

**Artigo de Revisão****Telemedicine and Telehealth: Bibliometric analysis.**

Telemedicina e Telessaúde: Análise bibliométrica.

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**ABSTRACT**

**Background:** Access to quality health services is a global challenge. In this context, telemedicine has been facilitating access to health, especially since the advent of COVID-19. **Objective:** Ident and highlight the main characteristics of research in telemedicine and telehealth, worldwide. **Material and Methods:** The exploratory review used a bibliometric and quantitative approach, applied to databases of the Web of Science, Scopus, PubMed, SciELO and SAGE for all fields that had the themes “telemedicine” and “telehealth” from the initial year, according to the databases, until 2020. **Results:** The main authors, universities, countries and themes of research on telemedicine and telehealth were identified, in addition to identifying the exponential growth of research related to telemedicine and telehealth was evident; however, there was a substantial growth in 2020 to provide quality care to distant locations, observing safety and cost-effectiveness criteria. In addition, thematic areas, methodologies, researchers and university and organizational networks were also demonstrated. **Conclusion:** Telemedicine and

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telehealth enables quality healthcare access for all, even for those in remote areas, thus shortening distances between patients and health professionals.

**Keywords:** Telemedicine; Telehealth; Research; COVID-19.

## RESUMO

**Introdução:** O acesso a serviços de saúde de qualidade é um desafio global. Nesse contexto, a telemedicina vem facilitando o acesso à saúde, especialmente desde o advento do COVID-19. **Objetivo:** Identificar e destacar as principais características da pesquisa em telemedicina e telessaúde, em todo o mundo. **Materiais e Métodos:** A revisão exploratória utilizou uma abordagem bibliométrica e quantitativa, aplicada a bases de dados da Web of Science, Scopus, PubMed, SciELO e SAGE para todos os fields que tinham os temas “telemedicina” e “telehealth” desde o ano inicial, conforme as bases de dados, até 2020. **Resultados:** Foram identificados os principais autores, universidades, países e temáticas das pesquisas realizadas sobre telemedicina e telessaúde, além da identificação do crescimento exponencial das pesquisas relacionadas à telemedicina e à telessaúde foi evidente; no entanto, observou-se um crescimento substancial no ano de 2020 para prestar assistência de qualidade a locais distantes, observando critérios de segurança e custo-efetividade. Além disso, também foram demonstradas áreas temáticas, metodologias, pesquisadores e redes universitárias e organizacionais. **Conclusão:** A telemedicina e a telessaúde possibilitam o acesso de qualidade à saúde de todos, mesmo para aqueles em áreas remotas, encurtando assim as distâncias entre pacientes e profissionais de saúde.

**Palavras-Chave:** Telemedicina; Telessaúde; Pesquisa; COVID-19.

## INTRODUCTION

The COVID-19 pandemic has resulted in technological advances, especially in healthcare, through telemedicine and telehealth. Telemedicine and telehealth were rarely used alternatives prior to COVID-19. However, the COVID-19 pandemic has converted telemedicine from a secondary alternative to an essential service in the delivery of healthcare. This changed has sparked interest in the field of telemedicine among researchers<sup>1</sup>.

Telemedicine has become increasingly important<sup>1</sup>, primarily because of the way patients consume medications and health information. With the rapid diffusion of internet technology in the public sphere today, health information is within the reach of consumers<sup>2</sup>. Telemedicine has improved access to health care specialists, beyond the limitations imposed by traditional health<sup>3</sup>. However, technological advancements have created a digital divide due to the uneven diffusion of health technologies, thus creating barriers for access to this modality of healthcare.

Telemedicine can be literally translated as “distance healing”; it is made up of the Latin word “medicus” and the Greek word “tele”<sup>18</sup>. In other words, it can be referred to as “provision of medical services at a distance”<sup>4</sup>. Some researchers see telemedicine as a part of telehealth, which has a broader scope. However, telemedicine and telehealth are used interchangeably; they represent the exchange of medical information through electronic communication to improve the health of patients<sup>5</sup>. While this is not a standard definition of these terms, their meanings and descriptions vary depending on the source. This was demonstrated in a study reviewing 104 peer-reviewed publications that presented definitions of telemedicine<sup>6</sup>.

A 2019 report presenting the results of a survey of telemedicine remuneration models in the United States revealed that until October, only 20% of the states required equal payments for virtual or face-to-face consultations; moreover, eight out of 50 states did not have a commercial model status for telemedicine<sup>7</sup>. However, the first half of 2020 witnessed immense incentive to implement telemedicine to reduce direct contact between patients and health professionals due to COVID-19-related restrictions<sup>8,9</sup>.

Further, new temporary regulations were issued by the American<sup>10</sup> and Brazilian government's<sup>11</sup>, among others, authorizing medical care and payment for teleconsultation services.

Despite the risk factors related to technology<sup>12</sup>, including restrictions on service remuneration models<sup>12,13</sup>, healthcare professional's resistance to adopting telemedicine<sup>14</sup>, and information security-related risks<sup>15</sup>, telemedicine has enormous potential to transform the supply of medical services by overcoming geographical distances, facilitating access to specialized health care, and bringing operational efficiency.

