Lombardy an outlier in the Covid-19 pandemic

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Italian version: Perché la Lombardia è un'anomalia evidenziata dalla Covid-19 R&P 2019;361-6

I was asked my thoughts on the "Lombardy as outlier" issue. I've been thinking about it for a while and a reading exercise can be carried out. I'm not surprised that Tom Jefferson asked me, being the historical curator in Italy of John Snow's work on the cholera epidemic of 1854 in London.[1] The analogies between this story and that of Covid-19 in Italy are many: from the beginning of the outbreak (then it was Soho, today it is Codogno), to the initial carrier (yesterday the Broad Street water pump, today the Italian "patient one", the runner of Codogno).[2] It would be interesting, and useful, to write a brief piece *On the mode of communication of the coronavirus* along the lines of Snow's book, with his maps, his estimates, his predictions.[1] The representation of the pandemic's trend and the interventions implemented to contain it are characterized by "variability" and Lombardy really is an outlier.

Before the Covid-19 manifested itself in Lombardy (February 20 in Codogno),[3] on January 31 the first two cases in Italy were confirmed: a couple of Chinese tourists. Two days earlier, on January 29, the first two cases had been reported in the UK.[4] The first case in the US had already been reported on January 20.[5]

Lombardy is the Italian region with the highest number of residents and density. It is first in terms of productivity and has an "excellent" health service - one of the most qualified in Europe. It is an unbalanced public-private health system (almost all of which has an agreement for public reimbursement) (60/40).

In Lombardy, in Codogno, the first Italian case was reported 7500 km away from Wuhan, and it is the setting with the highest mortality of positives in the hospital, and, to date, the first for prevalence on domiciled persons.

The outbreak in Codogno (Lodi) started from the hospital, as did that of Alzano (Bergamo). In both cases, positive, symptomatic patients were admitted to the hospitals and then discharged, and were then readmitted and hospitalized after a few days. No prevention measures were used by unsuspecting healthcare personnel, and this was strategic for the virus' spread and for the contagion of healthcare personnel, too. Codogno was locked down like Wuhan, while Alzano had no blocks put into place except the delayed, general national block (Bergamo was contaminated with an effect that is still unique worldwide). Measures were taken late, were contradictory, were both preventive and diagnostic, and were often being at odds between the Region and the Government.

Lombardy is the region with the highest number of beds (35,605, 3.6 per 1000 inhabitants), with the largest number of doctors (22,026, 2.2 per 1000 inhabitants) and with the largest number of accredited private hospitals (73). Lombardy is the only region to have had to resort to field hospitals for a pandemic in the last century.

Interventions focused for weeks on the severe final outcome of the infection (admittance to an intensive care ward) rather than on the containment and interruption of the process. They focused on resuscitations by postponing interventions on, and in, the territory. In Italy there are 12.5 beds per 100,000 inhabitants for Intensive Care compared to 34.7 in the USA, 29.2 in Germany, 11.6 in France, 11.5 in South Korea, 6.6 in the UK and 3.6 in China,[6] but the variability between the regions is wide. Lombardy is more similar to China, with 87 hospitals (private non-affiliated nursing homes excluded) that have intensive care wards (55 public and 32 affiliated), for a total of 234 beds in public hospitals and 140 in affiliated hospitals; and 3.74 beds per 100,000 inhabitants, 63% in the public 37% in the private sector.[7] With 374 beds and requests 5 times higher than the actual availability, Lombardy became a "case" that was placed outside the national distribution (an *outlier*).

Lombardy is not only the region with the highest number of Covid-19 deaths in Italy (over half the total), but (so far) also worldwide. After two months of hospitalizations for Covid-19, in 33 small Lombard municipalities the number of deaths has increased tenfold compared to last year. In Bergamo this increase is quadruple. In Milan, in one year, the deaths rose on average by 41%,, going from 1.100 to 1.551. Men 61.8%, women only 26.[8] Only positive hospital deaths are a probable certainty, all the rest are unconfirmed or unknown numbers.

