

# Technosociality in the daily life of a person with liver cirrhosis: Integrative review

**RESUMO** | Objetivo: identificar e refletir o uso da tecnossocialidade no cotidiano das pessoas com cirrose hepática para a promoção da saúde. Método: revisão integrativa desenvolvida de junho a dezembro de 2021. A busca pelos estudos foi atemporal realizada nas bases da PUBMED, Scopus e Biblioteca Virtual em Saúde, a partir dos descritores Rede Social, Internet e Cirrose Hepática. Os estudos foram selecionados seguindo o fluxograma PRISMA. Resultados: foram incluídos 13 estudos divididos em duas categorias: 1. Tecnossocialidade: alfabetização e letramento digital, necessidade de avaliação da propriedade e proficiência tecnológica; 2. Tecnossocialidade: uso de aplicativos como ferramenta terapêutica para a promoção da saúde, estratégia de monitoramento remoto para o gerenciamento e cuidado da pessoa com cirrose. Conclusão: a tecnologia está no cotidiano das pessoas com cirrose. A alfabetização digital e o uso de aplicativos são estratégias importantes para a promoção da saúde da pessoa com cirrose hepática.

**Descritores:** Cirrose Hepática; Internet; Rede Social; Promoção da Saúde.

**ABSTRACT** | Objective: to identify and reflect on the use of technosociality in the daily lives of people with liver cirrhosis for health promotion. Method: integrative review developed from June to December 2021. The search was conducted with no time limit in the databases PUBMED, Scopus and Virtual Health Library using the descriptors Social Network, Internet and Liver Cirrhosis. The studies were selected following the PRISMA flowchart. Results: 13 studies were included divided into two categories: 1. Technosociality: digital literacy, emphasizing the need for assessment of ownership and technological proficiency; 2. Technosociality: use of applications as a therapeutic tool for health promotion, remote monitoring strategy for the management and care of the person with cirrhosis. Conclusion: technology is in the daily life of people with cirrhosis. Digital literacy and the use of applications are important strategies for health promotion of people with liver cirrhosis.

**Keywords:** Liver Cirrhosis; Internet; Social Networking; Health Promotion.

**RESUMEN** | Objetivo: identificar y reflexionar sobre el uso de la tecnossocialidad en la vida cotidiana de las personas con cirrosis hepática para la promoción de la salud. Método: revisión integradora desarrollada de junio a diciembre de 2021. La búsqueda se realizó sin límite de tiempo en las bases PUBMED, Scopus y Virtual Health Library a partir de los descriptores Red Social, Internet y Cirrosis Hepática. Los estudios se seleccionaron siguiendo el diagrama de flujo PRISMA. Resultados: incluyeron 13 estudios, divididos en dos categorías: 1. Tecnossocialidad: alfabetización digital, evaluar la propiedad tecnológica; 2. Tecnossocialidad: uso de aplicaciones como herramienta terapéutica para la promoción de la salud, estrategia de monitorización remota para la gestión y el cuidado. Conclusión: la tecnología está en la vida cotidiana de las personas con cirrosis. La alfabetización digital y el uso de aplicaciones son estrategias para la promoción de la salud.

**Palabras claves:** Cirrosis Hepática; Internet; Red Social; Promoción de la Salud.

## Jéssica Costa Maia

Nurse. Master in Nursing. Doctoral student at the Federal University of Santa Catarina (UFSC). Florianópolis (SC), Brazil.  
ORCID: 0000-0003-4486-2094

## Rosane Gonçalves Nitschke

Nurse. Doctor in Nursing. Professor at the Federal University of Santa Catarina (UFSC), Department of Nursing, Graduate Nursing. Florianópolis (SC), Brazil.  
ORCID: 0000-0002-1963-907X

## Adriana Dutra Tholl

Nurse. Doctor in Nursing. Professor at the Federal University of Santa Catarina (UFSC), Department of Nursing, Graduate Nursing. Florianópolis (SC), Brazil.  
ORCID: 0000-0002-5084-9972

## Maria Lígia dos Reis Bellaguarda

Nurse. Doctor in Nursing. Professor at the Federal University of Santa Catarina (UFSC), Department of Nursing, Graduate Nursing. Florianópolis (SC), Brazil.  
ORCID: 0000-0001-9998-3040

## Kátia Cilene Godinho Bertonecello

Nurse. Doctor in Nursing. Professor at the Federal University of Santa Catarina (UFSC), Department of Nursing, Graduate Nursing. Florianópolis (SC), Brazil.  
ORCID: 0000-0002-2518-3136

## INTRODUCTION

Liver cirrhosis is the end-stage of chronic liver disease with a high clinical incidence. It is established by the growth of regenerative nodules from advanced fibrosis and vascular remodeling in the liver due to chronic liver injury. The most common causes for its development are increased exposure to alcohol, non-alcoholic fatty liver disease and hepatitis B and C virus infection, and it is often asymptomatic and indolent until the onset of clinical manifestations.<sup>(1)</sup>

In clinical practice, cirrhosis can be considered compensated or decompensated. Acute hepatic decompensation occurs with the manifestation of complications such as ascites, hepatic encephalopathy,

