Telemedicine Improves Access to Hepatology Consultation with High Patient Satisfaction

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Aims: Telemedicine between health care providers could be useful for improving the access to hepatology consultations, which is challenging in some regions. The primary objective of this study was to estimate the proportion of consultations that were resolved through a telemedicine program. Additionally, we evaluated patient satisfaction with this strategy. **Methods:** Consecutive telemedicine consultations made by non-hepatologist health care providers from different regions of Argentina to a specialty hepatology team were included. Participants and hepatologists used e-mail, teleconference systems, WhatsApp, or telephone to interact, depending on their preferences. Consultations were considered to be resolved through telemedicine when a diagnosis and an adequate follow-up were achieved without the need to refer the patient to a hepatologist or other specialist. Patient satisfaction with telemedicine was evaluated using the Patient Satisfaction Questionnaire Short Form and Telemedicine Satisfaction Questionnaire. **Results:** A total of 200 telemedicine consultations made by 24 physicians from 10 different provinces of Argentina were evaluated, of which 145 (73%; 95% CI: 66%–79%) were resolved through telemedicine. Practitioners specialties were as follows: family physicians, internists, gastroenterologists, infectious diseases, and obstetrics. The most frequent final diagnoses for those patients whose consultation was resolved through telemedicine were non-alcoholic fatty liver disease, viral hepatitis, and benign hepatic lesions. A high degree of patient satisfaction with telemedicine was observed in both questionnaires. **Conclusions:** Our results show the effectiveness of telemedicine in hepatology, with high resolution rate of consultations and rapid access to experts' assessment. Additionally, a high degree of patient satisfaction was observed using prevalidated questionnaires. (J CLIN EXP HEPATOL 2020;10:555–562)

The advent of telemedicine represents one of the most significant advances in modern medicine.^{1,2} The main objectives of the different modalities of telemedicine are focused on optimizing diagnosis, treatment, and prevention of different diseases by shortening travel distances and optimizing the efficiency in patient care.^{3,4} Additionally, training of health care providers can be satisfactorily accomplished through telemedicine.^{5–8} Liver diseases could be approached through telemedicine. For example, the Extension for Community Healthcare Outcomes (ECHO) Project, which consists of telemedicine between health care providers, proved to be

useful for improving access to the treatment of hepatitis C in underserved areas.^{6–8}

Argentina has a surface area of 2.79 million square kilometers (km²) and 40.17 million inhabitants. The population density is marked by a strong heterogeneity, with areas that range from 14,000 inhabitants/km² to areas of 0.1 inhabitants/km².⁹ Moreover, significant disparities are also observed on access to certain medical specialties, such as hepatology or liver transplant programs.⁶ Under these circumstances, we implemented a telemedicine program between health care providers, which gives support in the diagnosis and treatment of liver diseases to practitioners from different regions of Argentina.

The primary aim of this study was to estimate the proportion of consultations that were resolved through this telemedicine program. Additionally, we explored factors associated with the resolution of the consultation through telemedicine and patient satisfaction.

METHODS

The telemedicine project of general hepatology was launched by Fundación Icalma in September 2016. Its main aim is to offer early access to hepatology consultation to non-hepatologist health care providers from different

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Abbreviations: ECHO: Extension for Community Healthcare Outcomes; PSQ-18: Patient Satisfaction Questionnaire short form; TSQ: Telemedicine Satisfaction Questionnaire; IQR: interquartile range; OR: odds ratios; NAFLD: nonalcoholic fatty liver disease; HCC: hepatocellular carcinoma <https://doi.org/10.1016/j.jceh.2020.04.017>

regions of the country. We decided to launch this telemedicine program because patients frequently travel long distances to receive outpatient liver care. In our own experience, in daily practice we perceived that a significant proportion of face-to-face consultations could be saved because most of the cases were relatively simple to manage remotely.

To participate in this project, physicians complete a pre-designed case record form sent by e-mail to the expert hepatology team in Buenos Aires. The assigned hepatologist performs a first evaluation of the case with the aim of determining in less than 24 h whether the case can be approached through telemedicine or it requires a classic “face-to-face” consultation. The interaction between participants and hepatologists after the first e-mail continues by e-mail, teleconference systems, WhatsApp®, or telephone, depending on their preferences. Once the consultation is closed (the diagnosis is established or the treatment and follow-up are determined) a follow-up e-mail is sent by the participant to the hepatology team to inform the final approach for the patient that was consulted.

