

A 3-Year Retrospective Study of the Impact of Integrating an Addiction Liaison Team into an Outpatient Alcoholism Treatment Programme

José L. Bernal-Sobrino^{1,2}, Francisco Arias-Horcajadas^{2,3,4,5}, Carolina Varela-Rodríguez^{id 2,6,*}, Cristina Losada-Pérez^{2,3}, Agustín Blanco-Echevarría^{2,4,7}, María J. del Yerro Alvarez^{2,3}, Marta Martín-Mayor^{2,3,4}, and Gabriel Rubio^{2,3,4,5}

¹Control Management Department, Hospital Universitario 12 de Octubre, Carretera de Córdoba s/n 28041, Madrid, Spain

²Instituto de investigación Biomédica i+12, Carretera de Córdoba s/n 28041, Madrid, Spain

³Psychiatry Department, Hospital Universitario 12 de Octubre, Carretera de Córdoba s/n 28041, Madrid, Spain

⁴Medical School at Universidad Complutense de Madrid, Pl. de Ramón y Cajal, s/n, 28040 Madrid, Spain

⁵Addictive-Disorders Research Network (Red de Trastornos adictivos—RETICS) at Instituto de Salud Carlos III, C/ Sinesio Delgado, 4 28029 - Madrid, Spain

⁶Quality of Care Unit, Hospital Universitario 12 de Octubre, Carretera de Córdoba s/n 28041, Madrid, Spain

⁷Internal Medicine Department, Hospital Universitario 12 de Octubre, Carretera de Córdoba s/n 28041, Madrid, Spain

*Corresponding author: Quality of Care Unit—Hospital Universitario 12 de Octubre, Carretera de Córdoba S/N—21048 Madrid, Spain.

Tel.: +34 658508336; E-mail: carolinavr@gmail.com and carolinavr@gmail.com

Abstract

Background: The number of inpatients with alcohol and other substance-related problems (ASRP) in the general hospital population at any time is vast. To meet the needs of those patients, most hospitals have an Addiction Liaison Team (ALT) that diagnoses and initiates the treatment of the addictive disorder. In our hospital, this team is part of a more extensive and intensive Outpatient Alcoholism Treatment Programme that facilitates the continuity of care.

Aim: the main goal of this study is to evaluate the performance and effectiveness of our inpatient ALT.

Methodology: we carried out an observational cohort study of patients with ASRP admitted to the hospital from 2015 to 2017. We evaluated the performance and effectiveness of our ALT: referrals to the programme, inpatients mortality, readmissions to hospital, hospital length of stay (LOS) and medical or surgical treatment adherence.

Results: out of 133,181 admissions, 17,387 (13.14%) were positive for ASRP, and 615 (3.54%) were referred to the ALT. Referred patients had less in-hospital mortality, shorter LOS and lower risk of readmissions during the first year of follow-up. Subjects treated in the programme had better therapeutic adherence.

Conclusions: integrating the ALT into an outpatient programme facilitates an earlier detection and initiation of treatment during the hospital stay and the continuity of care. Alcohol misuse conditions affect the patient's prognosis and health outcomes, so appropriate care is needed. Inclusion in the programme was associated with less risk of hospital mortality, fewer readmissions and a lower LOS.

INTRODUCTION

Alcohol misuse is a frequent health issue and a significant public health problem in Europe, often associated with a high mortality rate. A study on the prevalence of mental health problems in Europe estimates that up to 5.3% of the European population has presented with either alcohol misuse or dependence throughout their lives (Wittchen et al., 2011). Up to 50% of the emergency department and 30% of the Acute Medicine Department admissions are related to alcohol consumption (Smothers et al., 2004). The direct and indirect costs derived from alcohol misuse or dependence can be as high as 600 euros 'per' person 'per' year (World Health Organization, 2018). Spain occupies the sixth position in a European Statistical rank of alcohol consumption-derived costs by countries (Wittchen et al., 2011).

The 2021 Spanish Ministry of Health report shows that during 2019–2020, 93.0% of the 15–64-year age-group (95.0% of men; 90.4% of women) recognized having

consumed alcohol throughout their lives. When considering the last 12 months, the last 30 days and drinking daily, 77.0% (72.0% of men and 71.6% of women), 83.0% (72.0% of men and 53.9% of women) and 8.8% (14.2% of men and 3.4% of women) of the total population, respectively, reported having taken alcoholic beverages. Regarding alcohol intoxication, 10.8% of the population reported at least one intoxication episode in the last 12 months (13.0% of men and 7.8% of women). Moreover, binge drinking in the last 30 days was reported by 31.2% (5–6 drinks) to 36.9% (1–2 drinks) of the total population.

Despite the high prevalence of alcohol misuse, this condition is underdiagnosed in in-patient populations (Monras et al., 2003; Chen et al., 2004; Smothers et al., 2004; Diehl et al., 2009). Moreover, these patients usually do not have access to a specific treatment for their addiction (Marin et al., 1994; Piette et al., 1998; Smothers et al., 2004). The lack of specialized management has been related to poorer

medication compliance (Brennan et al., 2001), more readmissions to the hospital (Nordeck et al., 2018) and higher post-discharge mortality rates (Probst et al., 2014). Hence, it seems essential to have a specific programme to provide a holistic approach for identifying and offering patient-centred care strategies and fulfilling patients' needs during their stay in the general hospital. This programme should be expected to improve treatment adherence and facilitate engagement with social and mental health community teams. Addiction Liaison Teams (ALT) based at general hospitals have become crucial to assure commitment to alcohol and other substance-related community teams (Trowbridge et al., 2017). The ALT is integrated by the following Mental Health Unit professionals and workers: two psychiatrists, one psychologist, one mental health nurse and one administrative. Initiating treatment for substance use disorders in the acute hospital setting is feasible and effective, leading to better medical and health outcomes, including emergency utilization, increased completion of medical therapy and transitioning to outpatient substance use treatment programmes (Wei et al., 2015).

