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Educational Article

The impact of COVID-19 on research

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Coronavirus disease 2019 (COVID-19) has swept across the globe causing hundreds of thousands of deaths, shutting down economies, closing borders and wreaking havoc on an unprecedented scale. It has strained healthcare services and personnel to the brink in many regions and will certainly deeply mark medical research both in the short and long-term.

Prior to the COVID pandemic, virology research (including influenza) represented less than 2% of all biomedical research. However, the number of laboratories and investigators that have pivoted to address COVID related research questions is astonishing, likely comprising 10–20% of current biomedical investigation, showing the incredible adaptability of the research community [1]. The multinational support rapidly infused for COVID-19 research is in the billions of euros [2]. The sharing of research findings and research data has never been as rapid and efficient [3]. The crisis has also brought disease, health, and healthcare back to the forefront of societal issues, and will have a lasting impact on public spending. However, with all this optimism and focus, there is a downside.

To begin, the COVID-19 crisis has led to a massive influx of publications. Not only are specialty journals being flooded with submissions by authors being unwittingly granted much needed writing time, but publications on COVID have literally inundated us. More than 20,000 papers have been published since December 2019, many in prestigious journals. There are also an increasing number of studies being uploaded to preprint servers, such as BioRxiv, for rapid dissemination prior to any peer review. However, we cannot assume that the time and quality available for peer review is able to keep pace with the explosion of publication. There is need for increased caution in the wake of this massive influx of submissions, especially since we are increasingly seeing these results being picked up by

the media and diffused to a less attuned audience. In recent weeks, several prestigious journals, including the Lancet and the New England Journal of Medicine, have published retractions of earlier and potentially major COVID-related findings [4,5]. On June 15, 2020, The New York Times highlighted potential lapses in the peer review process affecting major scientific journals [6].

We must strive to improve scientific quality always. The current debate over the use of hydroxychloroquine further illustrates the undermining of the scientific process when faced with global desperation for ready-made truths and solutions [4,7,8]. Science needs time, and good science needs a lot of it for data to grow and knowledge to evolve, but this process is ill-prepared to handle the rush for solutions to the COVID crises.

Moreover, just as COVID-19 has shown social, racial, and economic health disparities, the pandemic seems also to have accentuated existing gender inequalities within the field of research [9]. Indeed, early analyses suggest that female academics are publishing less and starting fewer research projects than their male peers. This might be an effect of the lockdown and the fact that more women than are men are juggling caring for families and children despite both “working” from home [10,11].

Travel, social, and funding restrictions will also take a serious toll on scientific research worldwide. Research staff and resources have been purposely and purposefully prioritized to COVID-19 activities above all else. Distancing and transmission issues have caused most non-COVID clinical research to be suspended, causing a reduction in recruitment of research subjects and a delay in data entry into clinical trial databases [12]. Research-related hiring has been suspended because of travel restrictions and young researchers might soon find themselves out of a job if their subject is not the pandemic. Indeed, though government-funded medical research bodies

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worldwide say they are committed to maintaining the continuity and breadth of biomedical research, how the economic downfall will influence government spending remains to be seen. Furthermore, research funding that relies on public fundraising is expected to drop substantially and many researchers will see a significant decrease in funding opportunities [13]. The global impact the crisis will have on the economy makes it hard to imagine that future research funding will not be substantially affected.

During this crisis, many resources were understandably redirected toward preparing for and caring for COVID-19 patients, but the collateral damage to so many patients with non-COVID-19 medical conditions that did not receive, or failed to seek, treatment will surely emerge [14]. Finally, children have also paid a high price for the redirecting of medical resources, with delays in their medical and surgical management, as well as vaccinations [15,16]. This may be especially problematic when many aspects of pediatric care is based on their developmental clock, which even the pandemic cannot stop. Whether this was the best option will certainly be analyzed in retrospect. Congenital anomalies alone account for over 400,000 deaths worldwide every year, and inflict a considerable burden both on children, families, and healthcare systems [17]. Thus, it is essential that funding for medical research does not follow the same pattern with a disproportionate decrease in funding for non-COVID research including pediatric and developmental urology.

COVID-19 has already changed the world, not only because of the disease itself, but because of the long-term effects of the world's reaction to the pandemic. While the pandemic may have brought with it some silver linings, it is crucial that the scientific community conduct current and future research broadly and openly, lest future pandemic preparedness in research repeat the hard-fought lessons of today.

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