Consultations

For the purpose of this study, consultations had to be made by family physicians, internists, obstetrics, infectious disease specialists, or gastroenterologists in Argentina from 1 October 2016 to 31 September 2018. The consultations were reviewed by three specialists in liver diseases (EM, SM, and AG).

Study objectives and definitions

The primary objective of the study was to estimate the proportion of consultations that were resolved through telemedicine. Additionally, we explored factors associated with the resolution of the consultation and patient satisfaction with telemedicine.

Each consultation started on the day that the participating physician sent the initial e-mail and ended either when the case was resolved through telemedicine or when a recommendation to refer the patient to a hepatologist or other specialist was made. We considered the consultation to be resolved through telemedicine when a diagnosis and an adequate follow-up were achieved without the need for referring the patient to a liver disease specialist or other specialist.⁵ We recorded the number of telecommunications that were necessary to close each consultation and the distance between the participants' center to Fundación Icalma.

To evaluate patients' satisfaction with telemedicine, surveys were conducted within the first month from the day that the consultation was closed.^{5,6} The Patient Satisfaction Questionnaire Short Form (PSQ-18) and Telemedicine Satisfaction Questionnaire (TSQ) were used to assess the overall patient satisfaction with telemedicine.^{10–13} The

PSQ-18 captures seven categories of patient satisfaction, including general satisfaction, technical quality, interpersonal manner, communications, financial aspects, time spent with the doctor, and accessibility and convenience. The subjects recorded their responses on a five-point Likert scale that ranged from strongly disagree¹ to strongly agree.^{5,14} The TSQ questionnaire consists of 14 questions divided into three categories: quality of care provided, similarity to face-to-face encounter, and perception of the interaction. For the purpose of this study, the first four questions were not used. Similar to the PSQ-18, the TSQ uses a five-point Likert scale from strongly disagree to strongly agree.^{5,13,15} Scores for negative questions were reversed so that low scores consistently indicate low satisfaction and high scores reliably indicate high satisfaction.¹⁴

Statistical analysis

Median and interquartile range (IQR) were used to describe quantitative variables and absolute numbers and percentages for qualitative variables. To compare qualitative variables chi-squared test or Fisher's exact test were used. Quantitative variables were analyzed using Mann-Whitney test. A multiple logistic regression analysis was performed to evaluate factors associated with the resolution of the consultation through telemedicine. Variables with a p-value ≤ 0.1 in the univariate analysis were selected to be included in the final multivariate analyses through stepwise backward selection. Odds ratios (OR) with their corresponding 95% confidence intervals (95% CI) are presented. All tests were two-tailed and a p-value of less than 0.05 was considered statistically significant. SPSS version 20 was used to perform the statistical analysis.

Ethical considerations

The study was performed in accordance with the Declaration of Helsinki and the E6 Good Clinical Practice Standards ICH, as well as the Guide for Human Health Research (Resolution 1480/11) of the Ministry of Health of Argentina. All personal data were codified in accordance with the Organic Law 25,325 of 30 October 2000 on the Protection of Personal Data in Argentina. All study data were treated anonymously with restricted access only to authorized personnel for the purposes of the study. The Institutional Review Board approved the study (#3020). Patients and physicians consented to participate in the study.

RESULTS

A total of 200 telemedicine consultations from 10 different provinces in Argentina were included in the study (Figure 1). The main characteristics of the participating physicians and of the patients that were consulted are summarized in Tables 1 and 2. A total of 24 physicians

Figure 1 Consultation disposition.

participated, 6 (25%) of whom performed more than 10 consultations. Ten (24%) physicians worked at a distance greater than 1000 km from Fundación Icalma.

