

How can we manage the COVID-19 infodemics? A case study targeted to health workers in Italy

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Abstract

Introduction. The Istituto Superiore di Sanità (ISS) has been asked for rapid technical and scientific advice to the State and Regions during Sars-CoV-2 pandemic preparedness.

Methods. An *ad hoc* Working Group on Scientific Literature updates (WG SL) was set up at ISS (March-May 2020) to screen pre-prints and peer reviewed papers from arXiv, medRxiv, bioRxiv, and Pubmed to provide a real time knowledge and empirical evidence addressed to health-workers.

Results. The WG SL screened a total of 4,568 pre-prints and 15,590 peer reviewed papers, delivered as daily summary report of pre-print selection for ISS President activity in the National Scientific Technical Committee framework and a weekly open access publication (COVID Contents) on peer-reviewed papers of interest for health professionals, monitored by a satisfaction questionnaire.

Conclusions. Promoting health literacy, with a cross-cutting approach is a powerful heritage of Public Health Institutes and a proven effective non pharmacological intervention.

Key words

- COVID-19
- Public Health
- infodemics
- health literacy

INTRODUCTION

On January 7, 2020 a novel coronavirus, originally abbreviated as 2019-nCoV by WHO, was identified from the throat swab sample of a patient in Wuhan, PRC. This pathogen was later renamed as Severe Acute Respiratory Syndrome CoronaVirus 2 (SARS-CoV-2) and the disease was named COroNaVirus Disease 2019 (COVID-19) by the WHO [1].

Countries all over the world have not been prompt enough to adequately fight such an aggressive pandemic and needed to implement different approaches: the clinical and laboratory diagnosis, the management of symptomatic people (home assistance, hospitalization and ICU, therapy strategy), and the so called non-pharmaceutical interventions based on social distancing, hygiene, and mask wearing [2]. Italy was the first

European country to be affected by COVID-19 [3-5], and, like the majority of Western countries, was not adequately prepared for the rapid spread of the pandemic [6].

The COVID-19 pandemic is producing an unprecedented 360° explosive impact of “health on all policies”, (i.e., socio-economy, environment, education), creating serious problems but also giving rise to opportunities for a tighter co-operation among different institutional levels towards a resilient approach, mainly on the backs of the workers of the National Health Systems, and on those of citizens, asked to follow the so-called Non Pharmaceuticals Interventions.

The COVID-19 spread triggered an avalanche of scientific research, both inside and outside the medical domain, to provide communities with tools to overcome

this pandemic by minimising its adverse impacts. This resulted in the production of an unprecedented number of preprints and peer reviewed papers at a such high speed to pose in serious difficulty all people involved. In fact, it became difficult to stay abreast of the research explosion by continuously monitoring real time knowledge, identifying gaps and overlooking areas in order to better guide and mobilise the expertise of scientists towards effective solutions [7, 8]. This rapid accumulation of empirical evidences obliged policymakers and emergency managers to provide their indications and decisions by taking into account these rapidly changing scientific evidences [9]. Committed institutions were, as first, charged to develop recommendation addressed to citizens as well as to health workers [10], under a strong demand of real time information, and a huge mass media coverage of all the pandemic aspects, with a diversity of experts asked to give their opinion at any prompted claim [10, 11].

The Istituto Superiore di Sanità (ISS), as leading technical and scientific body of the Italian National Health Service and public advisory body for the Ministry of Health, has been appointed to give technical and scientific advices to the Government and Regions on aspects related to public health. So, as COVID-19 pandemics started in Italy, ISS has been involved in the Scientific Technical Committee (CTS) to manage the

phase 1 of emergency. It has been asked to give advices and by setting up rules at national and local level to fight COVID-19 pandemic. In this period, a Working Group on Scientific Literature updating (SL WG, a 10 people team) has been set up at ISS and received the mandate to manage such huge mass of manuscripts to provide a real-time updating on “emerging issues” and “scientific claims” for the ISS President within the preparedness frame of the CTS activities (Figure 1). In this paper, we wish to report such experience, to propose it as a readiness tool for future global health emergencies.