The reduction in transport is one of the incentives for telemedicine<sup>16</sup>. For patients, the incentives for telemedicine include reduced transportation time and costs as well as reduced risks of locomotion. In addition, other advantages of telemedicine include improved health care, greater access to care and specialists for persons from rural areas as well as elderly patients, better monitoring of patients with chronic conditions, and reduced morbidity and mortality along with increased satisfaction with quality of care. Along with patient satisfaction with telemedicine, professional satisfaction among healthcare providers is also important; however, there is a lack of adequate research on this topic<sup>17</sup>.

Therefore, this review presents the main characteristics of telemedicine research and highlights the evolution of research in this area, especially in 2020. This article presents as a general objective, to identify the main characteristics of scientific research inherent to the theme of telemedicine and telehealth, by answering the following questions: What are the main authors of the topic? What are the main universities that promote research in the area? What is the quantitative historical series of research related to the theme? Which main countries promoting research linked to the theme? What are your main research and networks of influence? And finally, which main themes are added to the theme, in the health area?

This study's results aim to provide future applied research with relevant and reliable theoretical bases, in addition to benefitting future studies by offering essential element mapping to support the logic of new theories.

## **MATERIAL AND METHODS**

The search in databases, including the Web of Science (WoS), Scopus, PubMed, SciELO, and SAGE platforms, used keywords as the search strategy. \*All fields were included, including the themes "telemedicine" and "telehealth," using the "OR" bead. Operationally, the research took place in five stages: (1) definition of the research strategy; (2) data collection in the databases selected for the study and data export; (3) organization and integration of the databases and graphic layout; (4) analysis of the results with identification of patterns and factors of relevance; (5) finally, analysis of scenarios, trends, and practical implications.

The analysis included quantitative data by period since the beginning of the base. The country of origin of the study was evaluated for information on the dissemination of study results. Moreover, an analysis of publications by university and authors was included. The Vosviewer software ([www.vosviewer.com](http://www.vosviewer.com), University Leiden) was used to analyze the relevance of universities.

Finally, reinforcing the justification of the novelty and contribution of the approach of the present research, the following are the research inherent to the theme, which address more specifically bibliometric methods of analysis applied to the theme of telemedicine and related themes:

**Table 1.** Telemedicine and Tele Health Research with application of web of science bibliometric methods.

Authors	Article	Year	Base Date
Youngberry K.	Telemedicine research and MEDLINE	2006	PubMed
Fatehi, F; Wootton, R	Telemedicine, telehealth or e-health? A bibliometric analysis of the trends in the use of these terms	2012	Web Of Science Sage PubMed
Armfield, NR; Edirippulige, S; Caffery, LJ; Bradford, NK; Grey, JW; Smith, AC	Telemedicine - A bibliometric and content analysis of 17,932 publication records	2014	Web Of Science Scopus PubMed
Yang, YT; Iqbal, U; Ching, JHY; Ting, JBS; Chiu, HT; Tamashiro, H; Hsu, YHE	Trends in the growth of literature of telemedicine: A bibliometric analysis	2015	Web Of Science Scopus PubMed
Groneberg DA, Rahimian S, Bundschuh M, Schwarzer M, Gerber A, Kloft B	Telemedicine - a scientometric and density equalizing analysis	2015	PubMed
Yanjun Wang, Ye Zhao, Jianzhong Zheng, Ailian Zhang, Haiyuan Dong	The evolution of publication hotspots in the field of telemedicine from 1962 to 2015 and differences among six countries	2017	Sage
Sweileh WM, Al-Jabi SW, AbuTaha AS, Zyoud SH, Anayah FMA, Sawalha AF	Bibliometric analysis of worldwide scientific literature in mobile - health: 2006-2016	2017	PubMed
Shen L, Xiong B, Li W, Lan F, Evans R, Zhang W	Visualizing Collaboration Characteristics and Topic Burst on International Mobile Health Research: Bibliometric Analysis.	2018	PubMed
Gu, D., Li, T., Wang, X., Yang, X., Yu, Z	Visualizing the intellectual structure and evolution of electronic health and telemedicine research	2019	Scopus PubMed
Waqas, A; Teoh, SH; Lapao, LV; Messina, LA; Correia, JC	Harnessing Telemedicine for the Provision of Health Care: Bibliometric and Scientometric Analysis	2020	Web Of Science

Through the content analysis of the research listed, it was possible to perceive the application of bibliometric in a very specific way in certain pathologies, except for Yang, et al (2015) research<sup>26</sup>. Moreover, not presenting the analysis of the theme telemedicine and telehealth in an integral and updated way.

## RESULTS & DISCUSSION

### The History of Telemedicine

Research on telemedicine has taken a huge leap in recent years, especially in the last year due to the COVID-19 pandemic<sup>8</sup>. In the survey of the scientific bases, the year-by-year evolution was evident, from the initial history to the past decade where the growth witnessed an exponential pattern, especially in 2020. The COVID-19 pandemic has made telemedicine and telehealth significant and essential for delivering quality healthcare to remote areas, while observing safety and cost-effectiveness protocols<sup>12,18</sup>.

