Pandemic response in Italy and prospects for public health
the perspective of the Italian institute for public health (Istituto Superiore di Sanità)

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Buen día, agradezco mucho a los organizadores de esta prestigiosa conferencia por la oportunidad de estar hoy aquí con ustedes para compartir la experiencia del Instituto Superior de Salud de Italia sobre la respuesta a la pandemia en Italia y las perspectivas de la salud pública.

Pido disculpas por el hecho de que no hablo español.
COVID-19 in Italy

- The outbreak in Italy started abruptly in a context of widespread local circulation
- First country detecting local transmission in the EU
- Evolving strategies (different response phases) and the role of applied research

What now?

26.3 million cases of laboratory confirmed SARS-CoV-2 infection
191 thousand related deaths (CFR 0.7%)

Data updated as of 20 September 2023
First phase – unprecedented impact

Italy’s Health Care System Groans Under Coronavirus — a Warning to the World

In less than three weeks, the virus has overloaded hospitals in northern Italy, offering a glimpse of what countries face if they cannot slow the contagion.

Doctors: COVID-19 pushing Italian ICUs toward collapse

Hospital systems everywhere should activate emergency intensive care unit (ICU) networks and reserve beds to prepare for a “massive” increase in COVID-19 patients, doctors in hard-hit Lombardy, Italy, said in a commentary published on Mar 13 in JAMA.

The Milan-based authors used data gathered since Mar 7 to create linear and exponential models to project regional ICU demand to Mar 20. They said that their linear model predicted that 859 patients

Coronavirus, Cuba in soccorso dell’Italia: 52 medici e infermieri in arrivo a Crema

‘Hospitals are overwhelmed’: Italian doctors describe the struggle of fighting the coronavirus outbreak
Disproportionate impact on HCW

An Italian sacrifice to the COVID-19 epidemic

Italy’s Doctors Were Praised for Their COVID-19 Response in the Spring. Now They Are Burning Out

Image sources: RAI news, Huffington Post, Politico
First Acute Phase: Early transmission of COVID-19 in Italy in 2020

No known local SARS-CoV-2 circulation

Undetected local SARS-CoV-2 circulation

Known local SARS-CoV-2 circulation

20/21/01 WHO mission to Wuhan suggest for the first time human to human transmission of SARS-CoV-2

ECDC Risk Assessment: low risk of secondary transmission in the EU/EEA

27/01 Direct flights to and from China suspended

22/01 Italy nominated a national task force to address SARS-CoV-2

22/01 Surveillance of COVID-19 among severe cases of acute respiratory infection with epidemiological links
Laboratory network with confirmation capacity set up

23/01 1st meeting of the COVID-19 IHR Emergency Committee does NOT declare a Public Health Emergency of International concern (PHEIC)

30/01 2nd meeting of the COVID-19 IHR Emergency Committee declares a PHEIC

31/01 COVID-19 Italy declared a national health emergency

20/02 Local COVID-19 transmission detected

27/02 Shift to case based enhanced surveillance of all SARS-CoV-2 laboratory confirmed cases

01/03 Red Zone measures broadened to municipalities in Lombardia and Veneto

11/03 First Lockdown

04/03 First national level strict physical distancing measures including school closures

23/02 Strict physical distancing measures in 11 municipalities in the Lodi province (Red zone)

Progressive Lockdown tightening

Date of diagnosis
Date of symptom onset
Data Source: Italian National Integrated Surveillance for COVID-19 (period 23 Jan- 23 Mar updated as of 19 May 2020)
InfluNet-Epi: sistema di sorveglianza epidemiologico delle sindromi influenzali


- Durante la diciasettesima settimana del 2020, 558 medici sentinella hanno inviato dati circa la frequenza di sindromi simil-influenzali tra i propri assistiti. Il valore dell’incidenza totale è pari a 0,42 casi per mille assistiti.
- Nella fascia di età 0-4 anni l’incidenza è pari a 0,64 casi per mille assistiti, nella fascia di età 5-14 anni a 0,23 nella fascia 15-64 anni a 0,45 e tra gli individui di età pari o superiore a 65 anni a 0,38 casi per mille assistiti.

