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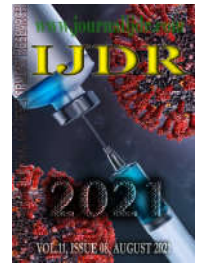
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RESEARCH ARTICLE

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## FORENSIC ASSESSMENT: THE APPLICABILITY OF TELEMEDICINE IN DAMAGE ASSESSMENT AND DISABILITY EVALUATION

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### ABSTRACT

**Introduction:** Telemedicine is a rapidly expanding area, especially in recent months, due to the COVID-19 pandemic. Social isolation measures resulting from the pandemic have challenged several medical specialties' performance, including forensic medicine and medical expertise. In this context, we aimed to analyze the use of the telemedicine method in forensic medicine and its applicability in damage assessment and disability evaluation. **Methods:** This qualitative and descriptive review was conducted on articles published from 2005 to 2020 by searching for indexed articles in English, Spanish and Portuguese in the Cochrane Reviews, PubMed, Scopus, Web of Science, SciELO databases and Lilacs. The searched keywords were telemedicine, video conferencing communication, remote consultation, disability assessment, work capacity assessment, expert evidence, medical expertise, and legal responsibility. The search was freely performed, combining the words, and using Boolean operators. **Results:** We recovered a total of 640 articles, but only 19 were read. We found 14 articles focusing on forensic medicine, which emphasized child sexual abuse assessment, forensic telepsychiatric practices, teleconsultations, and practical, ethical, and legal limitations of telemedicine in forensic evaluation. **Conclusion:** Forensic telemedicine has been used in specific areas. However, there is no record of the applicability of telemedicine for damage assessment and disability evaluation.

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## INTRODUCTION

Recent information and telecommunication technologies have rapidly changed the scenario of several knowledge areas, including sensitive areas, such as medicine and law. Physicians have been using communication tools for the benefit of their patients for several years. During recent decades, initiatives relating to the application of distance medicine through communication technologies began to be discussed, mainly in the 1990s, when the term telemedicine was created (R. L. Bashshur, 1995; França, 2000; Perednia & Allen, 1995; Sood et al., 2007; Wootton, 2001; Wootton et al., 2017). Telemedicine can be defined as the exercise of medicine at a distance

during which interventions, diagnoses, treatment decisions, and recommendations are based on data, documents and other information transmitted through telecommunication systems. It is an integrated health care system that uses technologies as a substitute for personal contact between the doctor and the patient (R. L. Bashshur, 1995; Declaração de Tel Aviv Sobre Responsabilidades e Normas Técnicas Na Utilização Da Telemedicina, 1999). Additionally, it is a branch of e-health that uses communication networks to provide health and medical education services from one geographical location to another (Sood et al., 2007). For telemedicine to become useful, patients must be able to collect and transmit health data that professionals need to evaluate their clinical condition. Legislators, regulators, and doctors around the world historically have been concerned about telemedicine

due to the doctor-patient relationship's particularities and the technical difficulties of the method. However, in the face of the COVID-19 pandemic and given the need for social distancing in some regions, there has been an acceleration of the debate on the regulation of telemedicine and the use of artificial intelligence in health services (American Medical Association, 2020; Caetano et al., 2020; FDA, 2020; Hollander & Carr, 2020; Maldonado et al., 2016; Ohannessian et al., 2020). In Brazil, the health restrictions resulting from this pandemic also have led to drastic changes in the functioning of the judicial power, with the closure of courts, forums, and tribunals and the remote continuity of most procedural acts by magistrates and civil servants (*Resolução CNJ 313/2020*, 2020; *Plano de Contingência Nacional Para Infecção Humana Pelo Novo Coronavírus COVID-19*, 2020; *Portaria 188/2020*, 2020). One of the essential services for the conduct of some legal proceedings, the judicial medical examination, was almost completely suspended, including medical and social assistance expert exams performed in disability benefits and benefits of provision continued by disability (*Resolução CNJ 313/2020*, 2020). Given this atypical scenario, the Brazilian government signed a law providing for the use of telemedicine during the crisis caused by the new coronavirus, authorizing its use during the pandemic on an emergency basis (*Lei 13.989/2020*, 2020). In addition, the National Council of Justice published a resolution making it possible to conduct medical examinations through electronic or virtual media in actions where social security benefits due to disability or assistance are discussed, as long as the effects of the pandemic crisis last (*Resolução CNJ 317/2020*, 2020).

This article evaluates the possibility of using the telemedicine method in forensic medicine through an integrative review, emphasizing the assessment of bodily injury and work disability. The study is justified by the need to discuss the use of this methodology in forensic medicine at the national and international levels.

## METHODS

This is a qualitative and descriptive study using the integrative review method to understand the applicability of telemedicine in damage assessment and disability evaluation. The following steps were taken after identifying the issue: 1) search for literature with keyword delimitation in databases, 2) definition of the studies' inclusion criteria, 3) search in databases, and 4) evaluation and analysis of obtained data (Fereday & Muir-Cochrane, 2006; Mendes et al., 2008; Torraco, 2005; Whittemore & Knafl, 2005). The search for scientific articles was performed between April and August 2020. The inclusion criteria defined were 1) articles in English, Spanish and Portuguese reporting the use of telemedicine in forensic medicine, with an emphasis on damage assessment and work disability and 2) articles indexed in the Cochrane Reviews, PubMed, Scopus, Web of Science, Scielo, and Lilacs databases. Different categories of articles were analyzed. The exclusion criteria were as follows: 1) scientific articles evaluating the use of telemedicine in health care, even related to the forensic area, and 2) studies that considered only ethical aspects in the forensic area of telemedicine.