Telemedicine is a multidisciplinary theme, with studies published in computer science, telecommunications, health informatics, biomedical engineering, and medicine journals. In this review, it is evident that the United States was the largest source of publications on telemedicine.

In addition to corporate telemedicine solutions, that are used by hospitals and clinics, telesurgery, artificial intelligence, Internet of things (IOT), portable devices, like smartphones and smartwatches, allow users to access real-time information on the status of their vitals, thus facilitating remote monitoring of patient health<sup>19,20</sup>. These technologies fall under the umbrella of “mobile health” (mHealth or m-Health)<sup>15,21</sup>.

Therefore, the terms including telemedicine, telehealth, eHealth, e-Health, electronic health<sup>30</sup>, mobile health, mHealth, and e-m-Health can be used in studies on health technology, without considering specific terms like “consultation” and others related terms “such as “telestroke,”<sup>14</sup> “teleophthalmology,” “telecardiology,” and “teledermatology”<sup>7</sup>. The terms “e-medicine” and “emedicine” were also found; however, we found that they had very low usage.

The Telemedicine has been associated with the United States since 1993. The American Telemedicine Association (ATA) is dedicated to promoting and accelerating the adoption and utility of telehealth. Telemedicine is considered by the ATA as the most current version of the term due to new technologies such as artificial intelligence and virtual reality<sup>22</sup>. Despite being a relatively recent topic that has evolved due to technological advancements, the first remote medical care initiatives by electronic means date back to 1840 with the use of the telegraph<sup>22</sup>. With the invention of the telephone in the 1880s, doctors were one of the first to use the telephone for professional purposes in the early 20th century. The radio, which developed in the early 20th century was used during the First World War and in the following decades to exchange medical information<sup>16</sup>.

Although the use of technologies for exchanging medical information commenced in the 19th century, the first effective telemedicine projects used facsimile to send images from one location to another<sup>16,23</sup>. The use of the closed-circuit TV, connecting two medical clinics located in distant places (112 miles), was first implemented in 1964. Since then, as the United States government increased investments in infrastructure and sponsored research at universities, many projects developed mainly in rural areas<sup>23</sup>. Immense technological developments also occurred during the space flight program, notably for monitoring vital functions (e.g., heart rate, pressure, respiratory rate, and temperature) of the crew, diagnostic medical support systems, and emergency handling on long-haul flights. Further, in the last decade the adoption of telemedicine by private health insurers have increased by more than 50% per year. However, until 2020, telemedicine witnessed modest utility, while in the United States only 15% doctors worked with practices that used telemedicine<sup>1</sup>.

### **Quantitative Data by Base**

An exponential growth trend in publications on telemedicine was observed. Figure 1 shows the year-by-year evolution, from the initial history of each base. In the initial years publications on telemedicine in the databases were practically non-existent; however, the beginnings were highlighted in 1992. The bases, present a large number of accumulated publications, surveyed in SciELO (1962–2020, 523 publications), SAGE (1944–2020, 8,021 publications), WoS (1964–2020, 27,624 publications), PubMed (1962–2020, 45,691 publications), and Scopus-Elsevier (1972–2020, 69,112 publications).

**Figure 1.** Timeline publications of the bases.

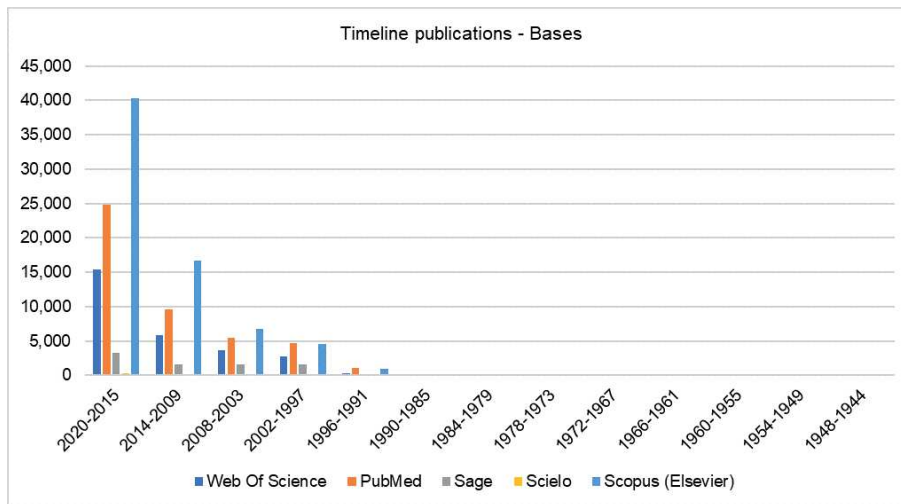
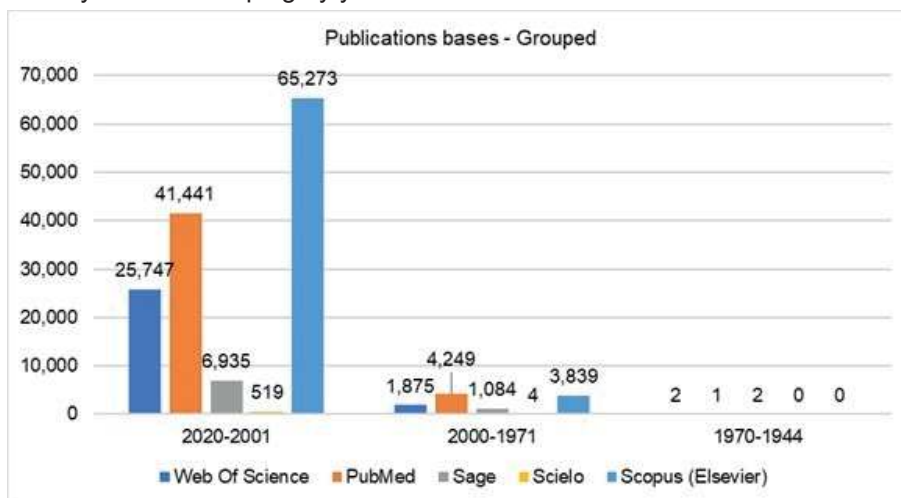