The treatment programme for alcohol and other substance misuses at the 'Hospital Universitario 12 de Octubre', a tertiary teaching hospital in Madrid (Spain), was implemented in 2014. Thus, a multidisciplinary team comprised of different services such as Internal Medicine, the Emergency Department, the Gastroenterology Department, the Liver Transplant Team, General Practitioners from Primary Care and patient associations were involved in developing the programme (Rubio et al., 2018). As a first step, the alcohol misuse screening tests and the criteria for patient referrals were explained in detail in a training course. The normalized procedure is as follows (Fig. 1). The patient's clinician of reference detects or suspects an alcohol-related issue during the hospital stay and asks for a consultation with the mental health department or directly to the ALT. Once the consultation is received, the ALT member interviews the patient and evaluates the risk of alcoholism. Depending on the severity of the alcohol and other substance-related problem (ASRP), a specific personalized intervention is defined, including, amongst others, pharmacological detoxification and motivational interviews to reduce consumption. Before hospital discharge, the patient is given an appointment for the outpatient alcohol programme.

The care process began once the hospital team identified the patient as an alcohol misuser and was referred to the ALT. These referrals were usually attended to within 24 h. The ALT would consult and work with other specialists to manage alcohol withdrawal and detoxification during hospital admission. Through motivational interventions, mental health professionals worked on the engagement with the programme once the patient was discharged from the hospital. A 2-year community follow-up after hospital discharge was offered to the patient (Rubio et al., 2018) (Fig. 1). As detailed in the article published by Rubio et al. (2018), the outpatient alcohol programme develops throughout 24 months; it takes place in an outpatient hospital setting and includes several interventions such as detoxification, motivational interviewing (2 months), relapse prevention (4 months), development of social skills (3 months), knowledge consolidation and discharge preparation (12 months) (Fig. 1).

The 'Hospital Universitario 12 de Octubre' is one of the biggest tertiary hospitals in Spain, with around 1300 beds, a workload of 7000 people, more than 45,000 stays

and 250,000 external consultations per year. It is a public hospital of the Spanish National Health Service, thus paid by general taxes and with a nearly universal population coverage. It has a 500,000 reference general population and more than 1,500,000 reference population for several services such as Oncology Radiotherapy. It is also a national reference for more than 15 pathologies. Hospital admissions can be achieved by primary care derivation to the specialist or by the patient demand via the emergency department. As for the alcohol programme, any person in the reference population can ask for admission with or without previous medical derivation.

This study's main goal was to evaluate our ASRP programme's efficacy. To achieve this aim, we considered relevant indicators such as referrals to the programme, in-patients' mortality, readmissions to the hospital, length of stay (LOS) and medical or surgical treatment adherence.

MATERIALS AND METHODS

We conducted a cohort, descriptive, observational, retrospective study of patients meeting criteria for alcohol or other substance misuse condition admitted to the Hospital Universitario 12 de Octubre between 1 January 2015 and 31 December 2017. The inclusion criteria were patients registered in the Minimum Basic Dataset (MBDS) under the alcohol-related and substance misuse-related ICD codes as a primary or secondary diagnosis (codes 291*, 292*, 303*, 304* and 305* from the ICD-9-MC for 2015 and F1* from CIE-10 for 2016 and 2017). As an exclusion criterion, we used the All Patient Refined Diagnosis Related Groups (APR-DRG), a patient classification scheme that incorporates the severity of illness. Data from patients registered under the unspecific APR-DRG (955 and 956) were considered unreliable and therefore excluded. The APR-DRG numbered 955 refers to 'principal diagnosis invalid as discharge diagnosis', whereas the APR-DRG numbered 956 refers to 'ungroupable'. The data sets used and analysed during the current study are available from the corresponding author upon reasonable request.

The dependent variables studied were referrals to the programme, inpatient mortality, readmissions for all causes and LOS during the first year after discharge. A binary logistic regression calculated risk-adjusted inpatient mortality (Supplementary Table S1) and first-year readmissions (Supplementary Table S2). The final model included the following variables: sex, age, type of admission (programmed or urgent), mortality risk associated with the APR-DRG using the risk-adjusted inpatient mortality, and the mean-adjusted APR-DRG weight and severity level for readmissions after 1 year. For severity level, we used the normalized and standardized APR-GRD procedure that considers the secondary diagnoses and the interaction amongst secondary diagnoses, age, principal diagnosis and the presence of specific procedures. To estimate the accuracy of the adjustment, we evaluated the area under the curve (AUC) ROC (Fig. 2). The AUC ROC considers the ability of the proposed model to predict the results, comparing the results offered by our proposed model against a 'random' model supported only by probability.

