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Published in:
Journal of Viral Hepatitis

DOI:
10.1111/jvh.12633

Publication date:
2017

Document Version
Peer reviewed version

Multi-disciplinary Managed care networks-lifesaving interventions for hepatitis C patients

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Key words: Managed Care Networks (MCNs) hepatitis C virus (HCV), people who inject drugs (PWIDs) access to care, sustained viral response (SVR)

Ethics: This study is based on anonymous routine clinical audit data and does not involve any participation from patients. This audit project did not require to be submitted for ethical approval.

Word Count 3142

Abstract

Background

Successful hepatitis C virus (HCV) therapy depends on effective pathways of care. Over 2 decades we have developed 4 sequential models of care latterly using a multi-disciplinary managed care network (MCN) to improve HCV testing, care and treatment.

Methods

Cohort study to evaluate the effectiveness of care pathways, carried out using all HCV antibody positive individuals tested in a geographical region between 1994 and 2014.

Results

Study of 3122 HCV positive patients. They were divided into four subgroups representing different care pathways defined by their date of HCV antibody diagnosis. The number who accessed treatment services within 1 year of diagnosis increased from 77/292 (26.3%) to 521/821 (72.9%). The rate of treatment starts within 1 year of diagnosis increased from 6/292 (2.0%) to 133/821 (16.2%), and the sustained viral response rate improved from 61.6% to 77.4%. All-cause mortality decreased from 232/688 (33.7%) in subgroup A to 55/1207 (4.5%) in subgroup D, multivariate analysis showed that pathway type was an independent predictor of mortality irrespective of age, sex, SVR status or HIV co-infection with pathway D having an odds ratio of 0.53(0.40-0.77 $p<0.001$) compared to pathway in A. At study end 78% (3122) of estimated 4000 HCV positive had been diagnosed. 97.5% of HCV caseload was referred to Specialist Services and 89% attended for assessment.

Conclusions

The introduction of a MCN increases access to care and reduced all cause mortality.

Introduction

Hepatitis C virus infection is a major public health problem, chronic infection occurs in 75 to 80% of cases and in the long term there is a considerable risk of liver cirrhosis and liver cancer (1). It is estimated that there are between 130 to 150 million people infected globally which results in 350,000 to 500 000 deaths a year (2). With the advent of highly effective direct acting antiviral oral therapies it is possible to successfully treat and cure virtually everyone with hepatitis C. However achieving cure requires not just the availability of efficacious treatment but the effective delivery of that treatment to those in need. The key to reducing the burden of liver disease from HCV for a region, is the diagnosis and delivery of treatment, to all patients who need it. This requires taking responsibility for a defined region and all the HCV infection within that region, irrespective of how and by whom the virus was contracted.

Recent estimates suggest that around 215,000 are chronically infected with hepatitis C in the UK and it is estimated that over 90% of cases are related to injecting drug use. (3).The majority who are referred to the specialist hepatitis services will be past or present drug users. People who inject drugs (PWIDs) are thought to be a particularly difficult population to reach as they may have difficulty accessing and using traditional medical services.

Expert consensus suggests that increasing testing and uptake of services may be improved not just by the integration of diagnosis and treatment but also by integrated multidisciplinary care which also addresses the individuals' alcohol, drug use problems, social circumstances and general health simultaneously with their HCV specialist care (4-9). These concepts of care have not been rigorously tested in clinical trials, as they are systems changes that cannot be randomised to individuals.

The Tayside region of Scotland has been a test bed for sequential development of integrated services over the last 2 decades; moving from standard secondary care based hospital outpatients, onto nurse supported treatment services, then to a HCV Managed Care Network (MCN) (10,11), and finally to a development in the MCN model which included a widespread dry blood spot testing programme in drug

services and development in our outreach services across the region which included providing treatment within drug services and prisons (12).

The aims of the study were to evaluate the outcomes of the individuals who had a positive hepatitis C antibody test in our region and to compare referral patterns, attendance and treatment outcomes over those 4 developmental stages, to investigate if these changes translated into better clinical outcomes.

