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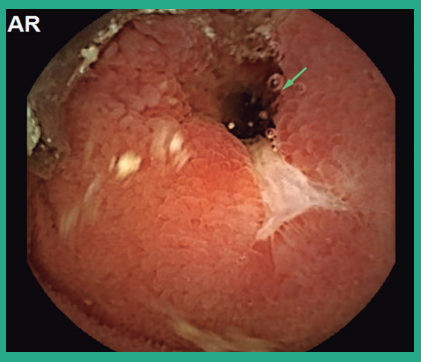

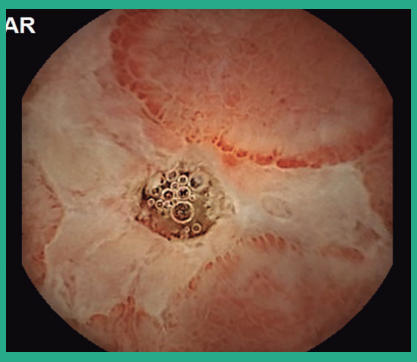

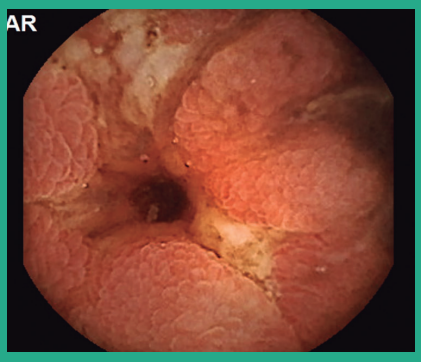

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Characterization of patients with chronic hepatitis C treated in a high complexity hospital in Medellín

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Abstract

Introduction: Throughout the world hepatitis C (HepC) is a public health problem. Estimates for its prevalence in Colombia range from 0.5% to 1% but 2.1 % for patients over 50 years of age. The Hepatology Unit at the Hospital Pablo Tobón Uribe (HPTU) has been a benchmark for management of HepC in Medellín and Colombia for years. **Objective:** To describe sociodemographic and clinical characteristics together with health outcomes of patients with chronic HepC who were treated at the HPTU between 2013 and 2018. **Materials and methods:** This is an observational, descriptive and retrospective study of patients with chronic HepC, treated between January 1, 2013 and March 31, 2018. **Results:** One hundred and eight patients were analyzed. The average age was 55.8 years (SD 13.7), 51.9% were men, and 78.7% belonged to the contributory health care scheme. Most frequently, the disease was transmitted by blood, and genotype 1 predominated in the group of patients analyzed. The effectiveness of interferon schemes was 46.9% while that of Direct-Acting Antivirals (DAA) was 94.6%. Adverse drug reactions were found in 68.2% of patients treated with interferon/ribavirin schemes but in only 25.9% of the patients treated with DAA. **Conclusions:** In this group of patients treated at HPTU, DAA were safer and more effective than interferon/ribavirin schemes.

Keywords

Hepatitis C, Colombia, antivirals, interferons, direct action antivirals.

INTRODUCTION

Hepatitis C (HepC) is a global public health problem whose prevalence is between 2% and 3%. It progresses to chronic diseases, and 70% to 90% of patients develop chronic liver diseases including cirrhosis and hepatocellular carcinoma (HCC). (1 , 2) Especially vulnerable populations including injectable drug users and people with inadequate healthcare. In Colombia, it is estimated that the prevalence of HepC in the overall population is between 0.5% but that it is 2.1% in people over 50 years of age. (3)

The goal of treatment is to reduce adverse health consequences such as terminal liver disease and HCC and reduce mortality from any cause by achieving sustained virological response (SVR). (4) This is defined as an unmeasurably small viral load at 12 weeks after the end of interferon-free therapies or at or 24 weeks interferon-based therapies. (5)

Treatment of HepC has evolved considerably. Treatment with pegylated interferon (peg-IFN) and ribavirin (RBV) are not tolerated well by many patients and which only achieve SVR in 6% to 56% of patients. (2, 6) Consequently, they are being replaced by direct action antivirals (DAAs) which achieve SVR in more than 90% of patients, have shorter treatment times and reduce the number of adverse events. (5, 7, 8) In the United States, second generation DAAs were approved in 2013. In Colombian they were considered to be vital drugs that were not available until simeprevir (SMV), daclatasvir (DCV) and asunaprevir

went on the market in 2015. These were followed by the treatment regimen of paritaprevir/ombitasvir/ritonavir/dasabuvir (PrOD) in 2016 and by sofosbuvir (SOF) and ledipasvir (LDV) in 2017. (9)

Hospital Pablo Tobón Uribe (HPTU) is a referral center for hepatology patients which is responsible for providing care for chronic HepC patients from various parts of Colombia. Nevertheless, systematic information on the characteristics of the diseases and patient population had not been published before now. Therefore, the objective of this work was to describe the sociodemographic, clinical characteristics and health outcomes of patients with HepC treated at the HPTU between 2013 and 2018.

