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**Quality of care provided to outpatients with hepatic cirrhosis in a teaching hospital**

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**ABSTRACT**

**Introduction:** a set of indicators to measure the quality of care of cirrhotic patients has been established and previously published studies report an adherence rate to clinical guide indications of 40-80 %.

**Objective:** to assess the adherence to quality indicators in a tertiary teaching hospital.

**Methods:** a retrospective observational study was performed of all cirrhotic outpatients seen during one semester in 2017. The charts were studied of 324 patients and quality indicators related to five domains were collected. An overall adherence to 14 quality indicators was recorded and analyzed based on the attending physician's experience.

**Results:** the results were excellent (more than 90 % adherence) for quality indicators related to prophylaxis of variceal bleeding and documentation of cirrhosis etiology, acceptable (60-90 % adherence) for hepatocellular carcinoma screening and disease severity assessment, and poor (less than 50 %) for vaccinations. Residents had significantly better results than experienced physicians in etiology, disease severity assessment and two indicators of prophylaxis of bleeding. Experienced physicians only presented a better adherence to hepatocellular carcinoma screening.

**Conclusions:** despite excellent results for some quality indicators, most required improvement, especially vaccinations. The quality of care achieved by residents is equal to and even better than that of experienced physicians. Measuring quality of care is essential to analyze and improve the health care of cirrhotic outpatients and may be a useful tool for supervising specialists in training.

**Keywords:** Liver cirrhosis. Quality of health care. Esophageal and gastric varices. Hepatocellular carcinoma. Internship. Residency.

## INTRODUCTION

Hepatic cirrhosis is a complex chronic disease characterized by impaired hepatic synthesis and portal hypertension (1). Patients with hepatic cirrhosis may develop a variety of complications that have an impact on prognosis, such as ascites, hepatic encephalopathy, esophageal variceal bleeding, bacterial infections and hepatocellular carcinoma (HCC) (1). In fact, decompensated patients have higher mortality rates than patients with compensated cirrhosis (2). Some of these complications can be prevented or treated via curative care if diagnosed early, and outpatient follow-up is essential for adequate prevention of variceal bleeding and for the early detection of HCC (3,4). Many clinical practice guidelines have established an optimal management of these patients (1,5-7) and adherence to good health care can significantly influence patient morbidity and mortality (8,9).

It is extremely important to measure the quality of health care in order to reduce practice variation and provide good health care (10,11). A set of evidence-based quality indicators (QIs) for different aspects of management have been established

to measure the quality of health care of cirrhotic patients (12-14). The indicators are related to different domains of quality measurements, such as etiology, HCC screening, prophylaxis of variceal bleeding, disease severity assessment, including liver transplantation evaluation (OLT) and general health care, such as vaccinations (15). Adherence to these quality indicators is low in the few published studies and ranges from 40 to 80 % (12-14,16-21). Thus, confirming that quality of care should be studied and improvement measures should be implemented (22,23).

The aim of this study was to assess adherence to cirrhosis-related quality-of-care indicators in a tertiary teaching hospital. Outpatient care was the focus, in order to select a manageable number of measurable indicators and analyze quality-of-care performance in relation to the attending physician's experience.

## **METHODS**

A retrospective observational study was performed at the Hospital Universitari de Bellvitge, which is a 700-bed, tertiary teaching hospital with an OLT program. The hospital is certified for specialist training and has kept electronic clinical records since March 2010. Cirrhotic outpatients are monitored within the Department of Digestive Diseases by medical staff or residents in their last year of training without supervision, in accordance with the current national program for specializing in digestive diseases (24). Cirrhotic patients are managed according to the indications established in 2014 by a consensus panel and based on the Baveno IV (25) guidelines. These indications were sent to all physicians responsible for caring for cirrhotic patients.