Methodology

This is a cohort study of all adults who have received a positive hepatitis C antibody test in the geographical region of Tayside, Scotland. The region has two cities, several major towns, a mixed urban and rural population with significant areas of deprivation and associated drug use. This is representative in microcosm of most developed health regions. This is an all-inclusive population based study of the performance of a health care system for the diagnosis and treatment of HCV. All HCV positive individuals have been included in our clinical database which was established in 2004. Retrospective data was collected on those tested before 2004 and prospective data was entered into the database for everyone who tested positive after 2004. Data collected included demographic information, risk factors, laboratory tests, referral details, follow up and treatment outcomes. The study period for new patient entry closed at the end of June 2014, with at least one year follow after a HCV positive test for all patients until end June 2015. Patients were followed up in or out of service from first diagnosis until SVR, death or moving residence outside the region.

Individuals were divided into 4 sub groups. These sub groups were based on the specialist pathway available at the time of their first postive antibody test . It is important to note that patients were analysed according to the date of first antibody test and may have entered or been in care through multiple care pathway development periods and the care they experienced would have changed as the whole service was developed.

Group	Time period	Interventions
Subgroup A	Pre July1999	• HCV testing commenced in region • Limited access to treatment

		• No specialist nursing input available
Subgroup B	July 1999-June 2004	• Specialist nursing support given at HCV treatment clinic • Clinic at main city hospital only • Treatment offered, interferon and ribavirin
Subgroup C	July 2004-June 2009	• Development of managed care network • Appointment of part time Nurse specialist • New referral pathway- referrals open to all health care professionals including drug workers and prison nurses • Outreach clinics established locally and in drug and prison centres centres throughout region • Treatment interferon and ribavirin
Subgroup D	July 2009-June 2014	• Routine dry blood spot testing in drug services and needle exchanges • Appointment of full time nurse specialist • Increase in outreach clinics across region • Treatment use of Direct Acting Antivirals (DAAs) in treatment regimen

Results

Phase 1 analysis: all HCV antibody positive analysis

There were 3122 new positive HCV antibody results during the period of the study. The first recorded test was the 2nd of April 1984 (performed retrospectively on stored serum) and the last test was the 28th of June 2014. Eight HCV antibody positive individuals who had tested positive in other regions and moved into our service while on treatment were excluded.

The first stage in the HCV care pathway is testing and diagnosis. The type and location of healthcare worker who carried out the first positive HCV test was documented. In subgroups A, B and C in 40% of cases this was the General Practitioner. The number tested by drug workers increased significantly from 4.5% in subgroup A to 35.8% within subgroup D when dry blood spot testing was introduced to drug services. (Table 1) By the end of the study 78% (3122) of our estimated 4000 HCV antibody positive people in our area had been diagnosed.

Across the cohort the mean age was 35.7 years and 73.9% were male. 118 (3.7%) were co-infected with HIV and 10 (0.3%) were hepatitis B surface antigen positive. Thirty-four acute episodes of hepatitis C were diagnosed, the majority (27) were diagnosed in the last subgroup (subgroup D) when yearly dry blood spot testing was routinely available in Drug Services. The risk factor(s) was documented in 97.2% of cases. In 85 cases there was no documentation on the request form and the individual's risks was not identifiable because they had died, were unable to be traced or were no longer resident in the area. The majority of individuals (81.7%) had a history of injecting drug use and 191 (6.2%) did not disclose any known risk factors. Table 1 lists further data for each subgroup.

The first phase of analysis was based on all antibody positive individuals in each of the four subgroups; endpoints in this phase of the analysis were spontaneously resolving infection (651), dying before accessing care (324), moving from the region before accessing care (294) or unable to be traced (23). The high number moving out of the region before accessing care is a reflection of the three prisons in the area. They were not followed up from the point they moved out with the region. In addition there were a number of individuals who had died before accessing care; this number was particularly high in the first two subgroups.