**Table 1. Distribution of scientific articles searched in Cochrane Reviews, Pubmed, Scopus, Web of Science, SciElo, and Lilacs databases, by following the selected keywords**

Crossed keywords	Database	Number of obtained references	Analyzed abstracts	Number of references selected for further analysis	Number of references selected for the review
Telemedicine, Videoconferencing AND Remote consultation <sup>1</sup>	Cochrane Reviews	0	0	0	0
Telemedicine OR Videoconferencing OR Remote consultation AND Disability evaluation <sup>2</sup>	Pubmed	197	8	4	2
	Scopus	110	5	3	2
	Web of Science	1	0	0	0
Telemedicine OR Videoconferencing OR Remote consultation AND Work capacity evaluation <sup>2</sup>	SciElo	0	0	0	0
	Lilacs	0	0	0	0
	Pubmed	15	3	1	0
Telemedicine OR Videoconferencing OR Remote consultation AND Independent medical evaluation <sup>2</sup>	Scopus	4	0	0	0
	Web of Science	0	0	0	0
	SciElo	0	0	0	0
Telemedicine OR Videoconferencing OR Remote consultation AND Expert testimony OR Forensic medical expertise <sup>2</sup>	Lilacs	0	0	0	0
	Pubmed	27	7	5	5
	Scopus	33	6	4	4
Telemedicine OR Videoconferencing OR Remote consultation AND Legal liability <sup>2</sup>	Web of Science	2	0	0	0
	SciElo	0	0	0	0
	Lilacs	0	0	0	0
Tele-assessment <sup>1</sup>	Pubmed	35	5	0	0
	Scopus	167	6	1	1
	Web of Science	5	0	0	0
Telemedicine AND Damage assessment <sup>3</sup>	SciElo	0	0	0	0
	Lilacs	0	0	0	0
	Web of Science	18	1	0	0
Telemedicine AND inability to work <sup>3</sup>	SciElo	0	0	0	0
	Lilacs	0	0	0	0
	Web of Science	13	3	0	0
Telemedicine AND forensic report <sup>3</sup>	SciElo	0	0	0	0
	Lilacs	0	0	0	0
	Web of Science	12	2	0	0
Telemedicine AND Tele-forensic examination <sup>3</sup>	SciElo	0	0	0	0
	Lilacs	0	0	0	0
	Web of Science	13	3	0	0
Tele-forensic examination <sup>3</sup>	SciElo	0	0	0	0
	Lilacs	0	0	0	0
	Web of Science	18	1	0	0

1 – just in English.

2 – in English, Spanish and Portuguese.

3 – in Spanish and Portuguese.

Different combinations of keywords in English, Spanish and Portuguese were used in the search, considered as DeCS (health sciences descriptors) and MeSH (medical subject headings): telemedicine, videoconferencing, remote consultation, disability evaluation, work capacity evaluation, independent medical evaluation, expert testimony, forensic medical expertise, and legal liability. The search was freely performed by combining the words and using the Boolean operators AND and OR. The following terms were also freely searched in the SciELO and Lilacs databases: telemedicine (*telemedicina*), damage assessment (*dano corporal*), inability to work (*incapacidad del laborativa*), forensic report (*pericia medica*), and tele-forensic examination (*telepericia*). Moreover, the term tele-assessment was searched in PubMed, Scopus, and Web of Science databases.

The terms were crossed as descriptors and as words in the title and abstract. The search was restricted to articles published between 2005 and 2020. A preliminary evaluation of the articles selected for analysis was performed, followed by reading of the abstracts and listing of those potentially eligible for further evaluation. The review process aimed to find articles related to the use of videoconferencing or other telemedicine techniques in damage assessment and work disability. After the first trial, a complete reading of the selected articles, including references, was performed to locate additional articles not identified by the initial research. When searching for reviews in the Cochrane Reviews database, no article on telemedicine, videoconference communication or remote consultation was found. In the PubMed database, 286 scientific articles were initially identified, of which the summary of 25 and the full content of