**Recebido em:** 14/07/2022

**Aprovado em:** 09/09/2022

gastrointestinal hemorrhage, bacterial infection, among others; becoming responsible for the main cause of hospitalization of these patients. <sup>(1-3)</sup>

Cirrhosis is still a cause of significant morbidity and mortality, despite advances in treatment options. <sup>(4)</sup> In 2019, it was considered the seventh highest cause of years of life,

adjusted for disability in people aged 50 to 74 and aged 16 for all ages. <sup>(5)</sup>

Considering these aspects, health promotion is a public health strategy capable of overcoming these difficulties and implementing actions to improve the population's quality of life. Health promotion aims to promote the improvement of conditions and ways of living, provide shared management and reduce vulnerabilities and risks to health in terms of social, economic, political, cultural and environmental determinants. <sup>(6)</sup>

In this perspective, with globalization, technologies have been representing promising tools to promote health. In recent years, the use of Information and Communication Technologies (ICTs) has increased significantly with the spread of the internet. With this increase in the daily use of the internet and ICTs, new possibilities for people's access arise in an interactive way with the purpose of facilitating care, monitoring and improving adherence to treatments. <sup>(7)</sup>

Technologies are increasingly present in people's daily lives, including mediating socialization, reporting us to what is called technosociality. <sup>(8-9)</sup> Thus, technosociality is understood as "the new forms of social interactions, provided by new technologies, which appear all over the world everywhere, diversifying the processes in our daily experience, both real and virtual"(p.102). <sup>(10)</sup>

In this scenario, the familiarization of health professionals with the use of technologies is important to reflect on how they can help in the health-disease process, being a health promoter in the work territory, that is, there is a need to know the process of technosociality. <sup>(11)</sup> Thus, its understanding and use by health professionals

is essential to assist in care strategies for people with liver cirrhosis.

From this context, this study aimed to identify and reflect on the use of technosociality in the daily lives of people with liver cirrhosis for health promotion.

Daily life in its intertwining with the health-disease process is the way of life of individuals expressed in everyday life through interactions, beliefs, values, which outline their process of living as a healthy being when they get sick, characterizing their life cycle. <sup>(12)</sup>

**METHOD**

This is an integrative literature review conducted in five stages: identification of the problem and elaboration of the guiding question; literature search according to the inclusion criteria to answer the research question; collection and evaluation of studies; analysis of results and; presentation of the summary of the work. <sup>(13)</sup> This survey was conducted from June to December 2021.

For the elaboration of the guiding question, the acronym PICO <sup>(14)</sup> was used: P (population): Liver Cirrhosis; I (intervention): Technosociality; C (comparison): not considered; O (outcome): Health promotion. As a guiding question, there was: What does the scientific evidence show about technosociality in the daily life of people with liver cirrhosis for health promotion?

The search for studies was carried out through the scientific literature of publications indexed in the following databases:

US National Library of Medicine PubMed/MEDLINE, Scopus and the Virtual Health Library (VHL). The descriptors in Health Sciences (DeCS) and the terms Medical Subject Headings (MeSH) used were: Social Network (Rede Social), Internet and Liver Cirrhosis (Cirrose Hepática). For each database, a search strategy was developed with the Boolean expressions AND and OR (Chart 1).

The collection of scientific studies was carried out in a single moment in July 2021. As inclusion criteria were original articles, reviews, complete articles and available for analysis, in English, Portuguese or Spanish, which were published until July 2021, with no time limit. Exclusion criteria were duplication of articles, monographs, theses and dissertations, conference proceedings, reflection articles, editorials and articles that did not respond to the research question.

After searching the databases, the articles were exported to an EndNote™ bibliographic reference management software. The articles underwent an independent screening with reading of titles and abstracts for selection and exclusion according to eligibility criteria and, later, a complete reading of potential articles for inclusion in the study was carried out. Inconsistencies were dealt with by consensus. The selection of articles followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart. <sup>(15)</sup>

The level of evidence of the selected studies was classified according to the seven hierarchical levels of evidence: level

**Table 1– Search strategies used in databases, Florianópolis, SC, Brazil, 2021**

Databases	Search strategy	Identified studies
Pubmed	(("Social Networking" OR "Internet" OR "Online Social Networking") AND ("Liver Cirrhosis" OR "Cirrhosis"))	46
Scopus	(("Social Networking" OR "Internet" OR "Online Social Networking") AND ("Liver Cirrhosis" OR "Cirrhosis"))	97
VHL	(("cirrosehepática" OR "Liver Cirrhosis" OR "cirrose" OR "cirrhosis") AND ("Rede Social" OR "RedesSociais" OR "Internet" OR "Social Network"))	86

Source: Author's own production, 2021.