MATERIAL AND METHODS

Type of Study

This is an observational, descriptive and retrospective study.

Study Population

Patients with chronic HepC whose diagnoses were confirmed by detection of hepatitis C virus RNA and who were treated in the HPTU between January 1, 2013 and March 31, 2018 were included in this study. Patients who were not treated pharmacologically, patients who were treated before 2013, and patients whose treatment information was incomplete were excluded.

Variables

Sociodemographic information collected included patient sex, age, schooling, insurance, affiliation regime, and residence department.

Clinical information collected included HCV transmission mechanism, HCV genotype/subtype, fibrosis/cirrhosis status, co-infection with human immunodeficiency virus (HIV) and/or hepatitis B virus (HBV), previous treatment schemes, treatment with DAA, variants associated with resistance (VAR), adverse drug reactions (ADR), number of non-anti-HCV medications used by the patient, hospitalization in the HPTU related to HepC, and SVR.

Information Gathering Process

Consolidation of the medical records of patients with ICD-10 codes B182 and B171 was obtained from the investigating hepatologist. Sociodemographic and clinical variables were extracted from the electronic medical record and recorded on a form in Microsoft Access® 2010.

Statistical Analysis

Absolute frequencies and relative frequencies were used for qualitative variables, and variables, means and standard deviations were used for quantitative variables. Statistical analysis of the data was performed with SPSS 23®.

Ethical Considerations

The Committee on Research and Research Ethics of the HPTU approved this study (Protocol 2018.033).

RESULTS

One hundred eight patients were included in the analysis (Figure 1). Of these, 51.9% were men, and the average age was 55.8 years (standard deviation [SD] 13.7) (Table 1). The most frequent transmission mechanism was a blood transfusion (25%), genotype 1 had the highest prevalence (77.8%), 39.8% of patients had advanced fibrosis/cirrhosis (F3-F4), 77.5% of patients in F4 had compensated cirrhosis, 4.6% had HCC, 90.7% had no coinfections, and 31.5% were hospitalized in the HPTU for causes related to HepC. Other clinical features can be seen in Table 2.

Treatment of HCV Infections

Thirty-sever percent of the patients were treated solely with peg-INF, 24.1% were treated with peg-INF followed by rescue therapy with DAA, and 38.9% were treated only with DAA (Table 3).

Of those treated with peg-INF (61.1%), 59.1% received boceprevir or telaprevir. Of these, 46.9% reached SVR (Figure 2). There were no SVR reports for five patients, three patients were waiting for interferon-free therapies, and one patient died due to a septic shock of urinary origin and severe hepatic encephalopathy. DAAs were prescribed for twenty-six patients who did not reach SVR.

Of the patients treated with peg-IFN, 68.2% had reports of ADRs in the EMH. ADRs occurred most frequently with boceprevir schemes. A total of 216 ADRs were recorded with asthenia and neutropenia each accounting for 8.8%, anemia for 7.9%, and leukopenia and adynamia for 6.9% each.

Use of Direct-Acting Antivirals

The most frequently prescribed DAAs were SOF/LDV and SOF/DCV/RBV (Table 3). Of the patients for whom DAAs were prescribed, 79.4% reportedly began treatment, and 88.9% of these completed treatment

