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


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 tecnocesocialidad 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 tiemopienhas bases PUBMED, Scopus y Virtual Health Library a partir de los descritores Red Social, Internet y Cirrosis Hepática. Los estudios se seleccionaron guiando el diagrama de flujo PRISMA. Resultados: incluyeron 13 estudios, divididos en dos categorías: 1. Tecnocesocialidad: alfabetización digital, evaluación de la adquisición tecnológica; 2. Tecnocesocialidad: uso de aplicaciones como herramienta terapéutica para la promoción de la salud, estrategia de monitorización remota para la gestión y el cuidado. Conclusión: la tecnocesocialidad está en la vida cotidiana de las personas con cirrosis hepática. 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.

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. (1)

In clinical practice, cirrhosis can be considered compensated or decompensated. Acute hepatic decompensation occurs with the manifestation of complications such as ascites, hepatic encephalopathy,
gastrointestinal hemorrhage, bacterial infection, among others; becoming responsible for the main cause of hospitalization of these patients.\textsuperscript{(1,3)}

Cirrhosis is still a cause of significant morbidity and mortality, despite advances in treatment options.\textsuperscript{(4,4)} 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.\textsuperscript{(5)}

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.\textsuperscript{(6)}

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.\textsuperscript{(7)}

Technologies are increasingly present in people's daily lives, including mediating socialization, reporting us to what is called technosociality.\textsuperscript{(8-9)} 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".\textsuperscript{(p.102)}

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.\textsuperscript{(11)} 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.\textsuperscript{(12)}

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.\textsuperscript{(13)} This survey was conducted from June to December 2021.

For the elaboration of the guiding question, the acronym PICO\textsuperscript{(14)} 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\textsuperscript{TM} 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.\textsuperscript{(15)}

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. (9)

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 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; Encephal 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.

<table>
<thead>
<tr>
<th>Study Number</th>
<th>Title</th>
<th>Year</th>
<th>Country</th>
<th>Database</th>
<th>Study type</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assessing Patient Proficiency with Internet-Connected Technology and Their Preferences for E-Health in Cirrhosis⁵⁴⁵⁶</td>
<td>2021</td>
<td>Canada</td>
<td>PubMed</td>
<td>Cross-sectional study</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Perspectives of Inpatients With Cirrhosis and Caregivers on Using Health Information Technology: Cross-sectional Multicenter Study⁵⁷⁸⁹</td>
<td>2021</td>
<td>USA</td>
<td>PubMed</td>
<td>Multicenter Cross-sectional Study</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>A Smartphone App to Manage Cirrhotic Ascies Among Outpatients: Feasibility Study⁵⁰</td>
<td>2020</td>
<td>USA</td>
<td>PubMed</td>
<td>Viability study</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Attitudes towards digital health tools for outpatient cirrhosis management in patients with decompensated cirrhosis⁵⁰⁹⁰</td>
<td>2020</td>
<td>USA</td>
<td>Scopus</td>
<td>Cross-sectional mixed method study</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Smartphone-Based Remote Health Monitoring—Implications for Healthcare Delivery in Patients with Cirrhosis⁵⁰</td>
<td>2019</td>
<td>USA</td>
<td>PubMed</td>
<td>Prospective multicenter study</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Utility of the EncephApp Score Test for covert hepatic encephalopathy screening in Chinese cirrhotic patients⁵¹</td>
<td>2019</td>
<td>China</td>
<td>PubMed</td>
<td>Multicenter cross-sectional study</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Improving cirrhosis care: The potential for teledmedicine and mobile health Technologies⁵²⁵³</td>
<td>2019</td>
<td>USA</td>
<td>Scopus</td>
<td>Opinion review</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>An Educational Needs Assessment for Patients with Liver Disease⁵⁴</td>
<td>2018</td>
<td>Canada</td>
<td>PubMed</td>
<td>Cross-sectional study</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>The patient buddy app can potentially prevent hepatic encephalopathy-related readmissions⁵⁵</td>
<td>2017</td>
<td>USA</td>
<td>PubMed</td>
<td>Proof of concept clinical trial</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Comparative analysis of online patient education material pertaining to hepatitis and its complications⁵⁶</td>
<td>2016</td>
<td>USA</td>
<td>PubMed</td>
<td>Comparative analysis</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>The benefits of using Sentinel Web Dashboard in medicine: IT solution for monitoring and treatment of patient with liver cirrhosis⁵⁷</td>
<td>2014</td>
<td>Romania</td>
<td>PubMed</td>
<td>Retrospective observational study</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>Use of ImPACT to Diagnose Minimal Hepatic Encephalopathy: An Accurate, Practical, User-Friendly Internet-Based Neuropsychological Test Battery⁵⁸</td>
<td>2013</td>
<td>USA</td>
<td>PubMed</td>
<td>Cross-sectional study</td>
<td>6</td>
</tr>
<tr>
<td>13</td>
<td>The role of an online community for people with a rare disease: content analysis of messages posted on a primary biliary cirrhosis mailing list⁵⁹</td>
<td>2005</td>
<td>USA</td>
<td>PubMed</td>
<td>Qualitative study of content analysis</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Author’s own production, 2021.

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

<table>
<thead>
<tr>
<th>Study Number</th>
<th>Objective</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1⁵⁴⁵⁶</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>2⁵⁰</td>
<td>To determine the perspectives regarding the adoption versus refusal of Information Technology (IT) interventions in health among patient-caregiver dyads.</td>
<td>People with cirrhosis admitted with hepatic encephalopathy and gastrointestinal bleeding were more likely to participate in a health IT intervention focused on preventing readmissions.</td>
</tr>
<tr>
<td>4⁵⁰</td>
<td>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.</td>
<td>Among people with cirrhosis, most had smartphones and would be willing to use a smartphone to manage their disease.</td>
</tr>
<tr>
<td>5⁵¹</td>
<td>To investigate the prevalence of smartphone use among people with decompensated cirrhosis and how it relates to clinical, demographic and social characteristics.</td>
<td>Smartphone use was prevalent among people with decompensated cirrhosis, and they were interested in remote health monitoring apps.</td>
</tr>
</tbody>
</table>
One study showed that telemedicine and Mobile Health can effectively meet the needs of people with cirrhosis by increasing preventive care.  

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. 

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.

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. 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. 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. 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. 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.

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. 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.

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. 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.

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. Other studies also highlight the sense of control, inductive reasoning, perceptual speed and psychomotor speed as barriers. 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. 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.

Patients frequently use the internet to obtain information and many claim that digital technology helps them in making decisions. 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.

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. 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. 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. Hepatic encephalopathy is a complication in cirrhosis that affects quality of life leading to repeated hospital admissions. Readmissions in liver cirrhosis have clinical, psychosocial and economic implications. 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.

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. (23)

The use of Patient Buddy engaged patients and caregivers as an educational tool that encouraged better knowledge and ownership of liver disease. (23) Supporting that, applications can overcome barriers and give people a connection to health services provided by the guidelines and directions. (38)

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. (20) 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.

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