**Table 2. Summary of studies included in the review regarding forensic telemedicine**

Study	Population	Technology	Comments
Miller et al (Miller et al., 2005) Estados Unidos	Children and adolescents with psychiatric illnesses	Videoconferencing	The article describes a telepsychiatry care delivery model used in a forensic clinic for the evaluation of children and adolescents, and analyses factors such as transmission mode, privacy, and confidentiality, expenses, service quality, in-person transmission versus video, user satisfaction, and responsibility concerns in the use of telepsychiatry.
Lexcen et al (Lexcen et al., 2006) Estados Unidos	Prisoners hospitalized for psychiatric illnesses n = 72	Videoconferencing	Evaluation of videoconferencing interview reliability compared to an in-person interview in patients with psychiatric illnesses in maximum security hospitals. Results suggest that remote interviews can provide similar clinical information to in-person interviews.
Manguno-Mire et al (Manguno-Mire, 2007) 2007	Defendants' competence assessment in the criminal area n = 21	Videoconferencing	Preliminary randomized control study on the use of telemedicine to evaluate competence for a criminal trial. Two forensic psychiatrists evaluated 21 psychiatric patients through telemedicine interviews and in-person. They found high levels of agreement between the two interview modalities. The limited sample size excludes definitive conclusions, so further studies involving a bigger population of forensic studies are needed.
Antonacci et al 2008 (Antonacci et al., 2008) Estados Unidos	Telepsychiatry Review	Videoconferencing	Literature review regarding the use and effectiveness of telepsychiatry by videoconferencing and its implications for forensic and correctional psychiatry. The scarce literature on telepsychiatry in the forensic context does not allow the general use of the method by the time the study was performed.
Sullivan et al (Sullivan et al., 2008) 2008 Austrália	-	Videoconferencing	Describes the use of videoconferencing in the country's mental health services. Concludes that the method generates an opportunity to link remote prisons, courts, and psychiatric clinics to distant specialized services, allowing assessment, treatment, expert testimony, education, and inter-service planning.
Miller et al (Miller et al., 2008) 2008 Estados Unidos	-	Videoconferencing	Describe a theoretical model of forensic assessment of children and adolescents in telepsychiatry and discuss the ethical and ethical negligence issues faced in the use of teleconference services.
Saleem et al (Saleem et al., 2008) 2008 Reino Unido	-	-	Considerations regarding forensic telepsychiatry in the United Kingdom and future perspectives and challenges in its use as a community forensic service.
Khalifa et al (Khalifa et al., 2008) 2008 Reino Unido	-	Videoconferencing	Literature review on the use of videoconferencing in the forensic practice of telepsychiatry. It was concluded that current literature provides just a few preliminary evidences of the method's effectiveness, besides presenting severe methodological limitations, such as the lack of control groups, small sample size, and limited evaluation of the results. Thus, its usefulness must be considered as preliminary.
MacLeod et al (MacLeod et al., 2009) 2009 Estados Unidos	Child victims of sexual abuse n = 42	Videoconferencing	Telemedicine in-person appointments to assist remote providers in examining sexually assaulted children who show up in needy rural hospitals. Videoconferencing was used to assist the examination and result interpretation during in-person appointments.
Miyamoto et al (Miyamoto et al., 2014) 2014 Estados Unidos	Child victims of sexual abuse n = 183	Videoconferencing	A descriptive and retrospective study on the assessment of quality and diagnostic accuracy of forensic examinations of pediatric sexual abuse performed in rural hospitals with access to telemedicine in comparison with examinations performed in similar hospitals with no access to telemedicine. The study demonstrated that hospitals with telemedicine presented significantly higher quality scores in several domains, including general examination, genital examination, documentation of the results, general evaluation, and total quality score ( $p < 0.05$ ).
Smits et al (Smits et al., 2017) 2017 Holanda	Tele-consultation in autopsies n = 938	Telephone	Descriptive, retrospective study regarding aspects of telephone consultations in necropsy exams among coroners.
Sales et al (Sales et al., 2018) 2018 Reino Unido	-	Videoconferencing	Literature review since 2007 to determine the effectiveness and viability of the increase in the use of telepsychiatry in forensic practice. The reviewed literature provides some positive evidence that the telepsychiatry is a reliable, effective, and acceptable method for providing mental health care in the forensic context. Further studies are needed, considering the possible legal and ethical implications of its use in forensic contexts.
Walsh et al (Walsh et al., 2019) 2019 Estados Unidos	Tele-consultation by nurses specialized in sexual abuse n = 178	Telephone	A descriptive and retrospective study describing a pilot project of support in the distance evaluation of sexual assault by nurses through telehealth, aiming to support the local doctors conducting forensic medical examinations of sexual assault for adult and adolescent patients. The patients' acceptability, the functioning of the technology, and the different types of assistance were evaluated.
Luxton et al (Luxton & Niemi, 2019) 2019 Estados Unidos	Defendants with mental illness or intellectual disability n = 50	Videoconferencing	Provides a discussion on pre-trial forensic assessments ordered by courts in the United States, mainly focused on defendants with severe mental illness of intellectual disability. It describes the implementation and results of the first program evaluation on the use of videoconferencing to perform forensic assessment services for adults (assessment of forensic skills /criminal immutability).

seven were read. In the Scopus and Web Science databases, 327 and 29 scientific articles were identified in the initial search, respectively. Seven articles were selected for full reading. No scientific articles were found in the SciELO and Lilacs databases. The articles focusing on the use of telemedicine in forensic medicine and medical expertise selected for a full reading were subjected to thematic analysis according to the study's goals.

## RESULTS

Fourteen articles were found based on the descriptors used in the search between 2005 and 2020. Table 2 shows the scientific articles selected for full reading and the main characteristics of the studies.

In recent decades, an accelerated development of telemedicine in health services was observed, initially led by government agencies and organizations aiming to provide medical services and promote solutions for residents of rural areas and areas without specialized medical services, in addition to reducing operational costs (Craig & Peterson, 2005; Heinzelmann et al., 2005). The first telemedicine modalities considered effective in clinical practice were teleradiology, telepsychiatry, echocardiographic image transmission, and teleinterconsultation between specialists (Gogia, 2020; Hailey et al., 2002; Wootton, 1996). In some countries, telemedicine is already part of the healthcare service chain, as it is being used more intensively in radiology, mental health, pediatrics, dermatology, cardiology, and orthopedics specialties (Heston, 2019; Khandpur, 2017; Klaassen et al., 2016).