Figure 2 shows publications grouped by 10 years. According to a 2021 survey, more publications emerged in telemedicine from 1991–2020, thus commencing a cycle of constant growth. However, the most significant growth has occurred in the last 10 years. Moreover, Scopus (Elsevier) presents the highest growth in publications in the last 10 years, followed by PubMed, WoS, SAGE, and SciELO.

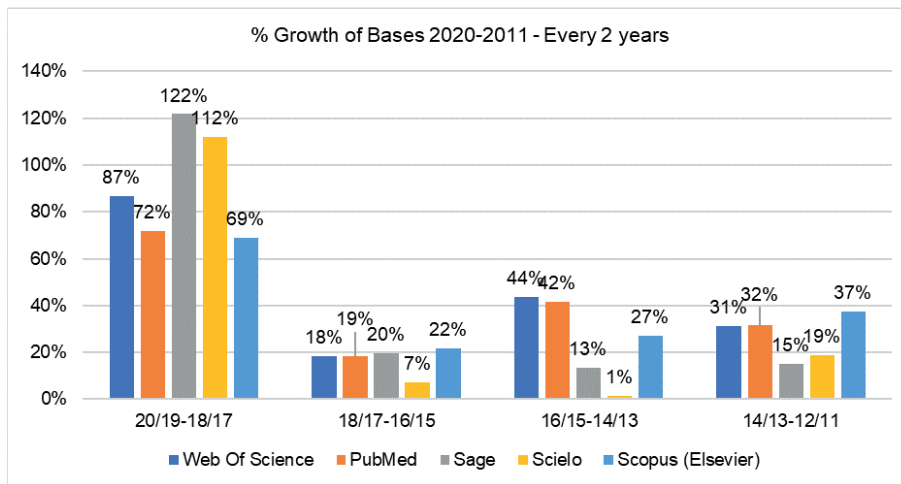
**Figure 2.** Publications by bases: Grouping by years.



The bases reveal immense growth in recent years, since the shock that occurred between 1981 and 1990. However, the growth that occurred in the past 10 years deserves mention as it has contributed to developments in research and applicability of telemedicine. The year 2020 witnessed the most exponential growth in the research period. This growth occurred during the COVID-19 pandemic, where telemedicine, that was not a very active alternative and faced several barriers and bureaucracies prior to 2020, became essential to healthcare; thus streamlining care and shortening distances between patients and healthcare providers<sup>18</sup>. Therefore, COVID-19 is seen as an accelerator of telemedicine and telehealth, especially because of features such as cost-effectiveness and patient safety<sup>24</sup>. Figure 3 expresses the notoriety of growth.



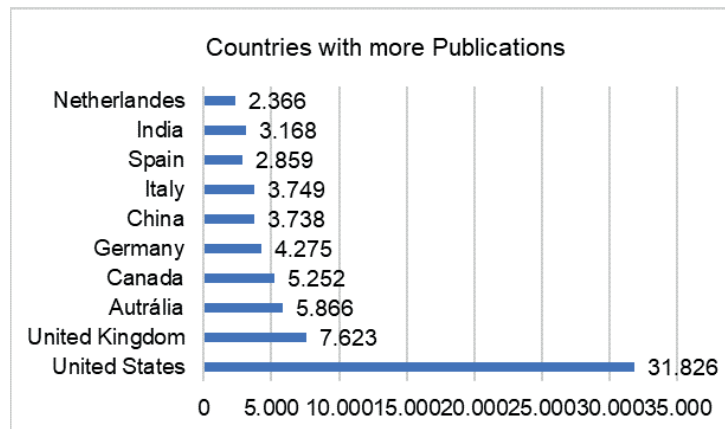
**Figure 3.** Growth of 2011–2020 publications (in percentage).