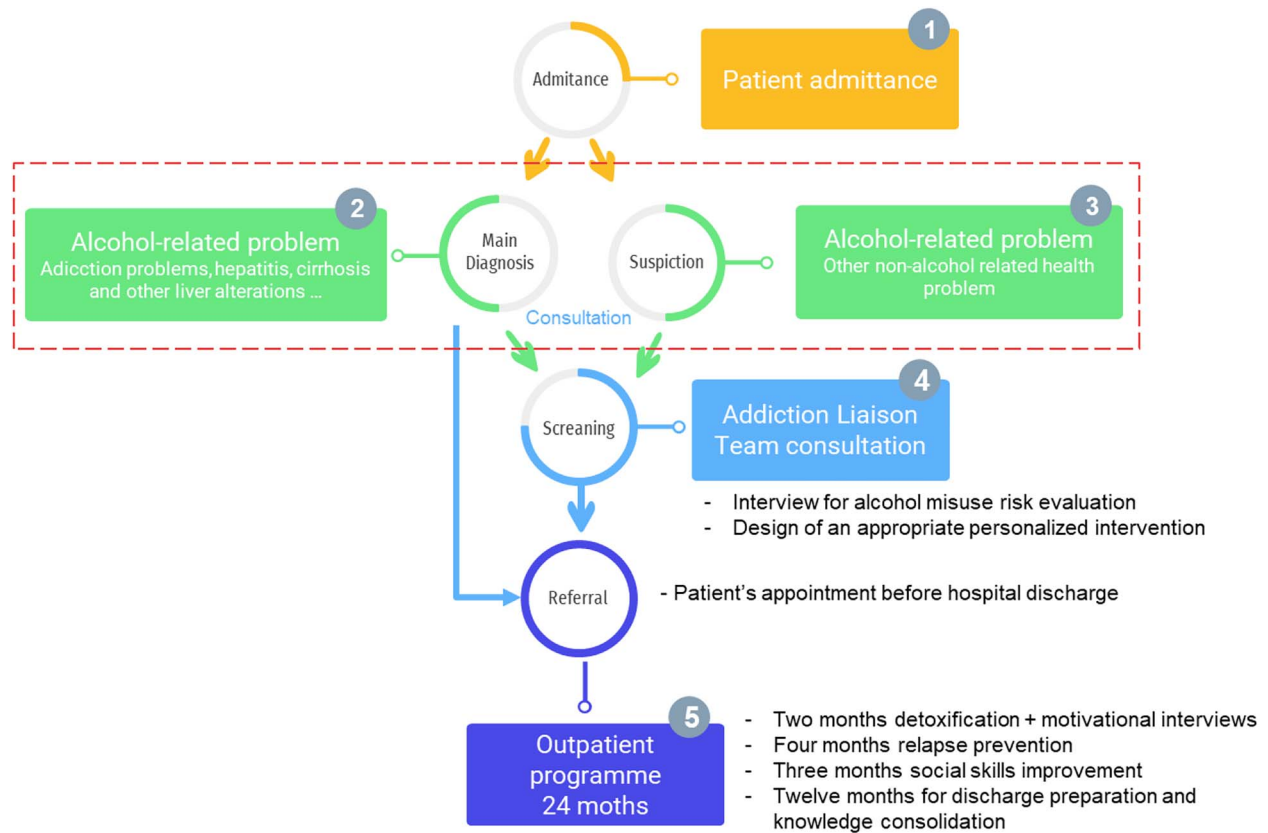


Fig. 1. After the patient’s admittance to the hospital (1), if the principal diagnosis causing the hospital stay is or could be related to alcohol misuses (2), such as addictions, hepatitis or cirrhosis or other liver alterations, patients is screened for ASRP. Patients then could be referred to the outpatient programme with (4) or without (5) intervention of the ALT. Systematic screening is not performed if the principal diagnosis causing the hospital stay is not directly related to alcohol misuse. However, if the clinician responsible for the patient has established a possible ASRP they contact the ALT (4). The dashed-line square indicates the point of intervention.

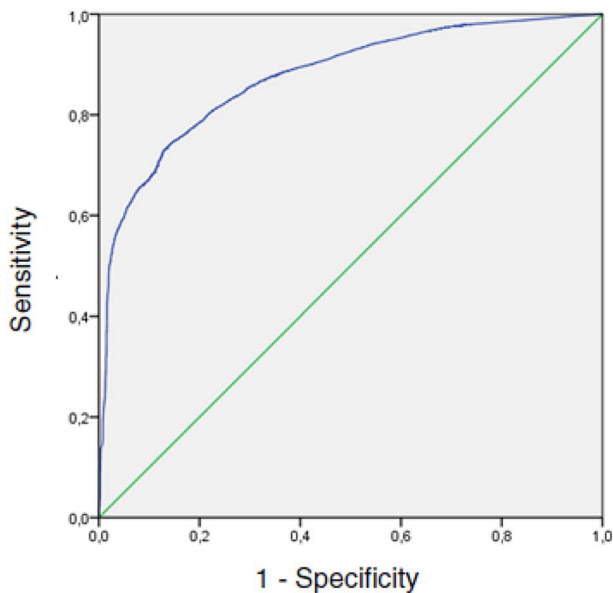


Fig. 2. ROC curve of the risk-adjusted in-hospital mortality model, the AUC, estimates that the adjustment proposed by the model is appropriate in 87.6% of the cases.

To risk-adjust the inpatient LOS, Poisson regression was used, and the overdispersion was analysed using the negative binomial regression with a chi-square test. The final model

included the following variables: sex, age, type of admission (programmed or urgent) and the mean APR-DRG weight (Supplementary Table S3).

Gross mortality rates (GMR) and first-year readmissions gross rates (RGR) were calculated as the division between the number of deaths (‘exitus’) or readmissions observed, respectively, and the global number of patients considered. The risk-adjusted mortality (RAMR) and readmission ratios were calculated by dividing the ‘exitus’ or first-year readmissions observed and the ‘exitus’ or first-year readmissions expected, respectively. The expected ‘exitus’ and readmissions were computed using the predictive models described above. The Byar approximation to Poisson’s exact test was used to obtain confidence intervals at 95%. The results obtained for included versus excluded patients in the inpatient health programme were compared.

Finally, to evaluate the programme’s impact on adherence to the prescribed treatment, our study compares the proportion of missing programmed consultations for any speciality or service the year before and after their inclusion into the programme.

