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Letter to the Editor

Regional variation in trajectories of healthcare worker infections during the COVID-19 pandemic in Italy

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To the Editor—Healthcare workers (HCWs) have been key in the current global response against the COVID-19 epidemic; their safety can help address the clinical and public health challenges associated with SARS-CoV-2 infection.[1]

As of late March, infections of HCWs in Italy reached a peak of ~10.0% of the total COVID-19 cases,[2] representing a potential amplifier of the epidemic following the viral transmission within and outside the health facility environment, to HCWs, visitors, inpatients, and outpatients. The Italian National Health Institute (Istituto Superiore di Sanita, ISS), has been issuing a biweekly bulletin on the COVID-19-update since March 19, 2020. These bulletins report on Italian regional data collected by local laboratories, stratified by demographic and epidemiological variables (eg, age, province, etc). Until April 2, bulletins were also reporting the cumulative number of SARS-CoV-2–positive HCWs.[3-7] Unfortunately, no data on incident infections among HCWs have been published in the most recent reports.

The available data show wide regional disparities, both in terms of HCW infection prevalence and in trajectories over the 4 weeks of monitoring (Fig. 1). On March 19, 2020, the cumulative number of positive individuals ranged from 7 in Valle d'Aosta to 19,882 in Lombardy, with a proportional attributable contribution to the total amount of cases varying from 0.2% (n = 1) in Campania to 41.5% (n = 44) in Sardinia. Although the overall national trend of positive healthcare workers out of the total cases showed a slight decrease (from 9.5% to 8.4%) from March 19 to April 2, several regional patterns were also described in the same period (Fig. 1).

Some regions (eg, Piemonte, Valle d'Aosta, Marche, Lazio, Campania, and Basilicata) initially showed low percentages of infected HCWs, and these cases were rapidly and accurately managed. The Molise region recorded a prevalence of 28.1% during the first day of monitoring, which was successfully lowered to 17.0%, whereas Sardinia showed a high percentage (34.0%) at the beginning of April. On the other hand, stable lower estimates were reported in Lombardy (14.0%), Tuscany (10.0%), Calabria (10.0%), Emilia-Romagna (7.0%), Liguria (6.0%), and Abruzzo (5.0%). Sicily and Puglia showed a slight proportional increase (from 0.9% to 3.0% and from 7.0% to 10.9%, respectively) and several areas showed dramatic increases: Veneto (from 2.0% to 8.8%), Friuli-Venezia-Giulia (from 6.2% to 16.1%) and Umbria (from 0.7% to 10.8%).

Cautious interpretation of these data is needed. A rapid decreasing proportion of positive HCWs might be the consequence of a rapid inflation of the total positive cases in the general population or of a strong regional response based on tailored and immediate public health interventions. On the other hand, the proportional stability (~15.0%) might be explained by the high regional burden of infected individuals over the previous weeks (46,071 cumulative cases by April 2). In regions where the proportion of infected HCWs is increasing or is still very high, appropriate public health measures to curb the trend should be implemented and scaled up.

Importantly, the national picture does not clearly showcase regional and provincial scenarios. Regional dynamics are significantly affected by local events, such as incident clusters of disease, as well as adoption and adaptation of national preparedness plans and their appropriate implementation. Furthermore, accurate and continuous monitoring of local data is needed, and the responses to emergencies must be adapted in the most granular way. As emphasized by the recent World Health Organization (WHO) Health Emergency and Disaster Risk Management Framework (HEDRM), monitoring and evaluation is a critical step in the risk management cycle and can be applied in any moment of the continuum, from prevention and mitigation to preparedness, response, and recovery.[8] Recording and reporting regional data on infections among HCWs should be comprehensively coordinated by the ISS. Reports should be published to provide key feedback to the scientific community to facilitate participation in the fight against SARS-CoV-2.