One hundred and forty-five consultations (73%; 95% CI: 66%–79%) were resolved through telemedicine, with a median of two (IQR 2–3) telecommunications per consultation. In only two consultations the initial response took more than 24 h. The main reasons for consultation were the following: 49 (25%) abnormal liver test, 42 (21%) viral hepatitis, 34 (17%) non-alcoholic fatty liver disease (NAFLD), 33 (17%) focal liver lesions, 24 (12%) cirrhosis, and 18 (9%) other. The main final diagnoses after expert review were as follows: 54 (27%) NAFLD, 50 (25%) viral hepatitis, 24 (12%) cirrhosis, 22 (11%) benign focal liver lesions, 14 (7%) hepatocellular carcinoma (HCC), 10 (5%) autoimmune liver disease, 10 (5%) drug-induced liver injury, 8 (4%) alcoholic liver disease, and 8 (4%) other.

When considering the final diagnosis, NAFLD, viral hepatitis, and benign focal liver lesions taken together accounted for 75% of the consultations that were resolved through telemedicine. On the other hand, cirrhosis and

Table 1 Characteristic of the Participant physicians (n = 24).

		All participant physicians (N = 24)
		Count (%) / median (IQR)
Medical specialty	Family physician	10 (41%)
	Internist	7 (29%)
	Gastroenterologist	3 (13%)
	Infectious diseases	3 (13%)
	Obstetrics	1 (4%)
More than 10 cases presented		6 (25%)
Age (years)		38 (37–56)
Location of participant physician center ^a	Bs. As. La Matanza (52 km)	2 (8.3%)
	Bs. As. Almirante Brown (35 km)	1 (4.2%)
	Bs. As. Tigre (28 km)	1 (4.2%)
	Bs. As. Berazategui (28 km)	1 (4.2%)
	Bs. As. Bahía Blanca (651 km)	1 (4.2%)
	Bs. As. Junín (264 km)	1 (4.2%)
	Bs. As. Coronel Suárez (542 km)	1 (4.2%)
	Santa Fé (465 km)	2 (8.3%)
	La Pampa (609 km)	1 (4.2%)
	Tucumán (1254 km)	2 (8.3%)
	Corrientes (913 km)	1 (4.2%)
	San Juan (1159 km)	2 (8.3%)
	Neuquén (1135 km)	3 (12.5%)
	Santa Cruz (2519 km)	2 (8.3%)
	Tierra del Fuego (3094 km)	1 (4.2%)
	Chaco (935 km)	1 (4.2%)
	Ciudad Autónoma de Buenos Aires (4 km)	1 (4.2%)
Distance from participant physician center to Fundación Icalma (Km)		651 (53–1159)

^aThe distance from the participant physician center to Fundación Icalma is shown within parenthesis.

Table 2 Characteristics of all Patients who were consulted through telemedicine and according to whether resolution of the consultation was achieved or not (n = 200).