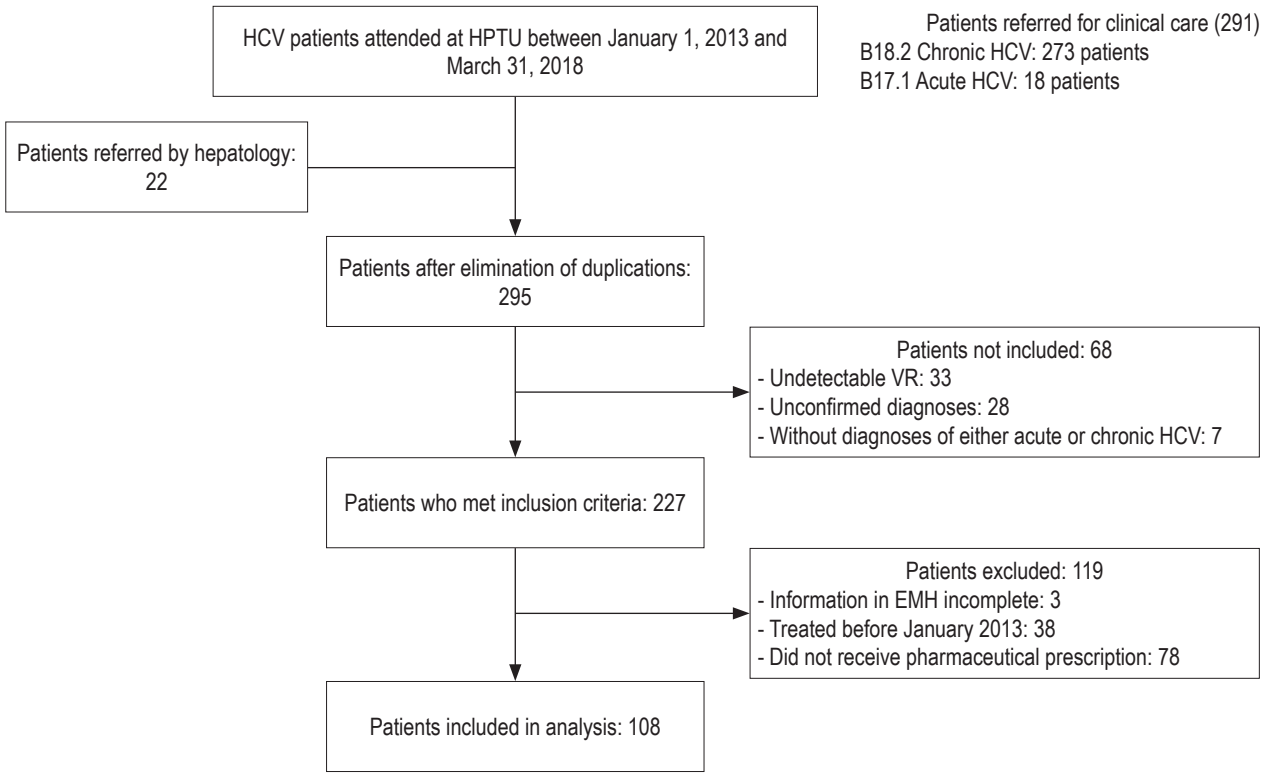

Figure 1. General diagram of the investigation. VR: viral load; EMH: electronic medical history; HPTU: Hospital Pablo Tobón Uribe.

Table 1. Sociodemographic characteristics of patients with chronic hepatitis C

Characteristics	Frequency	% (n = 108)
Sex		
Men	56	51.9
Women	52	48.1
Age		
≤30	5	4.6
31-40	12	11.1
41-50	15	13.9
51-60	32	29.6
61-70	30	27.8
71-80	12	11.1
>81	2	1.9
Education		
Basic primary	12	11.1
Basic secondary	23	21.3
Technical	5	4.6
Professional	2	1.9
Graduate school	24	22.2
No report	3	2.8
Basic primary	39	36.1

Characteristics	Frequency	% (n = 108)
Health care system regimen		
Subsidized	11	10.2
Contributive	85	78.7
Exception	6	5.6
Individual	2	1.9
No report	4	3.7
Health care benefit plans		
SURA EPS	24	22.2
Nueva EPS	19	17.6
Coomeva EPS	14	13.0
Others	50	46.3
No report	1	0.9
Residence Department		
Antioquia	86	79.6
Atlántico	5	4.6
Risaralda	5	4.6
Quindío	3	2.8
Cundinamarca	2	1.9
Others	7	6.5

(Figure 3). Of the patients who finished treatment, 77.1% (37/48) had a viral load report at 12 weeks after the end of treatment. Of these, 94.6% achieved SVR (Figure 4). The remaining 5.4% did not achieve SVR due to a VAR, mainly related to NS5A inhibitors. The first patient took DCV/asunaprevir for 24 weeks without achieving SVR. In this case, no other scheme was initiated, given the costs and risks of side effects. The second patient received SOF/SMV/RBV for 12 weeks, but did not reach SVR. The specialist reported that the treatment was not available. It should be noted that a third patient presented VAR but achieved SVR (Table 5).

DAA safety was analyzed for all patients who reportedly began treatment; there were records of ADRs associated with DAA for 25.9% (14/54) of these patients. Thirty-seven ADRs attributed to seven DAA schemes were identified. SOF/DCV/RBV had the highest frequency, followed by SOF/LDV/RBV. The most frequent ADRs were anemia (16.2%), asthenia (10.8%), headaches and flu symptoms (8.1% each) (Table 6).

