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SYSTEMATIC REVIEW

Access to telehealth by stroke patients: which are the main barriers and how they are explained by the UTAUT theoretical model? A systematic review

Acesso de pacientes com AVC à telessaúde: quais são as principais barreiras e como são explicadas pelo modelo teórico UTAUT? Uma revisão sistemática

Acceso de los pacientes con ACV a la telesalud: ¿cuáles son las principales barreras y cómo se explican desde el modelo teórico UTAUT? Una revisión sistemática

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ABSTRACT | Stroke is a chronic health condition that requires monitoring. In this sense, telehealth emerges as a tool to enable better access. However, since it is related to use of technology, this modality might face new barriers. Our goal was to identify, with a systematic literature review, the perceived barriers to telehealth access by stroke patients and conceptualize them within the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The systematic review was carried out in the following electronic databases: PubMed, MEDLINE, SciELO, LILACS, and PEDro; and the combination of descriptors were: "Barriers to Access to Health Care," "Telerehabilitation," "Telehealth," "Stroke," and "Physical Therapy Modalities." The included studies focused on telehealth barriers perceived by stroke patients. Initially, 298 articles were found, 295 via databases search, and three via active search; of these, only six articles were included in this review. Overall, the articles revealed the perception of more than 220 stroke patients, with barriers categorized into eight types, most of them related to the dimensions of Effort Expectancy and Facilitating Conditions of the UTAUT model. The barriers of the Effort Expectation dimension that are related to the knowledge in the use of technologies are likely to be overcome since training can be carried out before the telehealth service. However, the barriers related to the Facilitating Conditions dimension regarding financial aspects, the internet, and home context are difficult to overcome, possibly interfering with user's acceptance of telehealth.

Keywords | Barriers to Access of Health Services; Telerehabilitation; Telehealth; Stroke; Physical Therapy Modalities.

RESUMO | O acidente vascular cerebral (AVC), como condição crônica de saúde, requer monitoramento. Nesse sentido, a telessaúde surge com o objetivo de possibilitar um melhor acesso aos serviços de saúde. Porém, por estar relacionada ao uso de tecnologia, essa modalidade pode enfrentar novas barreiras. O objetivo desta pesquisa foi identificar, por meio de uma revisão sistemática da literatura, as barreiras percebidas por pacientes com AVC quanto ao acesso à telessaúde e conceituá-las dentro do modelo da Teoria Unificada de Aceitação e Uso de Tecnologia (UTAUT). A revisão sistemática foi realizada nas seguintes bases de dados

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eletrônicas: PubMed, MEDLINE, SciELO, LILACS e PEDro; por meio da combinação dos descritores "barreiras de acesso aos cuidados de saúde", "telerreabilitação", "telessaúde", "acidente vascular cerebral" e "modalidades de fisioterapia". Inicialmente, foram encontrados 298 artigos, sendo 295 por meio da busca em bases de dados e três por meio de busca ativa, e, destes, apenas seis artigos foram incluídos na revisão. Somados, os artigos revelaram a percepção de mais de 220 indivíduos que sofreram AVC e oito tipos de barreiras, a maioria delas relacionadas às dimensões de Expectativa de Esforço e Condições Facilitadoras do modelo UTAUT. As barreiras da dimensão Expectativa de Esforço relacionadas ao conhecimento no uso de tecnologias são passíveis de serem superadas, pois treinamentos podem ser realizados previamente ao serviço de telessaúde. No entanto, as barreiras relacionadas à dimensão das Condições Facilitadoras no que se refere a aspectos financeiros, internet e contexto domiciliar são difíceis de superar, podendo, portanto, interferir na aceitação do usuário quanto ao uso da telessaúde.

Descritores | Barreiras ao Acesso aos Cuidados de Saúde; Telerreabilitação; Telessaúde; Acidente Vascular Cerebral; Modalidades de Fisioterapia.

