanden (outside Ticino), whose staff wanted to gain familiarity with the disease (overall 2 FTEs). On top of that, the CLM decided to hire some nurses no longer practicing but still with sound professional skills. Overall, the personnel expanded from 674 to about 700 FTEs.

The management did not consider it necessary to involve volunteers, also because it was clear from the beginning that the most important resources were specialized professionals. The decision of excluding volunteering resources from the operations was preceded by the cantonal directives in this respect. The same holds true for the support of the army, which would have become of use only in circumstances of saturated capacity.

Support for the personnel

The CLM activated an internal psychological support service. Two psychologists of the hospital had to reorient their ordinary activity of supporting patients to also supporting the personnel during the emergency.

This proved to be useful, especially in the most critical phase, when the number of deaths were at their peak. In addition, external psychological support (via phone) was provided at the cantonal level, a service which was more keenly used by some collaborators, perhaps because of the weaker personal link.

²⁷ The situation is similar in EOC, as previously mentioned in the case of ODL.

Palliative Care and family support

During the emergency, the CLM set up a palliative care service mainly managed by the geriatrists and an internal consultant specialized in palliative care. However, such service were, to some extent, less necessary for COVID patients than for the usual (non-COVID) patients in need of palliative care. This is due to the fact that the average time from the moment the COVID patient would start suffering to the moment of her/his death is overall very short. Instead, what was reported as particularly hard concerned the decision about whether putting a patient in intensive care with ventilation or not.

Another difficult aspect concerned the handling of the relationships between patients and their families. The personnel became a link between them because visits were not allowed unless in case of patients with a rapid and serious decline in their health status. In such cases, the visit of one family member was allowed for a maximum of 15 minutes. In all the other cases, tablets were promptly introduced from the first days to allow for virtual communication with relatives.

Ethical aspects

Especially at the beginning of the emergency, there was a fear that ethical decisions had to be made when getting close to the exhaustion of capacities. Such feelings prevailed, initially, in the ODL and mainly had to do with decisions on whether to transfer patients to intensive care or not. In practice, such decisions had to do more with the choice to avoid unnecessary care rather than with a shortage of beds, ventilators or other resources. Fortunately, as the full capacity was never reached, such ethical decisions never had to be taken in practice, although initially many potential alternative solutions to avoid such a possibility were investigated.

However, as also reported by the management of the CCT and of the ODL, during the emergency the CLM had to face the issue concerning the necessity of adopting a trial-and-error approach to cure patients with an unknown disease. In fact, initially, there was no scientific evidence regarding the effectiveness of the adopted therapies.

Social capital: trust and community engagement

The local population as a whole showed gratitude to the hospital, especially in private and professional contacts (even weeks after the first phase), and willingness to help. Many "thank you" cards were received and exposed in a showcase placed in the hospital hall, together with gifts, such as chocolates and some meals received from the local shops and restaurants.

In addition, CLM created a fund dedicated to patients, collaborators, and research on COVID and communicable diseases. Several important donations have gone into this fund.

Discussion

Similarly, to the ODL and the CCT, the case of the CLM confirms the importance of operating in a context of intra- and inter-organizational cooperation.

As far as the intra-organizational relationships are concerned, the logistical reconfiguration, turned out to play a relevant role for implementing effective solutions to isolate "Block B" and "Block A" as well as the triage and ambulance areas. By leveraging its specific structural features, the CLM was able to maintain, albeit partially, its ordinary non-COVID activities.

From an inter-organizational point of view, the horizontal integrated approach has proven to be a meaningful factor for collaboration with other services of the territory, such as ambulances, cantonal psychologists and the army – other than the collaboration with other hospital facilities.

The CLM case also highlights the importance of generating economies of scale when facing an emergency of such magnitude, as exemplified with the creation of a single multi-disciplinary setting by merging usually separated internal medicine specialties.

Finally, the case emphasizes two strategic aspects. The first aspect refers to the different institutional setting of the CLM compared to the other two cases operating within or in strict partnership with the EOC. Not being part of a network such as the EOC did not allow the hospital to easily take advantage of sharing skilled professionals (though the pre-existing relationships with other private organizations somewhat filled the gap). The less rigid hierarchy of CLM, however, (where healthcare activities take place in competence centers and one of the organizational core values is that each physician – hired as an independent accredited professional, rather than an employee – is “*primus inter pares*”)²⁸ called for less frequent daily coordination and communication practices. The second aspect refers to the timing of engagement on the front line of the pandemic, that allowed the CLM to partly build on the ODL's experience thus taking more stable decisions of organizational reconfiguration (e.g., less consecutive changes to reach the final logistical setting).

²⁸ See also the CLM's official site: <https://moncucco.ch/la-clinica/organizzazione/> (accessed on July 2020).

Conclusion and recommendations

The analysis of the response organized by the Ticino hospital system highlighted, above all, the importance of operating in a context of intra- and inter-organizational cooperation and the relevance of institutionalizing public-private collaborations in times of crisis. In this respect, relevant examples of such a horizontal integration are: the coordinated transfer of patients across the different hospital sites, the concentration of specific medical technologies and professionals in the COVID center, and the sharing of knowledge and practices.

The important role of the public-private partnerships became particularly evident when the CLM and the CCT came into play as COVID centers. The ODL, could be considered a game starter catalyzing the collaborative efforts of the other providers. The CLM opened to COVID patients to support the activities of the ODL that was reaching its full capacity. Such processes took place with neither ex-ante directives assigning them the role of COVID centers nor clarifications on what such role would have meant financially. The CCT reacted with its reconfiguration to care for a specific target of patients and facilitated the distribution of skilled personnel at the cantonal level.