MATERIALS AND METHODS

The activity design and workflow of the SL WG is illustrated in Figure 2. Briefly, the ISS Library staff searched from PubMed to report the links to peer reviewed papers on COVID-19 twice a day (7/7 day a week). The following search strategy was used: (coronavirus”[MeSH Terms] OR “coronavirus”[All Fields] OR “COVID-19”[Supplementary Concept] OR “severe acute respiratory syndrome coronavirus 2”[Supplementary Concept] OR COVID[All Fields] OR “covid-19”[All Fields] OR “covid19”[All Fields] OR “novel coronavirus”[All Fields] OR nCoV[All Fields] OR “SARS-CoV2”[All Fields]. Similarly, the links to pre-prints from medRxiv.org, bioRxiv.org, and arxiv.org were downloaded. The titles, authors, journals (for peer

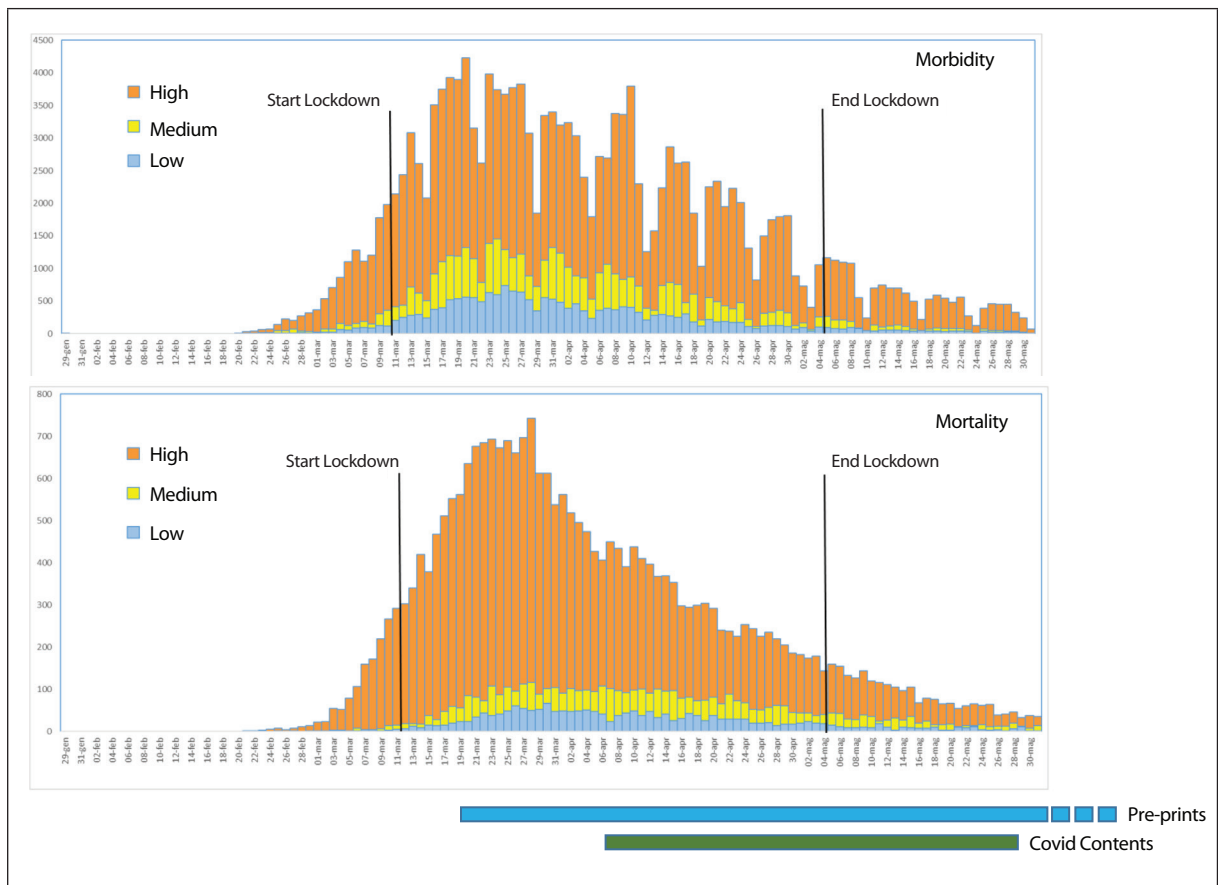


Figure 1 Distribution curves of COVID-19 A) morbidity and B) mortality in Italy until May 30 with the peaks reached in the second half of March. Bars under graphics report on COVID Content and Preprint ISS activity.