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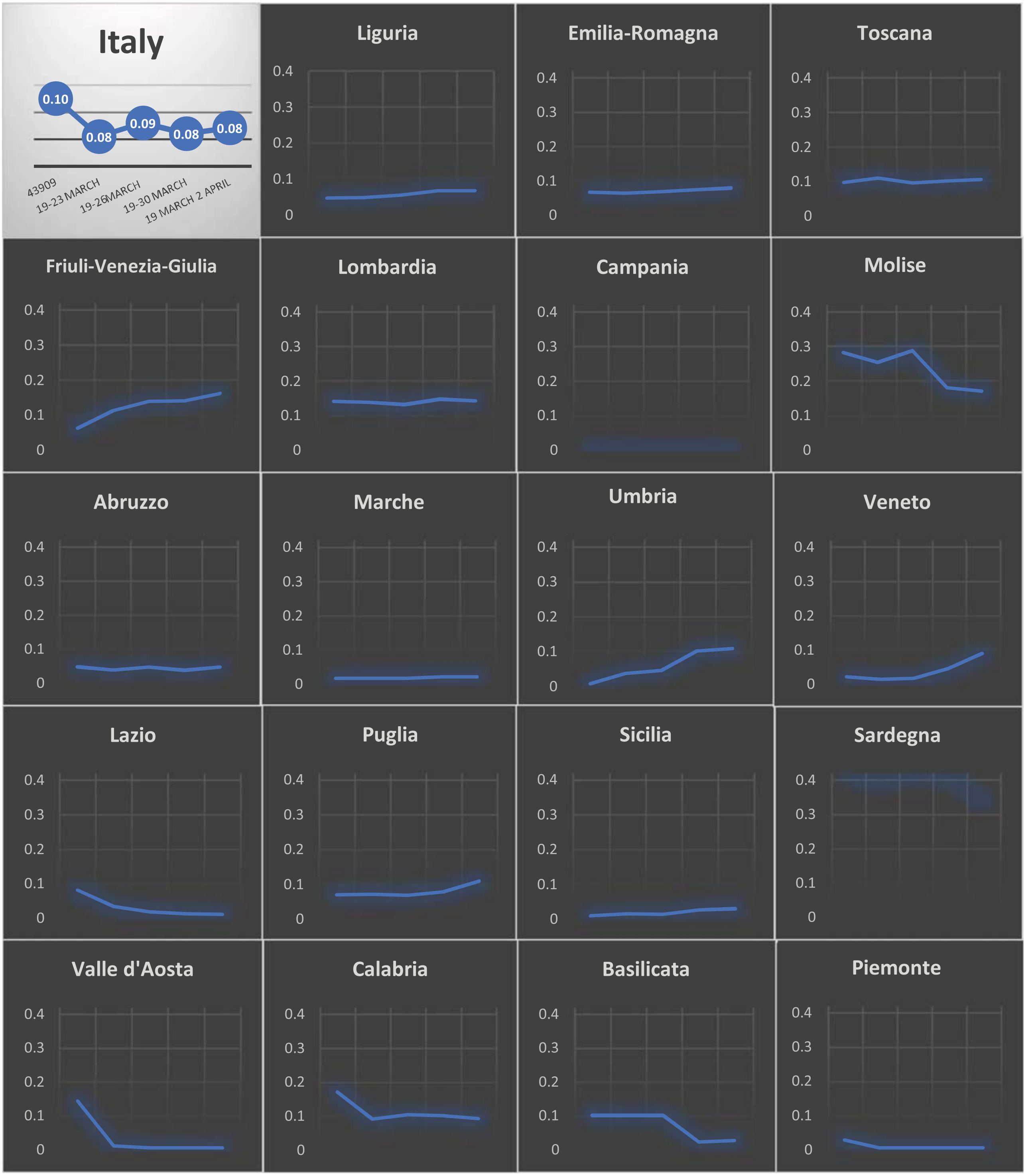

Fig. 1. Reporting graphs of proportional nfections in 19 regions in Italy.