		All patients (n = 200)	Consultation resolution with telemedicine		P
		Count (%) / median (IQR)	No (n = 55) Count (%) / median (IQR)	Yes (n = 145) Count (%) / median (IQR)	
Age (years)		54 (42–59)	56 (44–65)	49 (40–57)	0.006
Male gender		112 (56)	33 (60)	79 (54.5)	0.526
Reason for consultation	Abnormal liver tests	49 (24.5)	9 (16.4)	40 (27.6)	<0.001
	Steatosis	34 (17)	34 (7.3)	30 (20.7)	
	Hepatic focal lesion	33 (16.5)	16 (29.1)	17 (11.7)	
	Viral hepatitis	42 (21)	4 (7.3)	38 (26.2)	
	Autoimmune diseases	8 (4)	2 (3.6)	6 (4.1)	
	Iron overload	9 (4.5)	1 (1.8)	8 (5.5)	
	Cirrhosis	24 (12)	19 (34.5)	5 (3.4)	
	Other	1 (0.5)	0	1 (0.7)	
History of chronic liver disease		90 (45%)	37 (67.3)	53 (36.6)	<0.001
Exposure to hepatotoxics		16 (8)	2 (3.6)	14 (9.7)	0.244
Diabetes mellitus		45 (22.5)	18 (32.7)	27 (18.6)	0.038
Hypertension		41 (20.5)	8 (14.5)	33 (22.8)	0.242
Dyslipidemia		66 (33.2)	14 (25.9)	52 (35.9)	0.236
Alcohol consumption		42 (21)	18 (32.7)	24 (16.6)	0.019
Recreational drug use	Cannabis	18 (9)	6 (10.9)	12 (8.3)	0.152
	Cocaine	7 (3.5)	0	7 (4.8)	
	Synthetic drugs	1 (0.5)	1 (1.8)	0	
	Intravenous drugs	2 (1)	1 (1.8)	1 (0.7)	
	None	172 (86%)	47 (85.5)	125 (86.2)	
Biliary surgery		14 (7)	6 (10.9)	8 (5.5)	0.216
History of abnormal liver tests		133 (66.5)	45 (81.8)	88 (60.7)	0.004
Signs of liver disease on physical examination		45 (22.5)	35 (63.6)	10 (6.9)	<0.001
ALT (IU/L)		43 (33–50)	47 (45–55)	38 (30–45)	<0.001
Alkaline phosphatase (IU/L)		99 (89–105)	100 (88–110)	99 (89–105)	0.493
Gamma-glutamyl transpeptidase (IU/L)		65 (40–98)	86 (43–99)	56 (40–89)	0.035
Bilirubin (mg/dL)		0.9 (0.69–1.3)	1.2 (0.9–2.3)	0.9 (0.67–1.1)	0.002
Albumin (g/dL)		4 (3.6–4.32)	3.4 (3.2–3.9)	4.2 (3.8–4.45)	<0.001
Albumin $\geq$ 3.5 (g/dL)		167 (83.5)	25 (45.5)	142 (97.9)	<0.001
Prothrombin time (%)		87 (70–96)	63 (50–78)	88 (78–98)	<0.001
Prothrombin time $\geq$ 50%		187 (93.5)	42 (76.4)	145 (100)	<0.001
Platelets (109/L)		155.15 (150.3–165.43)	140 (99–156)	157 (153.2–168)	<0.001
Platelets $\geq$ 150 (109/L)		158 (79)	19 (34.5)	139 (95.9)	<0.001
Hypergammaglobulinemia		44 (24)	32 (71.1)	12 (8.9)	<0.001
Liver ultrasound	Steatosis	68 (35.2)	13 (25)	55 (39)	<0.001
	Hepatic focal lesion	35 (18.1)	14 (26.9)	21 (14.9)	
	Signs of liver disease	28 (14.5)	21 (40.4)	7 (5)	
	Portal thrombosis	3 (1.6)	2 (3.8)	1 (0.7)	
	Biliary abnormalities	2 (1)	1 (1.9)	1 (0.7)	
	Normal	57 (29.5)	1 (1.9)	56 (39.7)	
Number of telecommunications		2 (2–3)	2 (1–3)	2 (2–3)	0.001

Table 3 Telemedicine Satisfaction Questionnaire score¹⁻⁵ and Patient Satisfaction Questionnaire Short Form-18¹⁻⁵ completed by 188 Patients.

Telemedicine Satisfaction Questionnaire score	Score
	Median (IQR)
I feel comfortable communicating with my health care provider.	4 (4-5)
I think the health care provided via telemedicine is consistent.	5 (4-5)
I obtain better access to health care services by use of telemedicine.	5 (4-5)
Telemedicine saves my time traveling to a hospital or specialist clinic.	5 (4-5)
I do not receive adequate attention.	5 (4-5)
Telemedicine provides for my health care need.	5 (4-5)
I find telemedicine an acceptable way to receive health care services.	5 (4-5)
I will use telemedicine services again.	5 (4-5)
Overall, I am satisfied with the quality of service being provided via telemedicine.	4 (4-5)
Overall score	4 (4-5)
Health care providers are good about explaining the reason for medical tests.	4 (4-5)
I think my health care providers' office has everything needed to provide complete medical care.	4 (4-5)
The health care I have been receiving is just about perfect.	4 (4-4)
Sometimes health care providers make me wonder if their diagnosis is correct.	4 (3-4)
I feel confident that I can get the health care I need without being set back financially.	4 (4-4)
When I go for health care, the provider is careful to check everything when treating and examining me.	5 (5-5)
I have to pay for more of my health care than I can afford.	2 (2-3)
I have easy access to the medical specialists I need.	4 (4-4)
Where I get health care, people have to wait too long for emergency treatment.	5 (4-5)
Health care providers act too businesslike and impersonal toward me.	4 (4-5)
My health care provider treats me in a very friendly and courteous manner.	4 (4-5)
Those who provide my health care sometimes hurry too much when they treat me.	4 (4-4)
Health care providers sometimes ignore what I tell them.	4 (4-4)
I have some doubts about the ability of the health care providers who treat me.	4 (4-4)
Health care providers usually spend plenty of time with me.	4 (4-5)
I find it hard to get an appointment for health care right away.	5 (4-5)
I am dissatisfied with some things about the health care I receive.	4 (4-5)
I am able to get health care whenever I need it.	3 (3-4)