Incidenza della sindrome influenzale per stagione influenzale

Incidenza delle sindromi influenzali (ILI) in Italia

Stagioni 1999-00/2019-20

[Diagramme mostrando l'incidenza delle sindromi influenzali per stagione influenzale]
First acute phase - different impact in different parts of the country addressed with a national lockdown

COVID-19 attack rates per 100,000 population (age-adjusted) by region/AP of diagnosis and number of cases by region/AP of diagnosis (n = 98,716), Italy, 28 January–31 March 2020
Impact of early containment efforts on SARS-CoV-2 transmissibility

The national lockdown put in place as of March 11 to limit the spread of SARS CoV-2 in Italy brought Rt below 1 in most regions and provinces within 2 weeks.

"Lockdown was fundamental to prevent an explosion in the number of cases in other regions in which transmission had started weeks later compared with the outbreak epicenter (Lombardy, Veneto, Emilia Romagna)."
Impact of early containment efforts - acceptability

United but divided: Policy responses and people’s perceptions in the EU during the COVID-19 outbreak

Ingrid Salati a,*, Sebastien Neumann-Röhre a,*, Nirmala Bhattacharyya a, Pedro Pika Bounin a, Werner Bouwmeester b,*, Job van Eyll b,*, Jonas Schreyögg c, Tare Stangrit d

First two weeks of April 2020 (Italy was in full lock-down)

Grade of approval of specific measures in 7 EU countries (Likert scale from 1-strongly disagree to 5 strongly agree).

Darker colours show higher consensus

The study team did not find significant differences in policy support between Lombardy and the rest of Italy.

WHO

• Need to be «Icebreakers»
• Proof of concept
• Institutional synergy
• Strong, fast coherent response
• Population and context resilience
  • Acceptability

https://www.youtube.com/watch?v=oDeSCVGi-pM
Some negative impact dimensions of early containment efforts

…the impact of COVID-19 was largest in France and Italy (-5.3%), followed by Spain and Slovakia (-5.2%).

Source: EUROSTAT

Depressive symptoms in response to COVID-19 and lockdown: a cross-sectional study on the Italian population

Marco Delmastro & Giorgia Zamarola

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Collateral damage

UN report finds COVID-19 is reversing decades of progress on poverty, healthcare and education
First acute phase: take-home points

- Re-modelling of health care system
- Unsustainability of prolonged national lockdown policies
Flexible emergency increase hospital bed availability - ICU

Source: MoH "COVID-19 Rilevazione giornaliera posti letto attivati"
Early warning function of risk assessment
Innovative approach

- Mixed method epidemic intelligence approach (IBS and EBS)
- Continuous and timely (looking at data from the previous week)
- Reliable anticipation of severe outcomes (> incidence of hospitalization and death) in the three following weeks if no additional measures were taken
- Resource intensive

Official declaration of the second acute epidemic phase with increased epidemic risk in Italy

Second acute epidemic phase officially declared (9th October 2020 on previous week data)
Readiness (early October 2020)

Actions identified depending on ILI expected prevalence by COVID-19 scenario and regional risk level

Available online
Undifferentiated circulation of SARS-CoV-2 in Italy

27/02 integrated surveillance all confirmed SARS-CoV-2 infections

30/04 Risk assessment system

11/03Lockdown

22/01 first COVID-19 surveillance

04/05-03/06 Gradual re-opening

12/06 (Strategy)

20/02 first locally acquired case detected

31/01 COVID-19 Italy declared a national health emergency

18/05 DL n.65 (revised colour zones)

22/01 first COVID-19 surveillance

18/02 SARS-CoV-2 alpha variant is prevalent in Italy

12/04 Locally acquired SARS-CoV-2 delta/kappa variant detected

Cases by date of symptom onset

Cases by date of diagnoses/testing

Source: Sorveglianza nazionale integrata per COVID-19 (updated 23 June 2021)
Change in strategy ➔ the «colour zone» system for suppression

