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Health and Science in pandemic times: Narrative review

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***Abstract*—** *Objective: This study aimed to describe the aspects related to health and science during the pandemic caused by Sars-Cov-2. Method: It is a narrative review through the search for articles in the scientific databases, published from January 2020 to January 2021. For the treatment of the data, the technique of content analysis with categorization of the findings was used four complete original articles were selected that answer the central question of the research and organized according to the content of their evidence, distributed in five categories. Results: The analysis of the literature highlights important points such as the negative impact of false news on science, interdisciplinarity and its benefits on science and public health, the funding of Science to combat Sars-Cov-2, the safety of scientists in research during the pandemic and vaccine hesitancy. Discussion: It was found that in view of the crisis generated by Covid-19, it was clear to various sectors of society that only science is capable of finding a solution and shows itself as a hope for all humanity, since she is the only one able to find a vaccine and treatment for the New Coronavirus. Conclusion: Furthermore, it is concluded that scientists will certainly generate the necessary knowledge to face the COVID-19 pandemic, as well*

as subsidize public policies that will organize health care, reduce inequities and enable comprehensive care to patients.

I. INTRODUCTION

The pandemic caused by the SARS-CoV-2 respiratory virus (COVID-19) has become one of the biggest challenges of the 21st century. Its impacts are still priceless and directly and/or indirectly affect the health and economy of the world population. Worldwide, more than 107 million cases and 2.3 million deaths were reported by February 2021 and it is estimated that an even greater number will be recorded in subsequent months due to the recent discovery of new variant strains of the New Coronavirus. The growing number of cases and deaths has shown itself exponentially and the crisis has worsened in several countries, mainly in developing countries. [1]

Due to the delay in vaccination, the only way to slow the spread of the disease is through precautions. In view of the little scientific knowledge about COVID-19, the high capacity to spread the virus and cause deaths and the doubt about the best strategy to control the pandemic, the use of non-pharmacological containment measures, such as hygiene and hand washing, wearing masks, social distance and isolation of suspected cases.[1]

The strategy of keeping the largest number of people at home helped save lives, gave scientists more time to seek treatments and develop vaccines and for public health authorities and the health system to plan logistics, test and treat patients. This contributed to the flattening of the contagion curve. [1]

In Brazil, through this current scenario, elementary concepts such as Science, University and Unified Health System (SUS) stand out, which undergo a process of resistance and resilience in times of pandemic.[2]

As for Science, with regard to resilience, even with the progressive reduction of investments in science and technology in Brazil, scientists are still involved in research on vaccines, drugs, tests, epidemiological studies, evaluation of health inequalities, among others. Regarding resistance, there is a denial that vaccines can be effective.[2]

Not long ago, in an act of resistance, universities protested against a budgetary blockade that made its operation unfeasible and continued firmly, in an act of resilience, to produce new knowledge about COVID-19 on a daily basis.[2]

As underfunded and defamed as Science and Universities, SUS is preventing the tragedy from becoming even greater. In an act of resistance, the system has managed to provide assistance to all Brazilians with COVID-19 who depend on it and, with resilience, welcomes people, especially because it is composed of resistant and resilient health professionals, who place collective health above difficulties and continue to provide assistance to Brazilians who need it. [2]

One of the critical nodes when it comes to science is vaccine hesitation. The World Health Organization (WHO) has defined this behavior as being influenced by a number of factors, including issues of trust (not trusting the vaccine or the supplier), complacency (does not realize the need for a vaccine, does not value the vaccine) and convenience (access). [3]

Individuals hesitant about vaccination are a heterogeneous group that maintain varying degrees of indecision about specific vaccines or vaccination in general. They may accept all vaccines, but remain concerned about possible adverse reactions, some may refuse or delay some vaccines, but they accept others, and some individuals may refuse all vaccines. [3]

The present study aimed to describe the aspects related to health and science during the pandemic caused by Sars-Cov-2 through a narrative review.