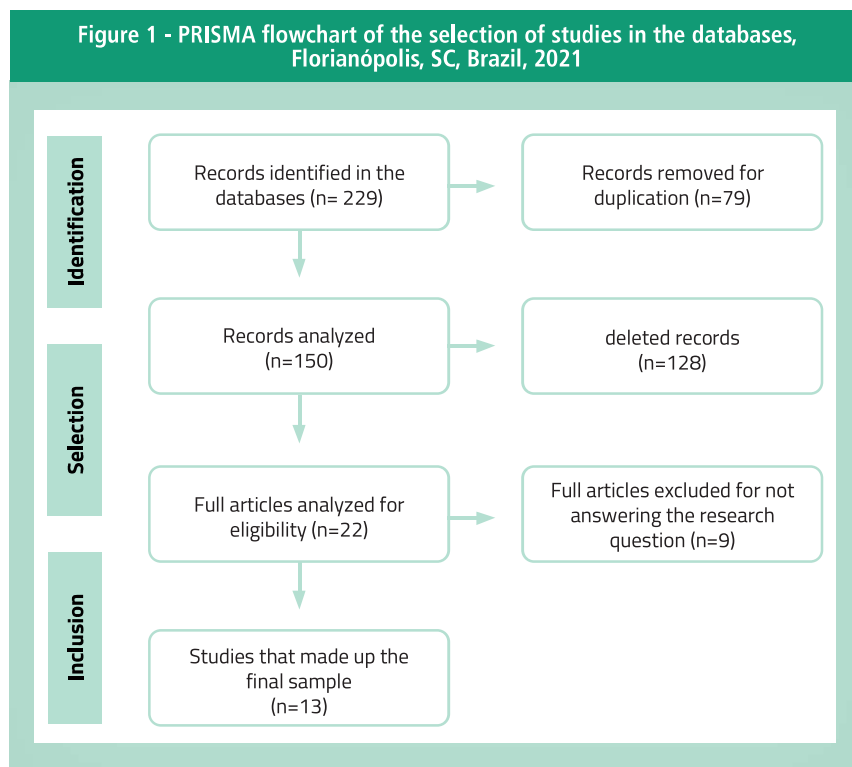
1, systematic review or meta-analysis of randomized clinical trials or clinical guidelines based on systematic reviews of randomized controlled clinical trials; level 2, well-designed randomized clinical trials; level 3, well-designed clinical trials, without randomization; level 4, well-designed cohort and case-control studies; level 5, systematic review of descriptive and qualitative studies; level 6, descriptive or qualitative study; and level 7, expert opinion and/or expert committee report. The definition of the level of evidence was used according to the research design developed by the authors.<sup>(16)</sup>

Data from the articles included in the research were extracted into a table prepared by the author himself in Microsoft Excel version 2019, the main data being: author, database, title, year of publication, country, objective, study design, conclusions and level of evidence. After extracting the data, from the related themes found in the articles, the evaluation, interpretation and synthesis of the studies was carried out. The results are presented in tables, described and discussed according to the literature.

## RESULTS

The present integrative review found 229 scientific studies in the search of the databases. After the evaluation, 13 studies that addressed technosociality in the context of people with liver cirrhosis were included in the research. The study selection flowchart can be seen in Figure 1.

Among the studies included, all were in the English language, nine were carried out in the United States, two in Canada, one in China and one in Romania. The analysis made it possible to identify six cross-sectional studies, a proof-of-concept clinical trial, a prospective multicenter study, a retrospective observational study, a comparison study, a feasibility study, a qualitative study and an opinion review. Regarding the methodological quality of the studies, one was classified as level 3, one level 4, one level 5, nine studies as level 6 and one level 7. Table 2 presents the characteristics of



Source: Author's own production, 2021.

the studies included in this review.

In the analysis of the theme, the studies were divided into two categories. In the first, technosociality: digital literacy and literacy, the results highlighted the importance of ownership and technological proficiency for the effective learning of people with cirrhosis through digital technology. They also mentioned that people with cirrhosis are interested in using technological tools for the management of liver disease, and that the internet makes it possible to access the virtual and technological environment both for reading about their health condition and for socialization.

In the second category, technosociality: use of applications as a therapeutic tool for health promotion, we identified five applications already developed that help in the monitoring of liver disease, namely: an application for the management of ascites; En-

cephal A Stroop Test as a screening tool for hepatic encephalopathy; computerized neuropsychological examination for the diagnosis of hepatic encephalopathy; Patient Body for self-monitoring; Sentinel Web Dashboard for the monitoring and treatment of liver cirrhosis. The applications work as a remote monitoring strategy for the management and care of the person with cirrhosis in order to reduce hospital readmissions. The synthesis of the studies can be seen in Table 3.

## DISCUSSION

### Technosociality: literacy and digital literacy

People with cirrhosis of the liver have high hospital admission rates and need for multidisciplinary care. Some innovative solutions have been used, such as teleconsultation and telemonitoring, to help prevent or reduce these