Table 2. Clinical characteristics of patients with chronic hepatitis C

	Frequency	% (n = 108)
Possible transmission mechanism		
Blood transfusion	27	25.0
Sexual transmission	8	7.4
Use of contaminated injection equipment (person who injects psychoactive drugs)	7	6.5
Adverse event related to health procedures	4	3.7
Occupational Exposure	1	0.9
Blood transfusion and other forms of blood transmission (tattoos, piercings, scarification)	1	0.9
Other forms of blood transmission (tattoos, piercings, scarification)	1	0.9
Maternal transmission to child	1	0.9
Unknown	58	53.7
Genotype		
1	7	6.5
1a	33	30.6
1a-1b	1	0.9
1b	43	39.8
2	7	6.5
2a	1	0.9
2b	2	1.9
3	2	1.9
4	3	2.8
Not genotyped	9	8.3
Coinfection		
HIV	7	6.5
HBV	3	2.8
None	98	90.7
Liver transplant status		
No transplant	91	84.3
Liver transplant status		
Transplanted	16	14.8
Prior transplant or on transplant list	1	0.9
Fibrosis status		
Not specified	20	18.5
F0	8	7.4
F1	15	13.9
F1-2	3	2.8
F2	12	11.1
F2-3	3	2.8
F3	4	3.7
F3-4	3	2.8
F4 (Cirrhosis)	40	37.0
Cirrhosis (Child-Pugh-Turcotte)		
Compensated (A)	31	77.5
Uncompensated (B)	6	15.0
Uncompensated (C)	2	5.0
Not classified	1	2.5
Hepatocellular carcinoma		
Yes	5	4.6
No	101	93.5
Suspected	1	0.9
No report	1	0.9
Extrahepatic manifestations		
Dermatological	9	8.3
Hematological	5	4.6
Autoimmune disorders	3	2.8
Renal	2	1.9
None	89	82.4
Hospitalization in HPTU related to HCV		
Yes	34	31.5
No	74	68.5

Table 3. Prescribed hepatitis C treatment schemes

Direct action antiviral schemes	Interferon based schemes					Total
	BOC/peg-INF/RBV	peg-INF/RBV	TPV/peg-INF/RBV	peg-INF	None	
None	24	10	5	1		**40**
SOF/LDV					12	**12**
SOF/DCV/RBV	3	4	1		4	**12**
SOF/DCV		1	1		7	**9**
PTV/OBV/R/Dasabuvir /RBV				1	8	**9**
PTV/OBV/R/Dasabuvir		3		1	5	**9**
DCV/Asunaprevir	1	2	1		4	**8**
SOF/LDV/RBV	1	3	1		2	**7**
SOF/SMV/RBV		1				**1**
SOF/RBV	1					**1**
Total	**30**	**24**	**9**	**3**	**42**	**108**

BOC: boceprevir; DCV: daclatasvir; LDV: ledipasvir; OBV: ombitasvir; peg-IFN: pegylated interferon; PTV: paritaprevir; R: ritonavir; RBV: ribavirin; SMV: simeprevir; SOF: sofosbuvir; POS: Telaprevir.

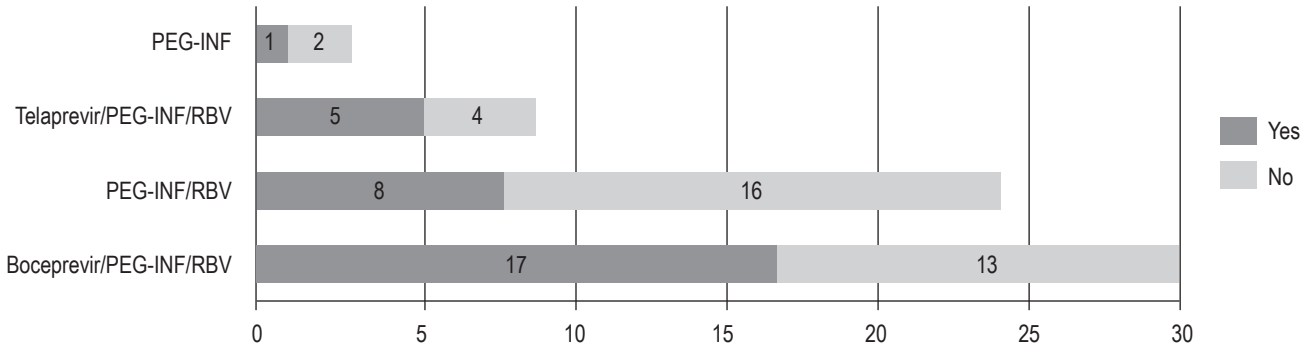

Figure 2. Sustained virological response range with interferon (n = 66). peg-INF: Pegylated interferon; RBV: ribavirin.