Table 1: Outcome of new diagnosis of HCV

		Subgroup A (n=688)	**Subgroup B (n=634)**	**Subgroup C (n=593)**	**Subgroup D (n=1207)**
Tester	General Practitioner	227 (32.9%)	265 (41.7%)	222 (37.4%)	276 (22.8%)
	Prison Services	150 (21.8%)	131 (20.6%)	118 (19.8%)	174 (14.4%)
	Hospital inpatient/outpatient	111 (16.1%)	76 (11.9%)	85 (14.3%)	195 (16.1%)
	Other	84 (12.2%)	98 (15.4%)	82 (13.8%)	120 (9.9%)
	HIV Specialist Team	56 (8.1%)	24 (3.7%)	21 (3.5%)	9 (0.7%)
	Drug services	31 (4.5%)	36 (5.6%)	64 (10.4%)	433 (35.8%)
	Haematology	29 (4.2%)	4 (0.6%)	1 (0.1%)	0 (0%)
Median age at diagnosis (Age range)		34.9 years	35.5years	36.8 years	35.8years
Male (%)		531 (77.6%)	492 (77.3%)	428(72%)	831(68.6%)
Ethnic group British Caucasian (%)		674 (97.9%)	618 (97.4%)	551 (92.9%)	1116 (92.4%)
Risk Factor	Blood products	50 (7.2%)	18 (2.8%)	25 (4.2%)	21 (1.7%)
	Intravenous drug use	496 (72.0%)	501 (81.0%)	450 (75.8%)	103 (87.5%)
	From high prevalence country	14 (2.0%)	15 (2.3%)	38 (6.4%)	81 (5.0%)
	No risk factors known	55 (7.9%)	36 (5.6%)	38 (6.4%)	52 (4.3%)
	Other (sexual, tattoo, needle stick)	32 (4.6%)	35 (5.5%)	36 (6.1%)	42 (3.4%)
	Not documented	37 (5.4%)	29 (4.7%)	2 (0.3%)	2 (0.1)
Co morbities	HIV	59 (8.5%)	32 (5.0%)	20 (3.3%)	7 (0.5%)
	HBV	1 (0.1%)	3 (0.5%)	4 (0.7%)	2 (0.1%)
	Haemophilia	19 (2.8%)	0 (0%)	1 (0.1%)	0 (0%)
HCV PCR	Positive	339 (49.2%)	445 (70.1%)	469 (7.1%)	830 (68.7%)
	Negative	93 (13.5%)	135 (21.2%)	103 (17.3%)	320 (26.5%)

status	Not known	256 (37.2%)	54 (8.5%)	21 (3.5%)	57 (4.7%)
Acute infection diagnosed		1 (0.1%)	3 (0.4%)	3 (0.5%)	27 (2.2%)
Non Resident/moved		103 (14.9%)	93 (14.6%)	58 (9.7%)	40 (3.3%)
Death before access to care		181(26.3%)	82 (12.9%)	39 (6.5%)	22 (1.8%)
No Trace		19 (2.7%)	0 (0%)	0 (0%)	4 (0.3%)
Total leaving study at phase 1 (1292)		**396**	**310**	**200**	**386**
Total requiring specialist care (1830)		**292**	**324**	**393**	**821**

Phase 2 analysis: HCV PCR positive or unknown analysis

The second phase of the study included 1830 individuals who were HCV PCR positive or HCV PCR status was unknown, who were living in our region (i.e. the target population for any treatment programme). The aim was to compare referral, attendance and treatment outcomes in each subgroup to determine if changes to practice had a significant impact on outcomes. This is presented as cumulative data, time periods from referral to access to care and treatment.

Across the subgroups 1786 (97.5%) were referred to our Specialist Services with 1629 (89%) attending at least one clinic appointment for assessment. The data represents cumulative attendance in the table so sub groups A, B and C have had longer and more opportunities to engage with services than sub group D. Over the course of the study the number of individuals who accessed specialist care within a year of diagnosis significantly increased from 26.3% to 72.9% (Table 2).