**Table 2 - Characteristics of the studies included in the integrative review, Florianópolis, SC, Brazil, 2021.**

Study Number	Title	Year	Country	Database	Study type	Level of Evidence
1	Assessing Patient Proficiency with Internet-Connected Technology and Their Preferences for E-Health in Cirrhosis <sup>(17)</sup>	2021	Canada	PubMed	Cross-sectional study	6
2	Perspectives of Inpatients With Cirrhosis and Caregivers on Using Health Information Technology: Cross-sectional Multicenter Study <sup>(18)</sup>	2021	USA	PubMed	Multicenter Cross-sectional Study	6
3	A Smartphone App to Manage Cirrhotic Ascites Among Outpatients: Feasibility Study <sup>(19)</sup>	2020	USA	PubMed	Viability study	6
4	Attitudes towards digital health tools for outpatient cirrhosis management in patients with decompensated cirrhosis <sup>(20)</sup>	2020	USA	Scopus	Cross-sectional mixed method study	6
5	Smartphone-Based Remote Health Monitoring—Implications for Healthcare Delivery in Patients with Cirrhosis <sup>(21)</sup>	2019	USA	PubMed	Prospective multicenter study	4
6	Utility of the EncephalApp Stroop Test for covert hepatic encephalopathy screening in Chinese cirrhotic patients <sup>(22)</sup>	2019	China	PubMed	Multicenter cross-sectional study	6
7	Improving cirrhosis care: The potential for telemedicine and mobile health Technologies <sup>(23)</sup>	2019	USA	Scopus	Opinion review	7
8	An Educational Needs Assessment for Patients with Liver Disease <sup>(24)</sup>	2018	Canada	PubMed	Cross-sectional study	6
9	The patient buddy app can potentially prevent hepatic encephalopathy-related readmissions <sup>(25)</sup>	2017	USA	PubMed	Proof of concept clinical trial	3
10	Comparative analysis of online patient education material pertaining to hepatitis and its complications <sup>(26)</sup>	2016	USA	PubMed	Comparative analysis	5
11	The benefits of using Sentinel WebDashboard in medicine: IT solution for monitoring and treatment of patient with liver cirrhosis <sup>(27)</sup>	2014	Romania	PubMed	Retrospective observational study	6
12	Use of ImPACT to Diagnose Minimal Hepatic Encephalopathy: An Accurate, Practical, User-Friendly Internet-Based Neuropsychological Test Battery <sup>(28)</sup>	2013	USA	PubMed	Cross-sectional study	6
13	The role of an online community for people with a rare disease: content analysis of messages posted on a primary biliary cirrhosis mailing list <sup>(29)</sup>	2005	USA	PubMed	Qualitative study of content analysis	6

Source: Author's own production, 2021.

**Table 3 - Categorization of studies selected in the integrative review, Florianópolis, SC, Brazil, 2021**

Study Number	Objective	Main results
Technosociality: literacy and digital literacy		
1 <sup>(17)</sup>	To characterize the readiness of people with cirrhosis for e-Health: assessing their frequency of Internet access and ownership of digital technology; determine your digital literacy proficiency and identify relevant predictors; and, to ascertain their general attitudes and receptivity to videoconferencing and online health management programs by age group.	People with cirrhosis had similar technological proficiency, proficiency, and online behaviors as the general population. They were very receptive to e-Health if usage training was provided.
2 <sup>(18)</sup>	To determine the perspectives regarding the adoption versus refusal of Information Technology (IT) interventions in health among patient-caregiver dyads.	People with cirrhosis admitted with hepatic encephalopathy and gastrointestinal bleeding were more likely to participate in a health IT intervention focused on preventing readmissions.
4 <sup>(20)</sup>	To assess the access, use and ease of technology, as well as the preferred characteristics of a digital health management tool, in people with early readmission for decompensated cirrhosis.	Among people with cirrhosis, most had smartphones and would be willing to use a smartphone to manage their disease.
5 <sup>(21)</sup>	To investigate the prevalence of smartphone use among people with decompensated cirrhosis and how it relates to clinical, demographic and social characteristics.	Smartphone use was prevalent among people with decompensated cirrhosis, and they were interested in remote health monitoring apps.



7 <sup>(23)</sup>	Highlight the benefits of investing in innovative telemedicine and Mobile Health solutions to improve care for people with cirrhosis and create subsequent cost savings.	Telemedicine and Mobile Health can effectively address the unmet needs of people with cirrhosis, increasing preventive care, expanding outreach to rural communities, and increasing high-value care.
8 <sup>(24)</sup>	To assess the educational needs of patients in a large tertiary liver center.	People with cirrhosis have shown great interest in learning more about their liver condition, indicating a need for more educational programs. Most prefer reading via the internet or pamphlets or individual discussions.
10 <sup>(25)</sup>	To describe a comparative analysis using several validated quantitative readability metrics of online patient information relating to hepatitis B, hepatitis C, cirrhosis and hepatocellular carcinoma (HCC) to determine whether the material meets or falls short of the recommended sixth through seventh grade reading level.	The reading materials reviewed in this study were written well above the recommended reading level.
13 <sup>(29)</sup>	Identify the issues of greatest importance to those posting biomedical, socio-emotional and organizational/systems messages; Compare the frequency and content of posts from people at different stages of the disease; Identify how people with primary biliary cirrhosis represent the psychosocial challenges and dilemmas, role and identity change, uncertainty and stigma identified in the social-scientific literature as key elements of the chronic illness experience.	The messages have a biomedical rather than a socio-emotional or organizational emphasis. The Internet offers a very valuable opportunity for those with illnesses to connect, learn and support others who have similar experiences.
Technosociality: use of apps as a therapeutic tool for health promotion		
3 <sup>(19)</sup>	To assess the feasibility of a smartphone application to facilitate outpatient management of ascites.	They demonstrated the feasibility of a smartphone app to facilitate ascites management and reported excellent patient and provider engagement rates.
6 <sup>(22)</sup>	Explore the Encephal App Stroop Test as a smartphone-based Covert Hepatic Encephalopathy (CHE) screening tool in China.	The Encephal App Stroop Test is an efficient screening tool for CHE in Chinese people with cirrhosis of the liver.
9 <sup>(25)</sup>	Define the feasibility of using the Patient Buddy app and its impact on 30-day readmissions by engaging and educating inpatients with cirrhosis of the liver and caregivers in a pilot study.	Using the Patient Buddy is feasible in people with cirrhosis who have recently been discharged and with their caregivers. Readmissions related to Hepatic Encephalopathy were potentially avoided after using the app.
11 <sup>(27)</sup>	Create an Information Technology (IT) system implemented with SentinelWeb-Dashboard, which could increase medical performance in the diagnosis, monitoring and treatment of liver cirrhosis.	This solution allows a secure integration of all medical information related to the diagnosis, treatment and monitoring of the disease. Using this application makes it easy to identify patterns of medical history evolution.
12 <sup>(28)</sup>	ITo illustrate the clinical use of a widely used and well-validated computerized neuropsychological examination, the Immediate Post-Concussion Assessment and Cognitive Test (ImPACT), in the assessment of Minimal Hepatic Encephalopathy (MHE).	Compared to paper and pencil tests, ImPACT provides a brief and user-friendly neuropsychological assessment of Hepatic Encephalopathy. ImPACT may become a new standard for diagnosing minimal hepatic encephalopathy.
Source: Author's own production, 2021.		