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Calculating an institutional personal protective equipment (PPE) burn rate to project future usage patterns during the 2020 COVID-19 pandemic

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To the Editor—The COVID-19 pandemic of 2020, caused by a severe coronavirus strain named SARS-CoV-2, and has created shortages of personal protective equipment (PPE).[1] The Centers for Disease Control and Prevention (CDC) released a PPE burn rate calculator for hospitals to project future PPE supplies.[2] This tool requires that hospital systems have an understanding of daily PPE usage patterns. This calculator also does not differentiate usage at various healthcare provider (HCP) and patient capacities. Vital factors that affect PPE supplies, namely decontamination, are not considered in the CDC PPE burn rate calculator. We designed a sampling approach to steward our current PPE supply, and we developed an institutional burn rate calculator to project usage patterns at various patient and/or provider volumes.

We implemented a sampling process that utilized providers already present on a dedicated COVID-19 patient intensive care unit (ICU). We sampled continuously from weekdays to weekends to capture multiple use patterns. We previously implemented patient safety officers (PSOs) on each unit caring for COVID-19 patients to monitor infection control practices (eg, donning and doffing of PPE under extended use and reuse policies). The PSOs completed a survey of all providers present on the unit on the day and night shifts. This survey collected the following information: provider role, number of patients under the HCP care, number of COVID-19/person under investigation (PUI) patients under HCP care, number of contacts with COVID-19/PUI patients, number of patients for which the HCP uses an N95 mask, number of N95 masks used during a shift, number of N95 masks sent for decontamination, number of N95 masks disposed during a shift, number of gowns used during a shift, number of gowns disposed during a shift, number of disposable face shields used during a shift, number of disposable face shields disposed during a shift, number of disposable eye protection measures worn during a shift, number of disposable eye protection measures disposed during a shift, and number of aerosol-generating procedures (AGP) for which the HCP participated for a COVID-19/PUI patient. Once sampling was completed, we were able to develop our calculator.

We first calculated the average number of HCPs by role per shift (day or night) by dividing the total number of providers by the number of shifts. Next, we determined the number of N95s used by role per shift by dividing the total N95s used by the total number of providers. Using the average number of providers by role (per shift) and the total N95s used by role (per shift), we estimated the N95 use rate by role per shift. We then aggregated the estimated N95 use rate by provider role per shift to determine the estimated total N95 use rate per shift. To calculate the burn rate, we determined the disinfection rate of N95 masks by HCP role per shift. The disinfection rate equals the total number of masks disinfected divided by the total N95s used by role per shift. This disinfection rate is then used as a constant to estimate the number of masks that are disinfected by HCP role per shift based on the estimated masks used by role per shift. The N95 burn rate is then calculated by subtracting the estimated number of N95s disinfected by HCP role per shift from the estimated N95 use rate by role per shift. From the sampled data, we also incorporated a functionality to determine the impact of proportionate changes in COVID-19/PUI patient volumes on N95 utilization.

Our model required several assumptions. We assumed that our data collection helped us establish a baseline for the number of HCPs (and roles) that would interact with our COVID-19/PUI patients and that this level of care (ie, HCP-to-patient ratio) would be maintained as our volumes fluctuate (such that HCP staffing is directly proportional to patient volume). For example, if 5 nurses are staffed per shift to treat 10 COVID-19/PUI patients, 50 nurses would be staffed per shift for 100 COVID/PUI patients and the N95 use and burn rates would proportionally increase as well. Lastly, our calculator does not capture changes in N95 disinfection and N95 use rates, which can be subject to change.

Our sampling process captured 158 providers over a total of 84 hours and 14 shifts: 6 day shifts (7:00 AM through 7:00 PM) and 8 night shifts (7:00 PM through 7:00 AM). We were able to track all providers that cared for COVID-19/ PUI patients on a single unit and thus to approximate N95 use on other dedicated

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