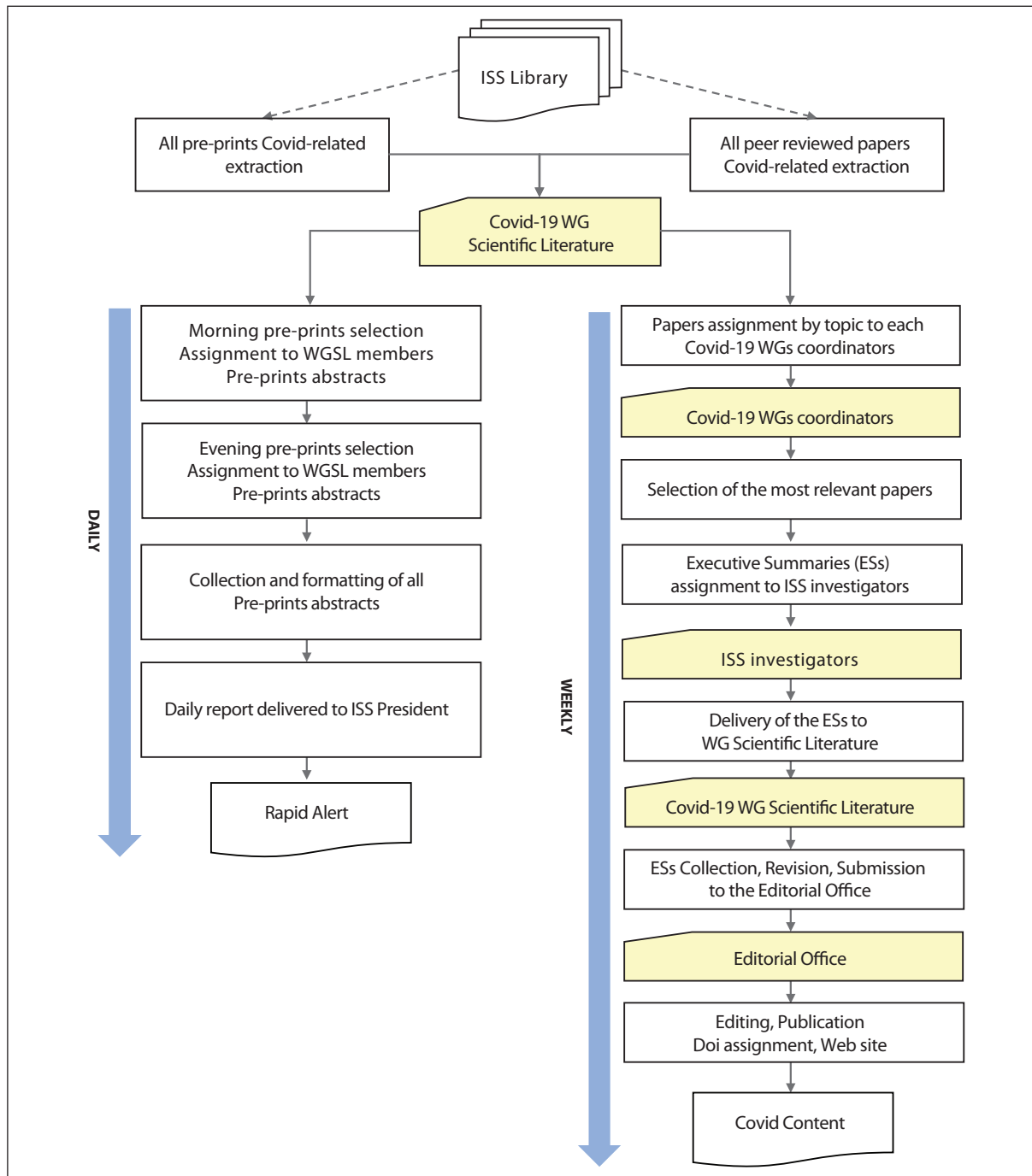


Figure 2
The activity design and workflow of the WG SL activity at ISS.

reviewed papers only) and the associated hyperlinks were listed into two separate PubMed and pre-prints .xls files and delivered to ISS researchers involved in COVID-19 activities and to the WG SL, twice a day. Pre-prints were downloaded, examined by the WG SL group, and those of higher relevance were chosen to produce a report including the most hot topics, tackled in selected pre-prints along with their executive summary and a selection of most representative figures and tables. Such report had to be delivered to ISS President within the next 24 h usually at 08:00-09:00 am time-

frame, well in advance of the scheduled daily meeting of the National Scientific Committee for COVID-19, chaired by the Civil Protection framed in the Prime Minister Cabinet. This activity, started on March 18, 2020 and is still ongoing.