The mean age did not vary significantly in the sub groups, in the last 2 subgroups the proportion of females who attended increased as did the proportion of PWIDs who accessed care. The genotype distribution across the study changed through time. In subgroup A, 55.2% were genotype 1 and this decreased to 38.5% in subgroup D, consequently genotype 3 infection rates rose from 40.4% in subgroup A to 58.2% in sub group (Table 2). This probably reflects greater testing in active PWID in subgroup D.

Table 2: Final outcomes of HCV PCR positive individuals

			Subgroup A	Subgroup B	Subgroup C	Subgroup D
Caseload total (1830)			n= 292	n=324	n=393	n=821
Total referred (1786)			279 (95.5%)	320 (98.7%)	386 (98.2%)	801 (97.5%)
Referrer	GP		121 (43.3%)	163 (50.9%)	172 (43.7%)	256 (31.3%)
	Other Hospital		44 (15.7%)	43 (13.4%)	40 (10.1%)	82 (9.9%)
	Prison service		39 (13.9%)	51 (15.9%)	71 (15.5%)	103 (12.8%)
	Drug Services		21 (7.5%)	23 (7.1%)	70 (18.1%)	315 (39.3%)
	Other		54 (19.3%)	40 (12.5%)	33 (8.5%)	45 (5.6%)
Did not attend clinic			32	19	31	139
Accessed care (1629)			260 (89%)	305 (94.1%)	362 (92.1%)	702 (85.5%)
Accessed care within one year of positive test			77 (26.3%)	76 (23.4%)	262 (66.6%)	599 (72.9%)
Accessed care within 1 to 3 years of positive test			21 (7.2%)	21 (6.5%)	54 (14.9%)	79 (9.6%)
Age range -Mean age			32.9 years	35.5 years	36.6 years	35.9 years
Male			195 (75%)	240 (78.6%)	255 (70.4%)	586 (71.3%)
Current PWIDs /or on opiate substitution at time of diagnosis			174 (66.9%)	241 (79%)	302 (83.4%)	693 (84.4%)
Genotype	Tested		210	255	315	657
	1		116 (55.2%)	117 (45.8%)	128 (40.6%)	253 (38.5%)
	2		6 (2.8%)	8 (3.1%)	16 (5%)	17 (2.5%)
	3		85 (40.4%)	126 (49.4%)	167 (53%)	383 (58.2%)
	other		3 (1.4%)	4 (1.5%)	4 (1.2%)	4 (0.6%)
	Not known		50	61		
Number started first treatment			157	168	206	349
Treatment within 1 year of diagnosis*			6 (3.8%)	20 (11.9%)	81 (40%)	133 (38.1%)
Treatment from 1 to 5 year of diagnosis*			23 (14.6%)	57 (33.9%)	96 (47.5%)	216 (61.6%)
Treatment from 5 to 10 year of diagnosis*			46 (29.2%)	64 (38%)	29 (14%)	N/A
Treatment after 10 years*			82 (52.2%)	27 (16%)	N/A	N/A
SVR			96 (61.6%)**	103 (61.3%)**	140 (67.9%)	258/333 (77.4%) ***
Complete treatment/no SVR data			1	2	13	15
Died on/after treat			0	5	2	8
Cirrhosis when starting first treatment			38 (24.2%)	45 (27.3%)	28 (13.5%)	48 (13.7%)
Second/third treatment	Commenced		26	18	17	11
	SVR		15 (57.6%)	9 (50%)	10 (58.8%)	10 (90.9%)
Follow up	Died		51	57	36	33
	Moved from area		23	47	53	58
	Lost to follow up		37	32	57	138
	Discharged SVR		114	112	150	268

*The table includes each patient from date of diagnosis; the treatment will be started at different stages in our pathways
** The SVR data is based across genotypes and using various treatment regimens and includes individuals who were on clinical trials in our area
***16 patients had not completed treatment by end of study