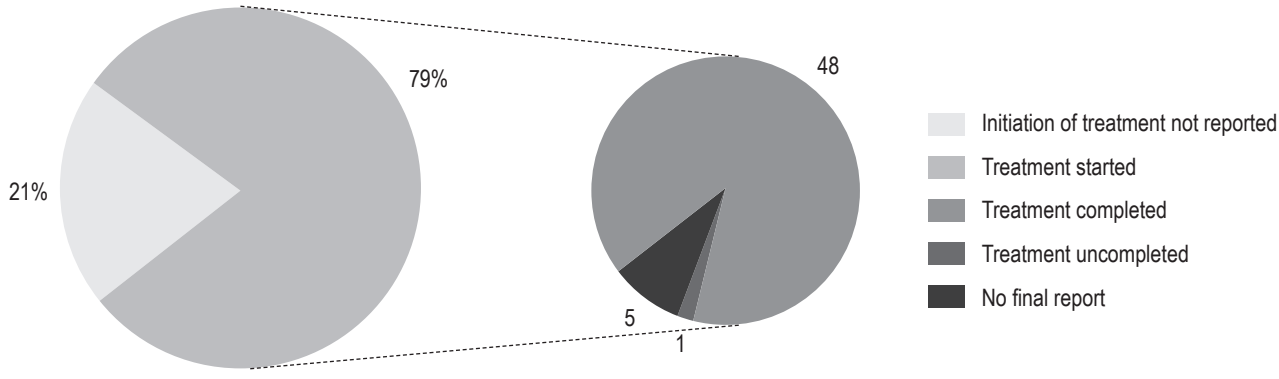

Figure 3. Status of treatment with direct-acting antivirals (n = 68).

Table 4. Adverse reactions to schemes with interferon, ribavirin and protease inhibitors (boceprevir or telaprevir)

ADR	Medication			n	%
	BOC/peg-INF/RBV	peg-INF/RBV	TPV/peg-INF/RBV		
Systemic	**37**	**42**	**7**	**86**	**39.8**
Asthenia	8	9	2	19	8.8
Adynamia	7	7	1	15	6.9
Fever	5	5	1	11	5.1
Muscle pains	2	6		8	3.7
Headaches	4	2		6	2.8
General malaise	2	4		6	2.8
Hyporexia	3	2		5	2.3
Chills	2	1	1	4	1.9
Coughing	1	2		3	1.4
Flu symptoms	1	1		2	0.9
Odynophagia		1		1	0.5
Polymyositis with elevated CK		1		1	0.5
Rhinorrhea		1		1	0.5
Dyspnea			1	1	0.5
Respiratory symptoms	1			1	0.5
Sinusitis			1	1	0.5
Weakness	1			1	0.5
Hematological	**36**	**9**	**12**	**57**	**26.4**
Neutropenia	12	4	3	19	8.8
Anemia	13	1	3	17	7.9
Leukopenia	8	3	4	15	6.9
Thrombocytopenia	2		1	3	1.4
Pancytopenia	1		1	2	0.9
Hematological alterations		1		1	0.5
Gastrointestinal	**10**	**9**	**2**	**21**	**9.7**
Nausea	3	2		5	2.3
Epigastralgia	3			3	1.4
Gastroesophageal reflux	1	2		3	1.4
Vomiting	2	1		3	1.4
Diarrhea	1		1	2	0.9
Loss of appetite		2		2	0.9
Dyspepsia		1		1	0.5
Belching		1		1	0.5
Other gastrointestinal symptoms			1	1	0.5
Neuropsychiatric	**11**	**8**		**19**	**8.8**
Depression	6	4		10	4.6
Insomnia	1	1		2	0.9
Dysgeusia	1			1	0.5
Hypersomnia		1		1	0.5
Hypomania		1		1	0.5
Suicidal ideation	1			1	0.5
Anxiety		1		1	0.5
Irritability	1			1	0.5
Vertigo	1			1	0.5

Table 4. Adverse reactions to schemes with interferon, ribavirin and protease inhibitors (boceprevir or telaprevir) (*continued*)

ADR	Medication			n	%
	BOC/peg-INF/RBV	peg-INF/RBV	TPV/peg-INF/RBV		
Dermatological	**9**	**2**	**6**	**17**	**7.9**
Itching	4		2	6	2.8
Rash	2	1	3	6	2.8
Alopecia	3			3	1.4
Skin lesions		1	1	2	0.9
Misceláneos	**4**	**4**	**4**	**12**	**5.6**
Anal pain			3	3	1.4
Canker sores			1	1	0.5
Weight gain	1			1	0.5
Dysphonia		1		1	0.5
Weight loss		1		1	0.5
Pleural pain		1		1	0.5
Phosphenes	1			1	0.5
Hemoptysis		1		1	0.5
Hyperbilirubinemia	1			1	0.5
Bleeding hemorrhoid	1			1	0.5
Endocrines	**1**	**2**	**1**	**4**	**1.9**
Thyroid disorders		2	1	3	1.4
Increase in blood glucose	1			1	0.5
Total	**108**	**76**	**32**	**216**	**100.0**

BOC: boceprevir; peg-INF: pegylated interferon; ADR: adverse drug reaction; RBV: ribavirin; POS: Telaprevir.