Continuous variables were described using the mean, standard deviation or median and interquartile range. Categorical and binary variables were expressed as frequencies and percentages. We used the *t*-Student or the Mann–Whitney U-test and the χ^2 or the exact Fisher test to compare continuous and qualitative variables, respectively. All of them were bilateral, and we considered statistically significant

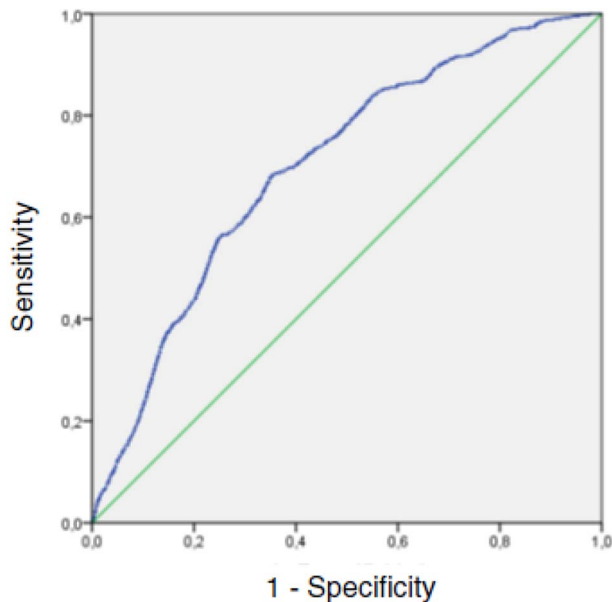


Fig. 3. ROC curve of the risk-adjusted first-year readmissions model, the AUC estimates that the adjustment proposed by the model is appropriate in 70.2% of the cases.

P-values < 0.05. Analyses were performed using SPSS V21 and Stata V13.

RESULTS

The model for the risk-adjusted in-hospital mortality had a high discrimination power (Fig. 2) with an AUC ROC = 0.876 (0.871–0.880) and a Pseudo R^2 = 0.238.

The model for the risk-adjusted first-year readmissions had a medium discrimination power (Fig. 3) with an AUC ROC = 0.702 (0.698–0.709) and a Pseudo R^2 = 0.0625.

There were 133,181 inpatient admissions; 854 (0.64%) were excluded since they were grouped under the unspecified APR-DRG. There were 17,387 patients classified as having an alcohol or substance-related condition, thus fulfilling the inclusion criteria and being considered for our study population. Therefore, the 3-year period-prevalence was 13.14%. This data could be underestimated because of underdiagnoses in electronic health records (EHR). In all, 615 (3.54%) were referred to the ALT and were followed up during hospital admission (Fig. 4). Of those patients, 219 patients had a principal diagnosis of ‘alcohol and drug misuse’ and ‘alcohol and drug-induced mental disorders’ during the inpatient admission episode. However, only 90 were finally referred to the programme (41.09%) (Fig. 4). The services with a better screening capacity were gastroenterology (15.12%) and internal medicine (7.74%). Any other service completed less than 3% of the referrals.

As shown in Table 1, patients identified and referred to the ALT included a lower proportion of women (21.95 versus 28.82%). They were younger but had similar complexity, measured as the mean weight of APR-DRG (P = 0.999) compared with patients with ASRP identified in the EHR but not referred to the ALT.

Non-attendance to outpatient consultation

The proportion of missed appointments of patients included in the programme was higher the year before its

implementation than the year after (23.91 versus 17.54%; P < 0.001).

In-hospital mortality, first-year readmissions and the average LOS

In all, 511 ‘exitus’ of patients with ASRP were identified during the study period. Only seven of these patients had been referred to the ALT. They were admitted during hospitalization in the following departments: gastroenterology (n = 3), oncology radiotherapy (n = 1), neurology (n = 1), haematology (n = 1) and internal medicine (n = 1). The average age of the patients included in the programme was 50, and six out of seven were men. In the group of patients who were not referred to the programme (n = 504), the causes of death were in order of frequency: respiratory (n = 124), circulatory (n = 74), neurological (n = 68), digestive (n = 57) and infection/parasite (n = 46) conditions.

Health outcomes were significantly better in patients referred to the ALT. Table 2 shows that patients referred to the ALT had a GMR of 1.14%, which is 0.80% lower than the cohort including all patients (with and without ASRP), 1.94%, and 1.86% lower than patients with ASRP not referred to the ALT. While patients not referred to the ALT showed a RAMR similar to the all-patient cohort (RR = 0.94 [CI_{95%} = 0.85–1.02]), referral to the ALT had a protective effect (RR = –0.30 [CI_{95%} = 0.12–0.54]).

The gross readmission rates were bigger in non-referred patients (32.91%) than in ALT-referred patients (24.51%) but similar to the general inpatient population (32.61%). The risk-adjusted readmission rates were 4.7 times higher in not referred patients versus (RR = 4.77 [CI_{95%} = 4.52–4.77]) ALT-referred patients (RR = 2.16 [CI_{95%} = 1.83–2.52]).

Regarding the LOS, the ALT-referred patients showed a similar duration as the general inpatient population (7.74 days versus 7.09), whereas the non-referred patients had longer lengths of stay (12.40 days). However, the risk-adjusted LOS was 46% days longer in the ALT-referred patients (RR = 1.46 [CI_{95%} = 1.43–1.50]) and only 4% in the non-referred patients (RR = 1.04 [CI_{95%} = 1.039–1.05]).

DISCUSSION

To the best of our knowledge, this is one of the few studies that has assessed the impact of implementing a specific programme to detect and treat alcohol and other substance misuse-related conditions during the patient’s hospitalization because of other medical or surgical conditions. The main findings of our study were that patients referred to the programme had less in-hospital mortality, a shorter LOS, a lower risk of readmissions during the first year of follow-up and better therapeutic adherence. However, despite its evident benefits, the low rates (3.5%) of detected and referred patients to the programme are noteworthy.

