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Research Paper

Opportunistic assessment and treatment of people with hepatitis C virus infection admitted to hospital for other reasons: A prospective cohort study

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ABSTRACT

Background: It will be essential to find novel ways to access, diagnose and treat people with Hepatitis C Virus (HCV) infection in Australia to achieve HCV elimination.
Aim: We assessed the effectiveness of opportunistic HCV assessment and antiviral treatment in patients admitted to hospital for other reasons.
Methods: Patients with HCV infection were referred from inpatient services at a tertiary referral centre in Sydney. Patients were assessed for HCV treatment with transient elastography (TE), HCV genotype and a clinical assessment and a summary letter was generated for all patients with a general practitioner (GP). Patients were offered treatment commencement at hospital discharge or after discharge with their GP, the infectious diseases clinic or with a gastroenterologist if they had cirrhosis. The primary outcome was the proportion of eligible patients who commenced treatment. We also undertook an intention to treat (ITT), modified intent to treat (mITT) analysis for virologic outcome (SVR12) and per protocol cure rates. An assessment of potential efficiency gains was undertaken.
Results: A total of 100 patients with a positive HCV antibody test were enrolled, of whom 70 were viraemic. The cohort included a high proportion of people who currently or previously injected drugs, indigenous patients and people previously lost to follow-up from other services. Treatment was initiated in 46 (66%) patients. The ITT was 80.4% (37/46) and mITT rate was 84.1% (37/44).The per-protocol SVR12 rate was 94.9%. Two subjects with genotype 3 and cirrhosis failed treatment, two subjects died and five were lost to follow up. The key barrier to uptake of DAA was incomplete assessment. Key inefficiencies of this model of care included referral of non-viraemic subjects, limited TE access and virologic test turnaround times.
Conclusion: This model of care can complement the current efforts to increase HCV treatment in the community for those who do not access care elsewhere or are lost to follow-up.

Introduction

It is estimated that there were 71 million people living with hepatitis C virus (HCV) infection worldwide in 2015, with approximately 400,000 deaths due chronic hepatitis C (CHC) each year (World Health Organization, 2017). In Australia it was estimated that there were 227,306 people living with HCV infection in 2015 with over 600 deaths annually (The Kirby Institute, 2016a). It is one of the most prevalent blood borne virus infections in Australia (The Kirby Institute, 2016b). In Australia, the predominant mode of HCV transmission is via injecting drug use (Hajarizadeh, Grebely, & Dore, 2013). CHC is associated with the development of cirrhosis, which occurs in approximately 7% of people after 20 years, with a subsequent risk of liver failure and hepatocellular carcinoma (HCC) (Hajarizadeh et al., 2013).

From 1 March 2016 highly efficacious and well tolerated HCV direct acting antivirals (DAA) were made readily available on the publicly funded Australian Pharmaceutical Benefit Scheme (PBS) for people living with CHC in Australia (Hajarizadeh, Grebely, Matthews,

Abbreviations: CHC, chronic hepatitis C; DAA, direct acting antivirals; EDs, Emergency Departments; GPs, general practitioners; HCV, hepatitis C virus; ITT, intent to treat; mITT, modified intent to treat; PWID, people who inject drugs; SVR12, sustained virological response at week 12 after completion of treatment; TE, transient elastography; WHO, World Health Organisation

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Martinello, & Dore, 2018). At present, the PBS requires specific information including the genotype of HCV and cirrhosis status to prescribe DAA therapy. Patients need to be an outpatient to be eligible for treatment as inpatient treatment is not funded through this scheme. Despite the accessible, affordable and highly efficacious treatment, only 26% of people living with CHC in Australia had been treated by the end of 2017 (Dore & Hajarizadeh, 2018). Although there may be further increases in primary care prescribing of DAA therapy, alternate models of care are needed to deliver treatment to people living with HCV infection who do not access existing treatment services so that the World Health Organisation (WHO) goals of HCV elimination as a public health threat by 2030 can be achieved (van Driel, Lim, & Clark, 2017; World Health Organization, 2016).