QIs were studied in all cirrhotic outpatients monitored by the Department of Digestive Diseases and seen during the second semester of 2017. The following ICD-10 diagnoses were used to select the patients: 571 (571.2, 571.5, 571.6 and 571.49) and 070.54. This last code (070.54: chronic viral hepatitis C) was included to detect stage F4 chronic hepatitis C patients, and those with a lower grade of fibrosis were excluded. Transplanted patients or those treated for HCC were excluded, as they need a different follow-up. Patient records were reviewed by three investigators (SS, AA, XX) and 14 QIs related to five domains of quality assessment were collected:

cirrhosis etiology, HCC screening, prophylaxis of variceal bleeding, disease severity assessment and general health care. The QIs were evaluated based on the clinical records of the semester in question and are shown in table 1, including the evaluation type for each variable. Additional potential covariates collected from the medical records included age, gender, alcohol consumption, day of the visit, follow-up time, presence of varices in the initial endoscopy, type of prophylaxis of variceal bleeding (primary or secondary), MELD and Child-Pugh scores and the reason for not performing an ultrasonography (US) or endoscopy. The attending physician's experience was also recorded, using three different categories: senior staff with more than 20 years of experience, junior staff with less than 20 years of experience or resident. The adherence to the 14 QIs was compared in association with the attending physician's experience.

Descriptive variables are presented as total numbers and percentages. The variables from different groups were compared using the Chi-squared test or Fisher's exact test. Continuous variables were compared using the Student's t-test or the Mann-Whitney U test. All tests were two-tailed and  $p < 0.05$  was indicative of statistical significance. SPSS 21.0 was used for the statistical analyses.

Patients' confidential information was protected according to national regulations and the study was approved by the Clinical Research Ethics Committee of the Hospital Universitari de Bellvitge.

## **RESULTS**

Five hundred and ninety-one patient records were reviewed, 324 of which were included in the study (Fig. 1). A total of 156 patients were monitored by three senior staff members, 84 by two junior staff members and another 84 by six residents. Of the 324 patients studied, 224 (69 %) were male and 178 (52 %) had an alcoholic etiology (alone or associated with HCV). QIs adherence is shown in table 1. Current alcohol consumption was reported in 148 of 178 (79 %) clinical records; 110 patients were abstinent and 38 were non-abstinent. The reasons for not performing an US are shown in table 2.

An initial endoscopy was not indicated in 17 patients as they did not meet the Baveno IV criteria that justified the test, such as signs of portal hypertension, less than 100,000 platelets or decompensated disease. An initial endoscopy was performed in 298 patients of the 307 (97 %) with a justified indication. Two patients refused to undergo the examination and the attending physician did not request one in seven cases. In this initial endoscopy, 213 patients had esophageal varices (64 grade 1, 117 grade 2, 31 grade 3 and 1 grade 4). Fourteen patients had gastric varices, four of whom did not have esophageal varices.

Prophylaxis of variceal bleeding with beta-blockers was indicated in 174 patients, due to the results of the initial endoscopy in 152 patients and varices that appeared during follow-up in 22 patients. Beta-blockers were contraindicated in nine patients and treatment was started in 162 of 165 (98 %) of patients in which it was indicated. The nine patients with beta-blocker contraindications were treated with a band ligation. Beta-blocker dose was reported in 53 % of cases and it was not possible to assess its adequacy (pulse control or maximum tolerance) in 56 %. Of the 65 records in which it was possible to assess adequacy, 60 had an adequate dose (92 %) and five had an inadequate dose (8 %).

Severity assessment according to Child-Pugh or MELD score was reported in 75 % of cases. Child-Pugh scores were used for most prognoses and MELD scores were reported in only 48 cases (15 %). Only 40 patients met the criteria for OLT assessment and it was discussed in 38 clinical records (95 %). HAV vaccination was indicated in 70 patients and was administered in 50 (71 %). HBV vaccination was indicated in 256 patients and 127 (49 %) were vaccinated. Pneumococcal vaccination was indicated in all patients and administered in 139 (39 %).

The comparative analysis yielded significant statistical differences between residents and senior physicians in five QIs (Table 3). On the one hand, residents had better results for etiology, disease severity assessment, documented dose of beta-blockers and follow-up endoscopies. On the other hand, senior physicians had better results for current US. With regard to the remaining QIs, there were no differences across the three groups.

## DISCUSSION

Health care quality has frequently been studied by analyzing outcomes in terms of recovery, restoration of function and survival (26). However, there are significant limitations when determining outcomes, as they are sometimes not clearly defined, difficult to measure or take a long time to manifest in some cases. Given these limitations, examining the process of care itself rather than the outcomes in order to measure quality of care is widely accepted. This approach may be even more relevant to the question of whether medicine is properly practiced (27). In light of this, this study on quality of care was performed by measuring QIs without analyzing any outcomes.