Several studies have shown, amongst general hospital inpatients, low rates of ASRP detection (Chen et al., 2004; Smothers et al., 2004; Diehl et al., 2009) and referrals to specific treatment programmes (Smothers et al., 2004; Diehl et al., 2009). The percentage of current or in remission ASRC detection in our hospital was low. Moreover, once patients were identified, the rate of patients referred to the treatment programme was also low. These percentages align with other authors’ reports (Smothers et al., 2004; Diehl et al., 2009). In

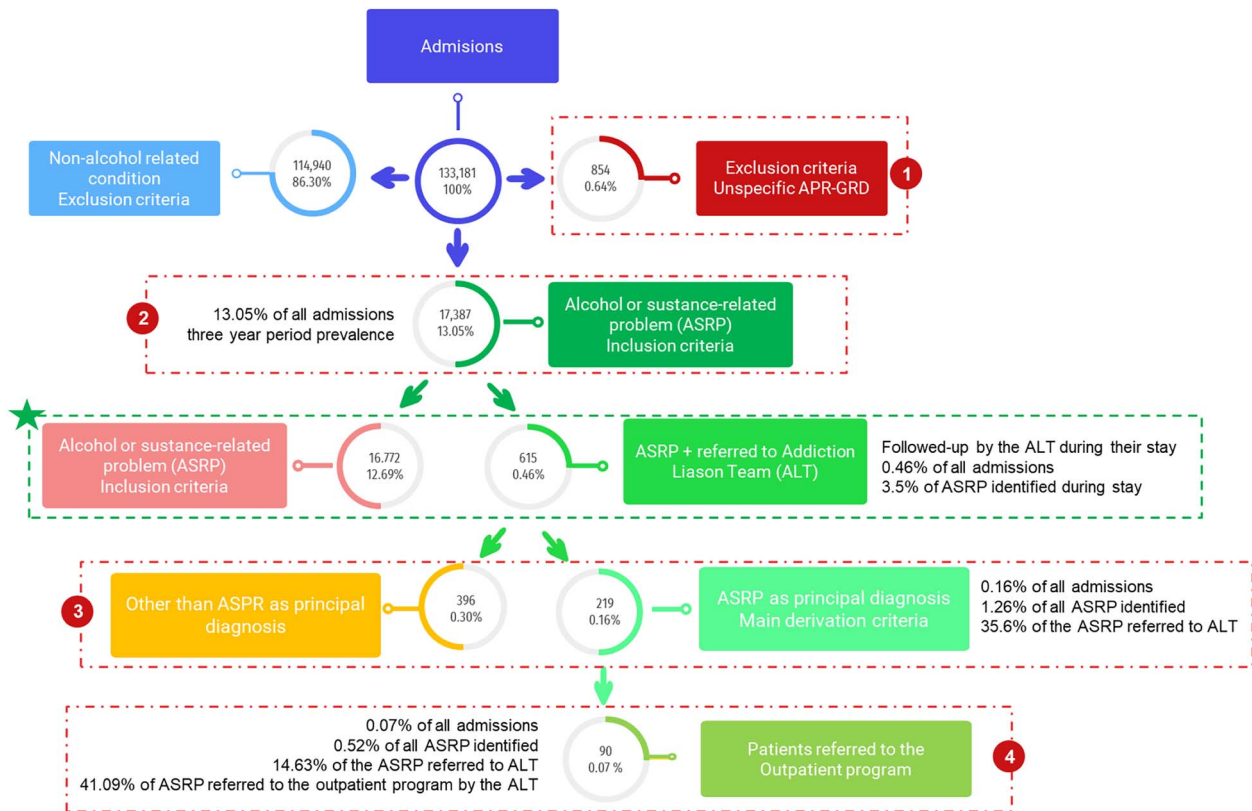


Fig. 4. Cohort patient flowchart describing percentages of patients' classification from all admissions to patients referred to the outpatient programme during the 3-year study period. The red square with a discontinuous line indicates identifiable causes for missing data. (1) The main reason for the patient loss at this step is poor-quality data in the EHR. (2) The main reason for the patient loss at this step is clinicians' underdiagnoses and lack of ASRP suspicion. (3) The main reason for missing data could be the underestimation of ASRP impact in other pathologies or the degree of the patient's addiction. (4) The main identified reason for possible missing referrals is the excessive workload in the ALT and outpatient programme, prioritizing the clear cases. The green star indicates the comparison groups: the intervention group ($n=615$), which includes the subgroup of patients in the cohort that have been identified as suffering ASRP in the EHR; it was identified as a problem during the stay, and the patient referred to the ALT for evaluation. The control group ($n=16,772$) is the subgroup of patients in the cohort identified as suffering ASRP in the EHR, but during the stay, they were not considered in the decision problem and were not derived to the ALT.

these studies, the main reasons suggested for this poor registration of ASRP in the health records were deficient diagnosis skills to identify these disorders (Clark, 1981; Geller et al., 1989) and insufficient education of healthcare professionals to detect and manage them (Miller et al., 2001).

In addition to these already reported reasons, we have considered other factors related to our sample. First, there is a stigma associated with ASRP in our country. Therefore, several cognitive biases may affect the decision-making during the healthcare process for both patients and health professionals. On the one hand, this stigma affects patients' willingness to be included in the programme primarily because of the non-acceptance of the diagnosis. On the other hand, professionals could be reluctant to involve patients in the programme or even discuss their alcohol or substance misuse with them.

Moreover, because of the cultural acceptance of alcohol consumption in a wine producer country like ours, there are difficulties in identifying and accepting the alcohol misuse diagnosis in the mild or initial stages of the illness. Thus, binge drinking is understood as a 'normal' behaviour at a young age and will not even be considered for medical attention unless it is directly associated with alcohol-related medical issues. There are also several issues regarding the medical setting itself, so there is a trend amongst health professionals to

believe that alcoholism is a mental health issue and, therefore, they do not pay special attention to it. Furthermore, over-specialization could be an issue, so professionals could feel unprepared to deal with ASRP. Finally, if the ASRP is recorded in the EHR, they consider that the patient has been evaluated already.

