

# Innovations and Discoveries in Medicine During the Covid 19 Pandemic

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**Abstract:** *The appearance of the COVID-19 pandemic disrupted all the current activities of our life, from the daily activities, work, the activities we carry out for recreation, as well as those of care, medical. The aim of the paper is to review the discoveries and innovations that have occurred in the time since the pandemic of COVID19. The authors have followed those innovations that have appeared in the medical system and can help the patient in his fight against the disease as well as those innovations that significantly help prevent the spread of this dangerous, uncontrollable and treatment-resistant virus. In the literature review, the authors approached a number of thirteen works published in the literature starting with March of this year. In the future, they would like to continue this article by reviewing the literature in half a year so that we can make a comparison and draw relevant conclusions that will help us to take fair and effective measures to combat COVID-19.*

*The result is a selection of innovations that have appeared in the world during this period.*

**Keywords:** COVID-19, innovation, discovery, pandemic.

**JEL Classification:** I12, I15, I18

## Introduction

The COVID-19 pandemic is one of the most difficult collective challenges facing humanity since the last world war. Research institutes, pharmaceutical companies and national health authorities are looking for ways to find therapies to save people's lives and reduce economic and social decline. "There are no more ways to get rid of the apparent choice between protecting public health and protecting the economy," says economist Pierre Azoulay. "There is only one, and that is innovation." Thus, to fight a new pathogen, we need: a new vaccine, new drugs, new tests, new clinical knowledge and new data for a new epidemiological model. (Dizikes, 2020). In this context, the name of frugal innovation appeared ( Harris et al., 2020). Creativity involves the generation of new ideas, and innovation means using ideas to create new products / services and competitive business models (Özmen et al., 2017; Tohanean and Toma, 2018). Thus, creativity creates mutations within us and innovation creates mutations within our existence (Marinescu and Toma, 2017). The aim of the paper is to review the discoveries and innovations that have occurred in medicine in the time since the emergence of COVID19 pandemic.

## Literature review

The innovation during this period was diverse:

- India and Pakistan rebuilt the train rolling stock to turn them into COVID-19 hospitals
- China built a 1,000-bed hospital in 10 days.
- Distilleries have produced millions of bottles of sanitary alcohol.

- The United Kingdom transferred the management of private hospitals to the National Health Service, thus increasing the capacity of hospitals by 8,000 beds.

All these measures have led to an increase in the capacity of healthcare in the context of the COVID-19 crisis (Woolliscroft, 2020). In this respect, it analyzes four aspects present in academic medical centers, news that appeared during the COVID-19 pandemic, these are:

- Virtual care, represented by the development of telemedicine, this method has certain advantages for patients: convenience, without risk of exposure, and for the doctor increases the ability to care for acute and chronic patients resulting in minimization of care. Another advantage is the maximization of clinical resources, probably the relaxation of payments.

- Home hospital, it requires the presence of sensors to monitor the vital functions of patients remotely. Treating patients remotely leads to the development of new communication skills and adaptation to new roles.

- Web education in medicine, transforming medical students' courses into virtual courses, using simulation methods and simulated patients.

Future society will require decisions making (often in real time), and therefore software packages must be created in relation to the requirements of those who use them, and user education must enable the possibility to use such products (Marinescu et al., 2017).

One of the innovative initiatives to combat COVID-19 is the establishment of international disease-fighting coalitions, such as the Coalition for Epidemic Preparedness Innovation (CEPI), an

international non-governmental organization funded by Wellcome Trust, the Bill and Melinda Foundation. Gates, the European Commission, and eight countries (Australia, Belgium, Canada, Ethiopia, Germany, Japan, Norway and the United Kingdom) aim to develop vaccines against five epidemic pathogens identified by the WHO (Lurie et al., 2020).

Countries tried to stop the COVID-19 pandemic and one of the strategies was early surveillance, testing, contact tracking and strict quarantine, these things can be done by coordinating data, integrating digital technology into health policies. Thus, states have adopted technologies for planning, surveillance, testing, contact tracking, quarantine, pandemic and health care.

Technologies can be classified into:

-Planning and tracking, where migration maps were used as a tool, using the mobile phone as a tool or mobile payment applications. Real-time reporting platforms have been created to provide data on the volume of patients, the amount of protective equipment, the number of staff, the rate of use of ventilators, for health care workers.

-Screening, high performance infrared thermal chambers are used

-Tracking contacts, using images from Security cameras

Quarantine and isolation. Cameras with drones and portable digital recorders monitor and restrict the gathering of people in public. China has introduced a code system (QR), in which people must complete a symptom survey and record their temperature, this allows authorities to monitor their health and control their movement. The QR code serves as a certificate and travel permit, with color codes representing low, medium and

high risk; individuals with green codes are allowed to travel without restrictions, while individuals with red codes must self-isolate for 14 days. The changes brought about by this new era of digitalization, happen very quickly and demonstrate a wide reach both within companies and in the daily life of every citizen. (Veith and Costea, 2019).

