ANALYSIS OF MASS TEST RESULTS IN THE AUTONOMOUS PROVINCE OF BOLZANO

Considerations and initiatives to fight the spread of SARS-CoV-2

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Snapshot: Autonomous Province of Bolzano

• The **healthcare** is provided by one health authority (Azienda Sanitaria dell'Alto Adige) organized in 4 health districts.

• **7 hospitals** with a total of **1,641 beds** are operated by the local healthcare authority

Country:
Italy
Province Capital:
Bolzano
Population:
534,624 People
Density:
72,2 km$^2$
Municipalities:
116

Distribution of the population:
Bolzano: 44,00%
Merano: 26,00%
Bressanone: 14,60%
Brunico: 15,00%

Degree of urbanization:
High: 21,10%
Intermediate: 23,90%
Low: 55,00%

Data: http://www.provincia.bz.it/salute-benessere/osservatorio-salute/distribuzione-territoriale.asp
Mass testing initiatives at international level

What is “mass testing”?

- “Mass testing” consists in performing a high volume of tests, regardless of whether people show symptoms or not, in order to identify suspected cases with SARS-CoV-2 infection. As the virus detection techniques become easier to perform and read, more population testing initiatives are performed by countries worldwide.

- There are great differences between countries in the way these initiatives are carried out, reflecting differences in the organisational models adopted, in the human resources and means employed, but also in the different cultures in dealing with sensitive issues such as public health protection.
Mass testing initiatives at international level

Studies from European Centre for Disease Prevention and Control

- The European Centre for Disease Prevention and Control (ECDC) has recently issued a paper on population-wide testing, considering rapid antigenic swabs to be ideal for this purpose, provided that the following **five objectives** for their use are met:
  - to control transmission
  - monitoring the transmission rates of the SARS-CoV-2 virus and its severity
  - to mitigate the impact of COVID-19 in health and care facilities
  - detect clusters or outbreaks in specific situations;
  - maintain the elimination status of COVID-19 once achieved
Mass testing initiatives at international level
The steps of the European Commission

• The European Commission has presented on October 28th 2020 a Communication to the European Parliament and the European Council on the steps to be taken to **stem the epidemic** and has **mobilised €100 million** to directly **purchase rapid antigenic tests** and deliver them to **Member States**, in the belief that they may be useful for population screening.
The screening in the AP of Bolzano

Aim of the initiative

1. To get a picture of the population in that specific moment

2. To test and isolate most of the cases of COVID-19

3. To gather data and information to cross with other data sources and for subsequent strategies
The screening in the AP of Bolzano

Details of the initiative

The initiative was realized between **20 to 22 November 2020.** All test executed **72 hours before and after** the testing period were included into the sample.

The **normal prevention and care activities** (increase in the capacities in the hospitals, organization of intensive care, monitoring in the residences for the elderly, etc.) **were not stopped** in the testing period and took place contemporarily.
The situation before the screening

Main indicators

**RT-Value**

- **1.92** from 19.10 - 25.10
- **1.72** from 26.10 - 01.11
- **1.16** from 09.11 - 15.11

**NEW**

Creation of **113** new hotspots

**Increased occupancy rate of ICU, IMCU and NS beds**
The ordinance of the Provincial Governor

Measures taken in case of positive tests (1/2)

Due to the **exceptional nature of the situation**, in order to identify and isolate the largest possible number of infected people, special measures have been taken:

1. **the positivity to SARS-CoV-2** infection by means of a rapid antigenic test is followed by **home isolation measures** without carrying out a confirmative PCR test

2. **strict contacts** were not traced
The ordinance of the Provincial Governor

Measures taken in case of positive tests (2/2)

In order to leave the isolation, there was a differentiation to be made:

• Persons who did **not develop symptoms** during the period of isolation: after **10 days of home isolation** from the detection of a positivity to SARS-CoV-2 the person could return to the community **without** the need for **further testing**.

• Persons who did **develop symptoms** during the period of isolation at home: in this case the person should immediately **contact** their **General Practitioner or Pediatrician** to take appropriate action.
The screening in the AP of Bolzano

Key figures and Data

Cost estimation: 4,500,000 €

Key figures:
Total number of tests: 361,781
Total positive cases: 3,615

Test locations:
Total municipalities: 116
Test locations: 204

Key Partner:

Dr. Franzoni
The screening in the AP of Bolzano

Health professionals employed for the screening

The total number of health professionals employed was **1,937**. These were divided in:

- **SABES personnel**: 1,289 people
  - 142 doctors
  - 1,048 nurses and midwives
  - 99 prevention, technical health and rehabilitation professionals

- **external health personnel**: 327 people
  - 196 private doctors
  - 65 GPs
  - 50 nurses, pediatric nurses, midwives
  - 16 prevention, technical health and rehabilitation professionals

- **White Cross and Red Cross personnel**: 321
The screening in the AP of Bolzano

The role of the municipalities

The **116 municipalities** of South Tyrol supported the local Health Authority in carrying out the screening of the population:

The key activities were:

a. **selecting and preparing the location** owned by the municipality or, if necessary, by other Authorities (e.g., school buildings, gyms, association offices) according the provided guidelines.

b. **providing its own staff** for administrative tasks and finding volunteers.
The screening in the AP of Bolzano

AG Tests used in the screening

LOW CIRCULATION PERIOD
Sensitivity 73%: calculated for 76 PCR positive samples (Ct cut-off values <40) collected from symptomatic and asymptomatic patients in August (high virus).
Sensitivity 85%: calculated for the same samples using Ct cut-off values <28.