The current standard of care for people with HCV infection who are diagnosed in the hospital as an inpatient is a referral for non-emergent outpatient review for assessment and treatment of HCV infection. People who inject drugs (PWID) and people with mental illness are overrepresented in populations affected by HCV (The Kirby Institute, 2016c). Outpatient based therapy for some people with HCV infection is associated with high rates of loss to follow-up. Therefore, engaging hospitalised inpatients with CHC for assessment and treatment for CHC opportunistically may be one potential avenue to treat people who may not access health care services elsewhere. In this study, we aimed to assess the efficacy of opportunistic inpatient assessment and HCV treatment commencement at, or soon after, discharge for people with HCV infection admitted to The Prince of Wales Hospital, Sydney for other conditions.

Methods

Design and participants

A prospective, single site, cohort study was conducted to evaluate the efficacy of assessment and HCV treatment recommendation for people with HCV infection admitted to The Prince of Wales Hospital, Sydney. The Prince of Wales Hospital is a major tertiary referral hospital in south eastern Sydney with more than 500 beds (Australian Government, 2017). Patients were enrolled over 16 months from March 2016 to July 2017 with follow-up to May 2018.

Medicare eligible adult inpatients (> 18 years old) with HCV infection were recruited via referrals to the infectious diseases service. The service model was promoted at one hospital grand rounds and by word of mouth with referring junior medical staff. Referring junior medical staff was asked regularly to review their patient list for patients with a CHC diagnosis and offer an HCV antibody test to those with risk factors for HCV infection. Patients with a negative HCV antibody test were excluded from the study and their data was not collected. Patients with a positive HCV antibody test had a clinical history and examination performed prospectively by a single Infectious Diseases registrar (trainee specialist) and were further tested for HCV viraemia with an HCV polymerase chain reaction (PCR) test – initially with a qualitative test followed by a quantitative test and HCV genotype. Liver tests, coagulation profile and platelet count were recorded. Patients were referred to trained nurses for hepatic transient elastography (TE) (Fibroscan) assessment of cirrhosis as an inpatient. All patients were intended to have TE as part of the study protocol to assess inefficiencies in the assessment process that could be improved. Weekly Fibroscan clinics were available and *ad hoc* testing was available at some other times. For patients who did not undergo TE, the AST to Platelet Ratio Index (APRI) was utilised *post hoc* to assess cirrhosis status. These subjects were not included as having completed the study assessment as we aimed to use TE to assess cirrhosis status for all subjects.

The assessment and treatment outcomes, including individual event dates, were recorded prospectively in an Excel spreadsheet by the Infectious Diseases registrar. Patients who completed assessment whilst in hospital were discharged with DAA therapy and outpatient follow-up. If assessment was completed after hospital discharge, a treatment recommendation letter was generated for the general practitioner (GP) as evidence of consultation with a specialist so that the GP could prescribe the DAA under the PBS regulations. If the patient assessment was not completed during the index hospitalisation and the patient had an identified GP, a letter was sent to the GP outlining the parts of the assessment that had been completed and what investigations were outstanding. Patients were given the option of follow up with either their GP or the infectious diseases service and patients with cirrhosis were advised to follow up with a gastroenterologist for screening for oesophageal varicies and hepatocellular carcinoma. For patients who attended hospital outpatient follow-up, the medical records were reviewed for outcome data. For patients who were followed up by a GP, the GP was called by telephone to obtain treatment initiation and virological outcome information. Patients who did not have a regular GP upon discharge and did not attend hospital outpatient for follow-up were contacted via telephone to evaluate if they had started on treatment and their virological outcome. The information provided by participants was later cross checked with the relevant dispensing pharmacy and laboratory.

Demographic data collected included age, gender, referral source, principal diagnosis, country of birth, Indigenous status, injecting drug use (IDU) history (current IDU defined as within the last 30 days), drug and alcohol service referral, current opioid substitution therapy, having a regular GP, and previous loss to follow-up for HCV care. Assessment data included assessment completeness and HCV viraemia assessment (presence/absence and genotype), presence of co-infections, cirrhosis status, and time to relevant investigation results. Treatment data included type of regimen, prescribing doctor type and follow-up service type. The absence of viraemia or sustained virological response 12 weeks after completion of therapy (SVR12) was determined. Follow up time was recorded from the initial assessment date until patients achieved SVR12 or at the conclusion of this study. The study was deemed a quality improvement or quality assurance activity by the office of the local Human Research Ethics Committee.