II. METHOD

The research is a narrative review, whose guiding question consisted of: What are the scientific productions available on aspects related to health and science during the pandemic caused by Sars-Cov-2?

The survey of bibliographic studies took place during February 2021, in which articles published in national and international journals, published in Portuguese and English, were available for free, in full, in electronic format in the Virtual Health Library databases (VHL), Scientific Electronic Library Online (SCIELO), PubMed and Google Scholar.

Then, the descriptors validated in the DeCS / MeSH were used: “COVID-19”; “Health” and “Science”, using the Boolean operators AND, published between January 2020 and January 2021.

For data treatment, the content analysis technique was used with categorization of the findings and the articles were identified by the acronyms SC 01 to 04, for better organization of the findings.

III. RESULTS

In the present narrative review, 04 (four) original scientific articles were selected that strictly met the selection of the sample previously established and showed approximations with the object of this study. The findings were organized into 05 categories that address: 1) The negative impact of false reports on science; 2) Interdisciplinarity and its benefits in science and public health; 3) Financing of Science in the fight against Sars-Cov-2; 4) Security of scientists in research during the pandemic; and 5) Vaccine hesitancy.

As for the profile of publications, it was observed that articles in English (75%), bibliographic review (100%), published in international journals (75%) and indexed in the Pubmed database (75%) predominate.

The negative impact of false reports on science

Article SC 01 provides evidence about people's susceptibility to believe in false news that is disseminated and this can be attributed to the lack of scientific knowledge and other aspects such as ideologies and disinformation.[4]

Researchers reinforce that it is necessary to seek information from secure sources and be aware of what is up in society, since many false news are disseminated on purpose.[4]

There are several proposals to tackle false news and some are in the technological and educational field, with an increase in information literacy, the use of safe sources and the construction of tools to help combat disinformation being recommended.[4]

The dissemination of correct information can occur in several spaces, including through Digital Technologies of Information and Communication (TDIC). TDIC are a set of technological bases, such as computers, internet and social media, which facilitate communication between people and enable the exchange of knowledge and help to promote learning.[4]

Scientific dissemination is characterized as an activity that aims to bring scientific knowledge to the non-specialized public, and it is necessary to use resources to make the language understandable and attractive, in addition to carrying out interventions so that the knowledge reaches people in informal spaces or through different digital technologies, such as the internet and radio.[4]

Thus, scientific dissemination can also be carried out through extension actions, one of its pillars being the promotion of scientific knowledge, which benefits both the university and society, since there is the transmission of knowledge produced in universities to the population and this process contributes to the professional training of university students, who start to experience and practice what was learned in a theoretical way in the classroom, being a pleasant and multidisciplinary way of teaching.[4]

In addition, when carrying out extension actions, the university performs its social commitment and gains credibility by contributing to the improvement of people's quality of life, but for this to happen it is necessary to plan and develop activities that really favor contact with society to gain support from her.[4]

World society is experiencing a delicate and atypical moment, where education is being reinvented in the face of available technological means. Despite the difficulties faced, it is possible to keep an educational process running and, for this reason, there is an increasingly intensified use of vehicles such as radio and social networks, which have been shown to be effective in the process of disseminating knowledge.[4]

The topics discussed within the University must not be restricted to the academic environment only, on the contrary, they must be disseminated to the community in an objective and clear way so that the population understands that science is present in our daily lives. Performing scientific dissemination through an accessible language consists of demystifying and popularizing content that is sometimes considered difficult to understand, precisely because of the methodology and terms used.[4]

Thus, it is possible to reinvent the strategies for building knowledge and social distancing has shown that the means previously used were not as explored, as they are being at the moment. The educator is reviewing his strategies and technology is making an essential contribution to a wider reach of information.[4]