In parallel, twice a week, a list of freshly available peer reviewed papers was shared among other ISS COVID-19 WGs. Researchers from ISS WGs with consolidated expertise in the different fields were asked to select the most relevant papers and to provide within the next 48 h a summary of the manuscript. The final

goal was to provide health professionals a weekly online publication, called COVID Contents (CC), with an assigned DOI, based on an expert selection of peer reviewed papers covering the different aspects of the pandemic. Owing to the above, researchers were asked to explain in Italian, in an easy and rapid way (via a .pdf download on smartphones) those scientific evidences, most in the media focus, useful to orient and to motivate health workers during their hard and h 24 COVID-19 duties.

Within this context, from no. 3 to no. 6 of CC issues, the SL WG decided to propose to CC readers a picture illustrating a logical scientific frame, citizen/patient centered, of the most discussed topic of the week. To have a feed-back on the success of this COVID Contents initiative, a 7 Q open questionnaire, was delivered to the readers with CC issue no. 7 and main results are reported in *Table 1S*, available online as Supplementary Material. The 8 weekly COVID Contents issues covered the time frame from April 18 to May 28 and basically overlapped the peak of the Italian pandemic (*Figure 1*).

RESULTS

Within the selected time frame, the number of the main manuscripts selected from preprints and peer-reviewed papers quoted in the CCs and ranked according to the main topics of this pandemic (i.e., Epidemiology Infection Control, Preparedness, Immunology, Drugs and Vaccines) is reported in *Table 1*. The CC issue progressively enrolled up to 150 experts, on voluntary basis, aiming to contribute with their expertise and ability to explain in few and simple words the context, objectives, methods, results, and relevance for the NHS of

rather complex topics. An example (in Italian) of a CC contribution is available online as Supplementary Material, *Figure 1S a and b*. The 8 CCs issues can be still consulted at www.iss.it/it/publicazioni-cessate.

Figure 3 reports the trend of the 30,723 access for CC download from ISS web site for the considered time-frame. The 6 figures accompanying the no.-3-no. 8 CC issues and illustrating the most relevant topics during the phase 1 of the pandemic are shown in *Figure 2S* (available online as Supplementary Material).

DISCUSSION

At national level, the demand of scientific evidences about the COVID-19 pandemic reached its peak just after the records of the first autochthonous cases in Codogno and Vo' on February 21, 2020, and kept a high level till the beginning of the first epidemic downslope [11] (*Figure 1*). To this respect, ISS was able to react faster to the challenges represented by the real-time mass media amplification of news from pre-prints, as matter of an easier organization of the workflow within the 10 person team of the WG on Scientific Literature. Nevertheless, the main goal was to have an open access publication mainly addressed to the personnel of the National Health System, rather than to investigators. Talking about the selection of pre-prints, the attention during the phase 1 was mainly focused on the topics about infection control: availability, proper use, and sanitization of PPE in the health settings, as well as viral shedding and contagiousness in health care and residential settings. Particularly, cleaning and decontamination procedures on surfaces were the most debated issues (18%) (*Table 1*). Epidemiology accounted for the 13% of the pre-prints selected. The daily broadcasted

Table 1

Description of the topics most in the focus of the papers considered for the Covid Contents 8 week issues (above) and for the the pre-prints alert (below) during the considered 12-22 week period in 2020 (see *Figure 1*)