«colour code» of measures (yellow, orange red) from 5 November 2020 – 17 May 2021

«…the activity reduction in all locations outside of the home was far from that observed during the nationwide lockdown imposed to counter the first wave, even in the strictest tier where a stay-home mandate was in place.
Mitigated negative impact on GDP (OECD, 2021)

Real GDP, index Q1 2015 = 100

Note: Shaded area indicates projections.
Source: OECD (2021), OECD Economic Outlook 109 (database) and provisional projections.

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Vaccination as an epidemiological game-changer
Report Vaccini Anti COVID-19

Totale somministrazioni

Con almeno una dose
49.556.896
91,78% della popolazione over 12
(persone con almeno una somministrazione)

Ciclo vaccinale
48.729.558
90,25% della popolazione over 12
(persone che hanno completato il ciclo vaccinale)

Dose addizionale/richiamo (booster)
40.492.537
84,88% della popolazione potenzialmente oggetto di
dose addizionale o booster che ha ultimato il ciclo vaccinale
da almeno 4 mesi

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https://www.governo.it/it/cscovid19/report-vaccini/
COVID-19 case fatality ratio by age at diagnosis and sex, Italy, 28 January–31 March 2020 (n = 10,940)


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Deaths averted thanks to vaccination: a measure of impact

- Between 53,209–148,756 avoided hospitalization
- Between 6,434–16,276 avoided ICU admissions
- Between 13,571–48,026 avoided deaths

Italy, population aged >12 yrs, Jan-Sept 2021

A new study by the WHO Regional Office for Europe and the European Centre for Disease Prevention and Control (ECDC) published in Eurosurveillance estimates that 470,000 lives have been saved among those aged 60 years and over since the start of COVID-19 vaccination rollout in 33 countries across the WHO European Region. (WHO-EURO)
What changed with mass vaccination?

Transmission indicators (number of new cases, Rt, clusters)

Impact indicators (hospital overload)

Change in strategy → the «colour zone» system for mitigation

Change in strategy → the «colour zone» system for mitigation

Reopening strategy 2021

- Risk assessment
- 7 day incidence (since January 2021)
- Rt

Vaccination

Viral variant circulation

- ICU occupancy rate
- Hospital occupancy rate
- 7 day incidence


«colour code» of measures (white, yellow, orange, red) from 18 May 2021

Context: Pandemic fatigue

«colour code» of measures (yellow, orange, red) from 5 November 2020 – 17 May 2021

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11/03/2020 Lockdown
04/05-03/06/2020 Riapertura
DM 30/04/2020 (Valutazione del Rischio)

12/10/2020 (Strategia)

DL 05/01/2021

27/12 Inizia la campagna vaccinale

18/05 DL n.65 2021
23/07 DL n.105 2021

18/05 DL n.65 2021
23/07 DL n.105 2021

10/03/2022 Fine Emergenza

23/07 DL n.105 2021

27/12 Inizia la campagna vaccinale

Fine giugno 2021 Variante delta prevalente

Inizio gennaio 2022 Variante omicron prevalente

Iniziamo a gennaio 2022 la campagna vaccinale

Variante delta
Variante omicron

Fonte dati: Sorveglianza nazionale integrata per COVID-19 (aggiornati il 10 novembre 2022)

Increased restrictions
Reduced restrictions

Phase 1: containment
Phase 2A: Suppression
Phase 2B: Mitigation
Fase 3: Suspension

Prevalence of a new more transmissible viral variant
Prevalence of a new sub-variant
Four kinds of COVID-19 control regime:

- **Uncontrolled scenario**: no control measures, transmission levels similar to R₀.
- **Mitigation strategy**: limited control with transmission reduced compared with R₀ but still above 1 (exponential growth but less rapid than in the absence of measures). During the COVID-19 pandemic, this strategy was often referred to as flattening the curve of the epidemic.
- **Suppression strategy**: through the implementation of combinations of layered control measures R decreases to less than 1, so the epidemic declines, but transmission is not completely eliminated.
- **Containment strategy**: by means of aggressive testing, contact tracing, and isolating, R is kept near 0 (known in China as a zero-COVID strategy).

