

## A report from COVID-19 Italian epicentre: LODI Hospital experience in healthcare workers protection.

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### Abstract

The report describes organizational and occupational strategies adopted by Lody Public Hospital (the first epicentre of Covid-19 outbreak in Italy) in order to face pandemic. Occupational Safety System (OSH) introduced infection prevention and control strategies (IPC) for the protection of healthcare workers (HCWs, while a reorganization of whole hospital based on the level of intensity of care for COVID-19 patients was established.

Screening on HCWs (N= 248) by nasopharyngeal swabs for SARS-CoV-2 and comparison between HCWs and local population (N=1123) are shown. These preliminary data, collected from 25<sup>th</sup> February till 25<sup>th</sup> March 2020, confirms that measures adopted mitigate the effects of virus transmission within the hospital and reduced the HCW component of the transmission of the infection.

Additional studies in depth are currently underway.

## Introduction

A novel human coronavirus (SARS-CoV-2) emerged in Wuhan, China, in late 2019. On 30<sup>th</sup> January 2020 the World Health Organization (WHO) declared a public health emergency and on 11<sup>th</sup> March defined it as a global pandemic [1] due to more than 118,000 cases of the coronavirus illness in over 110 countries and the risk of further global spread.

Report from affected countries have revealed in the past (2003) that 22% of HCWs were affected in hospitals across Hong Kong with the initial wave managing to infect 80% of the staff working in the medical wards of Prince Wales Hospital. [2]

Although evidence of super-spreading events in medical institutions that treats patients suffering from COVID-19 hasn't been described yet [3], the risk of infection for hospital workers is greater than the risk for the entire population, and medical personnel is a potential vehicle for spread of SARS-CoV-2.

Figures from China's National Health Commission show that more than 3300 healthcare workers have been infected as of early March and, according to local media, by the end of February at least 22 had died. [3][4]. In Italy, by March 23<sup>rd</sup> 20% of responding health care workers were infected, and 24 have died [6].

## Organizational and Occupational strategies

*"February 19<sup>th</sup> in the afternoon, a 38-year-old male, M.M., accessed Lodi (Lombardy) Hospital ER with aspecific fever and asthenia. He was discharged after several clinical examinations with no specific findings. After few hours he returned to ER referring the onset of respiratory symptoms. He was hospitalized and admitted in the Medicine Department. He moved to ICU in the following morning because of the worsening of his clinical conditions. At 9 p.m. of 20<sup>th</sup> February 2020 the Regional Reference Laboratory notified the nasopharyngeal swab positive result to SARS-CoV-2. In that moment M.M. became "Patient 1" and Italian COVID-19 epidemic outbreak."*

"Patient 1" has been managed in a very short time by three units: ER, Medicine Department and ICU. He was admitted in ICU at 11 a.m.. At 2 p.m. the head nurse, due to the suspicion of Covid-19, ordered all the nurses to wear the highest level of biological protection available in the hospital (total biological suit, FFP2 mask, facial and gloves) and prescribed personal protective equipment (PPE) have been strictly used ever since. ER department has been closed almost immediately.

Occupational health surveillance system has been rapidly activated, and quickly reached its full strength. .

Given that nosocomial transmission has been recognised as an important amplifier in epidemic [7][8] by 24<sup>th</sup> February Departments and Systems disappeared. A new organization based on the level of intensity of care for COVID patients was created. Non essential services were suspended, in order to prioritise resources. A Crisis Unit was established from the "day 1", with a 24/7 uptime.

By 25<sup>th</sup> February filter zones were set up, initially for the blue area, then for all areas of the hospital. As reported in Figure 1, risk exposure for HCWs differed depending on the area in which health care workers operated.. According to this, different levels of PPD and protection measures have been defined for each area.

## Table 1 - Organizational Criteria

Area	Intensity of care	numbers of Covid-19 confirmed cases	Biological risk
Blue	High	All	Very high
Yellow	Medium	All	High
Orange	Low	Awaiting for diagnosis	Medium-High
Green	COVID FREE	No cases	Low Medium

In addition, due to the partnership with the team of Médecins sans Frontières NGO who faced pandemic crises all over the world, and according to their experience, the Infection Control Group (ICG) has been established with the following tasks:

- Identify correct PPD for the specific area
- Create the filter zones
- Train all the workers for specific procedures and instrumental practises according to the area risk exposure. HCWs had been trained for the ordinary biological risk and not for the extraordinary situation created by the epidemic.
- Check dressing and undressing activities before entering or leaving the area by a tutor. These actions and the incorrect use of the PPD are the most common causes of infection for medical personnel during pandemic.

