In collaboration with:
Department of Life Sciences and Public Health, School of Medicine «A. Gemelli» Università Cattolica S. Cuore

Departmente of Management
Università Magna Graecia di Catanzaro

Center for Research and Studies on Healthcare Management
(Cerismas) Università Cattolica del Sacro Cuore

Center for Research in Medical Leadership
Università Cattolica del Sacro Cuore


AMERICO CICCHETTI, Ph.D.
Professor of Healthcare Management
Director, School of Healthcare Systems Economics and Management

Thanks to:
ALTEMS’s Covid-19 Research Team: Gianfranco Damiani, Maria Lucia Specchia, Michele Basile, Rossella Di Bidino, Eugenio Di Brino, Maria Giovanna Di Paolo, Andrea Di Pilla, Fabrizio Massimo Ferrara, Luca Giorgio, Maria Teresa Riccardi, Filippo Rumi, Angelo Tattoli, Entela Xoxi, Andrea Silenzi, Rocco Reina, Marzia Ventura, Concetta Lucia Cristofaro, Walter Vesperi, Anna Maria Melina, Teresa Gentile, Giovanni Schiuma, Primiano Di Nauta, Raimondo Ingrassia, Paola Adinolfi
Outline

• Background
• Goals
• Methodology and data
• Evidences
  • National epidemiology and response
  • Regional Epidemiology
  • Regional Response (phase 1)
  • Regional Response (phase 2)
• Take home messages
Background
The Italian NHS

Italian NHS is a “three layers” public universal healthcare system, free at the point of care.

Is structured in 21 politically and operationally autonomous Regional Healthcare Systems.

Any Region is asked to provide a Core Benefit Package of Services (LEAs).

Provision of services is ensured by a Regional network of Local Health Units and autonomous hospitals (public and private).

Ministry of Health monitors the respect of the LEA provided by Regions to citizens.

Ministry of Treasury monitors the respect of financial balance.

Regionalization in 20 years has increased differences among Regions.

Fonte: HIT Health Systems In Transition: Italy (OECD 2014)
Background

• Sars-COV-2 diffusion in Italy has generated an impact on society, economics and healthcare system

• It has been a human tragedy (33,000 deaths)

• Italian healthcare system’s conditions in January 2020 ...
  • Facing demographic and epidemiological challenges
  • Under-financed for 10 years
  • Major regional differences (north south) regarding governance, organizational models, resources’ availability (e.g. ICU beds), competences and performance (clinical, financial)
Goals
Goals

• To better understand the implications of the different strategies adopted by Italian Regional Healthcare Systems to deal with the spread of the virus and the consequences of Covid19;

• To draw indications for the near future and to make the whole Italian NHS resilient in the long range;

• To offer to researchers and policy makers a knowledge base to develop further analyses for a better understanding of an event of historical significance
MoH’s guidelines to Regions to respond to Covid-19 outbreak (March 1° 2020)

Ministry of Health supported by a Scientific Task Force provide Regions with guidelines regarding the re-organization of the hospital and community care network and related facilities.

The indications provided by the MoH on carrying out diagnostic tests provide for the priority execution of the test to symptomatic / paucisymptomatic clinical cases and to symptomatic family and / or residential risk contacts and to health and similar operators at greater risk.

The re-organization of the hospital network is planned with the increase of available ICU’s beds (+50%) and in the pneumology and infectious diseases through construction and retrieval of new hospitals (Covid Hospital) and expansion of beds in existing structures.

Establishment of Special Assistance Continuity Units (USCA) to monitor patients at home and in nursing homes for elderly.

Active monitoring by family doctors, pediatricians and public health offices of Local Health Units.

Possibility of requisition of hotels or other properties with similar characteristics to accommodate people under medical surveillance (intermediate care).
Methodology and data
Methodology and data (1/2)

- Weekly Reports from March 31st 2020 (#7 on May 15th);
- Multidisciplinary working group (Healthcare manager, public health specialists, pharmacologist, biomedical engineers);
- Researcher and healthcare managers from 10 Italian Regions were involved in the analysis.
Methodology and data (2/2)

PHASE 1 (March 1st – May 3rd)
- Legislation (national, regional, local)
- Epidemiological indicators (10)
- Organizational Indicators (12)

PHASE 2 (May 4th – Now)
- Legislation (national, regional, local)
- Epidemiological indicators (7)
- Organizational Indicators (9)