Stratified implementation of non-pharmaceutical measures:
- widespread testing, contact tracing, and isolating; proper use of face masks; physical distancing; limitations on mass gatherings; and improved ventilation systems at workplaces.
Activities to face COVID-19 pandemic

ISS

Monitoring of epidemic risk
Epidemiological and microbiological surveillance
Infection prevention and control
Scientific communication
Scientific publications and technical reports
Face masks authorization in derogation
Distance learning
Research and development in One Health perspective
National and international collaborations
Support to vaccination control and distribution

ESSENTIAL PUBLIC SERVICE
Member of the Scientific and Technical Committee (Decree of the Civil Protection Department, no. 371 February 5, 2020) and of the Control Room (Ministerial Decree April 30, 2020)

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Response pillars – data for action

- **Integrated surveillance (case-based data)**
- **National vaccination repository**
- **Genomic surveillance and analysis platform (I-Co-Gen)**
- **Epidemiological and microbiological data on all laboratory confirmed SARS-CoV-2 cases of infection**
- **COVID-19 laboratory network**
- **All SARS-CoV-2 sequences**
- **Wastewater surveillance**

Image source: CDC

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Data and information hub

Including open data

www.iss.it/malattie-infettive
Multi-disciplinary research collaborations

- Human health (evidence)
  - Epidemiological surveillance
- Environmental health (evidence)
  - Microbiological surveillance
  - Analysis of determinants
  - Surveillance of wastewaters
- Animal health (evidence)
  - Clinical surveillance
  - Research and Development of drugs and vaccines
  - Pandemic Origin research
  - Research on impact on wild and domestic animals

Additional research:
- Research and monitoring of vaccination impact
- Social and economic impact research
- GUIDANCE
- Research and monitoring of vaccination impact
- Social and economic impact research

Website: www.iss.it/malattie-infettive
A growing scientific effort

Trend of publication in a subset of 395 publications (Scopus)

AFFILOG (infectious AND disease AND department AND istituto AND superiore AND di AND sanità)

Documents by year

Documents by type

>1000 scientific papers published in the past 5 years in the Department of ID alone (PubMED)
COVID-19 related research

Studies characterizing the virus and its diagnostic tools

Characteristics of SARS-CoV-2 variants of concern B.1.1.7, B.1.351 or P.1: data from seven EU/EEA countries, weeks 38/2020 to 10/2021

Multiplex Real-Time Reverse-Transcription Polymerase Chain Reaction Assays for Diagnostic Testing of Severe Acute Respiratory Syndrome Coronavirus 2 and Seasonal Influenza Viruses: A Challenge of the Phase 3 Pandemic Setting

Whole genome and phylogenetic analysis of two SARS-CoV-2 strains isolated in Italy in January and February 2020: additional clues on multiple introductions and further circulation in Europe

Identification and characterization of SARS-CoV-2 clusters in the EU/EEA in the first pandemic wave: additional elements to trace the route of the virus
COVID-19 related research

Immunological studies

**PLOS PATHOGENS**

**RESEARCH ARTICLE**

Differential plasmacytoid dendritic cell phenotype and type I Interferon response in asymptomatic and severe COVID-19 infection

Martina Severa, Roberto A. Diotti, Mariella P. Enea, Fabiana Rizzolo, Stefano Fiore, Daniela Ricci, Marco Iannetta, Alessandro Sinigaglia, Alessandra Lodi, Nicola Mancini, Elena Cresciuolo, Massimo Clementi, Massimo Arnone, Stefano Baldiucchi, Luca Barzon, Paolo Stefanelli, Nicola Clementi, Filippo M. Coccia

