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A Cost Reimbursement Model for Hepatitis C Treatment Care Coordination

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Abstract

Objective: To estimate the cost of delivering a hepatitis C virus (HCV) care coordination program at two New York City healthcare provider organizations and describe a potential payment model for these currently non-reimbursed services.

Design: An economic evaluation of a hepatitis C care coordination program was conducted using micro-costing methods compared to macro-costing methods. A potential payment model was calculated for three phases: enrollment to treatment initiation, treatment initiation to treatment completion, and a bonus payment for laboratory evidence of successful treatment outcome (sustained viral response).

Setting: Two New York City healthcare provider organizations.

Participants: Care coordinators and peer educators delivering care coordination services were interviewed about time spent on service provision. De-identified individual level data on study participant utilization of services was also used.

Intervention: Project INSPIRE is an innovative Hepatitis C care coordination program developed by the New York City Department of Health and Mental Hygiene.

**Institution at the time the work was completed.

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Main Outcome Measures: Average cost per participant per episode of care for two provider organizations and a proposed payment model.

Results: The average cost per participant at one provider organization was \$787 (\$522 nonoverhead cost, \$264 overhead) per episode of care (5.6 months) and \$656 (\$429 non-overhead cost, \$227 overhead, 5.7 months) at the other one. The first organization had a lower macro-costing estimate (\$561 vs. \$787) whereas the other one had a higher macro-costing estimate (\$775 vs. \$656). In the three-phased payment model, phase 1 reimbursement would vary between the provider organizations from approximately \$280 to \$400, but reimbursement for both organizations would be approximately \$220 for phase 2 and approximately \$185 for phase 3.

Conclusions: The cost of this 5.6 month care coordination intervention was <\$800 including overhead or <\$95 per month. A three-phase payment model is proposed and requires further evaluation for implementation feasibility.

Keywords

Hepatitis C; care coordination; cost; payment

Introduction:

Over 3.5 million people in the United States have chronic hepatitis C virus (HCV), which is now a curable disease with highly effective oral regimens.¹ Prevalence is higher in areas with more active injection drug use including urban areas in the Northeast.²⁻⁵ As of 2010, there were an estimated 146 500 individuals with chronic HCV in New York City (NYC), of whom approximately 50% are aware of their infection.⁶ HCV death rates in NYC have increased by 38% from 1999 to 2014, with more than half of deaths occurring in people less than 65 years old;⁷ age-adjusted HCV death rates now equal death rates from HIV.⁸ Untreated HCV can be costly to the health system, with annual medical costs associated with chronic HCV averaging \$6 864 per patient overall and averaging \$12 481 per patient at advanced stages when individuals may require liver transplants or treatment for liver cancer.⁹

Highly effective and tolerable oral HCV treatments are now available that cure HCV at a published wholesale acquisition cost (WAC) of approximately \$39 600-\$94 500 per 12 week treatment course,¹⁰ although actual negotiated prices are discounted from this cost.¹¹ Cost-effectiveness studies have shown that taking into account these costs, HCV treatment represents good economic value from a societal perspective,¹¹ but ensuring that patients successfully initiate and complete treatment and achieve a cure (defined as a sustained virological response (SVR)) is critical to saving costs to the health system and maximizing health outcomes.

Project INSPIRE (Innovate and Network to Stop HCV and Prevent complications via Integrating care, Responding to needs and Engaging patients and providers), led by the New York City Department of Health and Mental Hygiene, is an integrated, innovative, and evidence-based comprehensive service model that combines the use of HCV surveillance data and facilitated case identification, with individual-level care coordination, health

promotion, medication adherence support, and HCV infection-centered primary care supported by expert consultation via tele-mentoring.¹² HCV care coordination addresses specific challenges that occur frequently in this population and may impede successful treatment such as psychosocial issues, poor social support, and alcohol and drug use disorders.¹³ The model includes elements from HIV care coordination and navigation services that have been shown to improve health care utilization, reduce missed appointments and loss to follow-up, and improve treatment adherence thereby contributing to better outcomes.^{14,15} The tele-mentoring sessions offer web-based presentations on hepatitis C care and treatment, including case presentations that are discussed with HCV medical experts. This service is based on the NYC Check Hep C program,¹⁶ which is an adaptation of the Project ECHO program that was originally developed to help primary care clinicians gain the knowledge and skills to treat rural, underserved HCV patients in New Mexico and has since spread to be used for other diseases and in other areas of the US.^{17,18} Project INSPIRE was funded by the Centers for Medicare and Medicaid Innovation as a Health Care Innovation Awards (HCIA) cooperative agreement obtained by the New York City Department of Health and Mental Hygiene (NYC DOHMH) and implemented by two NYC healthcare provider organizations between September 1, 2014 and August 31, 2017.