RESUMEN | El accidente cerebrovascular (ACV) como una condición de salud requiere de monitoreo. En este contexto, la telesalud emerge como una posibilidad que permite un mejor acceso a los servicios de salud. Sin embargo, dado que esta modalidad está relacionada con el uso de la tecnología, se pueden surgir nuevas barreras. El objetivo de esta investigación fue identificar, mediante una revisión sistemática de la literatura, las barreras percibidas por los pacientes con ACV con respecto al acceso a la telesalud y conceptualizarlas dentro del modelo de la Teoría Unificada de Aceptación y Uso de la Tecnología (UTAUT). La revisión sistemática se realizó en las siguientes bases de datos electrónicas: PubMed, MEDLINE, SciELO, LILACS y PEDro; a partir de la combinación de los descriptores "barreras de acceso a la atención médica", "telerrehabilitación", "telesalud", "accidente cerebrovascular" y "modalidades de fisioterapia". Inicialmente, se encontraron 298 artículos, de los cuales se obtuvieron 295 mediante la búsqueda en la base de datos y tres por la búsqueda activa; de estos, solo seis artículos se incluyeron en la revisión. Los artículos revelaron la percepción de más de 220 sujetos que sufrieron ACV y ocho tipos de barreras; la mayoría de ellas relacionadas con las dimensiones Expectativa de Esfuerzo y Condiciones Facilitadoras del modelo UTAUT. Las barreras de la dimensión Expectativa de Esfuerzo, relacionadas con el conocimiento en el uso de tecnologías, se pueden superar mediante una capacitación previa antes de utilizar la telesalud. Sin embargo, las barreras asociadas con la dimensión de las Condiciones Facilitadoras respecto a los aspectos financieros, de Internet y el contexto del hogar son difíciles de superar y, por lo tanto, pueden interferir en la aceptación del uso de la telesalud por parte del usuario.

Palabras clave | Barreras de Acceso a los Servicios de Salud; Telerrehabilitación; Accidente Cerebrovascular; Modalidades de Fisioterapia.

INTRODUCTION

Stroke continues to be the second leading cause of death and the leading cause of adult disability worldwide[1]. Stroke patients are at a greater risk of suffering temporary or permanent disability, around 70% and 80% of stroke survivors become dependent[2,3].

Although rehabilitation and healthcare follow-up are essential for the functional recovery of stroke patients, most of the population in low- and middle-income countries faces challenges in accessing this type of care[4]. Access barriers include a lack of rehabilitation centers available in a country, socioeconomic status, lack of adequate transport, and low level of education are factors that restrict access to rehabilitation services[4].

Sarfo et al.[5] stated that in a lower-middle income country, less than 30% of stroke patients have accessed rehabilitation program. The time spent in and the cost of transportation to rehabilitation services were the most cited reasons for abandoning rehabilitation by family members and patients[5]. Other factors mentioned as barriers to accessing rehabilitation services, especially in public health services, are the bureaucratic processes of referral and scheduling and the degree of disability. People with a moderate and severe motor disability, such as those who are unable to walk, are most likely to remain restricted to their homes without access to rehabilitation services, which results in further impairment and worsening of clinical conditions[6].

During the COVID-19 pandemic, more barriers to healthcare services are perceived[7]. Technological services such as telehealth and telemedicine were considered as support services within the health system until COVID-19. Although the use of these technologies has increased in recent decades, especially with the COVID-19 pandemic, it was

only after the pandemic that their implementation became a necessity[8].

Previous studies on the stroke population, such as the one by Laver et al.[9], have attempted to address efficacy, safety (including the presence of adverse effects), and the type of telehealth system. However, the perception of users on the difficulty to undertake and maintain adherence to this type of therapy has not been addressed.

With the growing number of smartphones worldwide, which greatly improves the potential for the use of "mobile health," telehealth may shorten the distance between health professionals and individuals in need of health monitoring[10]. Thus, in this scenario of new emerging health technologies, such as telehealth, we must recognize the access barriers, users' perceptions about applications, and acceptance of the current technology.

When addressing acceptance of health technology, the most applied method is the Unified Theory of Acceptance and Use of Technology (UTAUT) model, since it incorporates approaches of the human behavior theory[11]. Consequently, it covers questions about the amount of use, resistance to adherence, and abandonment of technology use in health, thus contemplating the user reactions to health technologies, such as telehealth[12].