### Publications on Telemedicine by Countries and Universities

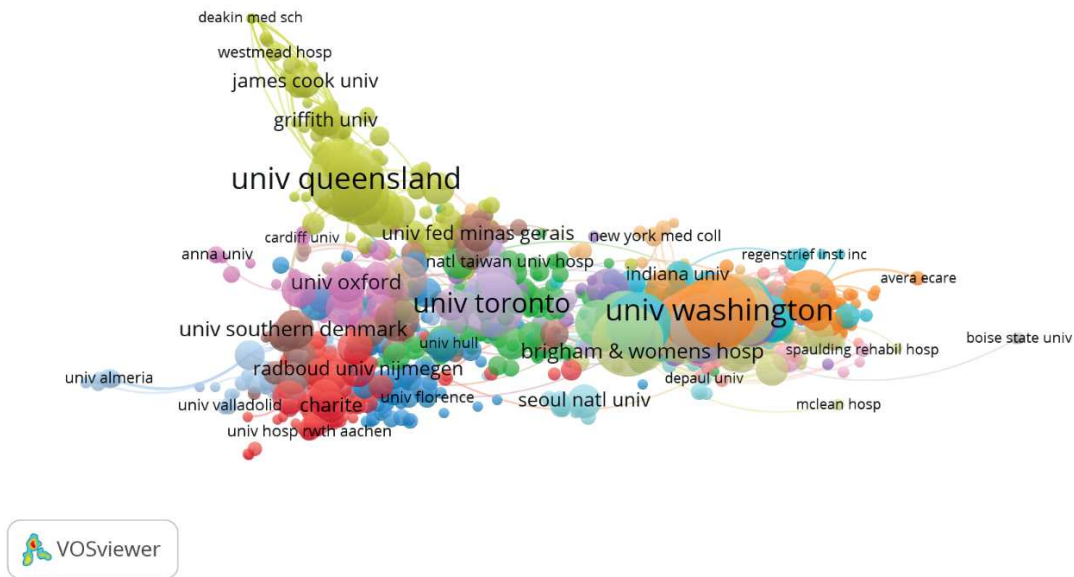
Regarding the publications by countries in the databases, during the research period, surveying Scopus (Elsevier) and WoS databases was considered feasible. We found that the United States had the largest number of publications (31,826). Figure 4 highlights the 10 countries, from which it was feasible to collect data.

**Figure 4.** Countries by number of publications.



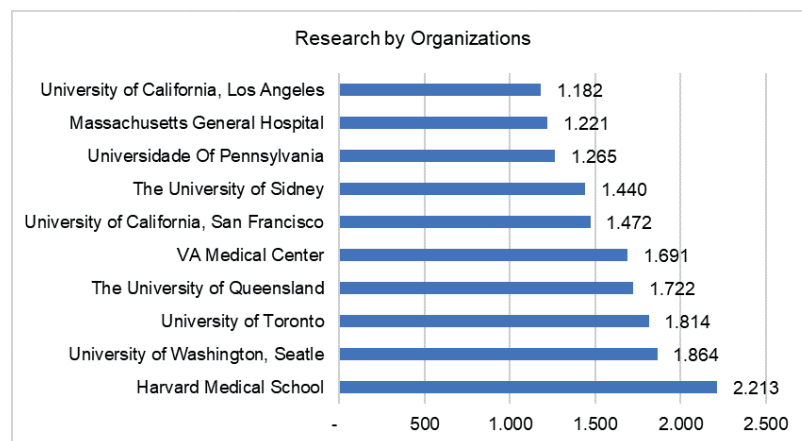
Universities affiliated to these researchers and publications were deemed as important as publications from countries. Among the foundations searched, it was possible to highlight the universities from the WoS, Scopus (Elsevier), and PubMed database, which are displayed in networks and graphics. In the WoS, 15,118 organizations were found, with an analysis limit of 1,368, of which 1,344 had consistent connections with other universities. For the network analysis, only the WoS was selected as it presents significant numbers with great relevance, as observed in Figure 5.

**Figure 5.** Universities' network by number of publications.



According to the analyses performed in Figure 6, the organizations/universities with the most prominence in telemedicine/telehealth research and those with the highest number of searches on the WoS, PubMed, and Scopus bases were added. We found that organizations with the largest number of publications were from the United States, Canada, and Australia. From the studies available in the databases, Harvard Medical School, University of Washington, University of Queensland, University of Michigan, University of Pennsylvania, University of Toronto were the most influential universities. However, except for the University of Queensland, the other universities with the most influential research on telemedicine, belonged to the same geographical region.