Outcomes

The primary outcome of the study was the proportion of patients who commenced DAA therapy. The secondary outcomes were intention-to-treat (ITT) and modified intention-to-treat (mITT) analyses of those who commenced treatment. The ITT analysis assessed the proportion of people who started treatment and achieved SVR12. The mITT analysis excluded people lost to follow-up after treatment completion. A per-protocol SVR12 outcome of subjects who completed treatment and follow-up according to the protocol and the proportion of initially viraemic subjects with undetectable HCV RNA at the end of the study were also reported.

Statistical analysis

Categorical variables are presented as counts and proportions, continuous variables as medians and ranges. The significance of differences between groups was assessed with Wilcoxon rank sum tests for continuous covariates and odds ratios for nominal covariates. $P < 0.05$ was deemed statistically significant. Predictive factors for commencement of treatment that were assessed in univariate analysis included gender, Indigenous status, drug and alcohol service referral, current drug injecting (defined as within the last 30 days), having a regular GP, current opioid substitution therapy and previous loss to follow-up for HCV care. Logistic regression using SPSS (version 25) was undertaken to assess predictors of treatment commencement. Variables included in the models included current drug injecting, current opioid substitution therapy, having a regular GP and previous loss to follow-up.

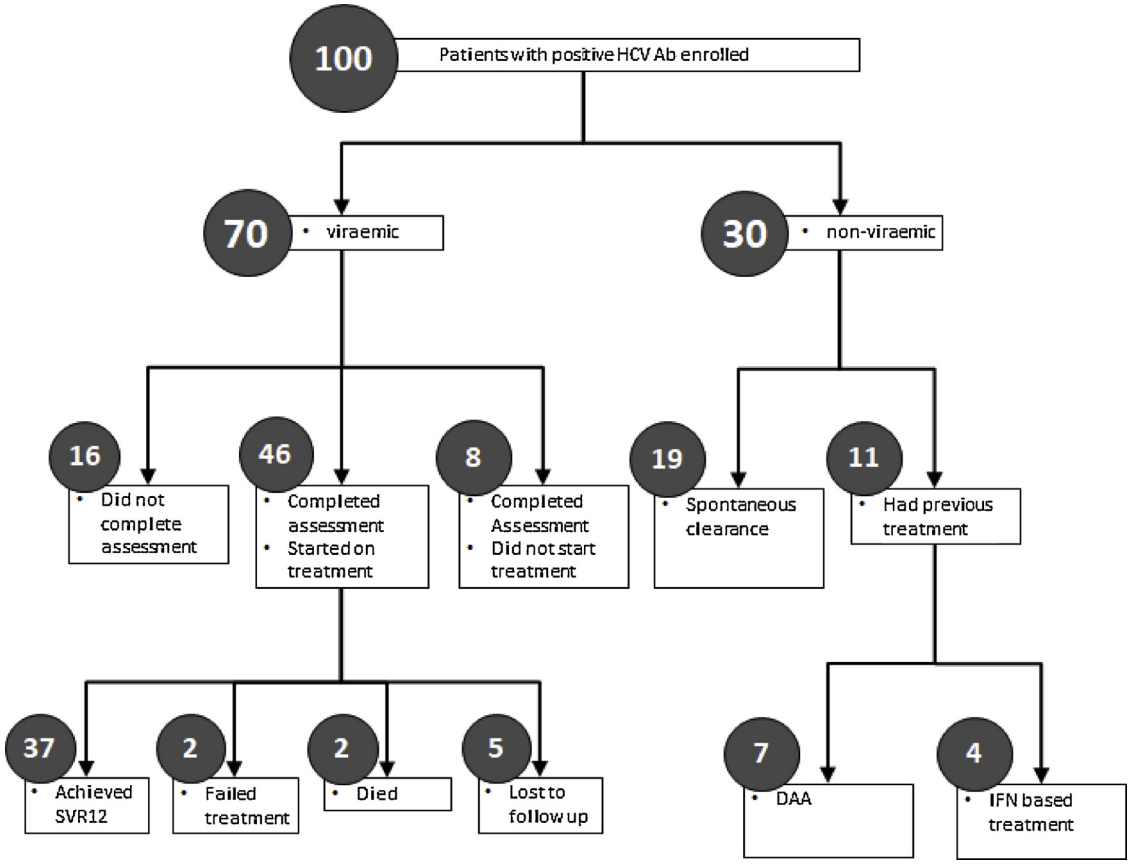

Fig. 1. Outcomes of 100 patients referred for assessment and treatment of HCV infection.