Our review is based on the need to explore the barriers that users identify as the main obstacles to access telehealth regarding the inclusion of health technologies for stroke healthcare. This study aimed to identify, by a systematic literature review, the perceived barriers to telehealth access by stroke patients and conceptualize the UTAUT model.

METHODOLOGY

This is a systematic literature review carried out following the recommendations proposed by the Preferred reporting items for Systematic Reviews and Meta-Analyses statement (PRISMA)[13].

Search strategy

The search for pre-selected and selected studies was performed in the following electronic databases: National Center for Biotechnology Information, US National Library of Medicine (PubMed), Medical Literature Analysis and Retrieval System Online (MEDLINE), Scientific Electronic Library Online (SciELO), Latin American and Caribbean Literature on Health Sciences (LILACS), and Physiotherapy Evidence Database (PEDro). The search strategy was developed with descriptors indexed in DeCS/MeSH and their equivalents in the English and Portuguese languages were: "Barriers to Access to Health Care," "Telerehabilitation," "Telehealth," "Cerebral Vascular Accident," "Physical Therapy Modalities," and "Internet Access" (Table 1). For the database search, the Boolean operator "AND" was used between the descriptors in each of the databases. The search was carried out by two researchers on April 14th, 2021.

Table 1. List of descriptors used and the number of articles found per database

Descriptor	PubMed	PEDro	LILACS	MEDLINE	SciELO
Barriers to Access of Health Services AND Telehealth AND Internet Access	167	0	0	55	0
Barriers to Access of Health Services AND Telehealth AND Internet Access AND Stroke	1	0	0	0	0
Barriers to Access of Health Services AND Telerehabilitation AND Internet Access	10	0	0	3	0
Barriers to Access of Health Services AND Telerehabilitation AND Internet Access AND Stroke	1	0	0	0	0
Barriers to Access of Health Services AND Telehealth AND Stroke	35	0	0	12	0
Barriers to Access of Health Services AND Telehealth AND Stroke AND Physical Therapy Modalities	1	0	0	0	0
Barriers to Access of Health Services AND Telerehabilitation AND Stroke	9	0	0	0	0
Barriers to Access of Health Services AND Telerehabilitation AND Stroke AND Physical Therapy Modalities	1	0	0	0	0
Total	225	0	0	70	0

Inclusion and exclusion criteria

Original studies published in English and Portuguese were included, without year restriction. The inclusion criteria were studies involving adults (≥18 years old) of both sexes, at any time after the stroke; studies that use information and communication technologies with valid information for the diagnosis, treatment, and prevention of diseases and injuries, as well as those with valid research, evaluation, and for the continuing education of health care providers (telehealth); outcomes included were related to barriers and perceptions reported by the studies participants. Regarding the exclusion criteria, the following were established: review studies; studies that did not include the stroke population; studies that did not address telehealth or barriers to telehealth access; and barriers to the user and/or caregivers' perceptions.

Studies selection

After searching all databases, duplicates were removed. Then, the selection was carried out by titles and abstracts of the studies. If the study did not meet the inclusion criteria, they were excluded. After the first selection, the full papers were read and those meeting the inclusion criteria were selected. An active search was also carried out to identify other potentially relevant studies. Two reviewers independently assessed the titles and abstracts of all identified records from the electronic searches. Full-text articles were screened for eligibility by both reviewers. Disagreements were settled by discussion and consensus. When required, a third reviewer was consulted. Those that met the inclusion criteria were added to the included studies. Figure 1 illustrate the selection process according to the PRISMA statement.