readmissions.<sup>(20,23)</sup> One study showed that telemedicine and Mobile Health can effectively meet the needs of people with cirrhosis by increasing preventive care.<sup>(23)</sup>

Therefore, it was evidenced among the studies that remote monitoring using smartphone can be proficient for people with decompensated cirrhosis. Given that, they are interested in using smartphones to manage the disease through health monitoring and prevention of readmissions.<sup>(18,21)</sup>

Based on this, it appears that the ability to understand and use digital technology is becoming increasingly

essential for the daily lives of people, especially those with liver cirrhosis. Technological literacy can be defined as the individual's ability to use technology effectively to access, evaluate, integrate, create and communicate information in order to improve the learning process through critical thinking.<sup>(30)</sup>

In one study, most people with cirrhosis had or used technologies at home, accessing the internet daily and had technological property, that is, skills to use computers and smartphones.<sup>(17)</sup> Access to the internet and the skills to use digital tools are important to be able to implement strategies that

aim to promote health, support the treatment and health care of the person with cirrhosis.<sup>(24)</sup> From this, measuring their knowledge and skills with technology is necessary to identify the level of digital literacy in order to allow the development of appropriate technological strategies.

Thus, it is proposed to consider another important factor for health promotion, the reflection on how technological proficiency can contribute to the learning process. The internet provides easy access to information and can be a useful tool for the learning process, however, if the information is not built

on solid foundations for the realization of knowledge, it will not be fulfilling its role of training and contributing to critical thinking.<sup>(31)</sup>

People with cirrhosis are very interested in learning more about their health condition, and one of the most used educational strategies in a study was reading via the internet.<sup>(24)</sup> In this regard, another study analyzed the reading materials available on the internet about cirrhosis and other liver conditions and identified that the materials are written with language and terms above the recommended reading level for sixth and seventh graders.<sup>(26)</sup>

This evidence leads us to the thought that the academy may know what to say, but, in many situations, not know how to do it. Science needs to show itself through constant feedback between empathy and form, with a more open writing, in order to facilitate understanding for any individual who receives the information without losing scientific rigor.<sup>(32)</sup>

The quality of education for people with cirrhosis has been shown to be an indispensable tool for the proper management of liver disease, as well as for the benefit of behavioral changes. However, digital literacy is important for the maintenance of technological learning in order to obtain technical mastery and skills for understanding and critical thinking from the most varied sources of reading.<sup>(33)</sup>

The internet provides a valuable opportunity for people with cirrhosis of the liver to gain more information about their condition, as well as connect with others to learn and provide support in the face of their lived experiences, signaling an ethics of aesthetics, a feeling together, made possible by technosociality.<sup>(9,34)</sup> Thus, corroborating, the internet can provide the management of online groups that provide interactions between individuals in order to produce a place for the exchange of ideas, debates and important reflections on

the most diverse diseases.<sup>(29)</sup>

As relevant predictors of technology proficiency are age, educational level and socioeconomic status. Advancing age, lack of access to education and/or low socioeconomic status are significant barriers to acquiring or maintaining digital proficiency.<sup>(17)</sup> Other studies also highlight the sense of control, inductive reasoning, perceptual speed and psychomotor speed as barriers.<sup>(35-36)</sup> These barriers are continually encountered in people with cirrhosis of the liver.

In view of this finding, education and teaching to people are considered essential to obtain digital proficiency, aiming to achieve a more equitable society, since there is a need to belong to society to establish the empowerment of the individual.<sup>(37)</sup> It is necessary to reflect on the digital divide considering social inequalities, that is, to reflect before implementing the use of digital technology as a tool for promotion, education, treatment or intervention in the daily lives of people with cirrhosis; and after its implementation, consider reflecting on the adequacy, improvement or training to achieve digital inclusion.