### Efficacy and effectiveness

In order to evaluate the effectiveness of the measures and procedures adopted we illustrate some preliminary data results. Firstly, we consider the results of nasopharyngeal swabs for SARS-CoV-2 (NSSC) in the nursing staff that was initially exposed to “Patient 1” (Table 2). The nasopharyngeal swabs were collected from all the healthcare workers (HCWs) and completed in the following two weeks.

Table 2: Laboratory testing results of nursing staff in ER, Medicine Department and ICU.

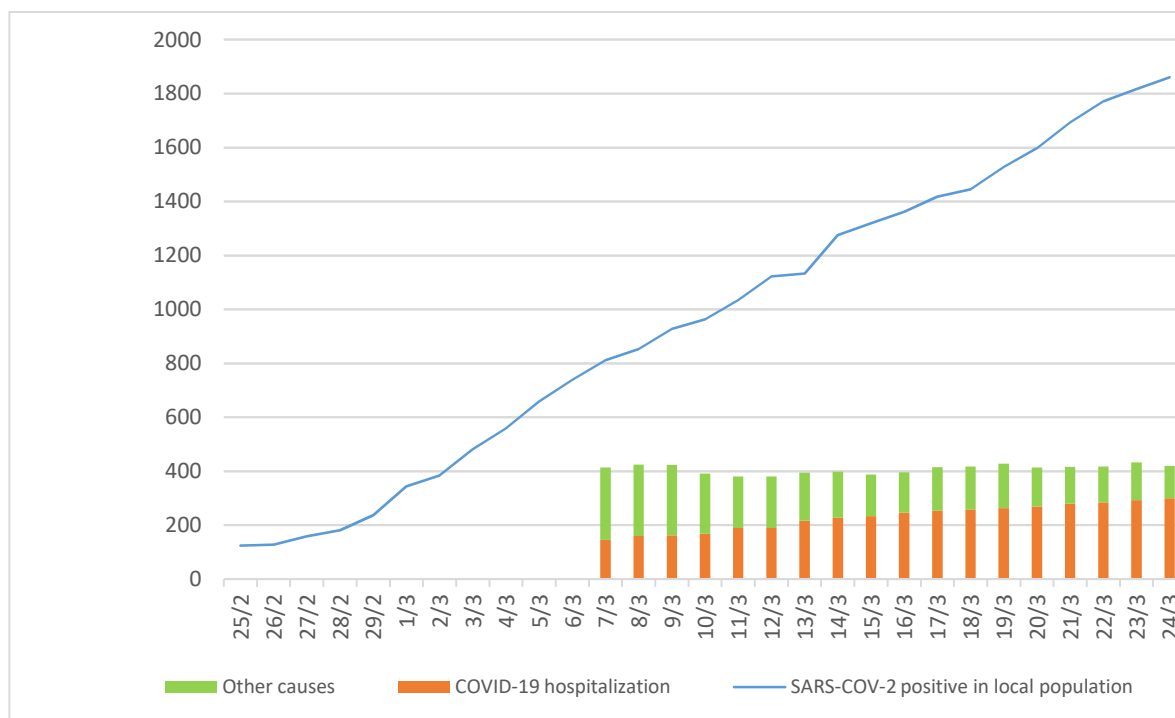
Unit	Test on nursing staff	Workers with positive SARS-CoV-2 swabs	% SARS-CoV-2 positive swabs
Emergency Room (ER)	25	3	12.0%
Medicine Department	39	25	64.0%
Intensive Care Unit (ICU)	14	0	0.0%
Total	78	28	36.0%

Data show that only 28 (36%) healthcare workers who managed “Patient 1” resulted positive for Sar-Cov-2. That none of the health care workers in ICU acquired infection suggests that protective procedures preserved them from being infected. The early control of the SARS-CoV-2 cluster transmission, which played an important role in slowing down the subsequent spread within the hospital, was obtained thanks to a prompt diagnostic suspicion and an early activation of protective procedures. Moreover, data collected from Medicine Department workers (64% of COVID-19 positive cases) confirm that

SARS-CoV-2 has got a powerful transmissibility [9], and confirm the possibility of being infected within a very short exposure time in the absence of prescribed PPE.

Figure 1 shows comparison between the trend of positive Covid-19 cases in local population. and the trend of hospitalization for Covid-19 during the first month: both increasing.

**Figure 1 – Trend of SARS-CoV-2 positive subjects in local population (data from Italian Civil Protection Department on Lodi area) and trend of COVID-19 hospitalizations in A.S.S.T. Lodi hospitals**



By March 25<sup>th</sup>, 71.4% of patients are COVID-19 confirmed, with a rising trend.