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Clin Infect Dis. 2021 Jan 4; ciab1933. PMCID: PMC7799260

**SARS-CoV-2 encephalitis is a cytokine release syndrome: evidences from cerebrospinal fluid analyses**

Andrea Placeto, MD,1,2 Stefano Meschedde, MD,3 Irene Volpynott, MD,1 Valeria De Giuli, MD,3 Francesca Capuoli, MD,3 Sara Marotte, MD,4 Sergio Ferrari, MD,4 Silvia Bazzotti, MD,4 Alberto Imenes, MD,4 Barbara Pellici, MD,4 Enrico Perri, MD,4 Alberto Banussi, MD,4 Emanuele Foa, MD, PhD,5 Francesco Castelli, MD, PhD,5 Gianluigi Zanussi, MD, PhD,5 Salvatore Mosaco, MD, PhD,5 Paola Stefanelli, MD,5 Roberto Gasparotto, MD,7 Anastasia Zokariou, MD, PhD,9 Andrew McKeen, MD,3 Nicholas J. Aitchin, PhD,10,11,12 Kai Ellarrov, MD PhD,10,11 Henrik Zetterberg, MD PhD,10,11,12,14,15 and Alessandro Padovan, MD PhD1

Clin Infect Dis. 2021 Jan 4; ciab1933. PMCID: PMC7799260

Published online 2021 Jan 4. doi: 10.1093/cid/ciab1933

SARS-CoV-2 encephalitis is a cytokine release syndrome: evidences from cerebrospinal fluid analyses

**Clinical Microbiology and Infections Disease**

**Original Article**

Early IgG / IgA response in hospitalized COVID-19 patients is associated with a less severe disease

Giorgio Fedele,1,2,3 Gianluca Russo,1,2 Ilaria Schiavoni,1 Pasqualina Leone,1 Eleonora Olivetta1,2,3 Valentina Perrf, Maria Antonella Zingaropoli, Maria Rosa Ciardi, Patrizia Pasculli, Claudio Maria Mastroiani,1 Paola Stefanelli1,2,3

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**Check for updates**

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COVID-19 related research

Sero-epidemiology studies

Prevalence of SARS-CoV-2 infection in Italian pediatric population: a regional seroepidemiological study

Manola Comar, Simone Benvenuto, Marzia Lazzaroni, Giorgio Fedele, Egidio Barbì, Alessandro Amaddeo, Francesco Maria Risso, Tamara Strain, Paolo Di Rocco, Paola Stefanello and Giovanni Rezza

Prevalence of SARS-CoV-2 IgG antibodies in an area of northeastern Italy with a high incidence of COVID-19 cases: a population-based study

Paola Stefanello, Antonino Bella, Giorgio Fedele, Serena Pancieri, Pasqualina Leone, Paola Vecca, Arianna Neri, Anna Caramante, Cecilia Fazio, Eleonora Benedetti, Stefano Fiore, Concetta Fabiani, Maurizio Simmaco, Mariliana Santino, Maria Grazia Zuccali, Giancarlo Bizzarro, Rosa Magnoni, Pier Paolo Benetollo, Stefano Merler, Silvio Brusasco, Giovanni Rezza, and Antonio Ferro

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COVID-19 related research

Epidemiology

Clinical characteristics of individuals under 40 years of age who died with COVID-19 in Italy

Epidemiological characteristics of COVID-19 cases and estimates of the reproductive numbers 1 month into the epidemic, Italy, 28 January to 31 March 2020

Flavia Riccardo1, Marco Ajelli1,2,3, Xanthi D Andriano4, Antonino Bella5, Martina Del Mastro2, Massimo Fabiani6, Stefania Bellino7, Stefano Benini1, Alberto Mateo-Urdiales7, Valentina Marzioni8, Maria Cristina Rota9, Antonietta Filati10, Fortunato D’Ancora11, Andrea Sideri7, Ornella Papan11, Filippo Trenchi11, Giorgio Guzzetta11, Piero Poletti11, Pasia Stefanelli11, Maria Rita Castelucci12, Alessandra Cipollone11, Corrado Di Benedetto11, Marco Taliento11, Andrea Picciotto11, Silvio Bruera11, Giovanni Rezza7, Stefano Merli7, Patrizia Pezzotti7, the COVID-19 working group.