HIGH CIRCULATION PERIOD
Sensitivity 80%: calculated for 56 PCR positive samples (Ct cut-off values <40) collected from symptomatic and asymptomatic patients in November.
Sensitivity 90%: calculated for the same samples using Ct cut-off values <28.

Moreover, for two further sample sets, one collected during a high prevalence period (69 subjects) and the other during a low prevalence period (633 subjects), 99-100% of antigen positive samples were confirmed by PCR (positive predictive value)
The screening in the AP of Bolzano

Participation rate

### Covid Screening 20-21-22 November 2020

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<tbody>
<tr>
<td></td>
<td>364.039</td>
<td>3.795 (1,0%)</td>
<td>3.619 (1,0%)</td>
<td>0,7%</td>
<td>350.848 (65,4%)</td>
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<table>
<thead>
<tr>
<th>Teststationen in den Gemeinden - Postazioni di test nei comuni</th>
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<tr>
<td>Tests</td>
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<td>259.025</td>
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<td>20.433</td>
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<td>66.577</td>
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<td>17.962</td>
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<th>Apotheken - Farmacie</th>
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<td>Tests</td>
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<td>20.433</td>
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<tr>
<th>Ärzte / Private Einrichtungen - Medici/strutture privati</th>
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<td>Tests</td>
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<tr>
<td>66.577</td>
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<thead>
<tr>
<th>Ärzte/Ärztinnen für Allgemeinmedizin und Kinderärzte/ärztinnen freier Wahl</th>
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<td>Tests</td>
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<td>17.962</td>
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The screening in the AP of Bolzano

All 116 municipalities are represented: example given

<table>
<thead>
<tr>
<th>Tests</th>
<th>Positivi/Testati $^1$</th>
<th>Positivi/Testati $^1$</th>
<th>Positivi/Testati $^1$</th>
<th>Positive Ansässige/Residenti $^1$</th>
<th>Getestete/Residenti $^1$</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>3.419</td>
<td>62</td>
<td>78</td>
<td>1.3%</td>
<td>3.794</td>
</tr>
<tr>
<td></td>
<td>1.8%</td>
<td>2.1%</td>
<td></td>
<td></td>
<td>63.3%</td>
</tr>
</tbody>
</table>

Ansässige – Residenti: 5,990

<table>
<thead>
<tr>
<th>Tests</th>
<th>Positivi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahrntal Valle Aurina</td>
<td>3.243</td>
</tr>
<tr>
<td>MMG_PLS: AHRNTAL MMG_PLS: VALLE AURINA Seniorenheim Georgianum</td>
<td>53</td>
</tr>
<tr>
<td>Seniorenheim Georgianum</td>
<td>123</td>
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<table>
<thead>
<tr>
<th>Tests</th>
<th>Positivi</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>1,6 %</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>17,0 %</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0,8 %</td>
</tr>
</tbody>
</table>
The screening in the AP of Bolzano

Ratio: positive tests / performed tests
The screening in the AP of Bolzano

Data analyzed

Following data was analysed after the screening:

- Age and gender
- Family groups
- Workers categories
- Distribution of positive cases in Municipalities
- **Correspondence of the positive emerged cases to the previous epidemiological insights and tests**
- Cross these data with PCR test in the same people who attended antigenic test
### The screening in the AP of Bolzano

Screening participants divided per age and sex

<table>
<thead>
<tr>
<th>Persone inserite in anagrafica BDPA</th>
<th>Persone NON inserite in anagrafica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totale</td>
<td>Positivi</td>
</tr>
<tr>
<td>Maschi</td>
<td>177.029</td>
</tr>
<tr>
<td>Femmine</td>
<td>170.286</td>
</tr>
<tr>
<td>Totale</td>
<td>347.315</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Età</th>
<th>Totale</th>
<th>Positivi</th>
<th>Totale</th>
<th>Positivi</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
<td>M</td>
</tr>
<tr>
<td>0 - 6 anni</td>
<td>2.340</td>
<td>2.249</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>7 - 18 anni</td>
<td>23.581</td>
<td>21.720</td>
<td>191</td>
<td>166</td>
</tr>
<tr>
<td>19 - 65 anni</td>
<td>123.933</td>
<td>115.737</td>
<td>1.318</td>
<td>1.108</td>
</tr>
<tr>
<td>66 - anni</td>
<td>27.173</td>
<td>30.580</td>
<td>219</td>
<td>259</td>
</tr>
<tr>
<td>Totale</td>
<td>177.027</td>
<td>170.286</td>
<td>1.742</td>
<td>1.546</td>
</tr>
</tbody>
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19
The screening in the AP of Bolzano
Comparison of age groups of all subjects and Ag positive subjects
The screening in the AP of Bolzano