**Table 3. Description of the activities of telehealth services**

Aplicação	Atividades
Telediagnostics	Use of information and communication technology to allow the diagnosis between geographically separated individuals.
Teleconsultation ou tele-expertise	Use of information and communication technology to allow inter-consultation between health professionals geographically separated (second opinion).
Telemonitoring	Remote monitoring of patients' vital signals and symptoms.
Teletreatment	Use of telemedicine to provide remote patient treatment, such as chronic disease management.
Telecare	Remote support and assistance provided to the patient using medical information and communication technology.
Tele-education ou teletraining	Use of information and communication technology for health education.
Telesupport	Remote health support in disaster situations.
Telesurgery	Performing remote surgical procedures.
Telesurveillance	Monitoring and surveillance of disease spread to establish patterns of progression.
mhealth	The use of mobile medical devices (mobile) connected to the internet and which send synchronously medical information remotely.
Medical specialties	The use of telemedicine in different medical specialties demanded the creation of new terminologies, such as telepsychiatry, teleradiology, telepathology, teledermatology, telecardiology, telepediatrics, teleophthalmology, and teleoncology.

Source: Organized by the author.

## DISCUSSION

We found articles dealing with specific forensic issues, such as teleconsultation in child sexual abuse assessments from remote or unattended areas; forensic telepsychiatry applications for the treatment and deposition of court experts; formulation of a theoretical model for forensic assessment of children and adolescents by videoconference; discussion of the practical, ethical, and legal limitations of using telemedicine in forensic assessment; and forensic assessments of pretrial criminal liability and teleconsultation for supporting medicolegal autopsies by less qualified professionals (Antonacci et al., 2008; Khalifa et al., 2008; Lexcen et al., 2006; Luxton & Niemi, 2019; MacLeod et al., 2009; Manguno-Mire, 2007; Miller et al., 2005, 2008; Miyamoto et al., 2014; Saleem et al., 2008; Sales et al., 2018; Smits et al., 2017; Sullivan et al., 2008; Walsh et al., 2019). We highlight that telemedicine has been used in some countries in specific forensic areas, mainly through videoconferences. Telemedicine can be broadly defined as the use of communication technologies to provide or support medical assistance from different localities (Wootton, 2001). It is one of the telehealth or e-health segments and is characterized by the use of emerging information and telecommunication technologies to improve or enable health and health care (R. L. Bashshur, 1995; Rashid L. Bashshur & Shannon, 2009; Fong et al., 2011; França, 2000; Goldberg, 1996; Perednia & Allen, 1995; Sood et al., 2007; Wittson et al., 1961; Wootton, 1996; Zundel, 1996). Therefore, the term telemedicine can be more effectively replaced by telehealth, online health or e-health, covering other areas that also use communication technologies in health care (Declaração de Tel Aviv Sobre Responsabilidades e Normas Técnicas Na Utilização Da Telemedicina, 1999). Telemedicine techniques began to be developed in the 1950s. In 1959, psychiatric consultations were performed between remote health services in the United States (telepsychiatry), and radiological examinations were transmitted by telecommunication in Canada (teleradiology) (Declaração de Tel Aviv Sobre Responsabilidades e Normas Técnicas Na Utilização Da Telemedicina, 1999).

In addition, it demonstrates applicability in the continued education of health professionals, several specialties' diagnoses, prehospital emergency care, clinical follow-up of chronic disease, and patients' mobility difficulty situations, such as in medical assistance to prisoners and in disasters (Hjelm, 2005). The types of telemedicine can be characterized by the types of information sent and the type of use. Table 3 summarizes the main applications of telehealth. Despite the numerous benefits, telemedicine is not a panacea (Hjelm, 2005). Some of its disadvantages are significant, such as in cases where physical examination is essential. Changes in the relationships between doctor and patient and between professionals is also a challenge (Resneck et al., 2016; Schwamm et al., 2017). In addition, it is necessary to observe the possible legal repercussions, reliability of the technology used, data confidentiality, and applicability in some medical specialties. A medical consultation by videoconference is limited because physical examination cannot be completely performed through video. In cases involving videoconferencing between medical assistants, the distant specialist doctor can rely on the clinical findings of the health professional who is with the patient, which is generally satisfactory (American Medical Association, 2020). Some studies demonstrate that there are still limitations in diagnostic quality with the use of telemedicine in some specialties, making it necessary to create evaluation protocols to assess the quality of medical care provided through telehealth (Alcântara & França, 2006). The American Medical Association has recently recognized the limitations of relevant telemedicine technologies and realized that appropriate measures must be taken to overcome them. Physicians must ensure that they have the information needed to make well-founded clinical recommendations when they are unable to perform in-person physical examinations, either having another health professional next to the patient to perform the examination or obtaining vital information through remote technologies. It was also highlighted that telehealth is not appropriate for first-time consultations whenever physical examination is needed and/or when the patient presents symptoms outside the limits of clinical telehealth protocols (Alcântara & França, 2006; Código de Ética Médica, 2018). Thus, there is a limitation of telemedicine technologies in assessing body damage and disability. An in-person propaedeutic act, such as

physical examination by a doctor, is needed to assist administrative authorities, police or judiciary in the value judgments shaping (França, 2019; Motta, 2019; Savaris, 2018). Medical expertise is a technical and scientific test and must be performed by a proficient professional (Alcântara & França, 2006; Choong & Barrett, 2014; França, 2019). The appointment of an independent and impartial expert by the magistrate to assess the status of a specific scientific issue in litigation guarantees the right of the parties involved in the judicial process (França, 2019). It is one of the pillars of the Brazilian medicolegal system. Considering that it generally occurs in claims for disability evaluation and personal injury in civil law, a dispute may arise whereby one or both parties request an impartial assessment from a specialist to help resolve a claim. The process aims to allow both parties the opportunity to clarify the medical field's ambiguities and resolve differences in claim resolution whenever possible. Expert assessments of damage and disability must occur in different ways, depending on the area of the law in which they are inserted, once the same disease or sequelae can yield different expert valuations (Vanrell & Borborema, 2015; Vieira & Quintero, 2008).