During the study 948 have commenced treatment, 872 have had one period of treatment, 68 have had two treatments and 8 had three. The sustained response rates of treatments have gradually improved throughout the study and the majority of first treatments contained interferon in the regimen. DAAs with interferon were included at the end of 2011. The number of individuals who started treatment within two years of diagnosis increased from 14.6% to 61.6%. In total 641 have obtained a SVR, 597 with a first treatment and 44 with second or third treatment. SVR rates are included in Table 2. In this analysis it is difficult to break this down by treatment genotype, duration and regimen because an individual may be diagnosed in one time period and have been treated at a much later stage. SVRs for first treatments are between 61.6 and 77.4% across the study.

To further analyse the impact of different treatment pathways we have used Kaplan Meier curves (13*)* to determine whether there was a significant difference on outcomes associated with the date of first diagnosis and the pathways that were in place at the time of diagnosis. For all 1629 individuals who attended at least one appointment at the specialist service we took the date of first positive HCV test and analysed time to first appointment at specialist clinic, the start of first treatment and the time to SVR.

The Kaplan-Meier survival curves for time to the 1st appointment, the 1st treatment, and SVR are shown in Figure 1. It shows that subgroup D (blue) has the shortest time to the 1st appointment, time to the 1st treatment, and time to SVR. The difference of these time periods are significantly different among the 4 subgroups.

Deaths in the subgroups

Within the study there were 570 recorded deaths, 69 of deaths were in individuals who were HCV PCR negative. Two hundred and eighty four died before being able to access specialist HCV care. A significant number in this group died from drug related deaths, HIV related illnesses or liver and hepatocellular carcinoma related deaths. The majority with HIV related illness died pre 2004. Of the 196 who died after accessing care a significant number had liver cirrhosis and liver cancer. (Table 3)

In all groups many died from other serious illnesses not related to the liver, the main cause of death was heart disease (30%), lung disease (19%) and cerebro-vascular disease (13%) respectively.

Table 3: Causes of death recorded in HCV positive individuals

Cause of death	Access to HCV care	No access to HCV care	PCR Negative
Alcohol related Cirrhosis Of Liver	17	13	3
Assault	3	3	0
Drug related death	57	69	20
Falling jumping or pushed from high place	0	4	0
Drug related death/known cirrhosis	5	0	0
HIV related death	10	58	6
Liver cirrhosis	9	8	0
Liver cirrhosis died from other serious illness	4	2	0
Liver cirrhosis with liver cancer	26	14	1
Mental and behavioural disorders due to alcohol dependence syndrome	8	5	1
Not known	7	11	8
Other cancer not liver related	7	14	6
Other serious illness resulting in death	23	51	16
Other specified viral hepatitis without mention of hepatic coma	10	14	4
Suicide	10	18	4
Total died	196	284	69
Total in subgroup	1629	545	651
% of deaths per subgroup	12.0%	52.1%	10.5%

When the rates of death between the 4 sub-groups are viewed there is an apparent reduction in death as the pathways change with the most recent sub-group having the lowest death rate (Table 4). Clearly there are several co-founders for such an observation.

Table 4: Numbers of deaths by subgroup

Number diagnosed with	Subgroup A	Subgroup B	Subgroup C	Subgroup D

HCV	(n=688)	(n=634)	(n=593)	(n=1207)
Dead before access to care	181 (26.3%)	82 (12.9%)	39 (6.5%)	22 (1.8%)
Died after access to care	51 (7.4%)	57 (8.9%)	36 (6.1%)	33 (2.7%)
Total deaths	232 (33.7%)	139 (21.9%)	75 (12.6%)	55 (4.5%)

To investigate this further we performed a Kaplan-Meier survival curve. The number of patients in this analysis is 3,099 patients (23 patients with missing data for date of death or date of SVR). The starting point of follow-up is taken to be the date of first test. The survival time (time from the first test to all-cause mortality) may be exactly observed or censored at the last follow-up date (date of moving out of the region or 30/6/2015).The Kaplan-Meier survival curves for the 4 subgroups are shown in the figure 4.