### **Technosociality: use of apps as a therapeutic tool for health promotion**

Technological evolution manages to bring possibilities for an educational intervention mediated by technologies, such as applications, to subsidize the practice of health promotion. The results indicate that the use of apps can facilitate the diagnosis, treatment, monitoring of liver disease and, consequently, promote better quality of life and well-being.<sup>(20)</sup>

Patients frequently use the internet to obtain information and many claim that digital technology helps them in making decisions.<sup>(17)</sup> Some apps have facilitating features that favor socialization. WhatsApp, for example, has low cost, good accessibility and because it is highly known by the population, it

allows for quick and instant sharing of information.<sup>(38)</sup>

In the findings of this study, the applications represented a technology capable of benefiting the person with liver cirrhosis, mainly in the decompensation of liver disease. The use of a smartphone app has been shown to be effective in managing ascites and enabling early therapeutic intervention.<sup>(19)</sup>

Ascites is a common clinical complication of cirrhosis, in which body weight is a relevant indicator of ascitic volume. In turn, daily weight monitoring is recommended to control it.<sup>(19)</sup> Using an application that performs this monitoring remotely can collaborate with the control and facilitate the evaluation and therapeutic intervention.

Another benefit found was the feasibility of applications to perform a neuropsychological assessment and provide the diagnosis and screening of hepatic encephalopathy.<sup>(22,28)</sup> Hepatic encephalopathy is a complication in cirrhosis that affects quality of life leading to repeated hospital admissions.<sup>(39-40)</sup> Readmissions in liver cirrhosis have clinical, psychosocial and economic implications.<sup>(18)</sup> The Encephal App Stroop Test application has shown that it can detect cognitive changes in people with cirrhosis, in addition to being performed in a shorter period of time and with better feedback, with advantages related to its usability, accessibility and acceptability by people.<sup>(22)</sup>

The strategy of using the application to prevent hospitalizations needs to be considered. It should be noted that the Patient Buddy application avoided hospitalizations related to HE through the communication provided between the clinical team and caregivers. The purpose of the application is to monitor people's adherence to medication, monitor daily weight, assess cognition, dietary adherence and provide contact with the clinical team, and its use by people with cirrhosis after discharge is

considered viable. <sup>(25)</sup>

The use of Patient Buddy engaged patients and caregivers as an educational tool that encouraged better knowledge and ownership of liver disease. <sup>(25)</sup> Supporting that, applications can overcome barriers and give people a connection to health services provided by the guidelines and directions. <sup>(38)</sup>

Regarding the Sentinel Web Dashboard application, it was developed to create reports, through informative panels, with data related to the diagnosis, monitoring and treatment of the person with cirrhosis. The application made it possible to securely integrate information about the clinical evolution of the person with cirrhosis, and can be a useful tool for the establishment of therapeutic protocols and guidelines, in addition to providing an improvement in the performance of health services. <sup>(27)</sup> Panels are considered one of the technological strategies that can be used to monitor the clinical team with the person with cirrhosis.

This analysis and reflection can

contribute to health professionals, especially nurses, in care strategies for people with liver cirrhosis made possible by technosociality. Finally, health promotion can be mediated through the use of technologies such as apps.

As a limitation of the study, the low publication of studies on the subject is highlighted, recognizing that the search was carried out in only three databases. The low level of evidence among the selected studies emphasizes the need to carry out more studies with robust methodology to explore the theme.

#### CONCLUSION

The studies provide evidence that technosociality is present in the daily lives of people with liver cirrhosis. For this, the assessment of the level of digital literacy of these people is important, in order to diagnose the understanding and use of technologies by this population. Digital literacy and digital literacy become part of daily care and need to be constantly evaluated and measured

to propose educational strategies, avoiding digital exclusion, which will benefit the use of technology by people with cirrhosis, thus contributing to the reduction of hospital readmissions, in addition to enabling the exchange of lived experiences and connection with other people.

There are several possibilities for using technology to assist in the care of the person with liver cirrhosis, whether for remote monitoring, telecare, teleconsultation, as well as for easier access to the health team. Therefore, technosociality, with the use of tools such as apps, is an important strategy that needs to be considered for the health care of people with liver cirrhosis, since it will be increasingly present in everyday life.