The Practice Metrics Committee of the American Association for the Study of Liver Diseases (AASLD) has recently identified 26 measures to define quality care of cirrhosis (13). However, this study was designed and performed before the publication of this article and some of the QIs used in our study are not included in these 26 measures. We chose QIs that can be applied to outpatients and collected retrospectively during the clinical course. The QIs selected in relation to HCC screening, prophylaxis of variceal bleeding, disease severity assessment and hepatitis A and B vaccinations have been reported in previous studies and are very similar to those included in the 26 measures approved by the AASLD (12,13,21). We have also included a cirrhosis etiology as documented in clinical records because all cirrhosis clinical guides recommend removing the etiological factor, especially alcohol consumption and hepatitis B or C virus infection. This is due to the fact that this is associated with a decreased risk of decompensation and increased survival rates (1,5). In addition, we also included current alcohol consumption in the case of alcoholic cirrhosis documented in clinical records because cessation of alcoholic intake in these patients is one of the best treatments of the underlying disease (28). In fact, 55 % of our patients had an alcoholic etiology (alone or associated with HCV). This QI is consistent with previous studies by Kanwal, who included similar QIs related to alcohol abuse: "If patients have alcohol-related cirrhosis, then they should be counseled to abstain from alcohol consumption" (12) and "patients with cirrhosis should receive counseling or be referred to a substance abuse treatment program"

(13). With regard to vaccinations, we also included the pneumococcal vaccine because spontaneous bacterial peritonitis and lung infections from this microorganism are not infrequent (29). In fact, there is a national consensus in Spain that adults at risk of underlying clinical conditions, including hepatic cirrhosis, should receive this vaccine (30). Although not stated in hepatic cirrhosis clinical guides, the US Advisory Committee on Immunization Practices also recommends one dose of this vaccine in patients with chronic diseases, including chronic liver disease (31). We have not studied QIs related to ascites or encephalopathy management because they do not reflect outpatient assistance. Furthermore, frailty tests were not included, as they were not performed in 2017.

With regard to the results of our study, it should be emphasized that we obtained adherence rates greater than 90 % in five QIs and these results can be considered as excellent. These five QIs were cirrhosis etiology documented in clinical records, current US, initial upper endoscopy, prophylaxis of variceal bleeding with beta-blockers and OLT discussion. In the case of HCC screening with US, the results were worse for the biannual examination of the last three years (67 %) and only 62 % of patients underwent all the examinations, if we consider both previous and current US (Table 2). The results are suboptimal but similar to those previously reported. In fact, the overall adherence rate was 52 % in a recent meta-analysis (32), with 70 % in European studies (such as ours) and only 39 % in retrospective studies, which is considered as closer to the real-world scenario. Since our study is retrospective, the results are better than expected but can clearly be improved. It is important to note that the reason for not performing an US within the last three years was attributable to the physician not requesting the examination in 19 % of cases and only occurred in 1 % of current US.

The results for prophylaxis of variceal bleeding were generally very good. Initial endoscopy was performed in 97 % of cases and prophylaxis with beta-blockers was started in 98 % of cases in which it was indicated. On the contrary, only items related to the documentation of blocker dose and the adequacy thereof are poor. The documentation of beta-blocker dose by senior staff is very poor (18 %) and represents an area to be improved. Adequacy of the dose was only found in 44 % of

cases.

The severity assessment was documented in most clinical records. The overall result was 75 %, as we accepted both Child-Pugh and MELD scores. It is surprising that MELD scores were documented in only 14 % of cases from a center with a liver transplant program, whereas Child-Pugh scores were used in all other cases. However, OLT discussion was present in almost all the clinical records of patients in which it was indicated, as could be expected in a center with an OLT program.

Vaccinations showed the worse results and are an issue that requires improvement. The fact that vaccinations are normally administered in primary care in Spain does not justify such poor results, since hospital specialists are responsible for indicating them.

One of the most important reasons for performing this study is that the current national program for the specialization in digestive diseases requires that residents in their last year of training monitor outpatients without on-site supervision of staff members (24) and that their performance must be measured. Measuring the quality of care provided by residents represents an important way of supervising their work. In our case, the results obtained by residents were excellent, similar or even better than those of staff in almost all the QIs. It should be emphasized that three of the four QIs in which residents showed better results are related to completing clinical charts such as cirrhosis etiology, beta-blockers dose and recording Child-Pugh or MELD scores. Senior staff only performed better in current US.