Covid Contents issue	no. 1	no. 2	no. 3	no. 4	no. 5	no. 6	no. 7	no. 8	Total	%
Topics										
Miscellaneous	1	0	3	7	4	2	3	1	21	2.4
Environment	0	0	1	0	10	2	1	2	16	1.9
Communication	1	7	4	5	5	5	7	4	38	4.4
Diagnosis	17	10	10	8	7	8	15	12	87	10.1
Epidemiology	6	9	8	11	4	11	5	5	59	6.9
Infection control	7	7	3	3	1	8	0	6	35	4.1
Pathology and Clinic	13	8	22	30	27	31	22	27	180	20.9
Preparedness	12	15	8	5	11	10	16	8	85	9.9
Mental Health	6	5	6	7	13	10	9	10	66	7.7
Veterinary Public Health	1	2	1	2	0	0	4	0	10	1.2
Support Technology	9	7	6	13	13	6	5	8	67	7.8
Telemedicine	1	6	10	10	8	9	11	6	61	7.1
Therapy	14	4	5	7	14	17	12	22	95	11.0
Vaccines	0	0	3	10	7	7	7	6	40	4.7
Total	88	80	90	118	124	126	117	117	860	100

Continues

Table 1
Continued

Rapid Alerts													
Week	12	13	14	15	16	17	18	19	20	21	22	Total	%
Topics													
Environment	6	5	6	4	7	4	5	4	2	4	2	49	2.8
Communication	2	5	4	10	3	4	7	5	4	12	6	62	3.6
Diagnosis	9	13	5	16	11	14	19	18	5	12	11	133	7.7
Epidemiology	31	38	27	31	18	17	15	10	13	13	7	220	12.7
Infection control	12	22	30	42	33	37	24	30	26	27	24	307	17.7
Pathology and Clinic	3	15	10	10	2	17	7	7	16	11	11	109	6.3
Preparedness	18	23	14	7	6	17	12	12	16	8	12	145	8.4
Mental Health	3	4	1	2	1	3	3	5	2	1	2	27	1.6
Veterinary Public Health	3	2	6	2	2	4	3	7	3	2	2	36	2.1
Support Technology	7	15	17	24	17	7	11	2	9	9	14	132	7.6
Telemedicine	0	2	0	0	1	0	0	0	0	2	0	5	0.3
Drugs and therapy	8	8	25	19	17	11	7	6	3	6	18	128	7.4
Immunology	5	12	9	14	17	14	7	11	11	19	14	133	7.7
Biocides	1	0	0	0	0	0	0	0	0	0	0	1	0.1
Bioethics	0	0	1	0	0	0	0	0	0	0	0	1	0.1
Causes of death	3	6	12	7	12	12	8	5	8	6	14	93	5.4
Economics	0	1	3	3	2	3	1	1	0	0	1	15	0.9
Training	0	2	0	1	0	0	1	0	2	1	0	7	0.4
Genomics	3	8	16	21	8	16	14	14	9	1	4	114	6.6
Rare diseases	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Traslational research	0	3	9	2	0	0	3	0	0	0	0	17	1.0
Total	114	184	195	215	157	180	147	137	129	134	142	1734	100

reports of the number of cases and deaths requested a continuous check of any manuscript claiming SEIR models and previsions of the national pandemic curve, and the comparison with data coming from Popular Republic of China, and South Korea, mostly, as countries more impacted by the first wave in the same timeframe. To this respect, also the efficacy of the NPI and the lasting and/or recovery of lockdown periods was attentioned. Other less frequent issues in the focus were embedded in the Preparedness and Supporting Technology categories, i.e., the availability of beds in COVID-19 units in hospitals and ICU, the best technologies available for contact tracing and their impact on the General Data Protection Regulation (GDPR). The publication of the first issue of the COVID Contents requested about three weeks, because the different target of the readers – Health Workers –, the delivery in open access, and the need to train the collaborators towards contribution in line with the editorial aim. The challenge was to explain in a plain and immediate way the relevance of a selected peer reviewed paper for the routine experience in fighting against the pandemic. Owing to the above, the manuscripts talking about the pathology, symptoms associated to the disease progressions due to the cytokines storm, the multi-organ damage due to an induced micro-coagulopathy, up to the Kawasaki disease