Profiling Organizational Response to Covid-19 Emergency in 21 Regions

Data Source

Gazzetta Ufficiale della Repubblica Italiana (Official Gazette of the Italian Republic): https://www.gazzettaufficiale.it/
Protezione Civile Italiana; available at: http://opendatadpc.maps.arcgis.com/apps/opsdashboard/index.html#/b0c68bce2cce478eaac82fe38d4138b1;
Ministry of Health; available at: http://www.datigi.salute.gov.it/dati/dettagliodataset.jsp?menu=dati&idPae=96
Evidences (1/4)
National epidemiology and response
# Legislation milestones

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 31st 2020</td>
<td>Declaration of National emergency</td>
</tr>
<tr>
<td>Feb 23rd 2020</td>
<td>Lock down is specific areas (Lombardia, Veneto, Emilia Romagna, Marche)</td>
</tr>
<tr>
<td>March 1st 2020</td>
<td>50% increase of ICU beds, 100% increase sub-ICU beds; identification of Covid-hospitals; Requisition of hotels as intermediate care; activation of CROSS; limitation of other NHS activities</td>
</tr>
<tr>
<td>March 4th 2020</td>
<td>Schools and universities closed (Nation wide)</td>
</tr>
<tr>
<td>March 9th 2020</td>
<td>National lock-down, new resources for the NHS (more physicians and nurses), establishment of USCA (Special Units for Community Care)</td>
</tr>
<tr>
<td>March 11th 2020</td>
<td>Suspension of any business activity</td>
</tr>
<tr>
<td>March 17th 2020</td>
<td>Initial economic support measures</td>
</tr>
<tr>
<td>March 22nd 2020</td>
<td>Harder lockdown measures, New resources fo NHS (physicians and nurses mobility)</td>
</tr>
<tr>
<td>March 25th 2020</td>
<td>Introduction of specific penalties to ensure lockdown</td>
</tr>
<tr>
<td>April 1st 2020</td>
<td>Introduction of specific indications for business still open</td>
</tr>
<tr>
<td>April 10th 2020</td>
<td>New measures to ensure safety</td>
</tr>
<tr>
<td>April 26th 2020</td>
<td>Regulation to start serologic tests and epidemiological studies</td>
</tr>
<tr>
<td>May 4th</td>
<td>Reduction of limitation to people mobility within same municipality, new measures to support national economy</td>
</tr>
<tr>
<td>May 18th</td>
<td>Reduction of limitation to people mobility within same Region, Major commercial business, pub and restaurants to be re-opened</td>
</tr>
</tbody>
</table>
Evolution of Cov-Sars2 (Italy)

- **RECOVERED 125,176**
- **POSITIVES 108,257** (April 20, 2020)
- **POSITIVES 68,351**
- **DEATHS 31,908**

Key Events:
- February 23rd: Regional Lockdown begins
- March 9th: National Lockdown begins
- March 1st: NHS plan
- April 10th: Safety measures to restart some businesses
- May 4th: Lockdown ends
March 1° NHS plan

Feb 23rd Regional Lock down begins

March 9th National Lock down begins

March 22th Mobility restrictions

April 10th Safety measures to restart some businesses

May 4th Lock down ends

Peak of Positives 108.257 (April 20 2020)
Testing capacity

- Feb 23rd: Regional Lockdown begins
- March 1st: NHS plan
- March 9th: National Lockdown begins
- March 22th: Mobility restrictions
- April 10th: Safety measures to restart some businesses
- May 4th: Lockdown ends
NHS response (Hospital vs home care)

- Feb 23rd: Regional Lock down begins
- March 1° NHS plan
- March 9th: National Lock down begins
- March 22th: Mobility restrictions
- April 10th: Safety measures to restart some businesses
- May 4th: Lock down end
Evidences (2/4)
Regional epidemiology
High prevalence

Medium-low prevalence

Low-very low prevalence
**Commento**

Lombardia Region had the vast majority of cases in Italy. Is now declining. The trend is still unclear. Piedmont has reached the «peak» later than others.
Lethality of Covid-19

Tavola Decessi fornita dall’ISTAT al seguente indirizzo web
https://www.istat.it/it/archivio/240401
Evidences (3/4)
Regional response (Phase 1)
Regional response model (Phase 1)
Regional «Readiness»: Regional healthcare contingency plans

