Italian pulmonologist units and COVID-19 outbreak: “mind the gap”!

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The outbreak of COVID-19 in Italy has shown the inadequacy of the health system to counterbalance a massive request for ICU care [1]. One fourth of > 1500 COVID-19 patients died after the admission in Lombardia ICUs; in only 11% of them, noninvasive ventilation (NIV) and/or high flow nasal cannula (HFNC) was attempted early to prevent respiratory deterioration and invasive mechanical ventilation (IMV). Conversely, in Chinese reports, NIV and HFNC were used respectively in between one third and two thirds of less severely hypoxemic COVID-19 patients keeping lower hospital mortality [2]. The success of noninvasive respiratory assistance in avoiding intubation is higher if attempted earlier in hypoxemic patients (PaO₂/FiO₂ > 150) [2]. Even after failure, NIV and/or HFNC may be good players to facilitate weaning from IMV and discharge from ICU. Clinical expert-guided hierarchical COVID-19 management strategy including intensivists and pulmonologists might have improved outcomes in some Chinese provinces [3].

The delayed admission in Lombardia overcrowded ICU of severely hypoxemic COVID-19 patients meeting the criteria for IMV without being offered a HFNC/NIV trial must have played a crucial role. Where should have been earlier and properly noninvasively supported acute patients with and without COVID-19 to keep the highest the ICU capacity?

Respiratory high-dependency care units (RHDCUs) are specialised cost-effective environments offering an “intermediate” level of care between ICU and ward, where NIV/HFNC, weaning from IMV and discharge of ventilator-dependent patients are provided [4]. Italian RHDCUs are mainly located inside the pulmonology ward and work following a step-up/step-down flexibility according to changes in clinical status. The “gap” between the Italian RHDCU network and pre-COVID-19 respiratory needs might largely explain ICU network failure in Lombardia [4]. A national survey performed at the beginning and 1 month after the COVID-19 outbreak demonstrated an increase rate (94% vs 12%) of Italian Pulmonologist Units (IPUs) accounting for 841 extra-beds involved in the fight against COVID-19. This was associated with the “up-grading” of 84% IPUs towards RHDCUs. Moreover, 72% of these extra-beds were dedicated to provide NIV/HFNC which avoided intubation/death in 40% of cases (http://www.aiponet.it/news/speciale-covid-19/2463-il-94-delle-pneumologie-in-prima-linea-nella-lotta-contro-l-infezione-da-covid-19.html) (Table 1). The expanded IPU network together with national more restrictive measures against virus dissemination after the Lombardia outbreak has contributed to the mitigation of COVID-19 impact on mortality in other regions.

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In conclusion, what could we learn from the Italian COVID-19 outbreak? The Italian health system needs a stronger pulmonologists/RHDCUs “backbone” for the governance of “ordinary” burden of respiratory diseases to mind the gap against next unforeseen pandemic.

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Authors’ contributions
RS ideated and structured the paper. AC, TR and AV contributed to the writing of the paper. RS revised the final version of the paper. All authors have read and approved the final manuscript.

Table 1 Distribution of RHDCU beds at the pre-COVID-19 time and of pulmonologist extra beds during the COVID-19 outbreak according to the different Italian regions

| Regions         | Population, inhabitants | Pre-COVID-19, E-RHDCU beds (min-max) | Pre-COVID-19, A-RHDCU beds | COVID-19, hospitalised pts* | COVID-19, ICU pts* | COVID-19, IPU extra-beds** | COVID-19, IPU NIV pts** |
|-----------------|-------------------------|--------------------------------------|----------------------------|---------------------------|------------------|---------------------------|------------------------|
| Lombardia       | 10,060,574              | 101–201                              | 77                         | 11,815                    | 1330             | 378                       | 240                    |
| Lazio           | 5,879,082               | 59–118                               | 13                         | 1079                      | 154              | 0                         | 0                      |
| Campania        | 5,801,692               | 58–116                               | 18                         | 468                       | 126              | 26                        | 4                      |
| Sicilia         | 4,999,891               | 50–100                               | 16                         | 484                       | 75               | 39                        | 12                     |
| Veneto          | 4,905,854               | 49–98                                | 36                         | 1633                      | 356              | 63                        | 10                     |
| Emilia-Romagna  | 4,459,477               | 45–89                                | 61                         | 3779                      | 351              | 40                        | 45                     |
| Piemonte        | 4,356,406               | 44–87                                | 12                         | 2985                      | 452              | 63                        | 29                     |
| Puglia          | 4,029,053               | 40–81                                | 22                         | 590                       | 106              | 0                         | 21                     |
| Toscana         | 3,729,641               | 37–75                                | 49                         | 1116                      | 279              | 92                        | 28                     |
| Calabria        | 1,947,131               | 19–39                                | 8                          | 130                       | 18               | 24                        | 8                      |
| Sardegna        | 1,639,591               | 16–33                                | 0                          | 113                       | 24               | 0                         | 0                      |
| Liguria         | 1,550,640               | 16–31                                | 4                          | 1142                      | 175              | 37                        | 0                      |
| Marche          | 1,525,271               | 15–31                                | 4                          | 998                       | 167              | 28                        | 12                     |
| Abruzzo         | 1,311,580               | 13–26                                | 4                          | 322                       | 69               | 6                         | 0                      |
| Friuli Venezia  | 1,215,220               | 12–24                                | 14                         | 229                       | 60               | 13                        | 17                     |
| Trentino-Alto Adige | 1,072,276             | 11–21                                | 7                          | 584                       | 140              | 31                        | 5                      |
| Umbria          | 882,015                 | 9–18                                 | 24                         | 173                       | 47               | 1                         | 4                      |
| Basilicata      | 562,869                 | 6–11                                 | 10                         | 36                        | 18               | 0                         | 0                      |
| Molise          | 305,617                 | 3–6                                  | 0                          | 27                        | 8                | 0                         | 0                      |
| Valle d’Aosta   | 125,666                 | 1–3                                  | 0                          | 92                        | 26               | 0                         | 0                      |
| Italy           | 60359546                | 604–1207                             | 379                        | 27795                     | 3981             | 841                       | 435                    |

*Data from the Ministry of Health update to 30 March 2020, http://www.salute.gov.it/portale/news/p3_2_1_1_1.jsp?lingua=italiano&menu=notizie&p=dalministero&id=4362
**IPU: Italian pulmonologist unit; data of the first survey promoted by ITS/AIPO on the role of IPU in the midst of pandemics of the Pandemic (24 March 2020), ref. (http://www.aiponet.it/news/speciale-covid-19/2463-il-94-delle-pneumologie-e-in-prima-linea-nella-lotta-contro-l-infezione-da-covid-19.html)

PNI_2006_08_28_marzo.pdf
NIV noninvasive ventilation
A = RHDCU: active beds of respiratory high-dependency care units according to the 3rd Census of Italian RHDCU promoted by ITS/AIPO, updated to 15 February 2020 (rate of adhesion to the survey of IPU: 90.7%)
E = RHDCU: estimated needed beds of respiratory high-dependency care units according to the National Health Plan (2006–2008), http://www.salute.gov.it/resources/static/primopiano/316/

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Yes

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