Clinical management uses a cloud-based assisted CT service to detect cases of pneumonia, with worldwide video conferencing and digital monitoring.

Risks: Possible risks may include misdiagnosis, equipment failure, breaches of confidentiality and costs for healthcare, lack of technology in the low-income population or in regions where they do not have access to broadband signals (Whitelaw et al., 2020).

Another area where health-enhancing technology was introduced during the pandemic was in intensive care where breathing equipment was insufficient due to the increase in the number of respiratory-assisted patients during this period, so positive continuous airway pressure devices were built. These devices were created by Mercedes Formula 1 who built with engineers and doctors at University College London a CPAP respirator that pushes oxygen to the lungs without the need for a ventilator. This device uses 70% less oxygen than previous devices. These devices are built by cars that would normally produce pistons and turbochargers for cars.

Thus, the entire capacity of the company in Brixworth, Great Britain, was modified to produce the CPAP respirator, the project was made open-source, so that any company could access and build it as needed.

Another problem in this pandemic is the spread of the disease. In order to be able

to have a good control of the contacts of the patients infected with COVID 19, thus there were initiatives to follow the telephone contacts in different countries such as China and Ghana. Apple and Google have started a joint project by using a phone's short-range Bluetooth network to track the spread of the disease.

Ava, a Swiss medical technology company, has launched a series of biometric bracelets that collect medical data such as: temperature, number of breaths, heart rate. These are then sent for analysis to a laboratory in Switzerland. This monitoring aims to monitor the population, and also to develop algorithms, then based on these algorithms it is hoped to identify possible cases of covid19 before the symptoms are visible. ( Krogh et al., 2020)

The pharmaceutical industry must thus be able to innovate quickly and succeed in using existing drugs on the market using them to cure other conditions that lead to time savings by bypassing safety studies that are costly and time consuming.

WHO has launched studies involving four existing drugs that promise:

- Remdesivir (a broad-spectrum investigative antiviral),
- Chloroquine or hydroxychloroquine (used to prevent and treat malaria),
- Combination of lopinavir and ritonavir (an HIV Therapy) and
- The combination of lopinavir-ritonavir with interferon beta-1a

Rum and whiskey distillers began to produce hand sanitizers and disinfectants. Similarly, cosmetics manufacturers such as Nivea, L'Oréal and LVMH have also started producing hand sanitizer to meet growing global demand. Dyson, a manufacturer

of household appliances, develops fans using its air compression technology. Both Jeff Bezos and Elon Musk have rebuilt the production capacity and expertise of their missile companies, Blue Origin and SpaceX, for 3D-printed face shields for healthcare workers. The specific logic behind these ultra-fast innovation initiatives can be summarized in five principles: capturing the issue of innovation, map resources, the use of emerging technologies, encouraging collaboration and integrating end-users (Crosina and Schinoff, 2020).

The information provided by patients about the symptoms of the disease, which they can freely share in the form of YouTube videos and Google searches, is an extremely valuable source of knowledge about the disease and its evolution, thus being critical for achieving rapid innovation. Also, medical employees are at the forefront of medical device innovation in the current pandemic. For example, engineers at Vanderbilt University have developed a prototype ventilator in collaboration with doctors at the university's medical center. Without the input of these doctors, some essential features, such as pressure sensors and alarms, could have been overlooked. in the design process.

Perspective in the midst of the current coronavirus pandemic, there is considerable uncertainty about whether and when we will have an effective vaccine and treatments. However, there are good reasons to be trustworthy. After specifying the key principles of recovery, the pharmaceutical industry and its partners already have ongoing tests. Now that managers in remote healthcare sectors are worsening with the significant and probably long-term social and economic consequences of the pandemic, the lessons of the

ultra-fast innovation industry based on recovery can help us quickly develop new solutions to our current and future challenges find out ahead. ( Krogh et al., 2020)

Cortellis Drug Discovery Intelligence reports 589 drugs targeting coronavirus proteins, of which 72 are specific for the treatment of COVID-19. Of these 72 drugs, 24 are drugs launched or registered for other indications that are now being investigated for the treatment of COVID-19. Twenty are vaccines to prevent COVID-19, three of which are already in Phase 1 or Phase 1/2 studies (Jaffar, 2020).

One of the innovations in this period of crisis was telemedicine, which led to the explosion of tele-health visits.