16 out of 21 Regions has issued an emergency Regional Health Plans for phase 1 in few days after the contagion outbreak.
Comment
Testing capacity has increased over time and the propensity to test is different Region to Region. The highest number of tests have been made in Lombardy and Veneto.
A significant difference emerges between the incidence of tests made by Veneto Region and in Trentino Alto Adige compared to the other Regions. In total, tests in Italy were 1,846,934 equal to 3.06% of the population (April 28th 2020).
The indicator shows the increase in PL in TI over 100,000 inhab. in the different regions. Almost all of the regions have increased ICU more than requested by the MoH (+50%) despite the recent change of direction consisting in the reduction of PL in TI that some regions are undertaking.
ICU Saturation (March 31st)

- **Lombardia**: 1260 ICU Beds, 1324 ICU Cases, 105% ICU Saturation
- **Emilia Romagna**: 962 ICU Beds, 353 ICU Cases, 37% ICU Saturation
- **Veneto**: 825 ICU Beds, 356 ICU Cases, 43% ICU Saturation
- **Lazio**: 707 ICU Beds, 173 ICU Cases, 24% ICU Saturation

**Legend:**
- ICU Beds (Now)
- ICU Cases (Now)
- ICU Saturation (Now)
Percentage of hospitalized / confirmed cases (March 31st)
Indicator 2.4. Percentage hospitalized/confirmed cases (Northern Regions)

<table>
<thead>
<tr>
<th>Data</th>
<th>Emilia-Romagna</th>
<th>Friuli Venezia Giulia</th>
<th>Liguria</th>
<th>Lombardia</th>
<th>P.A. Bolzano</th>
<th>P.A. Trento</th>
<th>Piemonte</th>
<th>Toscana</th>
<th>Valle d'Aosta</th>
<th>Veneto</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.39</td>
<td>0.20</td>
<td>0.49</td>
<td>0.52</td>
<td>0.34</td>
<td>0.26</td>
<td>0.48</td>
<td>0.34</td>
<td>0.21</td>
<td>0.23</td>
<td>0.43</td>
</tr>
<tr>
<td>Max</td>
<td>0.56</td>
<td>0.37</td>
<td>0.79</td>
<td>0.96</td>
<td>1.00</td>
<td>0.50</td>
<td>0.92</td>
<td>0.59</td>
<td>0.41</td>
<td>0.35</td>
<td>0.75</td>
</tr>
<tr>
<td>Min</td>
<td>0.23</td>
<td>0.00</td>
<td>0.22</td>
<td>0.22</td>
<td>0.11</td>
<td>0.00</td>
<td>0.19</td>
<td>0.13</td>
<td>0.00</td>
<td>0.13</td>
<td>0.20</td>
</tr>
<tr>
<td>Std Dev</td>
<td>0.11</td>
<td>0.08</td>
<td>0.17</td>
<td>0.16</td>
<td>0.27</td>
<td>0.11</td>
<td>0.23</td>
<td>0.14</td>
<td>0.09</td>
<td>0.07</td>
<td>0.15</td>
</tr>
<tr>
<td>Var</td>
<td>0.01</td>
<td>0.01</td>
<td>0.03</td>
<td>0.03</td>
<td>0.07</td>
<td>0.01</td>
<td>0.05</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Indicator 2.4. Percentage ICU/hospitalized (Selected Regions)