Some PSQ-18 items are worded so that agreement reflects satisfaction with medical care, whereas other items are worded so that agreement reflects dissatisfaction with medical care. Therefore, scores for negative questions were reversed so that low scores consistently indicate low satisfaction and high scores reliably indicate high satisfaction.

Figure 2 Patient Satisfaction Questionnaire Short Form results (n = 188).

HCC accounted for 55% of the final diagnoses in patients who required face-to-face consultation. In 44 (80%) of the 55 patients who required face-to-face consultation, the instruction to do so was defined during the first telecommunication.

Factors associated with consultation resolution through telemedicine

Table 2 summarizes the differences between the consultations that were resolved through telemedicine and those that were not. Briefly, the patients for whom consultation resolution through telemedicine was achieved were younger (49 [40–57] versus 56 [44–65] years, $p = 0.006$), with a lower proportion of history of chronic liver disease (37% versus 67%, $p < 0.001$), diabetes mellitus (19% versus 33%, $p = 0.038$), and alcohol consumption (17% versus 33%, $p = 0.019$), than those for whom a face-to-face consultation was advised. Additionally, history of

abnormal liver tests was less frequent in patients whose consultation was resolved through telemedicine.

On multivariate analysis, diabetes (OR 0.25 [95% CI 0.08–0.80], $p = 0.019$), albumin ≥ 3.5 mg/dL (OR 12.33 [95% CI 2.46–61.80], $p = 0.02$), platelets $\geq 150 \times 10^9/L$ (OR 9.99 [95% CI 2.49–40.09], $p = 0.001$), and hypergammaglobulinemia (OR 0.20 [95% CI 0.05–0.71], $p = 0.013$) were independently associated with resolution of the consultation through telemedicine.

Patient satisfaction with telemedicine

The results of PSQ-18 and TQS surveys are shown in Table 3. A total of 188 patients answered the questionnaires. In both questionnaires, a high degree of patient satisfaction with telemedicine was observed. Figure 2 summarizes the results of the PSQ-18 in which all explored categories show a high degree of satisfaction except for financing of the consultation. Similarly, in the TSQ survey, 70% of the

questions had the highest score, showing a high degree of general satisfaction with telemedicine (overall score 4 [IQR 4–5]) (Table 3).

DISCUSSION

The main finding of our study is that 73% of the consultations could be resolved through telemedicine, with a high level of patient satisfaction. Additionally, we were able to identify different factors associated with resolution of the consultation through telemedicine.

We decided to implement this telemedicine project for many reasons. As we mentioned, in Argentina, there are areas with very low population density and poor access to liver disease specialists.⁶ Additionally, transportation inside Argentina is complex for patients, not only because it is a large country but also because air and ground transportation is often limited and costly. Therefore, non-specialized physicians and patients frequently find it a challenge to access to specialty care consultation.

The most frequent final diagnosis in patients in which telemedicine was able to resolve the consultation were NAFLD, viral hepatitis, and benign hepatic lesions, which is similar to what was previously mentioned.^{5,6,16–18} Even though the approach to these liver diseases is straightforward for most hepatologists, it might not be the case for non-specialists. On the other hand, in patients for whom a face-to-face evaluation was suggested, cirrhosis and HCC were the most frequent diagnosis, which probably reflects more advanced stages of chronic liver disease and the need for a more complex evaluation. However, recent studies satisfactorily applied telemedicine for advanced liver diseases, even for patients who require transplant evaluation.^{16,19} It is interesting that the participating physicians were mainly family physicians and internists with no training in hepatology, and that it is likely that they would have referred the patients for a specialty consultation if they did not have access to telemedicine. In this direction, through recent studies it has been possible to objectify the need to train these specialists in the screening, staging, and management of patients with NAFLD in the first level of care.^{20–22}

From the patient perspective, telemedicine was very well received as shown by the PSQ-18 and TQS questionnaires in which a high degree of satisfaction was reported. This is similar to what was reported in previous studies, where a high level of satisfaction with the use of telemedicine to access specialty care was observed.¹⁴ Of note, as shown in Figure 2, patients showed concerns regarding financing of the consultation. We speculate that at the time they answered the questionnaire they might have been unsure if their health insurance would cover for this practice when it is not part of a research study, which is understandable because telemedicine is not a usual practice in Argentina.