Performance of SARS-CoV-2 antigen test

<table>
<thead>
<tr>
<th>Ag test</th>
<th>RNA detected</th>
<th>RNA not detected</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag positive</td>
<td>459</td>
<td>20</td>
<td>479</td>
</tr>
<tr>
<td>Ag negative</td>
<td>169</td>
<td>821</td>
<td>990</td>
</tr>
<tr>
<td>Total</td>
<td>628</td>
<td>841</td>
<td>1469</td>
</tr>
</tbody>
</table>

Sensitivity = 73,1% (459/(459+169))
Specificity = 97,6% (821/(821+20))

Positive predictive value= 95,8% (459/(459+20))
Negative predictive value= 82,3% (821/(821+169))

Accuracy = 87,1% (459+821)/(459+821+20+169)

BIAS:
- Selection of subjects tested with RT-PCR was not random and therefore does not reflect local epidemiology
- Ag and PCR test were not performed simultaneously, collecting two different biological samples
- Two different kits used for Ag testing and RT-PCR
The screening in the AP of Bolzano

Repercussion on main indicators
(comparison between Ministry reports 25-26-27)

1. **RT calculation based on data from Civil Protection Department:**
   Medical area beds from 98 to 65%, ICU decreasing.

   (Dec. 11\(^{th}\), 2020: 41,8% Med. Area beds occupation)

1. **Deaths and hospitalization presumably avoided.**
   - **Total Deaths, Dec. 11\(^{th}\), 2020:** 612
   - **In Patients 7 Regional Hospitals:**

<table>
<thead>
<tr>
<th>Total in patients</th>
<th>Nov 24th 2020</th>
<th>Dec 11th 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Area</td>
<td>323</td>
<td>239</td>
</tr>
<tr>
<td>ICU</td>
<td>38</td>
<td>31</td>
</tr>
<tr>
<td>other</td>
<td>148</td>
<td>138</td>
</tr>
</tbody>
</table>
The screening in the AP of Bolzano

New daily positive cases in AP of Bolzano

- frequenza giornaliera
- medie mobili settimanali
The screening in the AP of Bolzano

RDT Values

![Graph showing RDT values over time]
The screening in the AP of Bolzano

Comparison: RDT Values & new daily positive cases
AP of Bolzano
Predictive model of impact of screening-partecipation on Rt-Value
The screening in the AP of Bolzano

RDT Values (Italy)
Next steps
Monitoring the epidemiologic situation

• **Monitoring South Tyrol** is a initiative with a sample of **20,000 citizens** throughout the province with the aim of control the epidemiologic situation (weekly sample: 4,000 people). Furthermore, 900 school employees and 300 high school students will participate to the monitoring. The tests will be carried out on a **voluntary basis** every month - from December to March. The first tests are scheduled to take place next week. In order to gather as much information possible, the project-partner are ASTAT (provincial institute of statistics) and EURAC (Institute of Research).
Next steps
Monitoring the epidemiologic situation

- **Sectorial tests**, such as those carried out during the summer months on tourism workers, will also be repeated.
- **Monitoring various work environments**
- **Monitoring Social facilities** (not only for the elderly)
- **Wastewater monitoring** in collaboration with the Agency for the Environment and Climate Protection (Appa): a pilot project on wastewater analysis to detect the presence of the virus.
- **High school students** (98,000) and teachers on a monthly basis until the end of the emergency where it seems that it is the teachers who are most affected.
Residents in the screening
350,848
(N=3,619 Ag+  N=347,729 Ag-)

14 days follow up

hospitalized
N=858

COVID or intensiv departments
N=116

other departments
N=742

Ag+
N=61

Ag-
N=55

Ag+
N=31

Ag-
N=711

active surveillance
(symptomatics)
N=4,373

Ag+
N=1,301

Ag-
N=3,072

asymptomatics or no-COVID
N=345,617
55 screening participants with a negative test were admitted within 14 days to COVID or intensive care units: 15.8/100,000 of those with Ag-Age (mean, SD): 63.8, 19.4
Days between testing and admission (mean, SD): 7.7, 3.6

3072 screening participants with a negative test were symptomatic within 14 days and underwent surveillance: 8.8/1,000 of those with Ag-Age (mean, SD): 37.9, 21.5
Thanks for your attention