The cost impact and method for payment is a core concern for any organization seeking to implement an innovative but currently non-reimbursable program, like Project INSPIRE. To address these potential cost concerns, we present cost estimates for Project INSPIRE from a provider perspective and propose a potential payment model for currently non-reimbursable individual-level HCV care coordination services and provider tele-mentoring.

Methods:

Data Collection

We conducted a cost analysis of delivering the Project INSPIRE HCV care coordination protocol in 7 primary care clinics (4 in a community setting, 3 on a hospital campus) and 5 specialty clinics (2 hepatology clinics, 1 HIV clinic, 1 infectious diseases clinic, and 1 STD clinic) affiliated with two healthcare provider organizations, subsequently referred to as Clinical Partner 1 and Clinical Partner 2, located in the Bronx and upper Manhattan in New York City. Out of the 12 clinics, Clinical Partner 1 had 8 clinics and Clinical Partner 2 had 4 clinics participating in Project INSPIRE. Eligible participants were enrolled in or eligible for Medicare or Medicaid and not enrolled in a Ryan White or similar care coordination program.

Of the 1 381 individuals enrolled between January 2015 and February 2016, we analyzed data from the 987 who had been enrolled for at least a month at the time we conducted our analysis. To obtain estimates of time spent on each care coordination activity, we interviewed 9 care coordinators and 7 peer navigators between April 2015 and April 2016. Average utilization of care coordination services per participant per month was collected in a database that tracked patient-level use of care coordination services for services provided from January 2015 through February 2016. This database also includes information on patients' clinical history and treatment outcomes. Wage and fringe rates were collected from records on staff salary and overhead rates were obtained from clinic-level budgets provided

by the clinical partners. Start-up costs were collected from NYC DOHMH and the clinical partners, which included costs of conducting start-up training sessions for care coordinators and peers, purchasing and installing/setting up equipment and supplies, and developing health promotion materials (Appendix I and Appendix II, Table 1). Ongoing occupancy costs after start-up are included in overhead cost estimates. Overall, the data for care coordination protocol delivery costs reflect care processes that were in place during the period of January 1, 2015 to February 29, 2016. All procedures were approved by the Weill Cornell Medical College Institutional Review Board.

Analysis

The costing analysis estimates “steady state” costs of delivering the HCV care coordination protocol from the provider perspective. These costs include labor costs for care coordinators, peer navigators, and supervisors who are delivering the intervention protocol. They are classified as variable costs (time spent directly on specific participant-related activities that vary in utilization by participant) or time-dependent costs (weekly time devoted to activities like data entry, weekly meetings, and supervision). Additional costs include provider time devoted to case conferencing and tele-mentoring, and overhead. Costs for the one hour, weekly tele-mentoring sessions were calculated using provider time obtained from clinical partner tele-mentoring logs (Appendix I). One-time start-up costs, defined as non-recurring labor and materials costs in the first year of Project INSPIRE were also estimated (Appendix I and Appendix II, Table 1).

Base case estimates for the cost of the care coordination model were estimated using micro-costing methods. Micro-costing involves the “direct enumeration and costing out of every input consumed and produced as a consequence of the treatment of a particular patient.”¹⁹ (p 218) The micro-costing approach includes costs of: 1) services delivered to an individual participant (variable costs), 2) activities conducted on a weekly or monthly basis (time-dependent costs), 3) the tele-mentoring program, and 4) overhead (see Appendix I and Appendix II). Micro-costing may be inaccurate if individual task time estimates are imprecise or exclude “down time.” Micro-costing may also reflect institutional differences in program implementation, whereas macro-costing may minimize these differences by estimating effort based on monthly labor costs. To explore these considerations, we compared micro-costing results to results using a macro-costing method in which we divided total monthly care coordination full-time staff labor costs by the average monthly active caseload. Institutional differences in costs were also minimized for both micro-costing and macro-costing methods by using New York City-specific Bureau of Labor Statistics for medical staff wage rates and actual wages of care coordinators, which were the same across institutions.