Consequently, we consider that the risk exposure for healthcare workers, since they live in the epidemic area, is higher than risk observed in general population. Therefore, keeping the risk level as close as possible to the average of population (in same area) would be a desirable result.

Comparison between the Lodi's HCWs sick leave and local population SARS-CoV-2-19 confirmed cases (Figure 2) and between the A.S.S.T. Lodi's HCWs sick leave and COVID-19 hospitalization (Figure 3), confirm that, while the trend in population and in hospitalization is increasing, the sick leaves of the HCW is steady.

Figure 2 – Comparison between A.S.S.T. Lodi HCWs sick leave and local population COVID-19 positive subjects

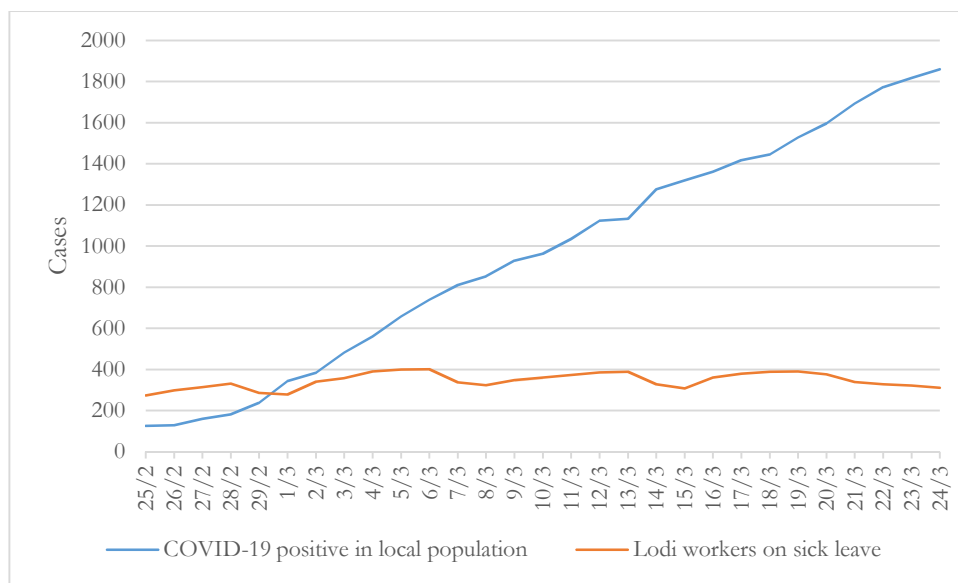
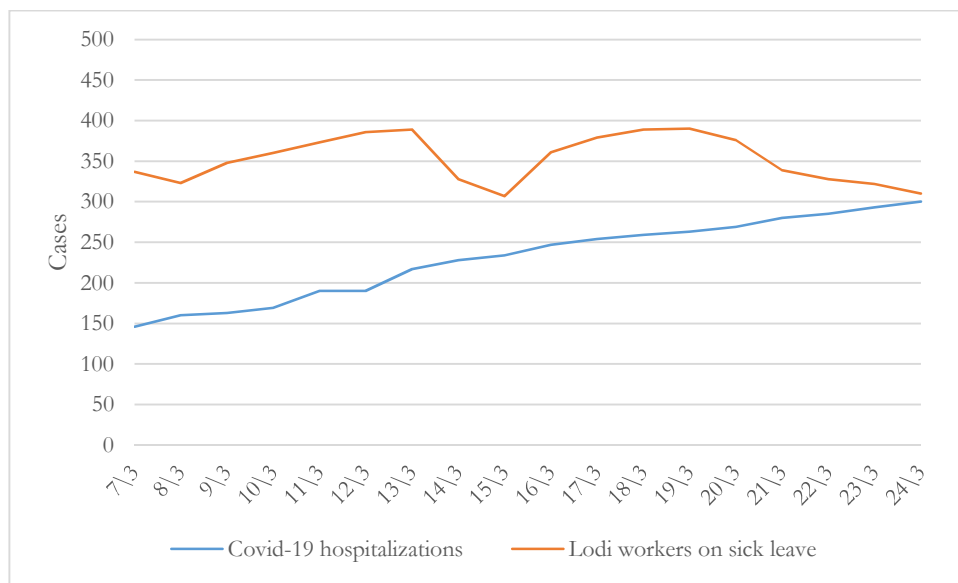


Figure 3 – Comparison between health A.S.S.T. Lodi workers sick leave and COVID-19 positive hospitalizations



These data show that organizational and occupational procedures adopted led to a reasonable level of protection of health care workers. It also suggests that, even though hospital-associated transmission was described as an important via of spreading infection [10], adequate IPC have been able to reduce risk exposure for HCWs. By this we could state that people living in epidemic area without adequate protection is the main cause of the high transmission rate of SARS-CoV-2 infections.