- Remote hospital consultations and family visits
- Online planning and automation of patient triage
- Artificial information for resource allocation and clinical decision making
- Supporting distance work and communication for team members
- Mobilizing teams to create PPE
- Ensuring connectivity to COVID-19 test sites and expansion capacity (Dyrda, 2020)

Coronavirus Innovation Map - an initiative of UNAIDS and the Moscow Innovation Agency to capitalize on the potential of innovation to improve health. It provides information for five categories: prevention, diagnosis, treatment, information and adaptation to life and business. More than 500 innovations have already been received that will be redirected to partners around the world to strengthen the power of reagents in the fight against COVID-19. (UNAIDS, 2020)

Patient care, remote-controlled robots, help medical staff perform critical procedures

to feed patients and monitor daily medical activity. The Esmerald device monitors the patient's condition, temperature, breathing rhythm, movements. (News, 2020)

New gadgets that are intended to be used in the COVID pandemic:

- door opener without handle
- several varieties of door hooks
- "simple and robust" basic fans
- disinfectant sprays mounted on the wrist
- wrist band that always rings when you are about to touch your face
- the virustatic shield has antiviral coverage
- the machine cleans the viral particle chamber and provides the patient with purified air
- elbow extension for lifting buttons
- buttons with foot handle (Sostman, 2020)

Analyzing these works, I completed the table below the following data: column 1-innovation, column 2- the place where it appeared or by whom it was developed, column 3- the purpose of the innovation.

Tabel 1- Innovations and discoveries in medicine during the COVID 19 pandemic

	Innovations	The place where it appeared	The purpose of the innovation
1	Restoration of train rolling stocks in hospitals	India and Pakistan	Increasing the number of beds
2	Built a hospital in 10 days	China	Increasing the number of beds
4	Transferred the management of private hospitals to the National Health Service	UK	Increasing the number of beds
5	Virtual care		Providing medical care
6	Home hospital		Providing medical care
7	Web courses for medical students		Providing medical care
8	Establishment of international coalitions	CEPI - an international non-governmental organization funded by the Wellcome Trust, the Bill and Melinda Gates Foundation, the European Commission, and eight countries (Australia, Belgium, Canada, Ethiopia, Germany, Japan, Norway and the United Kingdom)	Providing medical care
9	Migration maps – mobile phone and mobile payment applications	Real-time report platforms	Population migration control
10	Screening	High performance infrared thermal cameras	Detection of infected people
11	Drones with camera	Isolation control	Population migration control
12	QR - code system	China	Population migration control
13	Cloud-assisted CT service	Clinical management	Providing medical care
14	Continuous positive airway pressure devices - CPAP	Mercedes Formula 1	Providing medical care
15	Track phone contacts via Bluetooth network	Apple and Google in China and Ghana	Population migration control

16	Biometric bracelet	AVA Company	P r e v e n t i o n ; Detection of infected people
17	Medical disinfectant	Nivea, L'Oreal LMVH	Prevention
18	Fans	Dyson	Providing medical care
19	Protective materials	Jeff Bezos; Elon Musk; Blue Origin; Space X	Prevention
20	Information	You Tube; Google	Education
21	Fan	Vanderbilt University	Providing medical care
22	589 drugs targeting coronavirus proteins	Pharma Industry	Providing medical care
23	Tele-health		Providing medical care
24	Coronavirus innovation map	UNAIDS and the Moscow Innovation Agency	Providing medical care; P r e v e n t i o n ; Education ; Population migration control
25	Care robots		Providing medical care
26	Door opener without handle		Prevention
27	Some varieties of door hooks		Prevention
28	Basic fans "simple and robust"		Providing medical care
29	Disinfectant sprays mounted on the wrist		Prevention
30	Wrist band that always rings when you are about to touch your face		Prevention
31	The virustatic shield has antiviral coverage		Prevention
32	The machine that cleans the viral particle chamber and provides the patient with purified air		Prevention

33	Elbow extension for lift buttons		Prevention
34	Buttons with foot handle		Prevention

Source: Authors' own research

### Research methodology

The present article includes an analysis of the documentation found in various publications and scientific articles in order to illustrate the potential advantages of our country. Therefore, the authors used a comprehensive search into numerous sources of secondary data, such as articles, reports and books from the domains of "innovations and discoveries during the pandemic COVID19".

For the research, the authors used also electronic databases, such as Pubmed, Academia. EDU, BRILL and Wiley Online Library. Other sources were the archives of different journals, such as the journal "Manager". The method used is a descriptive and quantitative one, given the fact that the subject is very widely discussed.

### Results and discussions

This is why there is a close relationship in cause-effect relationship between creativity, invention and innovation, as the triggering factor of a relationship between the aforementioned can be any of them. (Marinescu, P., Toma, S., G., 2017). In the case of the discoveries researched in this article, the triggering cause is the covid pandemic19, the result of which is the stopping of the spread of this flag.

We are aware of the evolution of these discoveries and we really want all these, adapted and created by researchers to combat this virus to multiply and their appearance to have an ascending dynamic. Our evolution as a species depends on the work of these researchers and matters a lot in stopping this pandemic that is affecting our lives so brutally.

### Conclusions

Analyzing these works published in the literature since March 2020 the authors found 34 innovations in only the 15 articles they researched. They would like to continue this study by resuming the research of the literature in the first half of the year to make a comparison and draw relevant conclusions to assist us in taking fair and effective measures to combat COVID-19.



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