Bodily injury is any partial or total change in the physical, functional, or psychic bodily integrity and health of an individual. The designated expert must characterize the extent, severity, quality, and consequences of the damage and determine the causal link. The expert must also competently determine whether conditions prior to the disease have been restored and whether the disorder has been definitively diagnosed as well as establish whether the sequelae lead to a disability of work or performing daily living activities (Battista, 1996; Brandimiller, 2018; Cocchiarella, 2000; Spieler, 2000; Trezub & Patsis, 2017). On the other hand, the inability to work refers to any reduction or absence (resulting from a disability) of the ability to perform work activities within normal limits for humans. In addition, individual, sociocultural, and environmental factors interact and interfere with the individual's work capacity. Thus, the disability evaluation cannot be limited to biological factors, as it is the result of an interaction between the dysfunction presented by an individual, limitation of his activities, restriction in social participation and environmental factors that act as facilitators or barriers to job performance. Therefore, the assessment of work capacity is a complex action (Epiphanyo, 2009; Trezub & Patsis, 2017).

The medical examination of work incapacity aims to assess functional work capacity, considering the relevant legal situation, with a claim for a social security benefit being the most frequent reason (*Constituição Da República Federativa Do Brasil de 1988*, 1988; Penna, 2014). In the physical examination, the expert correlates the clinical complaints, reported symptoms and injuries, and findings of the examination to confirm the damage and functional deficit (*Parecer CFM 31/1997*, 1997; Garcia et al., 2015). In lawsuits requiring labor incapacity assessments, the medical examination is important to determine the condition of work inability, given that there can be disagreements between the parties in the process and that the law operator does not have the training to scientifically assess medical issues. The search for the demonstration of the truth and the right to the evidence production are fundamental rights of the citizen guaranteed by the Federal Constitution (*Resolução CFM 1.643/2002*, 2002; Garcia et al., 2015). The Brazilian legal regulation determines forensic medicine, and the use of tele-evaluation is considered an ethical infraction due to the impossibility of conducting an in-person physical examination, which is paramount to performing an adequate assessment of bodily injury and incapacity for work.

Furthermore, the inappropriate use of technologies in forensic assessment can mean lawsuits damages for citizens, workers, employers, and society, in addition to increasing litigation and the risk of professional errors. The damage assessment and disability evaluation are specialized types of forensic medicine performed by qualified physicians to provide the information needed to assist in decisions related to several medicolegal issues. They are extremely useful in different administrative and legal contexts and require specialized training and forensic medicine skills (Motta, 2019; Savaris, 2018; Trezub & Patsis, 2017). The medical expert's

evaluation is based on clinical evidence, mainly the patient's physical examination. When possible, it is different from the evaluation of the assistant doctor, giving an objective and impartial opinion on subjects within the specialization area. Medical expertise uses very specific methods and techniques, making it more difficult to implement projects involving distance assessment technologies, such as telemedicine (Alcântara & França, 2006; Epiphanyo, 2009; Motta, 2019). The general acceptance of telemedicine in medical expertise depends on the admissibility of scientific evidence. In this study, no scientific studies were found in indexed journals that evidence the effectiveness of telemedicine in damage assessment and disability evaluation. There are no controlled comparative studies between the applicability of teleforensic examination and conventional medical examination.

The current limitations of telemedicine in medical expertise jeopardize the assessment of the patient's functional capacity or damage due to technical difficulties resulting from the failure to perform the physical exam, restricting the evaluation of important behavioral and clinical data as well as and functional assessment. In addition, there are ethical limitations, legal uncertainty due to the absence of legislation, and the risk of confidentiality violation of the medical exam act. Additionally, telemedicine cannot replace face-to-face assessment when a detailed physical examination is needed. These physical examinations usually aim to assess functional limitations as well as mobility and sensitivities and collect any traces and samples for complementary expert examinations. Thus, the lack of scientific studies focusing on the use of telemedicine in damage assessment and disability evaluation can be explained by technical inapplicability due to the need for physical examination. In addition, it can also occur because telemedicine in forensic medicine is a new demand; thus, there are still no significant scientific advances in this area. Likewise, the perceptions and experiences of the legal area regarding this topic have received basically no attention in the literature of indexed scientific journals.

This is possibly due to the risk of irreparable damage to the interested parties. Additionally, it is possible that the medical examination performed under these conditions may prolong litigation when one of the parties is not satisfied with the conclusions of the expert report. A limitation of this study is its integrative scope. The existing literature in the field is not broad enough to perform a systematic review. Remarkably, there is a scarcity of scientific studies that specifically address telemedicine's applicability, cost-effectiveness, efficacy, or acceptability in damage assessment and disability evaluation. However, this integrative review promoted the understanding of the extent of the literature on this topic and provided clinically relevant information. Due to the scarcity of studies on forensic examination in damage assessment and disability evaluation, we conclude that the exceptional use of telemedicine to prevent proximity and displacement risks, as in the context of the recent COVID-19 pandemic, does not justify the use of an inspection method without measuring its scientific effectiveness. Thus, other studies are needed to assess the benefits and risks of using telemedicine in these assessments.