The length of follow up for the 4 subgroups is different. Within the same length of follow-up period (0 - 7 years), the latest subgroup (Subgroup D) has significantly higher survival probability (i.e. lower risk of death) than the other 3 subgroups. We can further investigate the difference by employing Cox regression models (Table 5).

This further analysis of the time to all-cause mortality, includes potential confounding risk factors which are age at 1st test (continuous variable), gender (male vs. female), subgroup(A to D), HIV co-infection (yes or no), and SVR status (yes or no). The Cox proportional hazard model (14 *ref required*) is used to investigate whether the time to mortality are still significantly different among the 4 sub-groups after adjusting for age at 1st test, gender, HIV co-infection, and SVR.

The SVR status does not satisfy the proportional hazard assumption, i.e. the baseline hazards for patients with & without SVR are not the same. Therefore a stratified analysis on SVR is performed to guarantee that the proportional hazard assumption is not violated. The results are shown in the following table.

Table 5: Multivariate Cox regression analysis for the time from the first test to all-cause mortality

Covariates		**Multivariate HR (95% CI)**	***P value***
Age at the first test		1.05 (1.04 – 1.05)	< 0.001
Gender	Male vs. Female	1.28 (1.04 – 1.56)	0.018
HIV	Yes vs No	4.35 (3.40 – 5.56)	< 0.001
Subgroup	B vs A	0.85 (0.69 – 1.05)	0.128

Subgroup	C vs A	0.79 (0.61 – 1.02)	0.074
Subgroup	D vs A	0.53 (0.40 – 0.71)	< 0.001

The hazard ratio of SVR is omitted since stratified Cox regression ignores the coefficient of the stratification factor, which is SVR in this model. We can see that after adjusting for age, gender, HIV infection and SVR, only the latest subgroup (D) has significantly reduced risk of death (HR = 0.53, $p < 0.001$) comparing to the earliest subgroup (A).

Discussion

This paper demonstrates that the referral and treatment pathway in Tayside acts as a model of best practice in how a co-ordinated care network can ensure widened access to testing and treatment and significantly improve outcomes for a cohort that contains significant numbers who are often deemed ill-suited for hepatitis C treatment. Improving diagnosis of HCV and access to care will only be effective if they are able to receive effective treatment and be cured of hepatitis C. All service developments were aimed at achieving successful SVRs. The greatest impact on our pathway was the introduction of routine dry blood spot testing (DBST) in drug services and community clinics and GP practices. This has significantly contributed to an increase in the number of new hepatitis C cases. In 2008, there were 127 new diagnosis (rate of 32.1 per 100 000 of our population) and the rate of new diagnosis increased to 68.5 per 100 000 which is higher than the overall rate for Scotland. (15) While the largest single change is the proportion of new diagnosis within the drug services, the numbers of patients diagnosed within general practice also continues to rise and is not diminished by the development of alternate routes into care.

The Kaplan-Meier survival curves for time to the 1st appointment, to 1st treatment, and SVR clearly shows that sub-group D has the shortest time to SVR. The difference of these time periods is significantly different among the 4 subgroups. It is not surprising that the time to first attendance and commencing treatment fell, then the time to SVR also improved, but taken in the context of a much larger number of patients being diagnosed and referred and the number of opiate dependent patients with chaotic life styles, also increasing in the later subgroups, it might be expected that such patients would be more difficult to treat and cure. So, by opening care to all of the community affected by HCV we

are seeing no diminution in the markers of success of the treatment programme. Clearly in terms of total numbers of each subgroup the commencement of treatment and achieving SVR in this study is biased toward the earlier subgroups. Patients in subgroups A, B, and C have had a much longer opportunity to be exposed to therapy and have also been exposed to the newer pathways of care, yet despite this bias against the newest pathway of care it still demonstrates it is superior.