Interdisciplinarity and its benefits in science and public health

Article SC 02 highlights that during the pandemic period, many scientists from around the world have conducted projects related to public health because it is an appropriate and timely discipline for carrying out interdisciplinary studies. Actions to improve public health care require new approaches, including the involvement of complementary disciplines.[5]

Many disciplines such as medicine and pharmacy, molecular and cellular biology, microbiology, biochemistry, genetics, immunology, pharmacology, nutrition, psychology, epidemiology, economics, social sciences, communication, political sciences, health services, nursing care, physics and chemistry, geography, statistics, computational science for big data management,

among others, encompass research perspectives that lead to the observation, analysis, understanding and interpretation of health in view of COVID-19.[5]

The importance of interdisciplinary research in the last three decades has witnessed an increasing tendency for collaborations between researchers from diverse backgrounds of training and education in all regions of the world.[5]

The literature on the theoretical scope and benefits of such collaboration is extensive. Although it is essential to carry out more research through a multidisciplinary approach to establish practical methods to be used on a large scale for treatment and disinfection to inactivate SARS-CoV-2 in different environmental settings, in order to reduce the risk of infection.[5]

Unlike multidisciplinary research, where researchers from different fields work separately or in collaboration, interdisciplinary research refers to teams with varied specialties to unify knowledge and achieve a general objective.[5]

In this context, Rosenfield[6] introduced a three-tier structure to conceptualize the collaboration mechanism between different disciplines: (i) in multidisciplinarity, researchers work in parallel or sequentially from a specific basic discipline to solve a common problem; (ii) in Interdisciplinarity, researchers work together, but still on a specific disciplinary basis to address the common problem; (iii) finally, in transdisciplinarity, researchers work together, using a conceptual framework design shared in specific disciplinary theories, concepts and approaches to solve a common problem. These concepts have been used in practice nowadays, since the efforts of the most diverse sectors have been added in tackling the pandemic.[5]

An example of transdisciplinary science relevant to the COVID-19 problem is the integrative science of microbiology, molecular pathology (including immunology and epidemiology, which synthesized results from analytical microbiology methods, including virology) at the laboratory level, along with staff statistics epidemiological analysis, with data from different population groups.[5]

However, there are difficulties in contact or communication within the professions, in addition to lack of confidence, lack of experience, health complexities, lack of organization and standardization, can become a major obstacle to successful communication.[5]

COVID-19 is a medical problem with immense social consequences and scientists around the world need to come together to find the right solutions to control this pandemic event, manage its consequences and prevent future recurrences of similar pandemics.[5]

The scientific community expects health workers to use the most up-to-date scientific evidence in their clinical practice and be better prepared for emerging epidemics, articulating joint interdisciplinary actions and engaging with the community of educators and mobilizers, thus contributing to the surveillance of systems in order to fill the gaps in health care and assistance.[5]

During the pandemic, while political leaders blocked their countries' borders, we saw scientists tearing down walls and creating global collaboration unlike any other in history. Never before have so many experts in so many countries been simultaneously focused on a single topic, with such urgency and determination.[5]

The role and collaboration of International Health-Related Organizations, such as the World Health Organization (WHO), Food and Agriculture Organization (FAO), International Nutrition Science Union (IUNS) and Non-Governmental Organizations (NGOs), as well as consortia international organizations such as the Universal Scientific Research and Education Network (USERN) and national and international academies, were recognized as crucial for an integrated knowledge of the new coronavirus and impacting on the effective management of COVID-19 worldwide. [5]

Article SC 03 corroborates and points out that although virologists are the most suitable professionals to work in the manipulation of the SARS – CoV-2 virus, this is also the ideal time to develop integrated research among immunologists, computer scientists, modeling and intelligence specialists. artificial, chemists, drug developers, engineers, clinical investigators of infectious diseases and intensivists, among other disciplines. [7]

Financing of Science in the fight against Sars-Cov-2

Article SC 03 addresses how the efforts of the scientific community can be mobilized for research related to COVID-19. In the midst of the health crisis, mass testing of the affected population becomes essential to really determine the impact of the disease.[7]