In our study, we aimed to identify factors that could be associated with consultation resolution through telemedicine. We found that patients with higher albumin and higher platelets were more likely to achieve resolution of the consultation through telemedicine. On the other hand, the presence of diabetes and hypergammaglobulinemia were predictors of failure to resolve the consultation through telemedicine. Although these findings were expected since they are associated with advanced liver disease, they might be useful for non-specialists to request a rapid evaluation through telemedicine.

We believe that our results support the idea that the implementation of telemedicine could favor early access to a specialized consultation. It is likely that these models of care reduce the need for transportation and costs, even allowing greater adherence to patient follow-up.^{1,3,5} Additionally, even in the subgroup of patients referred for face-to-face consultation, orientation and prioritization to access the specialist consult could be facilitated. Such findings grant greater sustainability to the concept of effective telemedicine evaluation because they have an impact, in an indirect way, in the access to and the quality of the medical care, in spite of the need for a face-to-face assessment.³

Our study presents some limitations. First, it is important to mention the possible selection bias in the cases that were consulted by the participant physicians. Second, the absence of a control group precludes the comparison of the consultations done by telemedicine with conventional consultations or referrals that do not apply telemedicine. Third, we did not evaluate the accuracy in the diagnoses that were made through telemedicine. Finally, social determinants were not evaluated. On the other hand, our study also has several strengths. First, participating physicians were trained in data collection, which generated consistent data and minimized missing information. Second, as far as we are aware, it is the first study to address the effectiveness of telemedicine for liver disease in Latin America.

In conclusion, our results seem to go in the same direction as those reported in previous studies, showing the high feasibility and effectiveness of telemedicine in hepatology.^{1,3,5} This modality is associated with a high rate of resolution of consultations, with rapid access to an expert assessment. Finally, we objectify a high rate of patient satisfaction with the use of telemedicine by means of prevalidated questionnaires. These results could represent a paradigm shift in the treatment of the most prevalent liver diseases (NAFLD, viral hepatitis, or benign liver lesions), allowing greater equity in access to a specialized consultation.

CONFLICT OF INTEREST

All authors have none to declare.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

Ezequiel Mauro: Conceptualization, Methodology, Data curation, Writing - original draft. **Sebastián Marciano:** Conceptualization, Methodology, Data curation, Writing - original draft. **María C. Torres:** Validation, Writing - review & editing. **Abel L. Novillo:** Conceptualization, Writing - review & editing. **Adrián Gadano:** Conceptualization, Methodology, Writing - review & editing.