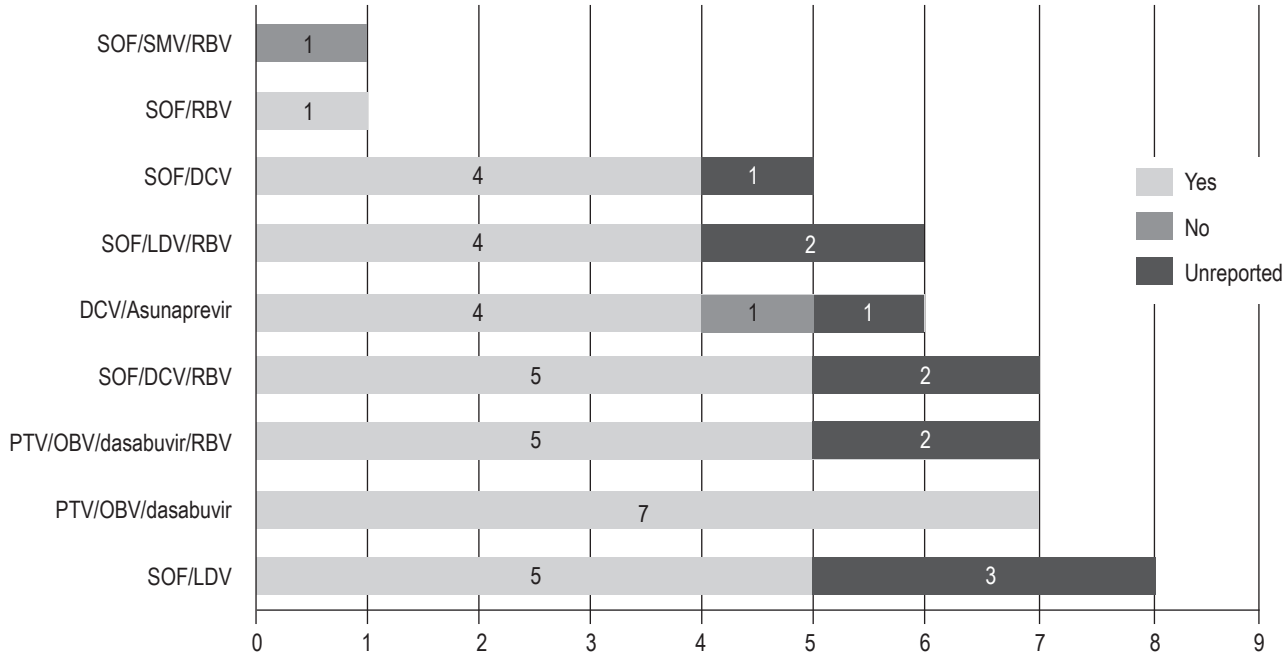

Figure 4. Scope of sustained viral response with Direct Action Antiviral schemes (n = 48). DCV: daclatasvir; LDV: ledipasvir; OBV: ombitasvir; PTV: paritaprevir; r: ritonavir; RBV: ribavirin; SMV: simeprevir; SOF: sofosbuvir.

Table 5. Patients with variants associated with resistance

	VAR	Sex	Age	GT	Scheme	Weeks	SVR
1	L31V and Y93H: resistance to DCV, EBV, LDV, OBV, VEL	Female	78	1b	DCV/asunaprevir	24	No
2	Y93N: resistance to DCV, ELB, LDV, OBV	Male	78	1a	SOF/SMV/RBV	12	No
3	L31V: resistance to: DCV, EBV, LDV, OBV, reduced susceptibility to VEL Q80K: SMV resistance.	Female	35	1a	SOF/LDV/RBV	24	Yes

DCV: daclatasvir; EBV: elbasvir; GT: genotype; LDV: ledipasvir; OBV: ombitasvir; RBV: ribavirin; SVR: sustained virological response; SMV: simeprevir; SOF: sofosbuvir; VAR: variant associated with resistance; VEL: velpatasvir.