and Multi Inflammatory Syndrome in Children were the most represented (20%) (Table 1). Following, the repurposing of already registered drugs, the potential use of plasmatherapy and monoclonal antibodies, and the vaccines pipelines in place accounted for 11% + 4.7%. The support to the clinical diagnosis accounted for the 11% of the selected papers: the use of artificial intelligence for the examination of CT findings in the lung, a machine learning approach to rank the evolution of the disease based on blood and immunological parameters of the patient (the so called “coronascore”), as well longitudinal studies about the genomic identification of the COVID-19 by RT-PCRs, and the sero-conversion. Last but not least, in term of preparedness, the ability to cope with the induced mental stress in health care workers, pregnancy, jailed persons, refugees, and all the other fragile groups/communities. The level of interest from Health professional and public has been monitored through, highlighting a very good consensus of the initiative among ISS and NHS readers. The peaks of the COVID Contents access following the weekly ISS President’s webinars addressed to NHS operators (Figure 3) indicate the effectiveness in reaching such target audience, even if a traceability of the access was hampered by data protection rules.

Finally two additional aspects emerged during this

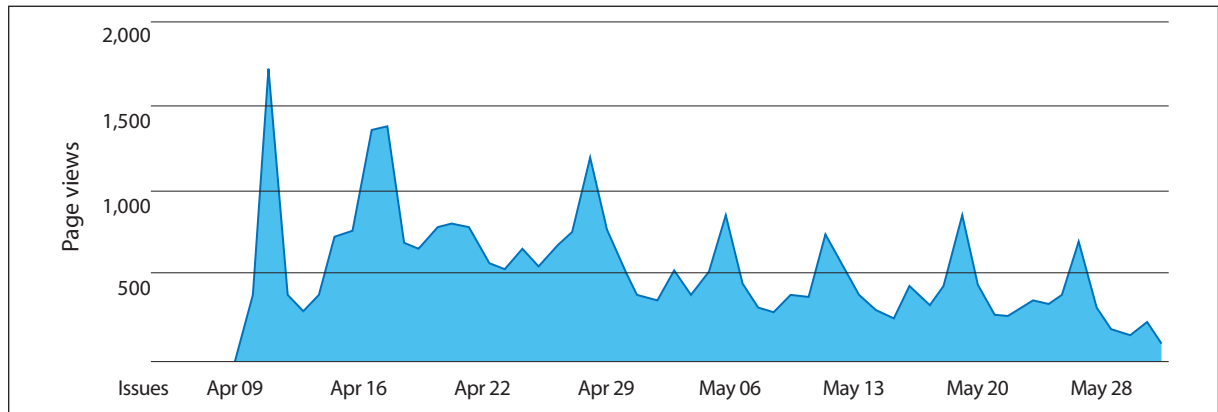


Figure 2
Trend of the 30,723 access for CC download from ISS web site for the considered timeframe.

WG activity: a) the new culture of open access literature; and b) the women role in the COVID-19 pandemic. The COVID-19 open access approach to medical literature is a unique opportunity to raise awareness among researchers and stakeholders about the importance of open science for human health. Demanding initiatives are emerging, especially in developing countries, addressed to sharing of post-prints at individual, group and multi stakeholder partnership level, but to make this plan effective, a more widespread culture of cooperation is fundamental. As the women role in COVID-19 pandemic is concerned, our limited experience shows that women represent the most responsive percentage to the questionnaire, and the most supporting contributions to the COVID Contents activity. Finally, literature reports that female-led countries acted quickly, implementing measures of lockdown early on as recommended by national health experts. Women are more likely to take up positions of leadership in societies that value equity, nurturing, solidarity, and collaboration, which are usually associated with healthier communities, more resilient to external shocks.

To conclude, while the pre-prints screening by is still in place, the COVID Contents experience ended on May 28. This decision was taken because of the increasing availability of systematic reviews and metanalysis about first evidences, accounting for the new "phase 2" scenario, mostly addressed to post lock-down policies,

quite far from the pressures of emergencies determined by the phase 1 overwhelming of the Health Care Services in Northern Italy. The interdisciplinary activity described in this paper proved that quick sharing of the scientific knowledge with health workers during the pandemic can be eligible among readiness tasks for the future pandemic challenges. Furthermore, such information sharing could represent a benchmark for effective communication among first responders to natural and human-made large-scale catastrophes and can be included among the necessary efforts to achieve a higher degree of effectiveness in synergy with environment and technology involved to support first responders operations.

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Conflict of interest statement

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