## CONCLUSION

It is inferred that the telemedicine method can be used in some areas of forensic science; however, current literature still provides only preliminary evidence for its effectiveness in the forensic area due to factors, such as methodological limitations, the absence of control groups, small samples, and limited result evaluation in the vast majority of the studies. In addition, no relevant study has specifically investigated telemedicine's use in damage assessment and disability evaluation by experts so far. Future research reporting scientific evidence on the applicability, acceptability, and cost-effectiveness of tele-inspection could provide new pathways for this approach. However, in the absence of user satisfaction and accurate, reliable, and useful systematic empirical data, caution should be taken, as it can result in irreparable damage to citizens and society.

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## REFERENCES

- Alcântara, H. R., & França, G. V. de. (2006). *Perícia médica judicial* (2nd ed.). Guanabara Koogan.
- American Medical Association. (2020). *Telehealth Implementation Playbook*. <https://www.ama-assn.org/system/files/2020-04/ama-telehealth-playbook.pdf>
- Antonacci, D. J., Bloch, R. M., Saeed, S. A., Yildirim, Y., & Talley, J. (2008). Empirical evidence on the use and effectiveness of telepsychiatry via videoconferencing: Implications for forensic and correctional psychiatry. *Behavioral Sciences & the Law*, 26(3), 253–269. <https://doi.org/10.1002/bsl.812>
- Bashshur, R. L. (1995). On the definition and evaluation of telemedicine. *Telemedicine Journal: The Official Journal of the American Telemedicine Association*, 1(1), 19–30. <https://doi.org/10.1089/tmj.1.1995.1.19>
- Bashshur, Rashid L., & Shannon, G. W. (2009). *History of Telemedicine: evolution, context and transformation*. Mary Ann Liebert Inc.
- Battista, M. E. (1996). Disability Evaluation. *JAMA: The Journal of the American Medical Association*, 276(22), 1847. <https://doi.org/10.1001/jama.1996.03540220071037>
- Brandimiller, P. A. (2018). *Conceitos médico-legais para indenização do dano corporal* (1st ed.). Revista dos Tribunais.
- Constituição da República Federativa do Brasil de 1988*, (1988) (testimony of BRASIL).
- Lei 13.989/2020*, (2020) (testimony of BRASIL). <http://www.in.gov.br/en/web/dou/-/lei-n-13.989-de-15-de-abril-de-2020-252726328>
- Caetano, R., Silva, A. B., Guedes, A. C. C. M., Paiva, C. C. N. de, Ribeiro, G. da R., Santos, D. L., & Silva, R. M. da. (2020). Desafios e oportunidades para telessaúde em tempos da pandemia pela COVID-19: uma reflexão sobre os espaços e iniciativas no contexto brasileiro. *Cadernos de Saúde Pública*, 36(5), e00088920. <https://doi.org/10.1590/0102-311x00088920>
- Choong, K. A., & Barrett, M. (2014). Forensic physicians and written evidence: Witness statements v. expert reports. *Journal of Forensic and Legal Medicine*, 22, 93–98. <https://doi.org/10.1016/j.jflm.2013.12.014>
- Cocchiarella, L. (2000). Improving the Evaluation of Permanent Impairment. *JAMA*, 283(4), 532. <https://doi.org/10.1001/jama.283.4.532>
- Parecer CFM 31/1997*, (1997) (testimony of Conselho Federal de Medicina). <https://sistemas.cfm.org.br/normas/visualizar/pareceres/BR/1997/31>
- Resolução CFM 1.643/2002*, (2002) (testimony of Conselho Federal de Medicina). [http://www.portalmedico.org.br/resolucoes/CFM/2002/1643\\_2002.pdf](http://www.portalmedico.org.br/resolucoes/CFM/2002/1643_2002.pdf)
- Código de Ética Médica*, (2018) (testimony of Conselho Federal de Medicina). <https://sistemas.cfm.org.br/normas/visualizar/resolucoes/BR/2018/2217>
- Resolução CNJ 313/2020*, (2020) (testimony of Conselho Nacional da Justiça).
- Resolução CNJ 317/2020*, (2020) (testimony of Conselho Nacional da Justiça). <https://atos.cnj.jus.br/files/original/161656202005085eb585f8b31d5.pdf>
- Craig, J., & Petterson, V. (2005). Introduction to the Practice of Telemedicine. *Journal of Telemedicine and Telecare*, 11(1), 3–9. <https://doi.org/10.1177/1357633x0501100102>