<table>
<thead>
<tr>
<th>DATA</th>
<th>Emilia Romagna</th>
<th>Lazio</th>
<th>Lombardia</th>
<th>Veneto</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>0.108</td>
<td>0.132</td>
<td>0.130</td>
<td>0.244</td>
<td>0.135</td>
</tr>
<tr>
<td>Max</td>
<td>0.156</td>
<td>0.350</td>
<td>0.266</td>
<td>0.388</td>
<td>0.230</td>
</tr>
<tr>
<td>Min</td>
<td>0.086</td>
<td>0.000</td>
<td>0.113</td>
<td>0.218</td>
<td>0.119</td>
</tr>
<tr>
<td>Dev Std</td>
<td>0.022</td>
<td>0.082</td>
<td>0.046</td>
<td>0.044</td>
<td>0.034</td>
</tr>
<tr>
<td>Varianza</td>
<td>0.000</td>
<td>0.007</td>
<td>0.002</td>
<td>0.002</td>
<td>0.001</td>
</tr>
<tr>
<td>Dimension</td>
<td>Hospital Centered approach</td>
<td>Integrated Approach</td>
<td>Community-Home Approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testing</td>
<td>Testing used for hospitalized or symptomatic patients only</td>
<td>Diffused testing in specific territories (symptomatic and pauci-symptomatic patients (contagion outbreaks)</td>
<td>Diffused testing in the whole regional territory (symptomatic and pauci-symptomatic patients (contagion outbreaks)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital use</td>
<td>Intensive use of hospitalization (&gt;40%) and average use of ICUs (&lt;15% of hospitalized)</td>
<td>Intermediate use of hospitalization (between 20 - 30%) and average ICUs use of hospitalized</td>
<td>Limited use of hospitalization (lower than 20%) and intensive ICUs use (&gt;20%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary and community care involvement</td>
<td>GPs active on an individual basis</td>
<td>GPs active in structured mobile teams in collaboration with nurses, with DPIs provided by RHAs</td>
<td>GPs active in structured mobile teams in collaboration with nurses, with DPIs provided by RHAs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICU use</td>
<td>ICUs intensively used and rapidly saturated (13-14% of hospitalized patients)</td>
<td>ICUs used to support specific contagion outbreaks (lower intensity: 10% of hospitalized patients)</td>
<td>ICUs used to support specific contagion outbreaks (higher intensity of use: 20% of hospitalized patients)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital solutions</td>
<td>Use of digital solution limited for contact tracing</td>
<td>Regional platforms to support Covid-19 patients at home (e.g. DoctorCovid, Lazio Region)</td>
<td>Local platforms to support Covid-19 patients at home (e.g. Trentino Region)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Regions and models of response

<table>
<thead>
<tr>
<th>Hospital Centered approach</th>
<th>Integrated Approach</th>
<th>Community-Home Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lombardia</td>
<td>Emilia-Romagna</td>
<td>Veneto</td>
</tr>
<tr>
<td>Liguria</td>
<td>Marche</td>
<td>PA Trento</td>
</tr>
<tr>
<td>Lazio</td>
<td>Toscana</td>
<td>PA Bolzano</td>
</tr>
<tr>
<td>Piemonte</td>
<td>Valle D’Aosta</td>
<td>Friuli Venezia Giulia</td>
</tr>
<tr>
<td>Basilicata</td>
<td>Calabria</td>
<td>Puglia</td>
</tr>
<tr>
<td>Sicilia</td>
<td>Campania</td>
<td>Molise</td>
</tr>
<tr>
<td>Umbria</td>
<td></td>
<td>Abruzzo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sardegna</td>
</tr>
</tbody>
</table>
Evidences (4/4)
Regional response (Phase 2)
Regional «readiness»
Healthcare planning (Phase 1 and Phase 2)

Phase 1

Phase 2

May 5th 2020

May 12th 2020
**Hospital Care Contingency Plans (Models)**

<table>
<thead>
<tr>
<th>Covid – Hospital</th>
<th>Hospitals networks</th>
<th>Hub and spoke</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marche</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(supported by infectious disease clinical departments located in other regional hospitals)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lombardia</strong></td>
<td></td>
<td><strong>Lazio</strong></td>
</tr>
<tr>
<td><strong>Liguria</strong> (+ covid-free hospitals)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Emilia –Romagna</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( only for intensive care «covid-19 intensive care»)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table shows the different approaches planned by Italian Regions for the management of Covid – 19 patients. It reveals an heterogeneity in the choices: two regions (Lombardia and Liguria) plan to operate an hospital networks while others (Lazio and Emilia Romagna) have designed an *hub and spoke* organizational model. At the moment, only one region (Marche) has deliberate to carry all covid patients’ in a dedicated hospital.
Discussion & Conclusion

Phase 1 of Covid-19 outbreaks was characterized by an uneven response to the emergency between the Italian Regions and three dominant organizational models were identified: hospital centered approach, community care approach, integrated approach.

Regions has adjusted their response granting on their own assets and traditional approach to healthcare (more or less hospital-centric);

Nevertheless a progressive convergence towards common management methods that include both hospital and local / home assets can be seen;

Post lock-down phase has been just started and new models of analysis are needed to monitor the evolution of the contagion and the regional adaptive response.