Using IC-10 codification, we identified patients with a notation regarding alcohol and substance-related misuse in the clinical documents. In our context, a very extended practice is copying personal health background in clinical reports from previous healthcare assistance without checking these data, including alcohol misuse. That favours inadequate information transmission and contributes to amplifying a missing window of opportunity in recruiting patients that could benefit from the programme. In addition, lack of time during patient attendance or the assumption that your colleagues have appropriately studied medical issues unrelated to your speciality could be the root causes of this behaviour. For these reasons, there is a need to provide health professionals guide to systematically record information regarding smoking habits, daily physical exercise, drug consumption and dietary intake in medical records.

ASRP have implications for prognosis and health outcomes. Our results showed that inclusion in the Outpatient Alcoholism Treatment Programme was associated with better

Table 1. Descriptive analysis of the profiles of patients with alcohol or substance-related conditions

	Outpatient programme				P
	Included		Non-included		
	Mean	SD	Mean	SD	
Age	50.3	11.1	56.4	16.0	<0.001
	Included		Non-included		P
	n	%	n	%	
Sex					
Male	480	78.0	11.938	71.2	<0.05
Female	135	22.0	4.834	28.8	<0.05
Serviced assigned					
Internal medicine	291	47.3	3.468	20.7	<0.05
Gastroenterology	190	30.9	1.066	6.4	<0.05
Cardiology	30	4.9	1.573	9.4	<0.05
Traumatology	21	3.4	799	4.8	<0.05
Other services	83	13.5	9.866	58.8	≥0.05
Main diagnosis category					
Diseases and disorders of the liver, biliary system and pancreas	207	33.7	1.492	8.9	<0.05
Alcohol and drug misuse and alcohol and drug-induced mental disorders	90	14.6	129	0.8	<0.05
Diseases and disorders of the circulatory system	46	7.5	2.528	15.1	<0.05
Diseases and disorders of the respiratory system	41	6.7	2.733	16.3	<0.05
Diseases and disorders of the nervous system	34	5.5	1.099	6.6	≥0.05
Diseases and disorders of the digestive system	32	5.2	1.725	10.3	<0.05
Diseases and disorders of the endocrine, nutritional and metabolic system	27	4.4	413	2.5	<0.05
Diseases and disorders of the musculoskeletal system and connective tissue	24	3.9	1.125	6.7	<0.05
Injuries, poisonings and toxic effects of drugs	19	3.1	202	1.2	<0.05
Infectious and parasitic diseases, systemic or not localized	19	3.1	428	2.6	≥0.05
Diseases and disorders of the kidney and urinary tract	15	2.4	1.046	6.2	<0.05
Diseases and disorders of ear, nose, mouth and throat	10	1.6	685	4.1	<0.05
HIV infections	10	1.6	103	0.6	<0.05
Other major diagnostic categories	41	6.7	3.064	18.3	<0.05

The table compares the intervention group ($n = 615$), which is the subgroup of patients identified as suffering ASRP in the EHR and referred to the ALT, with the control group ($n = 16,772$), which is the subgroup of patients identified as suffering ASRP in the EHR but not derived to the ALT.

Table 2. Comparison of health outcomes in patients with ASRP who were referred to the ALT and not referred to ALT versus the global inpatient cohort

	All patients	Referred to the programme [CI 95%]	Not referred to the programme [CI 95%]
GMR (%)	1.94	1.14	3.00
RAMR		0.30 [0.12–0.54]	0.94 [0.85–1.02]
RGR (%)	32.61	24.51	32.91
Risk-adjusted readmissions rates		2.16 [1.83–2.52]	4.77 [4.52–4.77]
LOS	7.09	7.74	12.40
Risk-adjusted LOS ratio		1.46 [1.43–1.50]	1.04 [1.039–1.05]

Patients with an alcohol misuse condition recruited and referred to the ALT during the hospital stay showed better health outcomes.

outcomes, such as less risk of hospital mortality, fewer readmissions and a shorter LOS. Additionally, patients' attendance at scheduled appointments improved since participating in the programme.

Alcohol misuse, through different pathophysiological mechanisms (Mehta et al., 2015), is associated with increased mortality (Wood et al., 2018), especially in patients admitted to intensive care units (Mehta, 2016). Within these mechanisms, several pathologies such as liver diseases (Ravi et al., 2017), pancreas conditions (Cho et al., 2015), traumatic brain injury (Albrecht et al., 2018), breathing problems (Marik, 2000), delirium and other less severe abstinence syndromes should be taken into account. In our study, pathologies associated with a higher mortality risk were similar to previously described (Mehta, 2016). We are unaware of any other research evaluating inpatient mortality related to referrals versus no referrals to an ALT. That could

be because of the patients' clinical complexity, making it difficult to screen and detect alcoholism and other substance-related problems when assessing them, and therefore, it would never be considered a referral to the ALT. It is also possible that a mild or moderate abstinence syndrome could be underdiagnosed by clinicians, contributing to increased mortality risk in such a vulnerable population (Awissi et al., 2013; Huai and Ye, 2014). All these issues entail suboptimal patient clinical management (Mehta, 2016).

LOS was shorter for the patients included in the programme. Our findings are in line with those reported in the scientific literature. Some studies have pointed out that physical and mental health comorbidities increase LOS (Lavin et al., 2017; Siddiqui et al., 2018), especially in intensive care units (Mehta, 2016). A recent retrospective study of 16,898 admissions to hospitals in Australia showed that comorbidity of stroke and alcoholism increased bed-occupied days by 36%

(Siddiqui et al., 2018). On the other hand, it has been found that referrals to ALT would be associated with improved patient-centred care and reduced hospital LOS (Bourgeois et al., 2005).