**Figure 6.** Publications by organizations.



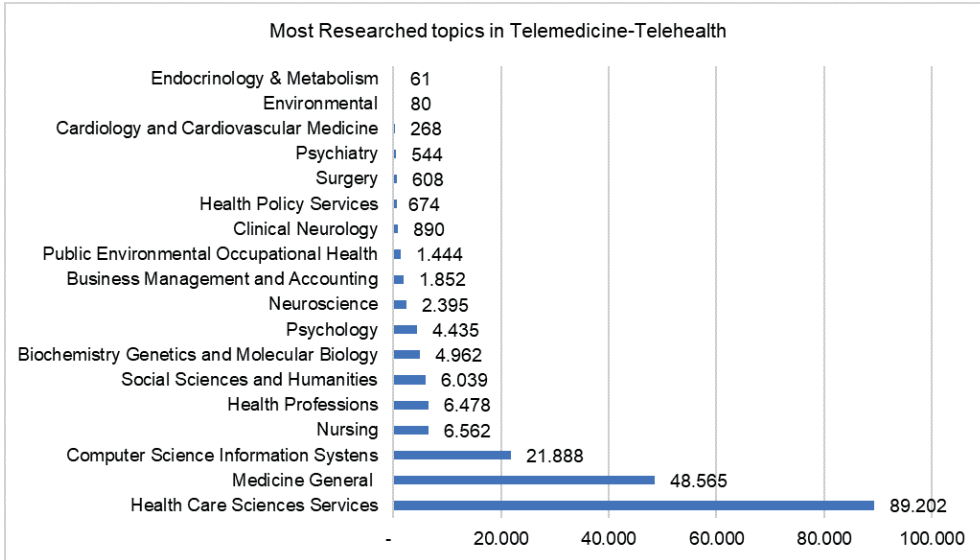
We identified a formation of networks of organizations and clusters between universities and organizations. On the WoS, universities formed 20 clusters, with 1,344 items (universities/organizations), thus forming a total of 15,159 (links) connections. The universities/organizations were categorized into the 10 main clusters as follows: cluster 1 (161), cluster 2 (145), cluster 3 (118), cluster 4 (116), cluster 5 (105), cluster 6 (90), cluster 7 (85), cluster 8 (73), cluster 9 (69) and cluster 10 (62). This evidence denotes an intense integration between research institutions for the development of telemedicine and telehealth-related research.



### Publications by Thematic Areas

Figure 7 present various telemedicine thematic areas that are represented in the majority of studies. Health care sciences services, general medicine, and computer science information systems are the thematic areas that exceed 20,000 searches in the research period of each base.

**Figure 7.** Most researched thematic areas in telemedicine.



### Publications by Author

We also analyzed relevant researchers with noteworthy work in the field of telemedicine in the research period in all the databases; the authors are shown in Figure 8. The author Wootton presents the largest number of searches, with 596 searches, followed by Smith (347 searches). Three authors present between 200 and 300 research include Reifman (294), Wallqvist (227), and Doarn (222). Finally, Merrel (195), Demiris (180), Frisoni (176), Roteman (153), Omboni (145), and Riva (153) present between 100 and 200 searches.

**Figure 8.** Author Chart by number of publications (1944-2020).

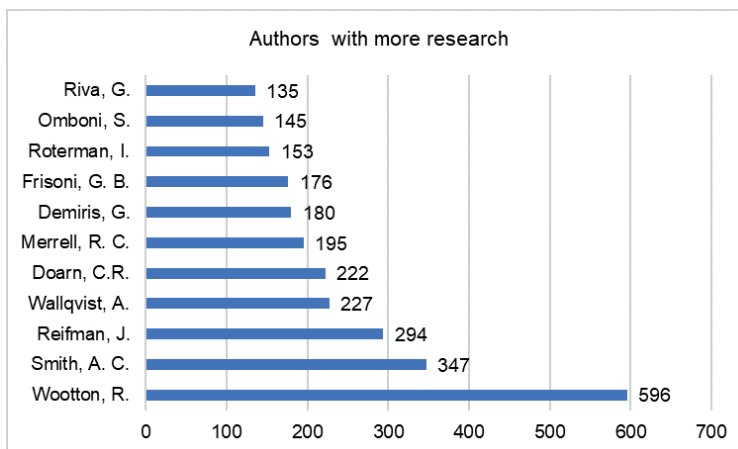
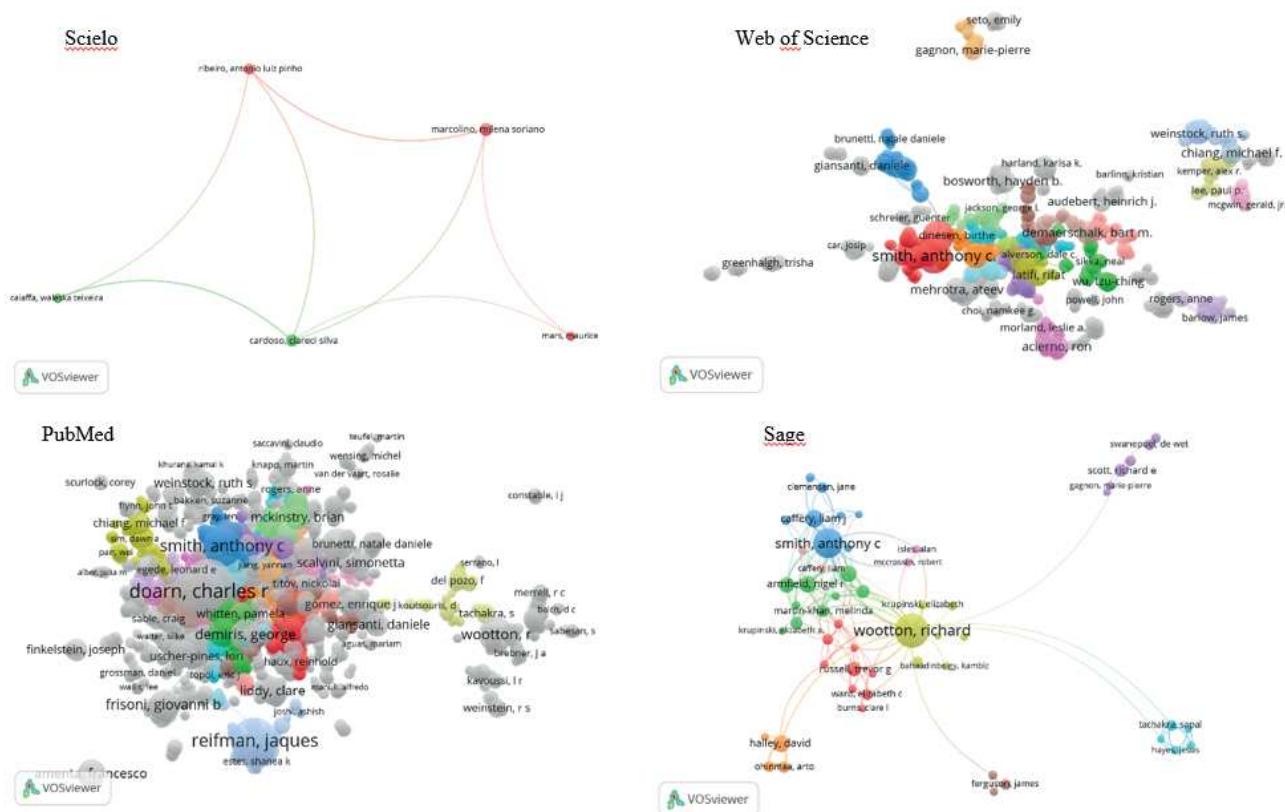