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ISS: Provider of national guidance and advice in accordance with the MoH

Some examples: all reports are available online
COVID-19 related training

Physicians daily enrollment and completion

EDUISS courses in the period 1 Jan 2020 - 27 Oct 2021

- 28/02/2020 E-learning course "Preparedness and response"
- 30/03/2020 E-learning course "Prevention and control"
- 28/04/2020 E-learning course "Contact tracing"
- 23/12/2020 E-learning course "Management Covid-19 outbreak in schools"
- 23/12/2020 E-learning course "Covid-19 vaccination campaign"
- 07/04/2021 E-learning course "Covid-19 vaccination in pharmacy"
- 17/05/2021 E-learning course "Covid-19 vaccination in workplaces"
- 27/05/2021 E-learning course "Covid-19 vaccination by Biologists and technical health, rehabilitation and prevention professions"
‘Traditional’ press office activities

Since the beginning of the pandemic
- More than 400 press releases
- More than 200K citations on the press
- More than 500 interviews (given by the President or Iss experts)
- Press conferences (weekly)

Social media - Trend Follower e interactions

- 80K follower on Twitter
- 25K on Facebook
- 8K on Instagram

Iss citations on the press
Preparedness and Readiness
Design and implementation of a rapid mixed method risk assessment system
Preparedness and Readiness
Government support in pandemic strategic planning
What next?
Building on lessons learned

- Lesson 1: Decisive leadership is essential
- Lesson 2: We need a plan
- Lesson 3: An early warning system linked to effective governance mechanism is essential
- Lesson 4: A trained, motivated and equipped workforce is essential
- Lesson 5: A strong society underpins a strong pandemic response
Building on a One Health approach

OH preparedness can enhance our understanding of risk factors of complex global health threats at the human-animal-environment interface.

It can also prove a new point of view from which we can hypothesize future potential scenarios and adapt national and regional prevention and preparedness strategies, to counteract the current megatrends that are damaging our entire planet.
We need to **bridge the Gap** between One Health Research and Public Health
Challenges

WHO worried COVID 'amnesia' will lead to another pandemic

BY Reuters Staff

GENEVA (Reuters) - The World Health Organization’s top emergency expert warned on Monday that the world risked future pandemics if it suffered “amnesia” and did not learn from the current coronavirus crisis.

What Data for which Action when
Having to make decisions...

.... With little scientific evidence and many uncertainties
The COVID-19 pandemic—caused by SARS CoV-2—is a typical *wicked problem*—we did not see it coming, we experience its effects, and it challenges our entrained ways of thinking and acting.


**EDITORIAL**

COVID-19 – how a pandemic reveals that *everything is connected to everything else*
Not the only «wicked» problem on our plate

“Super Wicked Problems” – The Coronavirus Pandemic as an Analogy for Future Sustainability Challenges

Relationship between science and politics

Science

Sometimes bringer of answers (almost never dichotomous)
Sometimes bringer of issues to address

Public Health role of scientists

Politics

Actions requiring endorsement
Questions expecting Yes/No answers

stakeholders
Balancing Public Health Strategies....
... in the midst of communication complexity

PH Officials
Reporting official data through Reports, articles, interviews, press releases, scientific papers

Politicians
Different views

Stakeholders

Ambitious scientists
Expressing personal views, often with a very narrow specialist perspective

Ambitious journalists
Journalistic investigations, counter-information

Stakeholders
(e.g. anti-vax groups)

COVID-19 communication
Social media

Stakeholders

Stakeholders

Stakeholders
Thanks for your attention

- Trust
- Built before an emergency and changes during an emergency
- Keep scientific curiosity alive
- Balance individual risk and collective risk

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