Concerning the readmissions during the first year after discharge, our results align with readmission rates after shorter (Nordeck et al., 2018) or more extended periods (Monras et al., 2003) reported in previous studies. It is noteworthy that patients that attended the outpatient treatment programme had an acceptable amount of consultations during the first 24 months (two to three per week), which could have facilitated abstinence and, therefore, treatment adherence to other medical comorbidities (Rubio et al., 2018, 2020), contributing to a reduction of the 1-year readmissions. This idea is supported by the finding of a reduction in non-attendance to other healthcare appointments of patients included in the programme compared with missed appointments the previous year. Patients referred to the ALT also attend other healthcare settings for their addiction-related and other pathologies treatments (Trowbridge et al., 2017). That could be because our programme integrates primary care professionals and patient associations, which are very proactive in health education issues (Rubio et al., 2018, 2020). Another contributing factor could be that alcohol consumption during the year before hospital admission favours non-attendance and non-adherence to treatments (Monras et al., 2003).

The main strength of our study is the high number of hospital admissions included and the follow-up of direct exploitable EHR indicators. However, several limitations must be taken into account. First, as our study relied on ICD-10 criteria exclusively, no individual EHR audit was performed, and we could have missed patients suffering from ASRP within the cohort. Moreover, discrepancies between the MBDS-coded principal diagnosis and the clinician's criteria are described. This limitation cannot be overcome with the study design; however, and in any case, since we have risk-adjusted the patients, it should not introduce a bias but lower the statistical power during the analysis. Second, our findings should be interpreted cautiously because of the retrospective descriptive study design. Since it was a retrospective study, the diagnoses were not made based on standardized criteria defined for the study. It was impossible to recover any more information since the personal data was anonymized. However, our interest was not as much in the diagnoses but in the role of the ALT. Notably, the interventions and services delivered by a mental health consultation liaison team specialized in alcohol and substance-related conditions are tailored to individual needs and social determinants (e.g. dependent on insurance status, the location of residence and mobility status). As a result, their services go beyond regular care in other hospitals without an established consultation-liaison service.

To conclude, our results show that including an ALT in an Outpatient Alcoholism Treatment Programme contributes to better clinical practice and an improvement in the continuity of care (Kremer et al., 2004; Trowbridge et al., 2017; Nordeck et al., 2018), which, in turn, is associated with a better prognosis for patients suffering from and ASRP in terms of a lesser risk of hospital mortality, fewer readmissions and a lower LOS. However, healthcare professionals also need to improve the training to detect and identify patients with an ASRP in hospital settings (Miller et al., 2001). Prospective studies are needed to evaluate health outcomes in inpatients with an ASRP more appropriately and deepen our understanding of

the reasons for the difficulties in identifying such patients in hospital settings.

Transparency section

The present work uses aggregated data from patients during their stay at the Hospital using the administrative database 'Basic Minimum Data Set'. No intervention was done over the patients or population, and confidentiality was protected. Re-identification of the individual patients was not technically possible. 'Therefore, there was no possibility or need to gather informed consent from anonymous patients or for Ethics Committee approval'. The data used for this work could be available to any researcher who needs the information. None of the authors has any conflict of interest to declare.

Supplementary material

Supplementary material is available at *Alcohol and Alcoholism* online.

Acknowledgements

The English was kindly reviewed by Sarah Cornick and fine-tuned with the aid of the premium version of an Artificial Intelligence (Grammarly). No other assistance in the preparation of this article is to be declared.

Author contributions

The contribution of the author is as follows: JLBS has made the statistical analysis and participated in the conceptual idea of the paper and writing of the manuscript. FAH has participated as primary authors of the manuscript, and the conceptual idea of the work. CLP, ABE, MJYA and GR have participated as authors of the manuscript and the conceptual view of the work. CVR has participated in the conceptual idea, defining indicators, interpreting the results and critically reviewing the manuscript.

CRedit authors statement

José L.B. Sobrino (Data curation-Equal, Formal analysis-Lead, Methodology-Equal, Writing—original draft-Equal), Francisco A. Horcajadas (Conceptualization-Lead, Investigation-Lead, Validation-Lead, Writing—original draft-Equal), Carolina V. Rodríguez (Formal analysis-Equal, Investigation-Supporting, Methodology-Supporting, Validation-Equal, Visualization-Equal, Writing—original draft-Equal, Writing—review & editing-Lead), Cristina L. Pérez (Conceptualization-Equal, Investigation-Equal, Methodology-Equal, Validation-Equal, Writing—original draft-Equal), Agustín B. Echevarría (Investigation-Equal, Supervision-Equal, Validation-Equal, Writing—original draft-Equal); María J. del Yerro Alvarez (Conceptualization-Equal, Investigation-Equal, Validation-Equal, Writing—original draft-Equal), Marta M. Mayor (Conceptualization-Equal, Writing—original draft-Equal, Writing—review & editing-Lead) and Gabriel Rubio (Conceptualization-Lead, Investigation-Equal, Methodology-Equal, Validation-Equal, Writing—original draft-Equal, Writing—review & editing-Equal)

Funding

No sponsor has supported this work.

Conflict of interest statement

None declared.

Declaration of financial/other relationships

All authors are Hospital Universitario 12 de Octubre employees. There are no other relationships to declare. Moreover, this evaluation is an implicit task of the everyday work of the authors.

Data availability statement

The data used for this work could be available to any researcher who needs the information.