Table 6. Recorded adverse reactions to direct-acting antiviral treatment schemes

ADRs \ Medication	SOF/DCV/ RBV	SOF/LDV/ RBV	DCV/ asunaprevir	PTV/OBV/r/ dasabuvir/ RBV	SOF/ DCV	SOF/ LDV	PTV/ OBV/r/ dasabuvir	n	%
Systemic	7	3	4	1			1	16	43.2
Asthenia	2		1				1	4	10.8
Flu symptoms	1		1	1				3	8.1
Headaches	2	1						3	8.1
Lower limb pain	1	1						2	5.4
Constitutional nonspecific symptoms		1						1	2.7
Arthralgia			1					1	2.7
Adynamia			1					1	2.7
Dizziness	1							1	2.7
Hematological	4	2						6	16.2
Anemia	4	2						6	16.2
Neuropsychiatric	2	1	1		1	1		6	16.2
Insomnia	1				1			2	5.4
Depression	1	1						2	5.4
Irritability			1					1	2.7
Alteration of immediate memory						1		1	2.7
Gastrointestinal	1	2		2				5	13.5
Diarrhea	1			1				2	5.4
Nausea		1						1	2.7
Gastrointestinal symptoms				1				1	2.7
Dyspepsia		1						1	2.7
Miscellaneous	1			1	1			3	8.1
Hypotension	1							1	2.7
Weight loss					1			1	2.7
Mild indirect hyperbilirubinemia				1				1	2.7
Dermatological			1					1	2.7
Itching			1					1	2.7
Total	15	8	6	4	2	1	1	37	100.0

DCV: daclatasvir; LDV: ledipasvir; OBV: ombitasvir; PTV: paritaprevir; r: ritonavir; ADR: adverse drug reaction; RBV: ribavirin; SMV: simeprevir; SOF: sofosbuvir.

None of the reported ADRs caused treatment discontinuation.

Polypharmacy in Patients with Hepatitis C

Four or more medications in addition to anti-HCV schemes were used by 46.3% of the patients used (Table 7). No records of outpatient medications were found for 17.6% of the patients.

Table 7. Polypharmacy in patients with chronic hepatitis C (n = 108)

Number of non-HCV medications	Frequency	%
<4	39	36.1
4-7	35	32.4
8-11	13	12.0
>12	2	1.9
No report	19	17.6

DISCUSSION

This is the first study of patients with HepC at the HPTU to look at the effectiveness and safety of DAAs. The distribution of HepC by sex and age was similar to that reported by Santos et al. Based on 1538 samples collected by referral laboratories in Colombia, they found an average patient age of 53 years (SD 14) with approximately 70% of patients between 40 and 70 years. (10) Genotype 1 and subtype 1b were found in 77.8% and 39.8% of the patients analyzed, respectively. According to Santos et al., they are the predominant genotype and subtype in Colombia. (10)

Advanced fibrosis/cirrhosis (F3-F4) was found in 39.8% of the patients with compensated cirrhosis in 77.5% of the cases in stage F4. An analytical cross-sectional study conducted in Cartagena for three months found that 50% of 41 patients had advanced cirrhosis/fibrosis, and 68% had compensated cirrhosis. (11) These differences may be due to the number of patients analyzed and to the short time within which information was collected in that study. The proportion of patients with cirrhosis was higher than that described by Hajarizadeh et al. (4-24%). (1) This can be explained by the level of complexity of the HPTU where patients with more advanced stages of disease are generally treated.

As in reports by other authors in Colombia and Latin America, blood transfusions constituted the main risk factor for contracting HCV. (12, 13) This result was expected since screening of blood donations for HCV in Colombia only began in 1993 and only reached 99% coverage in 1995. (14) Considering that the onset of cirrhosis begins 20 years after HCV exposure, the number of HepC diagnoses could increase over the next few years as the result of transfusions from before 1993. (1)

Effectiveness of Antiviral Therapy

SVR was achieved by 46.9% of patients given peg-IFN which is within the range of 6% to 56% reported in the literature. (8) For genotype 1, the most common genotype in this group, the response rate can reach 50%. (15)

An SVR of 94.6% was found in the group of patients who finished treatment with DAA. The cause of therapeutic failure in the other 5.4% was found to be VAR to NS5A inhibitors. This is consistent with Buti et al. who found that 1% to 7% of patients treated with DAAs do not reach SVR. (16) Causes could be attributable to the patient, the treatment regimen and/or the virus. (17)

VARs are changes in the nucleotide sequence responsible for synthesis of the proteins that are molecular targets of DAAs. This ability to generate resistance, typical of viruses, is greater in HCV than in other viruses such as HBV and HIV. (17) The VARs found in this study were L31V and Y93H which target NS5A inhibitors. VARs related to the nucleotide analog NS5B sofosbuvir were not reported. This can be explained by its high genetic resistance barrier. (18)