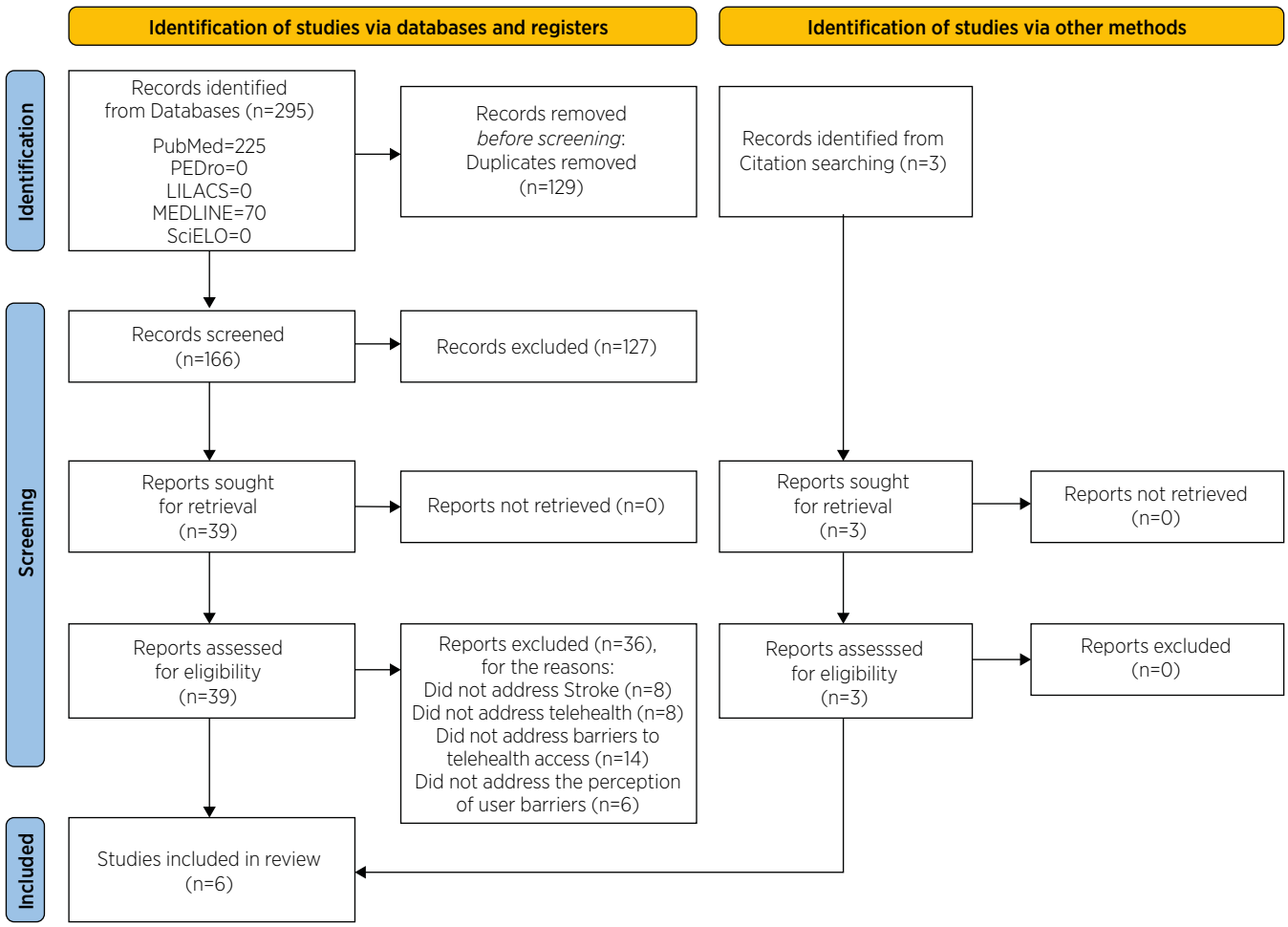

Figure 1. Illustrative flowchart of the article selection process, according to PRISMA Statement 2020

*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).
**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.
Source: Page et al.[13].

Theoretical framework: The Unified Theory of Acceptance and Use of Technology model

The UTAUT model consists of four main dimensions called essential determinants of behavioral intention. They are: 1. Performance Expectancy (PE); 2. Effort Expectancy (EE); 3. Social Influence (SI); 4. Facilitating Conditions (FC). Additionally, the UTAUT model contains four intention-behavior moderators that affect technology use, which are: gender, age, experience, and willingness to use (Figure 2)[12].