## Conclusions

The aim of this report is to share our experience with scientific community. We attempt to highlight some of the dire challenges being faced by a frontline healthcare service: Lodi is the epicentre of Italian Covid-19 pandemic. Lodi Public Hospital faced this crisis operating on organizational dimension and occupational one. By 24<sup>th</sup> February the hospital Crisis Unit reconvertered all departmentes into covid-19 areas with different intensity of care ( one area COVID free). Risk exposure for HCWs differed depending on the area in which health care workers operated. According to this, different levels of PPD and protection measures have been defined for each area. Moreover, we increased utilisation of training, knowledge and protocols to follow.

These factors contributed to keep transmission among them on lower levels than among general population

Data collected by Nasopharyngeal swabs results on HCWs population, appear to confirm that “Lodi approach” worked. We recognize the limitation of this single case report and acknowledge that additional studies and experiences are necessary to determine how best to protect health care workers from becoming infected with Sars-Cov-2 while they are providing care for patients.

We are confident that our on-the-field experience will join the entire expertise on COVID-19 pandemic and will help protecting health care workers ( and patients) against this virus.

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## Compliance with ethics guidelines

This article does not contain any studies with human or animal subjects. It does not involve a research protocol requiring approval by the relevant institutional review board or ethics committee.

## Conflicts of Interest and Financial Disclosures

The authors Baracco Alessandro, Beccarini Vittorio, Filippin Andrea, Bosio Davide, Perotti Gabriele, and Lombardo Massimo declare no conflicts of interest.

The authors whose names are listed certify that they have no affiliations with or involvement in any organization nor entity with any financial interest or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript

## Reference

1. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. World Health Organisation 2020.
2. N. Lee, D. Hui, A. Wu, P. Chan, P. Cameron, G. M Joynt, A. Ahuja, M. Yee Yung, C B Leung, K F To, S F Lui, C C Szeto, S. Chung, J. J Y Sung, A Major Outbreak of Severe Acute Respiratory Syndrome in Hong Kong, *N Engl J Med.* 2003 May 15;348(20).
3. Novel Coronavirus Pneumonia Emergency Response Epidemiology Team, The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China, *Zhonghua Liu Xing Bing Xue Za Zhi.* 2020 Feb 10;41(2):145-151.
4. Anelli F, Leoni G, Monaco R, Nume C, Rossi RC, Marinoni G, Spata G, De Giorgi D, Peccarisi L, Miani A, Burgio E, Gentile I, Colao A, Triassi M, Piscitelli P. Italian doctors call for protecting healthcare workers and boosting community surveillance during covid-19 outbreak. *BMJ* 2020 Mar 26; 368:m1254. doi: 10.1136/bmj.m1254
5. M. Nacoti, A.Ciocca, A.Giupponi, P.Brambillasca, F.Lussana, M.Pisano, G. Goisis, Daniele Bonacina, F.Fazzi, R. Naspro At the Epicenter of the Covid-19 Pandemic and Humanitarian Crises in Italy: Changing Perspectives on Preparation and Mitigation, *NEJM Catalyst*, 2020 Mar 21.
6. COVID-19: protecting health care workers, *The Lancet.* *Lancet.* 2020 Mar 21;395(10228):922.
7. E. Hunter, D. A Price, E. Murphy, I. S. van der Loeff, K. F Baker, D. Lendrem, C. Lendrem, M. L Schmid, L. Pareja-Cebrian, A. Welch, B. A I Payne, C. J A Duncan, First experience of COVID-19 screening of health-care workers in England *Lancet.* 2020 Apr 22
8. G. Chowell, F. Abdirizak, S. Lee, J. Lee, E. Jung, H. Nishiura, C. Viboud, Transmission Characteristics of MERS and SARS in the Healthcare Setting: A Comparative Study, *BMC Med.* 2015 Sep 3;13:210.
9. Han Y, Yang H. The transmission and diagnosis of 2019 novel coronavirus infection disease (COVID-19): A Chinese perspective. *J Med Virol.* 2020 mar 6.
10. Zhou P, Huang Z, Xiao Y, Huang X Fan XG. Protecting Chinese Healthcare Workers While Combating the 2019 Novel Coronavirus. *Infect Control Hosp Epidemiol* 2020; Mar 5: 1-4.