The Lombard primary care system has proved inefficient and harmful to the health of even the health workers themselves (over 100 doctors and a few dozen nurses have died of the infection). Even after weeks, the availability of personal protective equipment was limited, often inappropriate, and, according to a random distribution, in some cases even dishonest.

With the largest population of people aged over 65, Lombardy is the region with the highest number of Health Care Residences (RSA): 688 for 63,480 places, almost all private.[9] RSAs, transformed into places of death and elderly people abandoned in their own houses. The rate of deaths has more than doubled when considering the RSA guests and the private homes. The historic Pio Albergo Trivulzio, among the largest RSAs in Italy with 1300 beds, ended up under investigation by the Prosecutor's Office after the death of 70 positive residents for the failure to implement the measures given to protect the safety of the patients and staff.[10]

Lombardy, with 374 beds in the Intensive Care units could not have more than 374 patients attached to a respirator at any given time. If the average length of stay of an ICU patient is 14 days, Lombardy cannot provide intensive care for more than about 26.7 new patients per day (374/14 = 26.7). Assuming that about 5% of all cases of new infection are so serious as to require intensive care, Lombardy cannot afford to have more than a total of approximately 544 new infections per day (26.7 x 20 = 534). This is the real number of infections, only a part of which is reflected in the officially reported count and, unfortunately, in what reality has confirmed. Understanding and predicting the number of new daily infections that the Lombard health system would have been able to manage without imploding was the mandate and responsibility of those in charge. To do this,

knowing what the available resources were, it was not necessary to resort to sophisticated predictive models. It would have been sufficient to define, for each local reality, the number of new infections that the emergency health facilities could support, so as to determine which Rt (the virus's transmission rate at a given moment) to target and optimize the interventions to reach it in each context. After obtaining a decline in Rt and keeping it below 1 having brought the number of new cases daily to an acceptable value, the community could also consider the idea of relaxing some measures.[11] The process doesn't seem to have been followed in terms of outcome, transparent and explicit, of the results achieved and the strategy followed. However, one must be prepared to reset the drastic restrictions as soon as the infection reappears in the community. The risk is high because, for the general population to develop sufficient immunity to the virus (at least over 50% of the population), a safe and effective vaccine will be required, and this is not available today.

How long can the population accept the restrictions required to maintain that level of infection? Will people stop conforming to the restrictions? Is their mental and emotional well-being at risk? Mental suffering increases in home quarantine and could increase considerably with the continuation of the pandemic and the worsening of the economic crisis. There would be a need to experiment with strategies that anticipate and document the possibility of a progressive recovery of a life in which respect for fundamental rights becomes compatible, and a priority, once again, in particular for fragile populations. Fragile populations are minors, many of whom also live in unfavorable family conditions, exposed to a spectrum of immediate and future risks; the elderly, alone, with important clinical problems and not always self-sufficient; psychiatric patients, of all ages and severity, who need very diversified management strategies; disabled people with complex care needs; the homeless with the need to redesign the survival maps; families awaiting eviction, those in poverty, and those of conflict and domestic violence.

Lombardy is therefore anomalous and distant (an *outlier*) from the other regions. Another story of Covid-19 in Italy could be told without considering Lombardy. Another story of Lombardy could also be told without Codogno and Alzano-Bergamo, two Lombard *outliers*.

The long line of military vehicles that transported the coffins of the deceased in Bergamo is an *outlier*. Citizens who left their houses saying goodbye for the last time, who never returned as if they had had an accident. Bodies transported far from native places to be cremated due to the saturation of the demand for municipal cemetery services. Ashes returned to families of those deprived of the farewell of loved ones.

This is a list of factors characterizing Lombardy as an *outlier* and a long time and effort to will be needed to shift back into a "normal" distribution interval.

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