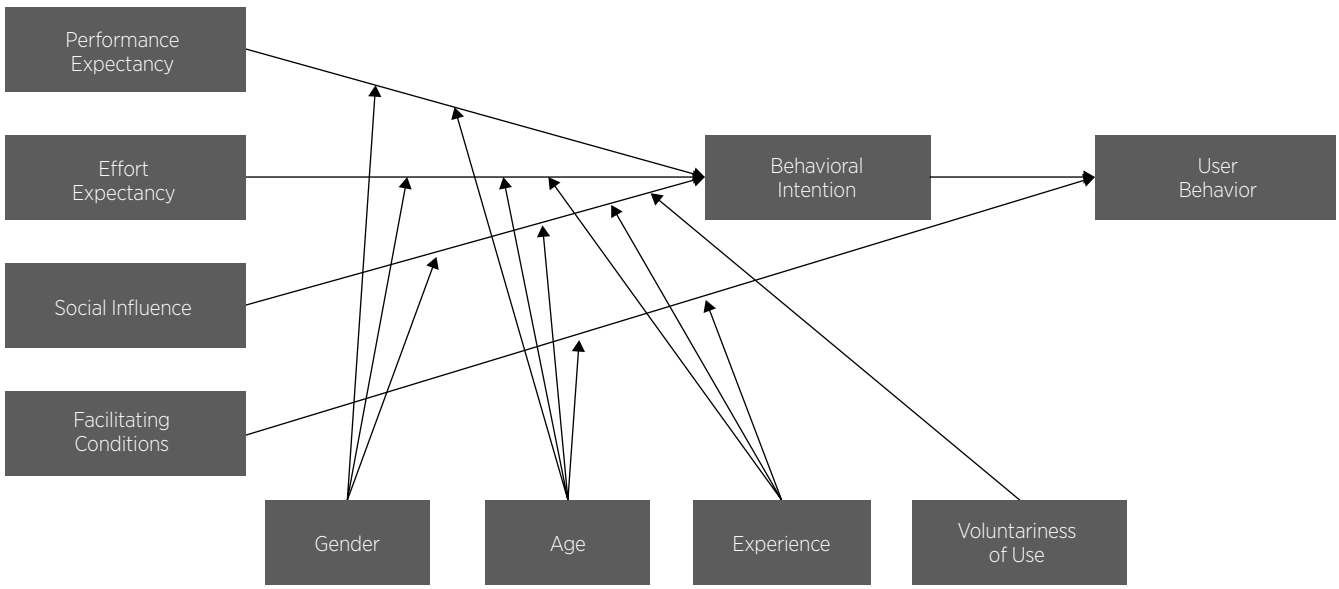

Figure 2. Framework of the Unified Theory of Acceptance and Use of Technology
Source: Venkatesh et al.[12].

By definition, Performance Expectancy (PE) refers to the degree to which an individual believes that the use of technology will help them to improve their performance; Effort Expectancy (EE) is the degree to which an individual believes that a feeling of ease is associated with using the system or device; Social Influence (SI) is the degree to which an individual realizes that other important people believe the system or device should be used; Facilitating Condition (FC) is the degree to which an individual believes that the organizational and technical infrastructure exists to support the use of the technology; finally, Behavioral Intention (BI) refers to the degree to which an individual intends to use the system or device[12].

RESULTS

The systematic search found 295 articles in all databases, and three articles were identified by other sources, totaling 298 articles. After screening and full-text reading, six were included. Table 1 summarizes the descriptors and search terms used for the search, as well as the number of studies found in each database. Table 2 summarizes the articles information, with the following data: author and year, type of study, sample, gender, average age, type of telehealth, and perceived barriers within the correspondent dimensions UTAUT model.