References

- Albrecht JS, Afshar M, Stein DM, *et al.* (2018) Association of alcohol with mortality after traumatic brain injury. *Am J Epidemiol* **187**: 233–41.
- Awissi DK, Lebrun G, Coursin DB, *et al.* (2013) Alcohol withdrawal and delirium tremens in the critically ill: a systematic review and commentary. *Intensive Care Med* **39**:16–30.
- Bourgeois JA, Hilty DM, Servis ME, *et al.* (2005) Consultation-liaison psychiatry: advantages for healthcare systems. *Dis Manag Health Out* **13**:93–106.
- Brennan PL, Kagay CR, Geppert JJ, *et al.* (2001) Predictors and outcomes of outpatient mental health care: a 4-year prospective study of elderly Medicare patients with substance use disorders. *Med Care* **39**:39–49.
- Chen CH, Chen WJ, Cheng AT. (2004) Prevalence and identification of alcohol use disorders among nonpsychiatric inpatients in one general hospital. *Gen Hosp Psychiatry* **26**:219–25.
- Cho JH, Kim TN, Kim SB. (2015) Comparison of clinical course and outcome of acute pancreatitis according to the two main etiologies: alcohol and gallstone. *BMC Gastroenterol* **15**:87.
- Clark WD. (1981) Alcoholism: blocks to diagnosis and treatment. *Am J Med* **71**:275–86.
- Diehl A, Nakovics H, Croissant B, *et al.* (2009) Consultation-liaison psychiatry in general hospitals: improvement in physicians' detection rates of alcohol use disorders. *Psychosomatics* **50**:599–604.
- Geller G, Levine DM, Mamon JA, *et al.* (1989) Knowledge, attitudes, and reported practices of medical students and house staff regarding the diagnosis and treatment of alcoholism. *JAMA* **261**:3115–20.
- Huai J, Ye X. (2014) A meta-analysis of critically ill patients reveals several potential risk factors for delirium. *Gen Hosp Psychiatry* **36**: 488–96.
- Kremer G, Baune B, Driessen M, *et al.* (2004) Alcohol-related interventions in general hospitals in Germany: public health and consultation-liaison psychiatry perspectives. *Adv Psychosom Med* **26**:118–27.
- Lavin K, Davydow DS, Downey L, *et al.* (2017) Effect of psychiatric illness on acute care utilization at end of life from serious medical illness. *J Pain Symptom Manage* **54**:176–85.e1.
- Marik PE. (2000) The clinical features of severe community-acquired pneumonia presenting as septic shock. Norasept II study investigators. *J Crit Care* **15**:85–90.
- Marin J, Rubio G, Bayon C, *et al.* (1994) Programas de psiquiatría de enlace Toxicomanías-Sida. In *Experiencia del Hospital La Paz. (Psiquiatry Link HIV-Alcoholism Programs. The Hospital La Paz Experience) Actas Luso-españolas de Neurología Y Psiquiatría*, Vol. 22, 249–53.
- Mehta AJ. (2016) Alcoholism and critical illness: a review. *World J Crit Care Med* **5**:27–35.
- Mehta S, Cook D, Devlin JW, *et al.* (2015) Prevalence, risk factors, and outcomes of delirium in mechanically ventilated adults. *Crit Care Med* **43**:557–66.
- Miller NS, Sheppard LM, Colenda CC, *et al.* (2001) Why physicians are unprepared to treat patients who have alcohol- and drug-related disorders. *Acad Med* **76**:410–8.
- Monras M, Ortega L, Mondon S, *et al.* (2003) Alcoholismo en el hospital general: detección y tratamiento (Alcoholism in the general hospital: detection and treatment). *Med Clin* **121**: 733–5.
- Nordeck CD, Welsh C, Schwartz RP, *et al.* (2018) Rehospitalization and substance use disorder (SUD) treatment entry among patients seen by a hospital SUD consultation-liaison service. *Drug Alcohol Depend* **186**:23–8.
- Piette JD, Barnett PG, Moos RH. (1998) First-time admissions with alcohol-related medical problems: a 10-year follow-up of a national sample of alcoholic patients. *J Stud Alcohol* **59**: 89–96.
- Probst C, Roerecke M, Behrendt S, *et al.* (2014) Socioeconomic differences in alcohol-attributable mortality compared with all-cause mortality: a systematic review and meta-analysis. *Int J Epidemiol* **43**:1314–27.
- Ravi S, Bade KS, Hasanin M, *et al.* (2017) Ammonia level at admission predicts in-hospital mortality for patients with alcoholic hepatitis. *Gastroenterol Rep* **5**:232–6.
- Rubio G, Marín M, Arias F, *et al.* (2018) Inclusion of alcoholic associations into a public treatment programme for alcoholism improves outcomes during the treatment and continuing care period: a 6-year experience. *Alcohol* **53**:78–88.
- Rubio G, Marín M, López-Trabada JR, *et al.* (2020) Efectos de la integración de grupos de ayuda mutua sobre la adherencia al programa de continuidad en el cuidado a pacientes con dependencia del alcohol realizado en Atención Primaria (Effects of including mutual aid groups in the adherence of a continuing care programme of alcohol dependent patients carried out in a primary care setting). *Aten Primaria* **52**:555–62.
- Siddiqui N, Dwyer M, Stankovich J, *et al.* (2018) Hospital length of stay variation and comorbidity of mental illness: a retrospective study of five common chronic medical conditions. *BMC Health Serv Res* **18**:498.
- Smothers BA, Yahr HT, Ruhl CE. (2004) Detection of alcohol use disorders in general hospital admissions in the United States. *Arch Intern Med* **164**:749–56.
- Trowbridge P, Weinstein ZM, Kerensky T, *et al.* (2017) Addiction consultation services—linking hospitalized patients to outpatient addiction treatment. *J Subst Abuse Treat* **79**:1–5.
- Wei J, Defries T, Lozada M, *et al.* (2015) An inpatient treatment and discharge planning protocol for alcohol dependence: efficacy in reducing 30-day readmissions and emergency department visits. *J Gen Intern Med* **30**:365–70.
- Wittchen HU, Jacobi F, Rehm J, *et al.* (2011) The size and burden of mental disorders and other disorders of the brain in Europe 2010. *Eur Neuropsychopharmacol* **21**:655–79.
- Wood AM, Kaptoge S, Butterworth AS, *et al.* (2018) Risk thresholds for alcohol consumption: combined analysis of individual participant data for 599 912 current drinkers in 83 prospective studies. *Lancet* **391**:1513–23.
- World Health Organization. *Global Status Report on Alcohol and Health* 2018. Geneva. https://www.who.int/substance_abuse/publications/global_alcohol_report/en/ (6 July 2020, date last accessed).