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## COVID-19's Impact on Medical Research and Future Challenges

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COVID-19 pandemic has caused unprecedented disruptions in many fields of activities including research. The pandemic has shown how essential are the global public goods like health, education and medical research.

It is challenging to conduct research and confront a contagious new disease during pandemics. No one can predict how the current pandemic will influence anything but the short term. A lot of things remain unknown. These are related to virus behavior, probable mutations, infection and levels of immunity. Despite difficulties, research community strives continually to gain insight into the virus itself. This pandemic is expected to have considerable short-term and long-term impacts on research. There is little discussion of the long-term effects of economic recession on research funding which may be the most persistent impact of the pandemic extending to the future.

Really research has been essential to tackle COVID-19 pandemic crisis and gives always a sign of hope.

Travel restrictions and physical distancing has caused disconnection between scientists and difficulties in international collaboration. Due to these restrictions, there is a need of development of other approaches including virtual connection and collaboration creating virtual laboratory communities.

Possibly the pandemic will induce detrimental effects on health and medical research field with long-term consequences on research and development. There is a lot of skepticism about future global research post COVID-19.

It is known that to attain quality of research and excellence, a workforce skilled, well trained is required. As the labs shut down there are many tasks that can be done and completed remotely, like looking into literature, revising manuscripts, doing data analysis through computer tools and on-line journal club using different platforms like Zoom. Also, during pandemic with physical distancing, the education and training of the young scientists and doctors is limited to online teaching and learning [1].

During lockdown there are difficulties accessing research laboratories and many tasks cannot be performed remotely. Decreased provision of equipment, supplies, and reagents is observed during pandemic because of restrictions and uncertainty in terms of resources and funding. Clinical research during coronavirus disease 2019 (COVID-19) is vital to contribute timely to diagnose and therapeutic intervention. During the pandemic priority must be given to conduct promptly clinical trials for the management of COVID-19 patients, ensuring safety issues of participants and medical personnel [2]. Self-isolation / quarantine and social distancing affect clinical trials due to difficulties accessing study participants groups thus affecting the easy development of new drugs, therapies and vaccines.

COVID-19 crisis is reshaping academic world and global research.

Recent research publications show an extensive multilateral collaboration between scientific groups worldwide. It is really a great challenge for scientific community to collaborate under these difficult conditions shifting to on-line research and online meetings. Virtual flexibility and interconnection are a positive outcome, enhancing collaboration worldwide among scientists.

It is worth of mentioning that this crisis resulted in a science more open than before. From the beginning of the outbreak of COVID-19, a great number of publishers, journals, medRxiv, bioRxiv (preprints) and research institutes adopted open science with flows of data, scientific information and knowledge about the new disease. Articles, data were quickly available free online with open access for everyone [3].

Strong research collaboration during COVID-19 pandemic has enhanced medical research focusing on effective and quick prevention, methods of testing, diagnostics and treatment. Resilience, and adaptability with a little autonomy are key characteristics of researchers during this crisis and very important towards a new normal. The feasibility of new approaches to acute research problems can enable governments to change policy based on scientific evidence. It is known that clinical research during pandemic is very important due to emergent conditions. Collaboration among different countries is a key element because multi-center clinical studies include large groups of participants contributing to more representative sample and better data analysis. In this collaboration poor countries with limited resources are able to participate.

But conducting this research during pandemic is difficult due to patient fear and hesitation related to COVID-19 contagious disease and government restrictions or to self-isolation /quarantine. However clinical trials must conduct timely with modifications ensuring safety and quality and completed in time

constraints. Disruption in supply chains and follow up often virtually in clinical trials are additional barriers to medical research during this unprecedented crisis. A concerted effort of all the available scientific knowledge, assessment, data analysis and resources to confront this new disease is needed. Also, the management of COVID-19 requires skilled scientific personnel in public health services being able to give the right health messages to population during the crisis. Priority must be given to medical research focusing on therapeutic treatments with the use of approved drugs because of the limitation of time. It is known that development of new drugs requires a lot of time and follow up phases. Definitely laboratory-based research such as the development of vaccines and new drugs, fighting the new coronavirus must advance.

Due to travel restrictions, congresses and meetings have adopted virtual environments resulting in a great participation of scientists, doctors and medical personnel, due to easy access, cost-effective option and time saving. Researchers have found alternative ways to interact with colleagues and share their research. Meetings are especially more accessible to researchers from resource-poor countries. This shift led to more accessible congresses and participation from afar, including virtual sessions and presentations. A great benefit is a wider group of attendees compared to a conventional meeting [4].

This approach is reshaping these scientific events and changes the concept of congresses entirely, enabling easier cooperation and diffusion of knowledge. There is a shift from trans-national movements of people to international flows of scientific data with the available knowledge and resources.

## Conclusion

Finally, the COVID-19 is reshaping global research and scientific development. COVID-19 pandemic pushed strong global research collaboration due to this extraordinary situation threatening human life. This collaboration has led to a plethora of scientific articles focusing on the new disease. Also, a particular characteristic of this pandemic was the need for open science. Since the outbreak of COVID-19, publishers, scientists have shared their data and works free of charge to diffuse easily their knowledge and advance the science for the new virus and the contagious disease.

Current crisis has induced many changes and interactions transforming the concept of doing research in the future. Virtual interaction between research groups globally has resulted in better communication and sharing of knowledge. The contribution of distant learning and education is also very important and will last, playing a significant role in the future. It is clear a scientific community must be strong, more open, flexible, cooperative and better organized to respond to future challenges and emergencies. Also, the pandemic has underlined the role of public services and hospitals to an immediate response to the crisis including mainly the risks of infection, patient's treatment and clinical research. Hospitals and research institutes must publicly be financed, to accomplish their role to the society. This extraordinary world crisis is a favorable circumstance for stronger international collaboration with the extensive use of digital tools. Research and scientific data obtained by the virus's epidemiology, pathogen mechanism and morbidity are important to shape policy and action during the recovery period and the post-COVID-19 era. The creation of two recent new mRNA vaccines (by Pfizer and Moderna) and other upcoming vaccines for mass immunization give to the world a great hope and help bringing an end to this global health crisis.

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Certainly global health research has been transformed by this pandemic and all the positive changes and innovations will be adopted by the scientific community in the time ahead.

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