Results

Between March 2016 and July 2017, 100 consecutive inpatients were referred to the infectious diseases service for assessment of chronic HCV infection (Fig. 1). The details of the 70 viraemic patients recruited are shown in Table 1. Eleven of the 30 (36.6%) patients without viraemia had previously been treated for HCV infection. Notable features were the proportion of Indigenous patients and people who currently or previously injected drugs, with a substantial proportion on opioid substitution therapy. Also noteworthy was that approximately one fifth of the population had previously seen a specialist for CHC and had been lost to follow-up. A substantial proportion of the studied population did not have a regular general practitioner.

Assessment and treatment outcomes

The outcomes of subject assessment are summarized in Table 2 and completion of key milestones in the clinical pathway is summarized in Fig. 1. After enrollment, there was a high proportion that completed assessment. There were 21 subjects who completed assessment in hospital. These 21 subjects were discharged with DAA and 20 achieved SVR12 (1 died). The remaining 25 subjects who started DAA were discharged prior to completion of assessment and they were started on treatment in the outpatient setting (6 in the infectious diseases clinic, 9 by a GP and 10 by gastroenterology). 17 achieved SVR12, 5 were lost to follow-up, 1 died and 2 failed DAA therapy. All 8 patients who completed assessment and did not start treatment were discharged prior to the availability of assessment results. Reasons for not starting treatment are described in Table 3.

The median length of stay of those did not complete assessment was 10 days and many were discharged prior to availability of all the results of the assessment. However, there was no statistically significant difference ($p = 0.49$) between those who completed assessment and those who did not. Some patients who completed assessment but were not commenced on treatment upon discharge did not follow-up with their GP or attend a pre-arranged infectious diseases outpatient appointment. At the closure of the study, 46 (66%) out of the 70 patients with HCV viraemia had commenced treatment. One ceased treatment due to side effects and two ceased for social reasons (all after 4 weeks of therapy). Two died (both cirrhotic), and three were lost to follow-up before completion of treatment. 37 out of 46 subjects achieved SVR12 (ITT = 80.4%). The mITT was 84.1% (37/44) as two subjects were lost to follow-up after treatment completion. 2 subjects who completed therapy had virological treatment failure making the per protocol as treated and assessable response rate 94.9%(37/39). Among the 37 who achieved SVR12, three had a truncated treatment course.

The proportion of all initially viraemic subjects with undetectable HCV RNA at the close of study was 52.8% (37/70).

No factors were associated with commencement of treatment in univariate analysis and no significant predictive model could be developed in logistic regression (data not shown).

Discussion

This was a prospective feasibility study evaluating the model of care of opportunistic assessment of inpatients with chronic HCV infection in the HCV DAA treatment era. The DAA treatment uptake of 66% in our cohort was notable and demonstrates the plausible effectiveness of the model. Other studies of HCV testing with linkage to care and treatment outcomes in the inpatient setting are limited. One study from the US identified that of 998 people diagnosed with HCV infection in an inpatient setting only 37% had HCV RNA testing, 9% underwent HCV genotyping and only 3% commenced treatment (Assoumou, Huang, Horsburgh, Drainoni, & Linas, 2014). The low rates of treatment in this

Table 1
Characteristics of 100 inpatients referred for assessment and treatment of HCV infection.