#### FUNDING SOURCE

PROEX – Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES

## Referências

- Gines P, Krag A, Abraldes JG, Sola E, Fabrellas N, Kamath OS. Liver cirrhosis. *Lancet*. 2021; 398(10308):1359-76. Disponível em: [https://doi.org/10.1016/S0140-6736\(21\)01374-X](https://doi.org/10.1016/S0140-6736(21)01374-X).
- Kasper P, Tacke F, Michels G. Management der dekompensierten Leberzirrhose in der klinischen Akut-, Notfall- und Intensivmedizin. *Med Klin Intensivmed Notfmed*. 2021. Disponível em: <https://doi.org/10.1007/s00063-021-00876-3>.
- Kamath PS. Acute on chronic liver failure. *Clin Liver Dis*. 2017; 9:86-8. Disponível em: <https://doi.org/10.1002/cld.625>.
- Sepanlou SG, Safiri S, Bisignano C, Ikuta KS, Merat S, Saberifiroozi M, et al. The global, regional, and national burden of cirrhosis by cause in 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet Gastroenterol Hepatol*. 2020; 5(3):245-66. Disponível em: [https://www.thelancet.com/journals/langas/article/PIIS2468-1253\(19\)30349-8/fulltext](https://www.thelancet.com/journals/langas/article/PIIS2468-1253(19)30349-8/fulltext).
- Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2020; 396(10258):1204-22. Disponível em: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)30925-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30925-9/fulltext).
- Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Secretaria de Atenção à Saúde. Política Nacional de Promoção da Saúde: PNPS: Anexo I da Portaria de Consolidação nº 2, de 28 de setembro de 2017, que consolida as normas sobre as políticas nacionais de saúde do SUS/ Ministério da Saúde, Secretaria de Vigilância em Saúde, Secretaria de Atenção à Saúde. Brasília: Ministério da Saúde, 2018. Disponível em: [https://bvsms.saude.gov.br/bvs/publicacoes/politica\\_nacional\\_promocao\\_saude.pdf](https://bvsms.saude.gov.br/bvs/publicacoes/politica_nacional_promocao_saude.pdf).
- Holderried M, Hoepfer A, Holderried F, Heyne N, Nadalin S, Unger O, et al. Attitude and potential benefits of modern information and communication technology use and telemedicine in cross-sectoral solid organ transplant care. *Sci Rep*. 2021; 11:9037. Disponível em: <https://doi.org/10.1038/s41598-021-88447-6>.
- Pereira A. A tecnossocialidade como fator de laço social [palestra ministrada ao curso de pós-graduação em Jornalismo da Pontifícia Universidade Católica (PUC) por Michel Maffesoli]. Porto Alegre; 1996.
- Maffesoli M. A ordem das coisas: pensar a pós-modernidade. Rio de Janeiro: Forense Universitária; 2016.
- Freitas RLFY. Novas tecnologias em tempos pós-modernos. *Rev FAME-COS*. 2008; 35:102-6. Disponível em: <http://dx.doi.org/10.15448/1980-3729.2008.35.4100>.
- Alves TF, Ferreira JM, Busana JÁ, Hoffmann ACOS, Nitschke RG, Tholl AD. Promoção da saúde no contexto da tecnossocialidade: revisão inte-



grativa da literatura. *Rev Nursing*. 2021; 24(276):5686-92. Disponível em: <https://doi.org/10.36489/nursing.2021v24i276p5686-5699>.

12. Nitschke RG, Tholl AD, Potrich T, Silva KM, Michelin SR, Laureano DD. Contributions of Michelmaffesoli's thinking to research in nursing and health. *Texto&contextoenferm*. 2017; 26(4):e3230017. Disponível em: <https://doi.org/10.1590/0104-07072017003230017>.

13. Whittemore R, Knaf K. The integrative review: updated methodology. *J AdvNurs*. 2005; 52(5):546-53. Disponível em: <https://onlinelibrary.wiley.com/doi/10.1111/j.1365-2648.2005.03621.x>.

14. Santos CMC, Pimenta CAM, Nobre MRC. The PICO strategy for the research question construction and evidence search. *RevLatinoamenferm*. 2007; 15(3):508-11. Disponível em: <https://www.scielo.br/rj/rlae/a/CFkNnz-8mvSqVjZ37Z77pFsy?lang=en>.

15. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLOS Medicine*. 2009; 6(7):e1000097. Disponível em: <https://doi.org/10.1371/journal.pmed.1000097>.

16. Galvão CM. Níveis de evidência. *Acta Paul Enferm*. 2006;19(2):5-5. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0103-21002006000200001&lng=pt&tlng=pt](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-21002006000200001&lng=pt&tlng=pt).

17. Ismond KP, Eslamparast T, Farhat K, Stickland M, Spence JC, Bailey RJ, et al. Assessing patient proficiency with internet-connected technology and their preferences for e-health in cirrhosis. *J MedSyst*. 2021; 45(7):72. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8179692/>.

18. Acharya C, Sehrawat TS, McGuire DB, Shaw J, Fagan A, McGeorge S, et al. Perspectives of Inpatients With Cirrhosis and Caregivers on Using Health Information Technology: Cross-sectional Multicenter Study. *J Med Internet Res*. 2021; 23(4):e24639. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8065567/>.

19. Bloom P, Wang T, Marx M, Tagerman M, Green B, Arvind A, et al. A smartphone App to manage cirrhotic ascites among outpatients: feasibility study. *JMIR Med Inform*. 2020; 8(9):e17770. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7495260/#:~:text=Conclusions,mortality%20among%20patients%20with%20cirrhosis>.

20. Bloom PP; Marx M; Wang TJ; Green B; Ha J; Bay C, et al. Attitudes towards digital health tools for outpatient cirrhosis management in patients with decompensated cirrhosis. *BMJ Innov*. 2020; 6:18-25. Disponível em: <http://dx.doi.org/10.1136/bmjinnov-2019-000369>.

21. Sack J, Hashemi N. Smartphone-based remote health monitoring-implications for healthcare delivery in patients with cirrhosis. *J Gen Intern Med*. 2019; 34(12):2726-27. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6854120/>.

22. Zeng X, Li XX, Shi PM, Zhang YY, Song Y, Liu Q, et al. Utility of the EncephalApp Stroop Test for covert hepatic encephalopathy screening in Chinese cirrhotic patients. *J GastroenterolHepatol*. 2019; 34(10):1843-50. Disponível em: <https://onlinelibrary.wiley.com/doi/10.1111/jgh.14656>.