For all cost estimates, we report total costs per participant per month. The cost per episode of care, defined as the time from enrollment in Project INSPIRE to the last care coordination service received, is calculated by multiplying the cost per participant per month by the estimated average number of months a person participates in Project INSPIRE. To derive average number of months of participation, we summed the average duration of time from

enrollment to treatment completion or the last service received if treatment completion is not reached.

Potential Phase-Based Payment Model Analysis—A potential three-phase payment model for the reimbursement of healthcare provider organizations was developed based on the micro-costing method results. Cost estimates were calculated for the following treatment phases: phase 1: enrollment to treatment initiation, phase 2: treatment initiation to treatment completion, and phase 3: sustained viral response (SVR) bonus payment. Care coordination services are assigned to phase I and/or II (see Table 1), and divided by the number of months each participant contributes to the corresponding phase. Phase I costs are based on the number of participants who enrolled, and phase II costs are based on the service utilization of participants who initiated treatment. The phase-based payment calculation accounts for the fact that some patients do not initiate treatment, and therefore the provider is not entitled to receive a phase II payment for services provided to these patients. As a result, the sum of the phase-based payments reported in Table 3 does not equal the total average cost per month for all patients. The bonus payment cost calculation divides the total cost of provider and Project INSPIRE staff participation in tele-mentoring sessions during an average month by the estimated number of Project INSPIRE participants who reach SVR each month (see Appendix I and Appendix II, Table 5). This results in a quality payment that would only be paid to the provider organization for each participant who achieves SVR. Attendance at the tele-mentoring programs offered by the clinical partners are not reimbursed by payers. An analysis was conducted to examine differences in the expected cost impact at the clinic level if they were reimbursed based on the payment estimates.

Results:

Variable Costs

When comparing utilization of services across services and sites, delivery of health promotion modules represents the highest proportion of variable costs at both sites (25% at Clinical Partner 1 and 24% at Clinical Partner 2), followed by prior authorization activities (20% at Clinical Partner 1 and Clinical Partner 2) (Appendix II, Tables 3a and 3b). Prior authorizations to acquire insurance approval for medication were the most time intensive service (median of 50-60 minutes) provided by care coordinators when compared to all other care coordination activities (Table 1). The average variable monthly cost for care coordination per participant is \$53 at Clinical Partner 1 and \$43 at Clinical Partner 2 (Table 2).

Time-dependent Costs

The cost of time-dependent care coordinator services per participant per month was slightly higher at Clinical Partner 1 than Clinical Partner 2 (\$15 versus \$11) due to greater time spent communicating with patients, conducting data entry, and case conferencing with peers. Peer and supervision costs were similar between clinical partners.

Provider Costs

The provider cost per participant per month is \$13 at Clinical Partner 1 and \$11 at Clinical Partner 2. Clinical Partner 1 includes only physician time whereas Clinical Partner 2 provider costs also include time of a psychologist and a social worker. Over 90% of the provider costs at all sites consists of case conferencing with a care coordinator individually or in a multi-disciplinary team. As reported by the care coordinators, typically two physicians participate in multi-disciplinary case conferences at Clinical Partner 1. At Clinical Partner 2, multi-disciplinary case conferences with more than one medical provider are not common.

Tele-mentoring Costs

Clinical Partner 1 had higher average tele-mentoring costs (\$8 per participant per month) compared to Clinical Partner 2 (\$5 per participant per month), reflecting higher tele-mentoring attendance of Project INSPIRE providers at Clinical Partner 1 even after taking into account its higher caseload.

Total Cost Estimates

The average cost per participant per month before considering overhead is \$93 at Clinical Partner 1 and \$75 at Clinical Partner 2 (Table 2). Project INSPIRE has greater care coordinator and tele-mentoring time costs at Clinical Partner 1 versus Clinical Partner 2. The average cost per participant at Clinical Partner 1 was \$787 (\$522 non-overhead cost, \$264 overhead) per episode of care (5.6 months) versus \$656 (\$429 non-overhead, \$227 overhead, 5.7 months) at Clinical Partner 2. The Clinical Partner 1 had a lower macro-costing than micro-costing estimate (\$561 vs. \$787) whereas Clinical Partner 2 had a higher macro-costing than micro-costing estimate (\$775 vs. \$656). Including macro-costing estimates, there is a range of \$561-\$787 in costs for the Project INSPIRE care coordination program.