In order to gather basic biometric data, an organization must quickly organize and execute clinical research with personnel trained in the correct approach and have the infrastructure to carry out high quality research, in order to be deployed in hours or days through platforms that can be mobilized. quickly.[7]

Investments in major research have been carried out, for example, the renowned New Jersey Alliance for Clinical and Translational Science (Rutgers CTSA Hub), which obtained regulatory approval and recruitment started

in 12 days for a prospective and longitudinal study in health professionals exposed to SARS –CoV-2 in 750 participants.[7]

This study will quickly provide data on incidence and prevalence in this public that is considered vulnerable because it is on the front lines of fighting the virus.[7]

Research funding in the United States (USA) provides up to 2024 $ 8.3 billion, of which $ 836 million goes to the National Institutes of Health (NIH), $ 61 million to the Food and Drug Administration (FDA), $ 950 millions for the Centers for Disease Control and Prevention (CDC) and $ 2 billion for the Biomedical Authority for Advanced Research and Development (BARDA).[7]

The investment model adopted in the USA has undoubtedly helped in the performance of the quality and impact of research at the time of crisis, with regard to clinical research, generation of protocols and regulatory efforts, which should take place quickly. [7]

Safety of scientists in research during the pandemic

Article SC 03 reflects on how scientists working in research during the pandemic can be safe and productive. He points out that the researchers suffer great frustrations because they feel unproductive and unable to potentially advance in the discoveries due to confinement at home and reduced activities.[7]

However, strategies were adopted to reduce these impacts, such as the establishment of effective communication through various types of videoconferencing, although it does not entirely replace the benefits of face-to-face meetings. Clinical research that does not involve contact with the patient can be maintained remotely, as can many meetings with patients. [7]

Vaccine hesitancy

Article SC 04 makes an assessment of the factors involved in vaccination hesitation and points out that the low acceptance occurs due to: Ethnicity (black / African); Work situation (unemployed); Personal belief (participants with a personal conviction against vaccines) those who have received vaccines (especially influenza) in the past have had greater acceptance; Religiosity was negatively correlated with the vaccination COVID-19; Politics (respondents who declared Democratic political partisanship were less likely to choose and receive vaccination. Those who felt close to radical parties or those who did not vote / felt close to any party were significantly more likely to refuse the vaccine. Who voted for extreme left or extreme right candidate in the last elections were more likely to refuse vaccination. It was observed that political ideology had no relation to the attitude towards vaccination; Gender (women had less acceptance); Education (participants with low schooling); Age (low age was associated with a lower willingness to receive vaccination); Income (participants with lower income). COVID-19 infection (no difference observed between those who were infected and those who were not); Concern with COVID-19 (those who were very concerned about being infected were less likely to refuse to cina); I work in healthcare settings (healthcare professionals had a higher acceptance).[3]

In this review, there was a high general hesitation of the vaccine in relation to the COVID-19 vaccine, with prevalences varying from 8% to 15% in the world. This phenomenon represents an important problem, because the increase in hesitation leads to falls in coverage and often precedes an outbreak of infectious disease.[3]

Health professionals should be involved in educating people about the importance and benefits of the vaccine. However, although researchers have begun to develop and evaluate interventions for people who hesitate to vaccinate, current data does not support an intervention method as superior to others, so ongoing development and evaluation of interventions is necessary. [3]

IV. DISCUSSION

From the analysis of the articles, it was found that, in view of the crisis generated by Covid-19, it was clear to various sectors of society that only science is capable of finding a solution and shows itself as a hope for all humanity, since she is the only one able to find a vaccine and treatment for the New Coronavirus.