- Epiphanyo, E. (2009). *Perícias médicas: teoria e prática*. Guanabara Koogan.
- FDA. (2020). *Enforcement Policy for Imaging Systems During the Coronavirus Disease 2019 (COVID-19) Public Health Emergency*. Guidance for Industry and Food and Drug Administration Staff. <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/enforcement-policy-imaging-systems-during-coronavirus-disease-2019-covid-19-public-health-emergency>
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive and Deductive Coding and Theme Development. *International Journal of Qualitative Methods*, 5(1), 80–92. <https://doi.org/10.1177/160940690600500107>
- Fong, B., Fong, A. C. M., & Li, C. K. (2011). *Telemedicine technologies: information technologies in medicine and telehealth*. Wiley.
- França, G. V. de. (2000). Telemedicina: breves considerações ético-legais. *Revista Bioética*, 8(1).
- França, G. V. de. (2019). *Medicina Legal* (11th ed.). Guanabara Koogan.
- Garcia, L., Silva, E., & Terra, J. (2015). A comparison of telehealth programs between the USA and Brazil: a legal perspective. *Smart Homecare Technology and TeleHealth*, 3, 139. <https://doi.org/10.2147/shtt.s64447>
- Gogia, S. (2020). *Fundamentals of Telemedicine and Telehealth* (1st ed.). Academic Press.
- Goldberg, M. (1996). Teleradiology and telemedicine. *Radiologic Clinics of North America*, 34(3), 647–665.
- Hailey, D., Roine, R., & Ohinmaa, A. (2002). Systematic review of evidence for the benefits of telemedicine. In *Journal of telemedicine and telecare: Vol. 8 Suppl 1* (Issue 1\_suppl, pp. 1–30). SAGE Publications Sage UK: London, England. <https://doi.org/10.1258/1357633021937604>
- Heinzelmann, P. J., Lugn, N. E., & Kvedar, J. C. (2005). Telemedicine in the future. In *Journal of Telemedicine and Telecare* (Vol. 11, Issue 8, pp. 384–390). SAGE Publications Sage UK: London, England. <https://doi.org/10.1258/135763305775013554>
- Heston, T. (2019). *Telehealth* (T. F. Heston, Ed.). IntechOpen. <https://doi.org/10.5772/intechopen.78461>
- Hjelm, N. M. (2005). Benefits and drawbacks of telemedicine. In *Journal of Telemedicine and Telecare* (Vol. 11, Issue 2, pp. 60–70). <https://doi.org/10.1258/1357633053499886>
- Hollander, J. E., & Carr, B. G. (2020). Virtually Perfect? Telemedicine for Covid-19. *New England Journal of Medicine*, 382(18), 1679–1681. <https://doi.org/10.1056/NEJMp2003539>
- Khalifa, N., Saleem, Y., & Stankard, P. (2008). The use of telepsychiatry within forensic practice: A literature review on the use of videolink. *Journal of Forensic Psychiatry & Psychology*, 19(1), 2–13. <https://doi.org/10.1080/14789940701560794>
- Khandpur, R. S. (2017). *Telemedicine - Technology and Applications (mHealth, TeleHealth and eHealth)* (1st ed.). PHI Learning Private Limited.
- Klaassen, B., van Beijnum, B. J. F., & Hermens, H. J. (2016). Usability in telemedicine systems—A literature survey. *International Journal of Medical Informatics*, 93, 57–69. <https://doi.org/10.1016/j.ijmedinf.2016.06.004>
- Lexcen, F. J., Hawk, G. L., Herrick, S., & Blank, M. B. (2006). Use of Video Conferencing for Psychiatric and Forensic Evaluations. *Psychiatric Services*, 57(5), 713–715. <https://doi.org/10.1176/ps.2006.57.5.713>
- Luxton, D. D., & Niemi, J. (2019). Implementation and Evaluation of Videoconferencing for Forensic Competency Evaluation. *Telemedicine and E-Health*, tmj.2019.0150. <https://doi.org/10.1089/tmj.2019.0150>
- MacLeod, K. J., Marcin, J. P., Boyle, C., Miyamoto, S., Dimand, R. J., & Rogers, K. K. (2009). Using telemedicine to improve the care delivered to sexually abused children in rural, underserved hospitals. *Pediatrics*, 123(1), 223–228. <https://doi.org/10.1542/peds.2007-1921>
- Maldonado, J. M. S. de V., Marques, A. B., & Cruz, A. (2016). Telemedicine: challenges to dissemination in Brazil. *Cadernos de Saúde Pública*, 32(suppl 2). <https://doi.org/10.1590/0102-311X00155615>
- Manguno-Mire, G. (2007). The use of telemedicine to evaluate competency to stand trial: A preliminary randomized controlled study. *Journal of the American Academy of Psychiatry and Law Online*, 35(4), 481–489.