	All referred subjects (n = 100)	Viraemic subjects (n = 70)
Age (median years (range))	49.50 (24–87)	49 (26–82)
	n (%)	n (%)
Gender		
Male	66 (66)	49 (70)
Female	34 (34)	21 (30)
Injecting drug use		
Current	26 (26)	19 (27.1)
Previous	57 (57)	37 (52.9)
Never	17 (17)	14 (20)
On Opioid Substitution Therapy	29 (29)	21 (30)
Referred to drug & alcohol services in admission	34 (34)	27 (38.6)
Country of birth		
Australia	85 (85)	60 (85.7)
Overseas	15 (15)	10 (14.3)
Indigenous	18 (18)	14 (20)
Referral source		
Medical Teams	64 (64)	46 (65.7)
Surgical Teams	25 (25)	23 (32.9)
Mental Health	11 (11)	9 (12.9)
Principal Diagnosis		
Infection	50 (50)	38 (54.3)
Pneumonia	9 (9)	7 (10)
Soft tissue infection	9 (9)	7 (10)
Endocarditis	7 (7)	4 (5.7)
Osteomyelitis	7 (7)	5 (7.1)
Epidural abscess	3 (3)	3 (4.3)
Sepsis	3 (3)	1 (1.4)
HIV related	2 (2)	1 (1.4)
Other deep infection	10 (10)	10 (14.3)
COPD exacerbation	20 (20)	12 (17.1)
Mental health	11 (11)	9 (12.9)
Cancer	6 (6)	3 (4.3)
Injecting drug use related Trauma	4 (4) 3 (3)	2 (2.9) 3 (4.3)
Elective surgery	2 (2)	1 (1.4)
Other[a]	4 (4)	2 (2.9)
Regular GP identified	73 (73)	52 (74.3)
Previous loss to HCV follow-up	18 (18)	15 (21.4)

HIV – human immunodeficiency virus; COPD – chronic obstructive pulmonary disease.
[a] Other included diabetic ketoacidosis (1), intracranial haemorrhage (1) and urolithiasis (2).

Table 2
Assessment of 70 viraemic inpatients referred for assessment and treatment of HCV infection.

	n (%) or median (range)
Proportion with complete assessment	54 (77.1)
Proportion with incomplete assessment	16 (22.9)
TE not done[a]	16
Neither TE nor genotype done	6
Co-infection	
HIV	6 (8.6)
HBV	3 (4.3)
Genotype	
1	28 (40.0)
2	2 (2.9)
3	30 (42.9)
4	2 (2.9)
Mixed (1 & 3)	2 (2.9)
Cirrhosis status in viraemic patients who underwent TE	
Cirrhotic (kPa > 12)[b]	16 (22.8)
Non-cirrhotic (kPa < 12)	38 (54.3)
Cirrhosis status in viraemic patients who did not undergo TE	16 (22.8)
Non-cirrhotic (APRI < 0.49)	10 (14.3)
Cirrhosis indeterminate (APRI 0.5-1)	1 (1.4)
Possible cirrhosis (APRI 1.1-2)	3 (4.3)
Cirrhosis likely (APRI > 2)	2 (2.9)
Time from initial assessment to Fibroscan (days)	2 (0.08–20)
Time from initial assessment to HCV viral load result (days)	4 (1–20)
Time from initial assessment to HCV genotype result (days)	13 (4–27)
Length of stay of people who completed assessment (days)	12 (1–288)
Length of stay of people who did not complete full assessment (days)	10 (1–159)

TE – transient elastography; HIV - human immunodeficiency virus; HBV – hepatitis B virus; kPa – kilopascals; APRI – aspartate aminotransferase to platelet ratio index.
[a] Patients who did not complete TE assessment either were discharged before the nurse was able to complete it, didn't fast or had ascites.
[b] 1 patient had decompensated cirrhosis.

study may relate to the era studied as it included a period before DAA treatments were widely available. A study from a single large UK hospital cohort that included all care types including a locally affiliated prison service demonstrated linkage to hepatitis care in 39% and treatment uptake in 22% of patients (Adland et al., 2018).

Several US studies have examined linkage to care after HCV diagnostic testing in Emergency Departments (EDs). One study examined people diagnosed in hospital EDs and affiliated primary care practices and demonstrated linkage to care in 53% with treatment uptake amongst viraemic patients in 29% (Brady et al., 2018). One ED based opt-out HCV testing program identified 292 people with HCV viraemia and linked 23% to an outpatient visit (Schechter-Perkins et al., 2018). Another two site ED based testing program identified 301 viraemic people of whom 32% attended a follow-up visit. In that study only 8% of the total cohort commenced treatment (Anderson et al., 2017). Another US study of ED HCV testing identified that 35% could be linked to care after a median follow-up of 433 days. Interestingly, 48% of that cohort required inpatient care which suggests that the model presented in the present study could provide treatment access to a significant proportion of people with HCV infection who are not otherwise linked to care (Franco et al., 2016).