Potential Phase-Based Payment Model

In the three-phased payment model, phase 1 reimbursement would vary between the provider organizations between approximately \$280 and \$400, but reimbursement for both organizations would be approximately \$220 for phase 2 and approximately \$185 for phase 3 bonus payment for achieving SVR (Table 3). At Clinical Partner 1, clinics with costs that exceed the estimated reimbursement would have had estimated losses of 7%-25% or \$42-\$157 per patient (Figure 1) if they were reimbursed according to the payment model. For the two primary care clinics, higher costs would be primarily driven by providers conducting more case conferencing with the care coordinators. For the one clinic that serves HIV-infected patients, higher costs would be driven by greater medication and pharmacy coordination and alcohol counseling costs. Clinics with lower costs than the estimated reimbursement typically had lower than average costs for case conferencing, medication and pharmacy coordination, and appointment reminders. Five out of the eight clinics would have had estimated cost savings of 4%-26% or \$23-\$159 per patient if they were reimbursed according to the payment model. At Clinical Partner 2, costs at a specialty clinic exceeded the estimated reimbursement by 3% or \$13 per participant which was largely driven by increased treatment adherence and medication and pharmacy coordination costs (Figure 2).

For the primary care clinic whose costs exceeded estimated reimbursement by 10% or \$52 per patient, costs were higher as a result of more case conferencing. The remaining two clinics would have had estimated cost savings of 15%-17% or \$74-\$84 per patient.

Discussion:

We evaluated the cost of the Project INSPIRE HCV care coordination program from a provider perspective and estimated a potential payment model for these services that may serve as a model for HCV care coordination services provided to similar populations nationally. Our estimates indicate that Project INSPIRE cost per participant per episode of care (including overhead) is approximately \$560-\$790 considering both micro-costing and macro-costing estimates, and monthly costs range from \$66 to \$93 per participant per month. In comparison, the average cost of a redesigned Medicare Coordinated Care Demonstration project that offered care coordination primarily by phone to reduce hospitalizations was higher, \$164 per beneficiary per month with a negotiated reimbursement from CMS of \$80-\$444 per month.²⁰ The higher cost may be due to differences in enrollment criteria, for example enrollees in this program were older (65 and older) and had specific indicators of high cost (e.g., hospital admission within previous year) that were different from those in Project INSPIRE. Nevertheless, the Project INSPIRE care coordination program had a lower cost for a program that provides not only for in-person care coordination, but also for tele-mentoring of providers to expand HCV treatment capacity beyond specialty liver care.

There were some differences between the costs incurred by the two healthcare provider organizations. Clinical Partner 1 had somewhat higher costs, reflecting more intensive utilization of care coordination services. At Clinical Partner 1 there are more clinics, a greater geographical spread, and they include mostly primary care clinics and one high HCV caseload HIV clinic. As a result, care coordinators at Clinical Partner 1 tailor their services to meet the needs of specific clinics. At Clinical Partner 2, the clinics operate as part of a more centralized healthcare system made up of specialty and primary care providers and are located geographically closer to one another, resulting in more standardized provision of services by care coordinators.

Clinical Partner 1 had lower macro-costing than micro-costing estimates whereas Clinical Partner 2 had higher macro-costing than micro-costing estimates. The micro-costing estimates at Clinical Partner 1 may reflect overestimates of the care coordinators' perceptions of the time required to complete some activities. To address potential overestimates, we made efforts to follow up with individual care coordinators when estimates seemed unusually high and we used median time estimates when calculating costs. The number of services utilized per participant per month at Clinical Partner 1 may also be overestimated in some situations where service utilization could be "double counted" in categories of overlap. For instance, a care coordinator may meet with a multidisciplinary team that includes the main provider and possibly mark that meeting as both a "case conference with provider" and a "multidisciplinary case conference" for the same event. Additionally, in our analysis we assumed all services were delivered by care coordinators because we were unable to identify which services (such as certain health promotion

modules) were delivered by peers. This may have resulted in some additional overestimate of care coordinator costs at Clinical Partner 1, which employs most of the peers. In regards to the lower micro-cost estimate at Clinical Partner 2 compared to the macro-costing estimate, the disparity may be a result of micro-costing estimates not fully accounting for downtime, travel time, or research time which is captured in the macro-costing estimates.

Differences in patient characteristics that are associated with greater need for services could account for some cost differences among sites that might also have led to differences between the Clinical Partners, but we did not have sufficient sample size to examine these differences at the site level. Furthermore, this program was limited to New York City residents with Medicaid and/or Medicare coverage and therefore not generalizable to all populations in all localities, but still remains a valuable estimate of costs of delivering HCV care coordination. For programs that wish to tailor these cost estimates to their localities, we provide detailed estimates of the cost of care coordination components and a comparison of NYC-specific wage rates to national labor rates in the appendix. Finally, start-up costs may not be generalizable; for example, these cost estimates do not include costs of existing supplies and equipment at each of the clinical partners that were used for Project INSPIRE that might need to be purchased by other programs.