One significant strength of our study is the sample size, with 324 patients. The retrospective design could be considered as a drawback, but reality is reflected more accurately when performed retrospectively in this type of study (32).

Our results are consistent with those previously reported and confirm that the quality of care of cirrhotic outpatients can be measured. Furthermore, there is considerable room for improvement, despite excellent results for several indicators. Quality indicators in charts completed by residents can be considered as excellent and even better in some cases than those completed by more senior staff. Corrective measures should be implemented due to the need for improvement (22,33). The next steps are to create a new protocol for cirrhotic outpatients that include the

latest guideline, hold a training session with the staff and residents responsible for their care and establishing a checklist (34) to be completed after each visit. A new study was performed during the second semester of 2019 to analyze adherence to quality indicators following the implementation of these corrective measures.

In conclusion, measuring health care is essential to detect areas in need of improvement in order to provide excellent care that might eventually have an effect on the morbidity and mortality rates of cirrhotic patients. Furthermore, it is also a useful tool to supervise specialists in training.

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**Table 1. QIs evaluated in the outpatient clinic**

<i>Domain</i>	<i>QIs</i>	<i>Type of evaluation</i>
Cirrhosis etiology	Cirrhosis etiology	Documented in clinical notes
	Current alcohol consumption (in the case of alcoholic cirrhosis)	Documented in clinical notes
HCC screening	Current US	Performed
	US performed every 6 months during the last three years	Performed every 6 months $\pm$ 2 months
Variceal hemorrhage prophylaxis	Initial upper endoscopy	Performed (if indicated)
	Follow-up endoscopies	Performed within an appropriate timeframe (if indicated)
	Prophylaxis of variceal bleeding	Implemented if indicated
	Beta-blockers dose	Documented in clinical notes
	Adequate beta-blocker dose	Pulse control or maximum dose tolerated reflected in the clinical notes
Disease severity assessment	Prognostic score (Child-Pugh or MELD)	Documented in clinical notes
	Transplant discussion	Documented if Child B-C or MELD > 14 in patients younger than 69 years old
General care	HAV vaccination	Completed. Indicated in patients older than 40 years
	HBV vaccination	Completed. Indicated if HBV serology negative
	Pneumococcal vaccination	Completed. Indicated in all patients

QI: quality indicator; HCC: hepatocellular carcinoma; US: ultrasonography; HAV: hepatitis A virus; HBV: hepatitis B virus.

**Table 2. Reasons for not performing US**

	<i>Current</i>	<i>Previous 3 years</i>
Performed	290 (90 %)*	215 (67 %)*
Not requested	5 (1.5 %)	59 (18 %) (19 during hepatitis C treatment)
Requested but not scheduled	25 (8 %)	31 (9 %)
Appointment missed	1 (0.3 %)	11 (3 %)
Unknown	-	4 (1 %)

\*US was only evaluated in 320 patients as four patients had class C Child-Pugh scores and no chance of OLT. Considering both previous and current US, only 199 of 320 patients (62 %) underwent all the examinations.

**Table 3. QIs with significant differences based on the attending physician's experience**

<i>Quality indicator</i>	<i>Senior staff</i>	$P_1$	<i>Junior staff</i>	$P_2$	<i>Residents</i>	$P_3$
Documented cirrhosis etiology	133 (85.3)	0.000	83 (98.8)	0.150	83 (98.8)	0.000
Documented disease severity assessment	91 (58.3)	0.000	68 (81)	0.000	83 (98.8)	0.000
Current US	145 (94.8)	0.124	75 (89.3)	0.370	70 (84.3)	0.015
Follow-up endoscopies	64 (76.2)	0.490	35 (83.3)	0.037	53 (96.4)	0.002
Documented beta-blockers dose	12 (18.5)	0.000	30 (69.8)	0.036	39 (88.6)	0.000

$P_1$ : comparison between senior staff vs junior staff;  $P_2$ : comparison between junior staff vs residents;  $P_3$ : comparison between senior staff vs residents.

Fig. 1. Flow chart of patients included and adherence to the 14 quality of care indicators of the five domains analyzed.

Accepted Article