Table 2. Descriptive analysis of studies published that addressed the barriers to access telehealth in stroke

Author/year	Type of study	Sample	Gender, n (%)	Average age (years)	Type of Telehealth	Perceived Barriers	UTAUT dimensions
Øra et al., 2020[14]	Randomized Clinical Trial	N=30 (patients)	W=11 (36.7%) M=19 (63.3%)	64.4	Synchronous remote videoconferencing	1. Internet connection. 2. Poor sound and image quality of the videoconferencing. 3. Remote mode as tiring. 4. Participant's difficulty using the computer, software program, and/or technical equipment.	1. FC 2. FC 3. PE 4. EE

(continues)

Table 2. Continuation

Author/year	Type of study	Sample	Gender, n (%)	Average age (years)	Type of Telehealth	Perceived Barriers	UTAUT dimensions
Nemeth et al., 2016[15]	Qualitative study	N=39 (patients/ caregiver)	W=28 (72%) M=11 (28%)	-	Email Phone call; Videoconferencing	1. Lack of trust in the health system and providers. 2. Weak relationships between the health team and the health user, fueled by poor communication. 3. Low literacy in health. 4. Financial limitations related to healthcare.	1. PE 2. SI 3. EE 4. SI
Sarfo et al., 2017[5]	Cross-sectional study	N=100 (patients)	W=49 (49%) M=51 (51%)	57.2	Using smartphones via: Text messages; Voice mail; Phone calls; Videoconferencing	1. Financial limitations, only 35% of patients had smartphones.	1. SI
Chen et al., 2020[16]	Qualitative study	N=13 (patients)	W=2 (15%) M=11 (85%)	70.5	Remote videoconferencing	1. Barriers to technical skills. 2. Limited home space.	1. EE 2. FC
Tyagi et al., 2018[17]	Qualitative study	N=13 (patients)	W=6 (46%) M=7 (54%)	59.0	Synchronous remote videoconferencing	1. Difficulties related to equipment configuration. 2. Limited scope of exercises. 3. Internet connection barriers.	1. EE 2. PE 3. FC
Chumbler et al., 2012[18]	Randomized Clinical Trial	-	-	Participants aged from 45 to 90 years	Synchronous remote videoconferencing	1. Quick changes in technologies (Obsolete equipment; wireless technology). 2. Problems with equipment functionality (Video limitations; technical support required).	1. FC 2. FC

PE: performance expectancy; EE: effort expectancy; SI: social influence; FC: facilitating conditions; N: number; W: women; M: men.

Qualitative and quantitative studies that inquire about user perception were included, most of them were published in the last five years (from 2016 to 2020). In summary, the results of included studies investigated the perception of more than 220 stroke patients and caregivers regarding barriers to access telehealth services. Studies that reported gender, presented an equivalent response between men and women; the participants' age ranged from 45 to 90 years old; videoconferencing was the most common system to deliver telehealth. Among the users who reported barriers, they perceived difficulties regarding equipment, internet, proper space at home, and low literacy (Figure 3). Table 2 shows the main barriers to telehealth access identified by the users and the correspondent UTAUT dimension. The dimensions of Effort Expectancy and Facilitating Conditions had the most reported barriers with four and six barriers, respectively. These dimensions (EE and FC) were reported in all included studies except one[5]. The described barriers identified in these dimensions were the most influential in the intention to use telehealth technologies by stroke patients. The dimensions were:

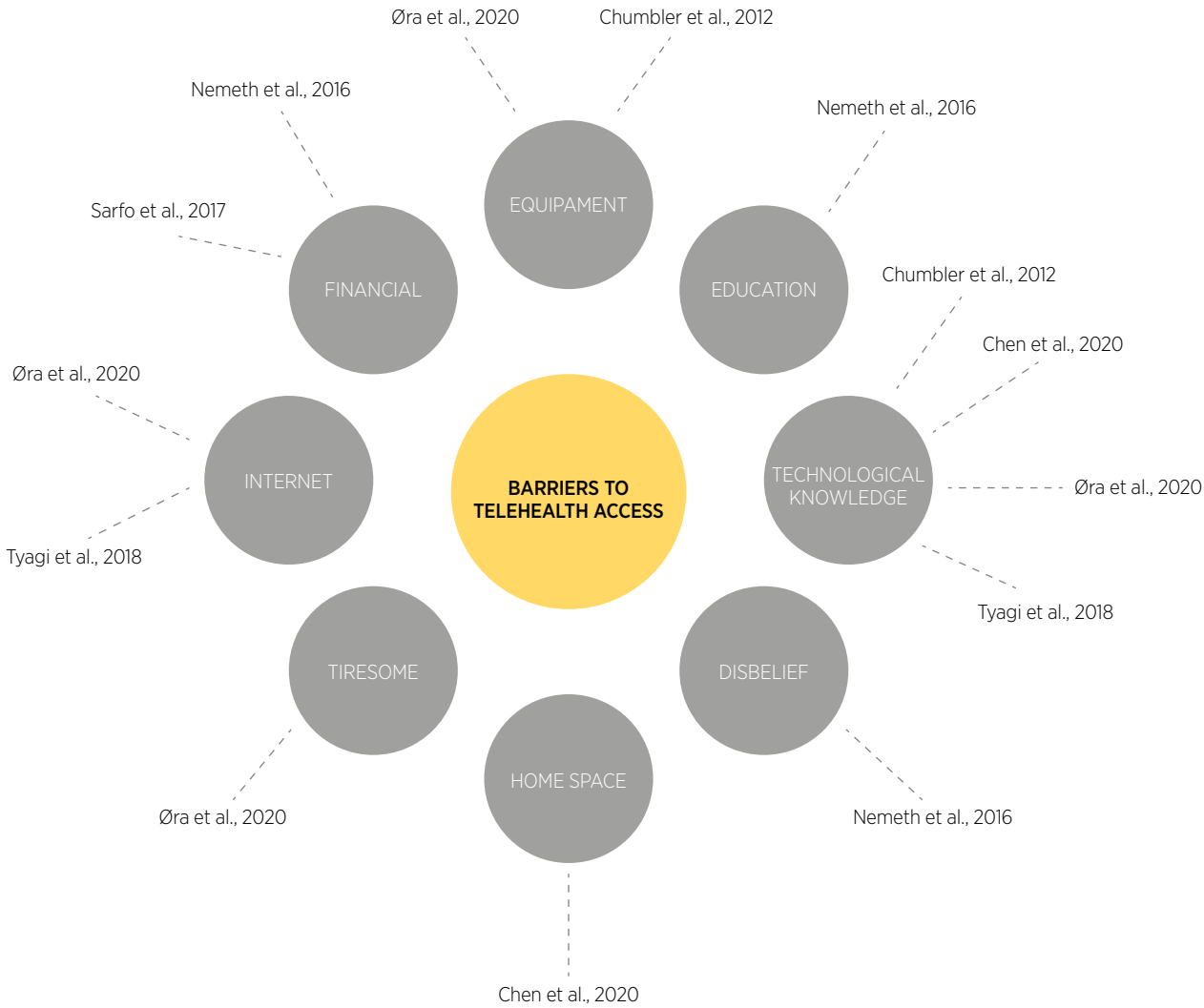

Figure 3. Representation of perceived barriers in accessing telehealth and the respective authors

Effort expectation barriers

These barriers related to EE were: 1. Low health literacy; 2. Participant's difficulty using the computer, software program, and/or technical equipment; 3. Difficulties related to the setup of the equipment; 4. Technical skills[14-17].

Barriers to facilitating conditions

Barriers related to this dimension are: 1. Internet connection; 2. Sound and image quality of videoconferencing; 3. Limited space at home; 4. Internet connections barriers; 5. Rapid changes in technologies (obsolete equipment; wireless technology); 6. Problems with equipment functionality (video limitations; technical support required)[14,16-18].

DISCUSSION

This review is the first to systematically summarize the barriers to access real-time remote health services for individuals with stroke, according to dimensions in UTAUT. In the six studies included, all UTAUT dimensions were reported as barriers to accessing telehealth. Effort Expectancy (EE) and Facilitating Conditions (FC) had a larger number of reported barriers. In summary, stroke patients reported several challenges to access telehealth.