A global study called Edelman Trust Barometer, corroborates the findings by stating that the pandemic has increased confidence in science and that 85% of people in the world believe that it is necessary to listen more to scientists and less to politicians.[8]

It also states that the word "science" has never been mentioned so many times and as much as it is already clear that there is science in every moment of a person's life, from the food he eats, the clothes he wears and the obvious instruments he uses in his work or leisure, awareness of the importance of science had not been achieved as intensely as it is today. [8]

Science is in favor of society, because despite dealing with the cuts in funds and attacks by a part of society, Brazilian scientists and public universities stood out in this very delicate moment and are doing important work, from research to actions that directly help the population.

It is unbelievable that in the 21st century, society is still debating whether it is necessary to have a vaccine. Science

has been breaking this discourse and more and more the population is becoming aware. Experts also point out that never in the history of mankind has there been such an effort and unity of scientists in favor of a single cause. Thus, science has recovered its noble and relevant role, but encouragement is still needed.

While access to information has become more accessible because of the internet, it has also become a way of spreading many false news.

When we think about why the pandemic arose, we see that science was already signaling the consequences of climate change and the predatory relationship between man and the environment. People want to go back to normal, where they were comfortable, but it is necessary to change the pattern of consumption. When it is not pleasant to their lifestyle, people prefer to deny science.

There has always been a gap between the population and science, so it is essential that scientists develop a language to communicate with the entire population more clearly. There is a need for a structural change in the way of seeing science, and that this should start at school with children, because doing Science is about seeking explanations and having a critical sense.

Despite the tragic scenario, the legacy of this pandemic is that health systems need to be strengthened. And the Family Health Strategy and Primary Care Program, which grew in the early 21st century, also requires a special look.

In addition, further studies and publications are necessary for the scientific community to reach a consensus. It is a race against time, but science also needs to be careful in its analysis. The population and politicians want a magic solution, but the scientific process is slow. There is no miracle in science, and if you skip the process, the damage can be even greater.

The pandemic has brought lessons to humanity for rethinking the current way of life, as well as showing the need for collaboration between teams, between universities around the world, in which the results of research have been quickly shared for all groups globally. The advances in the genetic sequencing of viruses, which through bioinformatics, have seen great innovations in the analysis of the sequences of the genetic material of the virus and which have even detected new virus mutations.

The advancement in the development of new diagnostic tests, with results that are increasingly faster and more efficient and that use gene editing tools. The vaccine race, in which it normally takes an average of 4 to 20 years to develop a vaccine. Now, it could be a record of one or a year and a half. The race to search for drugs that are effective, using analyzes in the drug database.

Improvements in the hygiene practices of the population, which is the introduction into the culture of citizens of certain habits that will help to contain this and other outbreaks caused by viruses.

Saving lives, strengthening our SUS and having an agenda for a process that will take longer, fighting for a vaccine and guaranteeing the access of the entire population to the vaccine and other means to protect their health, these are the great challenges

The importance of science in advancing and improving systems and health care, through innovation and the use of information technologies, deserves recognition as the most promising path to be followed for the effective fight of this pandemic. And finally, the delicate relationship between science and society brought important answers to better understand the nuances of the current pandemic scenario.

V. CONCLUSION

From this study, it was possible to discuss some of the priority aspects related to health and science during the pandemic caused by Sars-Cov-2 and understand that the advance of the current pandemic requires quick and conscious measures to preserve the population. Such measures, based on a solid scientific basis, promote and guarantee the strengthening of strategic actions to face COVID-19.

The scientific evidence reported in this review does not answer all the questions, but opens paths and perspectives for a better understanding of the problem, in the sense of qualifying scientific and health care actions. Nevertheless, epidemiological data, as well as research for new drugs and vaccines, can ultimately help humanity in controlling and mitigating the epidemic impacts on society.

Science can only exist with freedom and ethics. It does not mean that scientists can do whatever they want, that is why there are ethics committees that have grown stronger in the world.

Certainly, scientists will generate the knowledge that will make it possible to face not only the COVID-19 pandemic, but also to subsidize public policies that organize health care, reduce inequities and enable comprehensive care for patients.

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