- Mendes, K. D. S., Silveira, R. C. de C. P., & Galvão, C. M. (2008). Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. *Texto & Contexto - Enfermagem*, 17(4), 758–764. <https://doi.org/10.1590/S0104-07072008000400018>
- Miller, T. W., Burton, D. C., Hill, K., Luftman, G., & Veltkamp, L. J. (2005). Telepsychiatry: Critical Dimensions for Forensic Services. *The Journal of the Academy of Psychiatry and the Law*, 33(539–546).
- Miller, T. W., Clark, J., Veltkamp, L. J., Burton, D. C., & Swope, M. (2008). Teleconferencing model for forensic consultation, court testimony, and continuing education. *Behavioral Sciences and the Law*, 26(3), 301–313. <https://doi.org/10.1002/bsl.809>
- Plano de Contingência Nacional para Infecção Humana pelo novo Coronavírus COVID-19, (2020) (testimony of Ministério da Saúde).
- Portaria 188/2020, (2020) (testimony of Ministério da Saúde).
- Miyamoto, S., Dharmar, M., Boyle, C., Yang, N. H., MacLeod, K., Rogers, K., Nesbitt, T., & Marcin, J. P. (2014). Impact of telemedicine on the quality of forensic sexual abuse examinations in rural communities. *Child Abuse and Neglect*, 38(9), 1533–1539. <https://doi.org/10.1016/j.chiabu.2014.04.015>
- Motta, R. C. (2019). *Manual de iniciação e conceitos em perícias médicas* (LTr, Ed.; 4th ed.).
- Ohannessian, R., Duong, T. A., & Odone, A. (2020). Global Telemedicine Implementation and Integration Within Health Systems to Fight the COVID-19 Pandemic: A Call to Action. *JMIR Public Health and Surveillance*, 6(2), e18810. <https://doi.org/10.2196/18810>
- Penna, S. V. (2014). A judicialização dos direitos sociais após 25 anos da Constituição Federal Brasileira. *Lex Humana*, 6(1).
- Perednia, D. A., & Allen, A. (1995). Telemedicine Technology and Clinical Applications. *JAMA: The Journal of the American Medical Association*, 273(6), 483–488. <https://doi.org/10.1001/jama.1995.03520300057037>
- Resneck, J. S., Abrouk, M., Steuer, M., Tam, A., Yen, A., Lee, I., Kovarik, C. L., & Edison, K. E. (2016). Choice, Transparency, Coordination, and Quality Among Direct-to-Consumer Telemedicine Websites and Apps Treating Skin Disease. *JAMA Dermatology*, 152(7), 768. <https://doi.org/10.1001/jamadermatol.2016.1774>
- Saleem, Y., Taylor, M. H., & Khalifa, N. (2008). Forensic telepsychiatry in the United Kingdom. In *Behavioral Sciences and the Law* (Vol. 26, Issue 3, pp. 333–344). <https://doi.org/10.1002/bsl.810>
- Sales, C. P., McSweeney, L., Saleem, Y., & Khalifa, N. (2018). The use of telepsychiatry within forensic practice: a literature review on the use of videolink – a ten-year follow-up. *The Journal of Forensic Psychiatry & Psychology*, 29(3), 387–402. <https://doi.org/10.1080/14789949.2017.1396487>
- Savaris, J. A. (2018). *Curso de Perícia Judicial Previdenciária* (3rd ed.). Alteridade Editora.
- Schwamm, L. H., Chumbler, N., Brown, E., Fonarow, G. C., Berube, D., Nystrom, K., Suter, R., Zavala, M., Polsky, D., Radhakrishnan, K., Lacktman, N., Horton, K., Malcarney, M.-B., Halamka, J., & Tiner, A. C. (2017). Recommendations for the Implementation of Telehealth in Cardiovascular and Stroke Care: A Policy Statement From the American Heart Association. *Circulation*, 135(7). <https://doi.org/10.1161/CIR.0000000000000475>
- Smits, L. J. H., Dorn, T., Bakker, K., & Reijnders, U. J. L. (2017). Calling for advice: Aspects of telephonic consultation in post-mortem examinations. *Journal of Forensic and Legal Medicine*, 48, 55–60. <https://doi.org/10.1016/j.jflm.2017.04.006>
- Sood, S., Mbarika, V., Jugoo, S., Dookhy, R., Doarn, C. R., Prakash, N., & Merrell, R. C. (2007). What is telemedicine? A collection of 104 peer-reviewed perspectives and theoretical underpinnings. *Telemedicine and E-Health*, 13(5), 573–590. <https://doi.org/10.1089/tmj.2006.0073>
- Spieler, E. A. (2000). Recommendations to Guide Revision of the Guides to the Evaluation of Permanent Impairment. *JAMA*, 283(4), 519. <https://doi.org/10.1001/jama.283.4.519>
- Sullivan, D. H., Chapman, M., & Mullen, P. E. (2008). Videoconferencing and forensic mental health in Australia. In *Behavioral Sciences and the Law* (Vol. 26, Issue 3, pp. 323–331). John Wiley & Sons, Ltd. <https://doi.org/10.1002/bsl.815>
- Torraco, R. J. (2005). Writing Integrative Literature Reviews: Guidelines and Examples. *Human Resource Development Review*, 4(3), 356–367. <https://doi.org/10.1177/1534484305278283>
- Trezub, C. J., & Patsis, K. S. (2017). *Perícia Médica Previdenciária: benefícios por incapacidade* (1st ed.). Juspodivm.
- Vanrell, J. P., & Borborema, M. de L. (2015). *Perícias Médicas Judiciais* (2nd ed.). J. H. Mizuno.
- Vieira, D. N., & Quintero, J. M. A. (2008). *Aspectos práticos da avaliação do dano corporal em Direito Civil*. Imprensa da Universidade de Coimbra. <https://doi.org/10.14195/978-989-26-0400-8>
- Walsh, W. A., Meunier-Sham, J., & Re, C. (2019). Using Telehealth for Sexual Assault Forensic Examinations: A Process Evaluation of a National Pilot Project. *Journal of Forensic Nursing*, 15(3), 152–162. <https://doi.org/10.1097/JFN.0000000000000254>
- Whittemore, R., & Knafl, K. (2005). The integrative review: updated methodology. *Journal of Advanced Nursing*, 52(5), 546–553. <https://doi.org/10.1111/j.1365-2648.2005.03621.x>
- Wittson, C., Affleck, D., & Johnson, Y. (1961). *The use of two-way television in group therapy*. University of Nebraska College of Medicine.
- Wootton, R. (1996). Telemedicine: A cautious welcome. *British Medical Journal*, 313(7069), 1375–1377. <https://doi.org/10.1136/bmj.313.7069.1375>
- Wootton, R. (2001). Recent advances: Telemedicine. *BMJ*, 323(7312), 557–560. <https://doi.org/10.1136/bmj.323.7312.557>
- Wootton, R., Craig, J., & Patterson, V. (2017). *Introduction to Telemedicine* (2nd ed.). CRC Press.
- Declaração de Tel Aviv sobre responsabilidades e normas técnicas na utilização da telemedicina, (1999).
- Zundel, K. M. (1996). Telemedicine: History, applications, and impact on librarianship. In *Bulletin of the Medical Library Association* (Vol. 84, Issue 1, pp. 71–79). Medical Library Association.

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