It is important to note that the developments in our service were not achieved by a large increase in our nursing and medical staff. Our service is mainly nurse led and these outcomes have been achieved by 0.8 full time equivalent (FTE) specialist nurse when the MCN was introduced and the addition of another FTE nurse when DBST was introduced. The aim of the network has always been to empower colleagues to be involved in BBV testing and follow up and the high referral and attendance rates have been achieved by health care professionals such as drug workers, GPs, prison nurses and social workers taking the opportunity to discuss referral and treatment. Good communication and easy access to specialist service is important. There is a perception that individuals with hepatitis C can be “difficult to reach” however our centre has found that this is not the case. We are always aware that it might be more likely that our services are “difficult to find” and our service redesign was aimed at providing services in the right time and place.

The clinical database which was established in 2004 has been invaluable in tracking and following up patients. We have a record of every new diagnosis in our area; the data is kept prospectively and is updated every week. The information available is used to advise the clinical team of numbers who are currently in HCV service, who are lost to follow up, who have never attended a clinic or have never been referred, if they have died or moved out of the area. This data has been vital to showing the success of the redesign of our service. This data had also been used to assist with local projects carried out with General Practitioners and community pharmacists which have been shown to increase the numbers tested and accessing care.

The most striking finding from the study has been the greater than 40% reduction in risk of death in the first sub group compared to the most recent. Intuitively the older age of the earlier sub-group and poorer HIV infection outcomes of that time would have been thought to explain this, however multi-variate

analysis shows this survival benefit is maintained even when SVR, HIV status and age are taken into account. In our cohort the dominant causes of death are drug related, trauma and suicide, all strongly associated with active drug use. In our final sub-group the care pathway has led to massive increase in testing and diagnosis of HCV infection, this would have been expected to lead to an increased risk of death and yet we have observed the reverse. The associated increased speed of access into care and focus on HCV treatment may have led to a greater degree of engagement with health services and may have had a stabilising effect on drug using behaviour.

This is an observational cohort study so the power to ascribe causality between the interventions described and the outcomes is limited to describing associations. However it is very difficult to test the systems change and complex interventions undertaken here in a randomised trial, without expensive and large cluster randomised trials, which are probably impossible to perform.

Conclusion

In the field of HCV treatment much has been made of the waterfall of care with loss of large numbers of patients from the care pathway at each stage. In this study we report the outcomes of a series of changes to the care pathway, with modest investment in infra-structure but integration of existing services to work smarter. This has led to 97.5% of our HCV caseload being referred to our Specialist Services with 89% attending at least one clinic appointment for assessment. Over the course of the study with the introduction of new pathways the number who accessed specialist care within a year of diagnosis significantly increased from around 26.3% to 72.9%. There was a significant decrease in the time period from diagnosis to SVR.

At the end of the study 78% of estimated HCV cases had been diagnosed and 40% of the total caseload had an SVR. Our data shows that involving colleagues within a network can significantly increase HCV testing, diagnosis and treatment and can bring patients who are perceived as difficult to reach into care. Additionally, the entry into HCV care of those traditionally thought unsuitable is associated with reduced risk of death.

Acknowledgements and disclosures

Contributors JT and JD conceived the study analysed the data and wrote the manuscript. HW performed the statistical analysis, MM analysed the data and contributed to the manuscript. BS, PMcI, SC collected the data and reviewed the manuscript. All authors have approved the final version to be published.

Ms Jan Tait: has served as speaker, a consultant and an advisory board member for Abbvie, Bristol Myers Squibb, Gilead, Janseen, Merck Roche Sharp & Dohme and Roche.

Mr Brian Stephens has served as speaker for Gilead and Janseen

Professor John Dillon has served as speaker, a consultant and an advisory board member and received research grants from Abbvie, Bristol Myers Squibb, Gilead, Janseen, Merck Roche Sharp & Dohme and Roche

Financial support for study: None

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