Figure 9 shows the WoS, SciELO, PubMed, and SAGE networks. According to the feasibility in the generation of networks, we identified authors with the most influential research. On the WoS, 10

authors (described here by last name only) with the most influential research were Smith, Rogers, Shea, Wootton, Bosworth, Weinstock, Bardsley, Knapp, Doarn, and Cartwright. On PubMed, the 10 authors with the most influential research were Reifman, Wallqvist, Frisoni, Doarn, Merrell, Smith, Weinstock, Shea, Krupinski, and Wootton. On SAGE, the 10 authors were Smith, Wootton, Caffery, Gray, Armfield, Cadilhac, Edirippulige, García-Sáez, Greenwood, and Hailey. On SciELO, the 10 most influential authors were Cardoso, Fraga, Rizoli, Ribeiro, Caiaffa, Marcolino, Ferigolo, Moreira, Blasca, and Corrêa.

**Figure 9.** Authors' network.



Finally, some of the main scenarios and trends of telemedicine and telehealth have been addressed, in research conducted by reference researchers in the area, most of them analyze and describe the main challenges and contributions of this modality of access to health care in the most diverse realities. Next, in Table 2, it is possible to see a brief description of some of the studies with great impact of the themes, linked to the researchers of greater relevance of the theme (Figure 8).

**Table 2.** Relevant research on the themes of telemedicine and telehealth linked to the authors of greater importance.

Authors	Article	Description
Wootton, R.; O'Kane, B. (2019) <sup>30</sup>	Time Required to Create a Referral in Various Store-and-Forward Telemedicine Networks	Evaluates the use of safe tele imaging to improve efficiency and efficacy for transplant processes.
Wootton, R.; Bonnardot, L. (2019) <sup>31</sup>	Experience of Supporting Telemedicine Networks With the Collegium System: First 6 Years	Evaluation of the Collegium system over a period of 6 years to support organizations that support humane work in low-resource environments.