Other settings may have higher rates of linkage to care, but none are complete. A single centre study of a US sexually transmitted diseases clinic successfully linked 63% of diagnosed patients to care (Rhea et al., 2017). Community based testing organisations in New York City diagnosed 201 people with current HCV infection and 85% attended follow-up but only 7% intimated treatment (Ford et al., 2018). With HCV care coordinators a US based healthcare system successfully linked 94% of viraemic patients to care although treatment commencement data were not available (Castrejón et al., 2017). In contrast, a US infectious diseases ambulatory care clinic successfully initiated treatment in 60% of eligible patients (Zuckerman, Douglas, Nwosu, Choi, & Chastain, 2018). Taken together, it is likely that the model presented in the current study will complement community based efforts to diagnose and treat people living with HCV infection.

The outcomes in the present study are comparable to, or better than, outcomes from a range of other studies including a large South Australian prospective observational study that included four tertiary care centres with an ITT of 80.4%; an Australian a network of primary care, general practice, tertiary, private specialist practice and drug and alcohol outpatient clinics (REACH-C) with an ITT of 80.1% and Asian and North American clinic based treatment settings (Haridy et al., 2018; Kirby Institute, REACH-C 2018; Lim et al., 2018; Levin, Dabirshahsahebi, Bauer, & Huckins, 2016; Mason et al., 2017). This suggests that the model of care in the present study is as efficient as the current standard outpatient clinic or tertiary hospital based care.

Table 3
Outcome after HCV assessment of 70 viraemic inpatients.

	n (%) or median (range)
Incomplete assessment and lost to follow-up	16 (22.9)
Completed assessment but did not start treatment[a]	8 (11.4)
Completed assessment and started on treatment	46 (65.7)
Completed assessment while still an inpatient and discharged with DAA	21 (30.0)
Achieved sustained virologic response (SVR12)	37 (52.9)
Failed treatment	2 (2.9)
Died while on treatment[b]	2 (2.9)
Lost to follow-up (before or after treatment completion)	5 (7.1)
Lost to follow-up after completion of treatment	2 (2.9)
Lost to follow-up before completion of treatment	3 (4.3)
Time from assessment to treatment commencement (days)	59.5 (2-443)
Prescribed regimens	
Sofosbuvir + Daclatasvir	28
Sofosbuvir + Ledipasvir	16
Elbasvir + Grazoprevir	1
Dasabuvir, Ombitasvir, Paritaprevir and Ritonavir	1
Prescription by	
Infectious Diseases (study team)	27
Gastroenterologist	10
General Practitioner	9
Follow-up after starting treatment	
Infectious Diseases	19
General Practitioner	14
Gastroenterologist	13
Follow up	
Duration of follow-up (days) in those with viraemia	213 (27-771)

[a] All 8 were discharged from hospital prior to availability of assessment results and were offered outpatient follow-up. 4 decided that HCV treatment was not a priority after assessment, 2 did not attend a GP appointment and 2 did not attend an outpatient clinic appointment and were lost to follow-up before treatment commencement.

[b] Both were cirrhotic. One had obesity and pulmonary hypertension and died suddenly, the other died from upper gastrointestinal haemorrhage.

The DAA treatment uptake has been estimated to be 26% in people living with CHC in Australia to the end of 2017 (Dore & Hajarizadeh, 2018). To achieve the WHO HCV elimination goal by 2030 it is likely that in addition to expanding treatment in the primary care setting it will be important to optimise other parts of the health system as places to detect and treat people with CHC. This hospital-based model of care was an opportunistic assessment of inpatients with chronic HCV infection presenting to hospital for other reasons. We took a proactive approach to reach out to a difficult to reach population and enhance the treatment uptake in patients living with CHC. The collaborative shared care model with GPs also provided an important educational and clinical opportunity for GPs to gain experience in the management of patients with chronic HCV infection. GPs have reported difficulty obtaining access to TE testing and were not familiar with the assessment required for chronic HCV treatment (Wade, Draper, & Doyle, 2017).