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REFERENCES

1. Siegel CA. Transforming gastroenterology care with telemedicine [Internet]. *Gastroenterology*. 2017;152:958–963. <https://doi.org/10.1053/j.gastro.2017.01.048>. Available from:.
2. Dorsey ER, Topol EJ. State of telehealth. *N Engl J Med*. 2016;375:1400.
3. Serper M, Volk ML. Current and future applications of telemedicine to optimize the delivery of care in chronic liver disease. *Clin Gastroenterol Hepatol*. 2018;16:157–161. e8.
4. Cross RK, Kane S. Integration of telemedicine into clinical gastroenterology and hepatology practice [Internet]. *Clin Gastroenterol Hepatol*. 2017;15:175–181. <https://doi.org/10.1016/j.cgh.2016.09.011>. Available from:.
5. Glass LM, Waljee AK, McCurdy H, Su GL, Sales A. Specialty care access network-extension of community healthcare outcomes model program for liver disease improves specialty care access [Internet]. *Dig Dis Sci*. 2017;62:3344–3349. <https://doi.org/10.1007/s10620-017-4789-2>. Available from:.
6. Marciano S, Haddad L, Plazzotta F, et al. Implementation of the ECHO telementoring model for the treatment of patients with hepatitis C. *J Med Virol*. 2017;89:660–664.
7. Arora S, Thornton K, Murata G, et al. Outcomes of treatment for hepatitis C virus infection by primary care providers [Internet]. *N Engl J Med*. 2011;364:2199–2207. <https://doi.org/10.1056/nejmoa1009370>. Available from:.
8. Arora S, Kalishman S, Thornton K, et al. Expanding access to hepatitis C virus treatment-Extension for Community Healthcare Outcomes (ECHO) project: disruptive innovation in specialty care [Internet]. *Hepatology*. 2010;52:1124–1133. <https://doi.org/10.1002/hep.23802>. Available from:.
9. Política División. Superficie y Población|Instituto Geográfico Nacional [Internet]. [cited 2020 Feb 5]; Available from: <https://www.ign.gob.ar/NuestrasActividades/Geografia/DatosArgentina/DivisionPolitica>.
10. Marshall GN, Hays RD, Mazel R. Health status and satisfaction with health care: results from the medical outcomes study [Internet]. *J Consult Clin Psychol*. 1996;64:380–390. <https://doi.org/10.1037/0022-006x.64.2.380>. Available from:.
11. Grogan S, Conner M, Norman P, Willits D, Porter I. Validation of a questionnaire measuring patient satisfaction with general practitioner services. *Qual Health Care*. 2000;9:210–215.
12. Thayaparan AJ, Mahdi E. The Patient Satisfaction Questionnaire Short Form (PSQ-18) as an adaptable, reliable, and validated tool for use in various settings [Internet]. *Med Educ Online*. 2013;18:21747. <https://doi.org/10.3402/meo.v18i0.21747>. Available from:.
13. Yip MP, Chang AM, Chan J, MacKenzie AE. Development of the Telemedicine Satisfaction Questionnaire to evaluate patient satisfaction with telemedicine: a preliminary study. *J Telemed Telecare*. 2003;9:46–50.
14. Le LB, Rahal HK, Viramontes MR, Meneses KG, Dong TS, Saab S. Patient satisfaction and healthcare utilization using telemedicine in liver transplant recipients. *Dig Dis Sci*. 2019;64:1150–1157.
15. Westra I, Niessen FB. Implementing real-time video consultation in plastic surgery [Internet]. *Aesthetic Plast Surg*. 2015;39:783–790. <https://doi.org/10.1007/s00266-015-0526-4>. Available from:.
16. Su GL, Glass L, Tapper EB, Van T, Waljee AK, Sales AE. Virtual consultations through the veterans administration SCAN-ECHO project improves survival for veterans with liver disease. *Hepatology*. 2018;68:2317–2324.
17. Mellinger JL, Moser S, Welsh DE, et al. Access to subspecialty care and survival among patients with liver disease [Internet]. *Am J Gastroenterol*. 2016;111:838–844. <https://doi.org/10.1038/ajg.2016.96>. Available from:.
18. Mazzotti A, Caletti MT, Brodosi L, et al. An internet-based approach for lifestyle changes in patients with NAFLD: two-year effects on weight loss and surrogate markers. *J Hepatol*. 2018;69:1155–1163.
19. Konjeti VR, Heuman D, Bajaj JS, et al. Telehealth-Based evaluation identifies patients who are not candidates for liver transplantation [Internet]. *Clin Gastroenterol Hepatol*. 2019;17:207–209. <https://doi.org/10.1016/j.cgh.2018.04.048>. e1. Available from:.
20. Ginès P, Graupera I, Lammert F, et al. Screening for liver fibrosis in the general population: a call for action [Internet]. *Lancet Gastroenterol Hepatol*. 2016;1:256–260. [https://doi.org/10.1016/S2468-1253\(16\)30081-4](https://doi.org/10.1016/S2468-1253(16)30081-4). Available from:.
21. Castera L, Friedrich-Rust M, Loomba R. Noninvasive assessment of liver disease in patients with nonalcoholic fatty liver disease [Internet]. *Gastroenterology*. 2019;156:1264–1281. <https://doi.org/10.1053/j.gastro.2018.12.036>. e4. Available from:.
22. Serra-Burriel M, Graupera I, Torán P, et al. Transient elastography for screening of liver fibrosis: cost-effectiveness analysis from six prospective cohorts in Europe and Asia. *J Hepatol*. 2019;71:1141–1151.