23. Stotts MJ, Grischkan JA, Khungar V. Improving cirrhosis care: the potential for telemedicine and mobile health technologies. *World J Gastroenterol*. 2019; 25(29):3849-56. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6689809/>.

24. Gahmdi SSA, Shah H. An educational needs assessment for patients with liver disease. *JCanAssocGastroenterol*. 2018; 1(2):54-9. Disponível em: <https://doi.org/10.1093/jcag/gwy012>.

25. Ganapathy D, Acharya C, Lachar J, Patidar K, Sterling RK, White MB, et al. The patient buddy app can potentially prevent hepatic encephalopathy-related readmissions. *Liver Int*. 2017; 37(12):1843-51. Disponível em: <https://onlinelibrary.wiley.com/doi/10.1111/liv.13494>.

26. Gulati R, Nawaz M, Pyrsopoulos NT. Comparative analysis of online patient education material pertaining to hepatitis and its complications. *Eur J GastroenterolHepatol*. 2016; 28(5):558-66. Disponível em: [https://journals.lww.com/eurojgh/Fulltext/2016/05000/Comparative\\_analysis\\_of\\_online\\_patient\\_education.11.aspx](https://journals.lww.com/eurojgh/Fulltext/2016/05000/Comparative_analysis_of_online_patient_education.11.aspx).

27. Dumitrescu SR, Popescu D, Purcarea VL, Albu LC. The benefits of using Sentinel WebDashboard in medicine: IT solution for monitoring and treatment of patient with liver cirrhosis. *J Med Life*. 2014; 7(2):205-10. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4197506/>.

28. Tsushima M, Tsushima W, Tsushima V, Lim N, Madrigal E, Jackson C, et al. Use of ImPACT to diagnose minimal hepatic encephalopathy: an accurate, practical, user-friendly internet-based neuropsychological test battery. *DigDisSci*. 2013; 58(9):2673-81. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4197506/>.

29. Lasker JN, Sogolow ED, Sharim RR. The role of an online community for people with a rare disease: content analysis of messages posted on a primary biliary cirrhosis mailinglist. *J Med Internet Res*. 2005; 7(1):e10. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1550634/>.

30. Estes JS. Teacher preparation programs and learner-centered, technology-integrated instruction. Keengwe J, Onchwari G. Handbook of research on learner-centered pedagogy in teacher education and professional development. Hershey: IGI Global; 2017. p. 85-103. Disponível em: <http://doi:10.4018/978-1-5225-0892-2>.

31. Dravet F, Castro G. Aprendizagem, meios digitais e afeto: propostas para um novo paradigma na educação superior. *Interface (Botucatu)*. 2019; 23:e18032. Disponível em: <https://doi.org/10.1590/Interface.180321>.

32. Maffesoli M. O conhecimento comum – introdução à sociologia compreensiva. Porto Alegre: SULINA; 2020.

33. Assis MP, Almeida MEB. Digital literacy in higher education: a systematic literature review. *Rev Educação Em Questão*. 2020; 58(57). Disponível em: <https://doi.org/10.21680/1981-1802.2020v58n57ID21359>.

34. Maffesoli M. Pactos emocionais: reflexões em torno da moral, da ética e da deontologia. Curitiba: PUCPRESS; 2018.

35. Champagne K, Boot WR. Exploring predictors of mobile device proficiency among older adults. *Human-Computer Interaction*. 2017; 10272:162-71. Disponível em: [https://doi.org/10.1007/978-3-319-58077-7\\_13](https://doi.org/10.1007/978-3-319-58077-7_13).

36. Zhang S, Grenhart WCM, McLaughlin AC, Allaire JC. Predicting computer proficiency in older adults. *ComputHumanBehav*. 2017; 67:106-12. Disponível em: <https://doi.org/10.1016/j.chb.2016.11.006>.

37. Bernal-Meneses L, Gabelas-Barroso JA, Marta-Lazo C. As tecnologias da relação, informação e comunicação (TRIC) como ferramentas de inclusão social. *Interface (Botucatu)*. 2019; 23:e180149. Disponível em: <https://doi.org/10.1590/Interface.180149>.

38. Santos JC, Nunes LB, Reis IA, Torres HC. O uso do aplicativo móvel Whatsapp na saúde: revisão integrativa. *REME - Rev Min Enferm*. 2021; 25:e-1356. Disponível em: <https://cdn.publisher.gn1.link/remee.org.br/pdf/e1356.pdf>.

39. Vilstrup H, Amodio P, Bajaj J, Cordoba J, Ferenci P, Mullen KD, et al. Hepatic encephalopathy in chronic liver disease: 2014 Practice Guideline by the American Association for the Study of Liver Diseases and the European Association for the Study of the Liver. *J Hepatol*. 2014; 61(3):642-59. Disponível em: <https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.27210>.

40. Bajaj JS, Reddy KR, Tandon P, Wong F, Kamath PS, Garcia-Tsao G, et al. The 3-month readmission rate remains unacceptably high in a large North American cohort of patients with cirrhosis. *Hepatology*. 2016; 64(1):200-8. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4700508/>.