As previously reported, older individuals, as well as the overall profile of stroke patients, have greater difficulty in using technologies[19], in this sense, the need to understand what these barriers mean for telehealth use is stated with the need for an explanatory theoretical model on the use of technology. The perceived barriers to telehealth identified are related to the dimensions of the UTAUT model; the practical implications of this review and its limitations are discussed.

Perceived barriers to Telehealth access and Unified Theory of Acceptance and Use of Technology dimensions

The main barriers related to effort expectation can be inferred as a dimension of barriers that can be solved since it involves a level of knowledge, use, and operation that can be taught to the patient. It involves the individual's preference for the use of technology, since the delivery method and application of telehealth can be individualized. However, for this same dimension, the cognitive level of individuals should be considered. According to Chakraborty et al.[20], cognition has an important effect on the perception of utility, and, consequently, on the expectations of individuals regarding their performance and effort in the use of technologies. Since stroke patients may present cognitive sequelae, in addition to motor and speech sequelae[20], they may face more barriers related to effort and performance expectations. This implies the need for cognitive screening and assessment of individuals before insertion into a rehabilitation program via telehealth.

Within the facilitating conditions dimension, the perceived barriers are related to financial aspects, access to the internet, and home context that are difficult to overcome and may interfere with the user's acceptance of telehealth. Due to body function impairments and activity limitations, stroke patients face environmental barriers within their own homes[21]. Thus, it is appropriate to consider an assessment of the individual's home space and their safety support before the implementation of telehealth service. The individual's context, and consequently individualization of the delivery method of telehealth must be carried out before the introduction of telehealth care to avoid the rise of new barriers, which are difficult to overcome.

Other dimensions of the UTAUT model were also reported as minor barriers, namely: the perception of the system's usefulness; extrinsic motivators, such as how the system improves the individual's results and/or performance; relative advantage, or the use of innovation were conceptualized in the Performance Expectancy dimension. In the Social Influence dimension, only aspects regarding the financial condition and communication failure between providers and users were identified. These two dimensions were the ones with the fewest barriers addressed in the included studies, covering only three in each dimension.

Notably, these barriers, for the most part, had issues related to the telehealth method of delivery, and no barrier was identified regarding the conditions related to the individual, which highlights the lack of information about barriers that are specific to stroke, including its sequelae. Examples of this include cognitive and communicative ability impairments, which encompass the ability to understand commands; difficulty in learning tasks; post-stroke depression; and motor deficit. These impairments make individuals dependent or semi-dependent on a caregiver to perform tasks[22,23]. In this sense, the absence of a caregiver could negatively interfere and should be considered as a barrier to telehealth access[24]. However, our analysis showed that the addressed barriers that stroke patients face in accessing telehealth did not consider the specific characteristics of this population.

Practical implications

The identified barriers in this study should be used for future analyses or during the development of software programs to provide remote health services in real time. Health care providers can use the UTAUT framework as a guideline to anticipate and attempt to minimize or eliminate potential barriers, thus ensuring an effective online service delivery to their patients at home.

Limitations

The use of a qualitative method of content analysis to address the barriers perceived in the studies is one of our limitations. This is mainly inferred by the small number of studies that quantitatively assess limitations proven as barriers to telehealth access. Thus, this review addressed the results of cause-and-effect studies alongside the results arising from descriptions in qualitative studies.

CONCLUSION

The main barriers to telehealth access by stroke patients refer to the use of technology and the required infrastructure to deliver this method of healthcare, according to the dimensions Effort Expectancy and Facilitating Conditions of the UTAUT model, respectively. It can be observed that the barriers related to the Effort Expectancy dimension are barriers that can be overcome by providing knowledge about the use of technologies with training that can be carried out before the telehealth service is offered. However, the barriers in the dimension of Facilitating Conditions, which are related to financial aspects, internet conditions, and home contexts are difficult to overcome and, therefore, can also interfere with the user's acceptance of telehealth. This review consisted mainly of subjective approach research, therefore, it is necessary to carry out studies with a quantitative approach, thus identifying the main barriers and predicting possible failures to access telehealth.

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