The model engaged a number of people who had previously been lost to follow-up and a number who were currently injecting drugs. We mainly enrolled people with concomitant infections, mental health problems and pulmonary disease. In our cohort, the rate of cirrhosis in viraemic patients was almost 26%, which is higher than some community recruited samples (Kelly, Riordan, Bopage, Lloyd, & Post, 2018; The Kirby Institute, 2018). This detection of cirrhotic cases argues that this approach may preferentially identify the people most at risk of poor clinical outcomes from untreated HCV infection. Also, the proportion of Indigenous patients assessed was significant.

The main reason for not commencing treatment was incomplete assessment. The protocol required TE and this was only reliably available once per week and sporadically on other days, depending on staffing levels. The turnaround time for HCV genotyping meant that some people were discharged before a result was available. Currently, despite pangenotypic DAA therapy being available on the PBS, there remains a requirement for HCV genotyping and cirrhosis assessment to access subsidised medication. Reducing the requirement for genotyping could enhance assessment and treatment as demonstrated in this study. Similarly, reduction in reliance on TE to diagnose cirrhosis would make the pathway more efficient. The assessment of cirrhosis remains important as people with cirrhosis remain at risk of HCC after successful HCV treatment and should be enrolled in HCC screening programs. The use of non-invasive markers of hepatic fibrosis can be used to reliably exclude cirrhosis in more than half of patients and will be used in the future (Kelly et al., 2018). Other interventions to improve the efficiency of the model could include enhanced HCV testing of inpatients to increase the number of referrals; further promotion of the service and development of a policy requiring referral whilst the patient is still in hospital (rather than booking an outpatient appointment); increase the number of staff able to receive referrals to reduce time to clinical assessment and reduce the risk of discharge before return of virologic test results; use non-invasive markers of cirrhosis to reduce reliance and burden on the TE service. We will also examine whether accepting only viraemic patients is as effective and work with the TE service and virology laboratory to reduce test turnaround times.

The limitations of this study were mainly the absence of a control group, the small sample size, the single centre design and proportion of non-viraemic subjects referred. As the study cohort involved hospitalised patients it may not be reflective of the general population with HCV infection. The study is subject to significant selection bias as subjects referred to the Infectious Diseases service were more likely to have other infections and the study registrar had to develop a therapeutic relationship with the participants for the treatment of the underlying condition leading to hospitalisation. We did not systematically screen all inpatients for HCV so the overall efficiency of the model of care is not known. We did not compare or assess the outcomes of people with CHC referred to the gastroenterology service in the same time period. Although the outcomes reported here are consistent with other published models of care, it is possible that these outcomes are better than that would be seen with systematic screening and referral to the service.

With such small sample size, it will be difficult to draw firm conclusion regarding the efficacy of our intervention. Further larger multicentres studies will be required to conclusively evaluate the efficacy of this model of care. This study was a pilot study to evaluate the efficacy of opportunistic assessment and treatment of people with hepatitis C virus infection admitted to hospital for other reasons. Reassuringly, our ITT and mITT findings were similar to the local and international data which suggest that this model of care could complement current efforts in treating patients with CHC. Further efforts to reduce assessment time are likely to enhance the outcomes as those that were discharged from hospital with DAA had a very good outcome.

In conclusion, this approach to inpatient assessment and treatment for chronic HCV infection may be a feasible model of care to increase HCV treatment if it is implemented widely. Australia is well positioned to achieve the WHO target of HCV elimination by 2030, but it will require optimisation of testing and treatment for hard to reach populations and this model of care could enhance the prospect of achieving those targets.

Authors contributions

Fabian Chiong: Dr Chiong contributed 60% of the total work. He designed the research protocol, opportunistically assessed and managed patients with chronic hepatitis C infection admitted to Prince of Wales hospital for other reasons, collected data, analysed the data and wrote the manuscript under the guidance of Associate Professor Jeffrey Post.

Jeffrey Post: Associate Professor Post contributed 40% of the total work. He refined the study design, supervised the assessment and

management of patients with chronic hepatitis C infection and edited the manuscript.

Declaration of interest

None.

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