Another relevant common aspect emerging from the analysis, with special reference to the CLM and the ODL, is the importance of taking advantage of economies of scale when facing an emergency of such a magnitude. Through the concentration of technologies and personnel in a few multi-disciplinary settings, by merging usually separated internal medicine specialties (internal integration), the two hospitals were able to face the emergency efficiently.

Moreover, in all three cases showed how social capital and trust played a prominent role during the health emergency, with the local community representing a source of material and emotional support for the hospital. Similarly, informal social networks showed to be very important to carry out urgent and practical tasks.

Differences between the cases analyzed are on the other hand found in their managerial styles. While the ODL and the CLM showed participatory approaches to decision-making, with daily meetings open to all the personnel; the CCT instead, seemed to adopt a less participatory approach as compared to the other two cases, as it was more based on a close interaction between the CCT and the EOC Crisis Cells. This may also be due to the smaller size of the CCT compared to the other two organizations.

In the ODL the change management appeared to be “fluid”, since priorities and objectives required constant updates according to the logic of “learning by doing” and with the explicit intention of boosting creativity and inventiveness. Contrarily, the management of logistical and organizational changes were driven by logic, technical knowledge, and clearly defined objectives in the CCT and CLM.

Another relevant aspect was the attention that the top management of all three hospitals dedicated to containing the indirect psychological effects the emergency had on the “two populations” hit by the crisis: the patients and the hospitals’ personnel. In particular, the ODL activated a specific and well articulated initiative in this respect (SoStare project). The CLM reported a moderate use of its internal and external psychological support. Also, the CCT activated a psychological support service, reporting a moderate volume of requests. All the organizations did proactively cope with the risk of depending on professionals living in a foreign country, namely Italy.

Finally, the ODL and the CCT built preparedness for potential further emergencies by investing in the ability to recreate the emergency logistic configuration in 48 hours, eventually without the necessity of stopping the non-COVID activities.

Table 4 below outlines a comparative summary of the discussed aspects across the three case studies analyzed.

Table 4: Comparative synthesis of the analyzed case studies

Aspect	ODL	CLM	CCT
<i>Intra- and inter-organizational collaboration</i>	Relevant	Relevant	Relevant
<i>Social capital contribution</i>	Yes	Yes	Yes
<i>Managerial approach</i>	Participatory style «Open meetings»	Participatory style «Open meetings»	Close interaction between CCT and EOC Crisis Cell
<i>Change management</i>	Learning by doing Inventiveness	Focus on logic, technical knowledge and clearly defined objectives	Focus on logic, technical knowledge and clearly defined objectives
<i>Mental wellbeing of healthcare workers</i>	Articulated internal initiative (SoStare project)	Internal and external psychological support	Internal "Psychological Emergency Service"
<i>Preparedness for the second wave</i>	Yes	Not mentioned	Yes

In summary, the findings from the three case studies suggest that collaboration towards a common goal, constant communication, and pre-existing personal connections among key actors of the hospital system played a critical role to cope with the crisis. The emergency also highlighted the importance of managing the dependence from other countries both in terms of skilled personnel and supplies.

Based on the evidence collected through the case studies, the authors identified some actionable recommendations:

Recommendation 1: Recognize the importance of public-private partnerships to reach effective collaborations when an emergency threatens the health of the whole population. To this extent, defining a legal and institutional framework might ensure the efficient application of the rules and principles when roles and responsibilities of each party must dramatically change due to unexpected contingencies.

Recommendation 2: Consider the importance of economies of scale associated with the concentration of technologies and personnel. Such an approach also fosters the resilience of the health system in case of an intra-hospitals nosocomial outbreak.

Recommendation 3: Find the right balance between “control”, with the high-level authorities defining uniform rules and processes, and “participation”, allowing the local actors to have a voice and transmit a realistic picture of the situation in the field. The final goal consists of fostering efficiency while maintaining a grip on the real developments of the phenomenon.

Recommendation 4: Inventory and supply chain management should be revised considering the challenges posed by a pandemic, as usual supplier conditions, product requirements, and lead times are considerably challenged in such a contingency. Hospitals' management rules and practices should be inspired not only by efficiency principles but should also account for the likely shortage of equipments necessary to cope with a pandemic and the demand and price changes occurring in such circumstances.

Recommendation 5: Care about the psychological effects on the “two populations” hit by the crisis: the patients and the hospitals' personnel. Developing interventions designed to tackle the indirect social and psychological effects of the pandemic is of paramount importance to foster systemic resilience.

Recommendation 6: Prepare for potential future waves of the pandemic or further pandemics. Building hospitals' logistic and organizational preparedness is very important to be ready for being able to deal with eventual re-configurations in a short timeframe.

Disclosures

Ethical issues

Not applicable.

Competing interest

Authors declare that they have no competing interest.

Authors' contributions

All authors made substantive contributions to the study and reviewed and approved the final manuscript.

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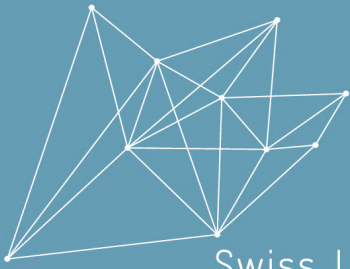
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Any errors or omissions remain the responsibility of the authors.

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