Similar to reports by other authors, the SVR rates of patients with VAR to NS5A and without VAR to NS5A were similar in this study. (19) Some researchers disagree about the relationship of VAR and SVR, so they recommend determining these variants at baseline especially in cases that involve a null response prior to therapy. (17, 18) Current Colombian guidelines for managing HepC recommend analyses of resistance to NS3 and/or NS5A only for patients who have not achieved SVR. (20)

The most frequent VARs in genotype 1b are reported to be L31V/M and Y93H/N. Y93H results in high levels of resistance to drugs that act on NS5A. It is important to note that VARs to NS5A continue to be present as long as two years after the end of treatment, so it is essential to consider them before administering rescue therapy. (17)

Safety of Antiviral Therapy

The availability of DAA has led to an improvement in the tolerability of treatment as in this study in which 25.9% of patients who received DAAs presented some type of ADR compared to 68.2% of those who received peg- INF. Although the analysis of the severity of ADRs was not the subject of this study, it was observed that patients with peg-INF/RBV had more severe ADRs especially hospitalizations due to anemia in which patients required blood products and infections associated with leukopenia or neutropenia.

We found that 39.8% of the patients who received peg-INF/RBV had systemic ADRs, especially asthenia, adynamia, fevers, myalgia and headaches. This is similar to reports the literature which show that these symptoms develop in 11% to 50% of cases, appear within a few hours following administration of medication, and have spontaneous remission from 24 hours to several days later. (21-25) Hematological ADRs are the most common of those due to peg-INF/RBV and are the main cause of low adherence rates, dose reductions and treatment discontinuation. (21, 22, 26) In this study, they occurred in 26.4% of the patients. They developed neutropenia and anemia which could be associated with bone marrow suppression by peg-IFN and RBV-induced extravascular hemolysis. (23, 27)

Systemic ADRs accounted for the largest portion (43.2%) of those that occurred in patients who received DAAs. They were followed by neuropsychiatric ADRs (16.2%), hematological ADRs (16.2%) and gastrointestinal ADRs (13.5%). Barrajón et. Al. reported very similar results in a retrospective analysis of 355 patients treated with DAAs. They found that 43.7% of their study population developed ADRs, mostly systemic (37.1%), gastrointestinal (18%) and neurological (15.8 %). (28) It can be inferred that the appearance of hematological and neuropsychiatric ADR swas related to the use of RBV combined with SOF/DCV or SOF/LDV. Development of anemia and depression occurred more frequently in these patiens than in those who did not receive RBV. Calleja et al. have also reported a high incidence of anemia (91%) in patients who received SOF/LDV/RBV. (7)

These results show that there are still cases in which the addition of RBV or peg-INF is necessary even though the use of DAA increases tolerability to antiviral treatment. This is especially true for patients previously exposed to interferon who present with cirrhosis which increases the risk of ADRs. (4, 20 , 28)

Polypharmacy in Patients with HepC

Polypharmacy can be defined as the use of five or more daily medications. (29) Our study found that 46.3% of the patients were polymedicated. This can be explained by age (> 50 years) and HepC patients with coexisting diseases which required additional medications.

Polypharmacy can increase susceptibility to medication-related problems such as ADR, falls, hospital readmissions, and drug interactions. (29) This makes establishment of comprehensive health care programs that include pharmacotherapeutic follow-up imperative to prevent and resolve these medication-related problems.

CONCLUSIONS

Characterization of patients with HepC treated at the HPTU during the study period found a similar distribution among men and women with higher prevalences between 40 and 70 years of age and with transfusions as the most frequent transmission mechanism. DAAs were safer and more effective than schemes with peg-IFN/RBV, but RBV is still necessary in cirrhotic patients with previous exposure to treatment, and this increases the risk of ADR.

There is a need to implement comprehensive patient-centered care with access to health services and medications throughout the course of treatment and appropriate pharmacotherapeutic follow-up. Similarly, prospective studies evaluating the safety and effectiveness of DAAs in patients with chronic HepC are needed.

LIMITATIONS

This study has several limitations. Given its retrospective nature, it is directly dependent on the quality of information recorded in the electronic medical records. During data collection, incomplete records were detected which could diminish the quality of the study. Similarly, medical notes lacked uniformity indicating that the hospital's electronic medical records need to be standardized from the start to the end dates of treatment. Reports of viral loads, concomitant treatment and possible mechanisms of transmission all need to be recorded for adequate patient follow-up as well as for the national epidemiological report.

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Conflicts of Interests

The authors declare that they have no conflicts of interest.

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