Authors	Article	Description
Smith, A. C.; Gray, L. C. (2009) <sup>32</sup>	Telemedicine across the ages	Evaluation of the use and importance of telemedicine to improve access to health care for remote communities
Reifman, J.; Gilbert, G. R.; Fagan, L.; Satava, R. (2002) <sup>33</sup>	Military Research Needs in Biomedical Informatics	Discussion on the U.S. Army Biomedical Informatics Roadmap in 2001, U.S. Army Medical Research and Materials Command (USAMRMC) was dedicated to the development of a strategic plan in four areas of focus: Hospital and Clinical Informatics, Electronic Health, Combat Health Informatics and Bioinformatics, and Biomedical Computing.
Liu, R.; AbdulHameed, M. D. M.; Wallqvist, A. (2019) <sup>34</sup>	Teaching an Old Dog New Tricks: Strategies That Improve Early Recognition in Similarity-Based Virtual Screening	He studied the standard ligand-based virtual screening method for large compound libraries with a molecular similarity research method that classifies the probability of a compound being active against a drug target by its greater Tanimoto similarity with known active compounds.
Doarn, C.R.; Latifi, R. (2016) <sup>35</sup>	Telementoring and Teleproctoring in Trauma and Emergency Care	A review of the use of telemedicine applied to trauma, emergency care and surgery specialties.
Merrell, R. C.; Lee, A.; Kwankam, S.Y.; Beatrice, M.; Chinyama, C.; Latifi, R.; Piso, M.I.; Serban, F. (2006) <sup>36</sup>	Satellite applications for telehealth in the developing world	The use of telemedicine and telehealth via satellite in the developing world.
Demiris, G.; Thompson, H.; Boquet, J.; Le, T.; Chaudhuri, S.; Chung, J. (2013) <sup>37</sup>	Older adults' acceptance of a community-based telehealth wellness system	Describes a software kiosk system implemented within a community environment, which reduces the costs of installing and maintaining individual systems.
Roterman, I.; Konieczny, L.; Banach, M.; Jurkowski, W. (2011) <sup>38</sup>	Intermediates in the Protein Folding Process: A Computational Model	Analysis of a simulation model of the process of folding proteins in silico. The two-step model (consisting of the initial stage - ES and the final stage - LS).
Omboni, S.; Ferrari, R. (2015) <sup>39</sup>	The Role of Telemedicine in Hypertension Management: Focus on Blood Pressure Telemonitoring	The objective of updating and critically evaluating the role of telemedicine and of home blood pressure telemonitoring (HBPT), in the management of hypertensive patients.
Riva, G.; Gamberini, L. (2000) <sup>40</sup>	Virtual reality in telemedicine	This article also discusses technological, ergonomic, and human factors issues, and specific guidelines are presented for the expansion of vr use in telemedicine.

The descriptive analysis of research allows the initial identification of the role and challenges of the use of telemedicine and telehealth as an effective channel for improving quality and access to health, especially in more vulnerable community. In this sense, we highlight the importance of discussion

and research development based on cost-effectiveness analysis, access, regulation, remuneration, technology, user satisfaction, among others.

## CONCLUSIONS

In recent times, telemedicine and telehealth has gained space and notoriety, in its applicability in the field as well as in scientific research. This is evident through the significant increase in publications in recent years, especially in the year 2020.

The relevant quantitative increase in publications linked to telemedicine and telehealth themes, which only in 2020 obtained the expressive mark of 26,216 publications, reaffirm the search for science to understand the general and specific context of this modality of access to health services. Among the platforms that safeguard most research, Elsevier, Pubmed and Web of Science stand out, and the three together represent 94% of the publications on the topics.

The United States of America and the United Kingdom, have greater centralities in research, with individual emphasis the Universities of Harvard, Washington, Toronto and Queensland, being these the main institutional references in the Development of research linked to telemedicine and telehealth in the world.

Among the main areas that address the themes of telemedicine and telehealth, special emphasis is the areas of Health Care Sciences Services, Medicine General, Computer Science Information Systems, Nursing, Health Professions, Social Sciences and Humanities, Biochemistry Genetics and Molecular Biology, Psychology, Neuroscience, Business Management and Accounting and Public Environmental Occupational Health. All with over a thousand publications.

Regarding the main authors of the theme, we have: Wooton, R., Smith, A.C., Reifman, J., Wallqvist, A., Doarn, C.R., Merrell, R.C., Demiris, G., Frisoni, G.B., Roteman, I., Omboni, S. and Riva, G.

The COVID-19 pandemic has accelerated processes and unlocked bureaucracies to facilitate the use of alternative forms of healthcare<sup>27</sup>, thus effectively promoting discourse on cost-effectiveness<sup>28</sup>, access, and quality of care<sup>25</sup>. Telemedicine and telehealth improve access to health services, enabling individuals to access healthcare without the need to leave their homes, travel long distances, or visit health organizations, thus reducing risk of exposure to infections. This alternative proposes healthcare for all, even for those in remote areas<sup>29</sup>, thus ensuring quality access, with the right specialist and shortening distances between patients and health professionals.

Although there have been significant research developments in the field of telehealth and telemedicine, several thematic areas of the subject are still left unexplored. Future studies should examine these unexplored areas. As this review identifies the main characteristics of research on telemedicine and telehealth, it is a relevant and practical contribution to the scientific community.

## Contributions

ADZ: Structuring the text of the article and organizing the relationship between data and the theoretical approach, analysis of practical impacts and research suggestions.

SM: Review of the theoretical approach of the article, Review of research coherence, formatting and review of the English language and theoretical approaches for the analysis of the network of authors and co-authors in telemedicine and telehealth.

MAVCC: Review of the theoretical approach of the article, Review of research coherence, formatting and review of the English language and theoretical approaches for the analysis of the network of authors and co-authors in telemedicine and telehealth.

FFT: Database organization, tables, graphs and article structure.

TPM: Database organization, tables, graphs and article structure.

JAWC: Structuring the text of the article and organizing the relationship between data and the theoretical approach, analysis of practical impacts and research suggestions.

### Conflict of Interest

Os autores declaram não haver conflito de interesse.

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