We found that approximately 20% of full-time staff variable costs in Project INSPIRE were spent supporting prior authorizations at the time we conducted our study, which represents an opportunity for cost savings for programs implemented with other insurance models. Care coordinator assistance with prior authorizations reduces clinical provider workload and helps vulnerable populations, such as people who use alcohol or drugs, overcome provider barriers to requesting insurance coverage for treatment.²¹ Many payers require additional laboratory testing (e.g., HCV resistance testing) and drug testing, or will deny medication to patients without advanced fibrosis or cirrhosis²²⁻²⁵ despite clinical guidelines indicating that treatment is indicated for patients without regard to clinical stage of disease or active alcohol or substance use.²⁶ Legal actions have recently led Medicaid and other insurers in New York State to eliminate HCV treatment restrictions based on disease prognosis and severity, and similar changes have occurred in some other states.²⁷ Whether these changes will reduce the care coordinator workload associated with prior authorization remains to be seen, however, because other documentation may still be required and prior authorization denials for other reasons may still occur. If there is reduced effort required of care coordinators for prior authorizations, then care coordinators could potentially take on larger caseloads focusing on other aspects of care coordination to support providers and patients.

To provide a route for payment of this currently non-reimbursable program, we describe a potential three-phase payment model, with the initial two payments providing most of the reimbursement. Variation in cost at the clinic level around the estimated reimbursement appears to depend primarily on the intensity of use of services for medication and pharmacy coordination, treatment adherence counseling, and case conferencing. A bonus payment of approximately \$185 per SVR would be sufficient to cover the costs currently being incurred by the clinical partners to participate in the tele-mentoring program. Participation in this tele-mentoring program is highly valued by providers and Project INSPIRE staff as a key component of the intervention, particularly as a source of support and empowerment for

primary care physicians who want to treat their HCV patients. While the three-phase payment model is flexible enough to be implemented in a variety of formats, including as a per contact payment that is paid if patient engagement occurs in a given month or as a healthcare common procedure coding system or diagnosis-related group code similar to codes recently implemented for depression care management,²⁸ we acknowledge that other payment models can also provide a route for care coordination reimbursement.

The Project INSPIRE HCV care coordination program provides substantial value for cost because the care coordinators help ensure successful treatment initiation, adherence, treatment completion and, ultimately, cure. The model includes additional potential benefits to payers because it provides education to populations that may be disenfranchised and disengaged from the health system, encouraging self-management skills and better engagement with the health care system. Additionally, services provided through this care coordination model, such as screening for depression and alcohol counseling, may help improve Medicaid managed care organizations' quality ratings. At a cost of less than \$800 per participant per episode of care, or less than \$95 per month, further evaluation of payment models such as the three-phase model should be pursued.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Conflicts of Interest and Sources of Funding:

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References:

1. Yehia BR, Schranz AJ, Umscheid CA, Lo Re V, 3rd. The treatment cascade for chronic hepatitis C virus infection in the United States: a systematic review and meta-analysis. *PLoS One*. 2014;9(7):e101554. [PubMed: 24988388]
2. Tempalski B, Pouget ER, Cleland CM, et al. Trends in the population prevalence of people who inject drugs in US metropolitan areas 1992–2007. *PLoS One*. 2013;8(6):e64789. [PubMed: 23755143]
3. Aceijas C, Rhodes T. Global estimates of prevalence of HCV infection among injecting drug users. *Int J Drug Policy*. 2007;18(5):352–358. [PubMed: 17854722]
4. Institute of Medicine Committee on the P, Control of Viral Hepatitis I. In: Colvin HM, Mitchell AE, eds. *Hepatitis and Liver Cancer: A National Strategy for Prevention and Control of Hepatitis B and C*. Washington (DC): National Academies Press (US); 2010.
5. Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Division of HIV/AIDS Prevention. *HIV and Viral Hepatitis*. 6 2016 Available

at: <https://www.cdc.gov/hiv/pdf/library/factsheets/hiv-viral-hepatitis.pdf>. Published June 2016. Accessed January 26, 2017.

6. New York City Department of Health and Mental Hygiene: Division of Disease Control, Bureau of Communicable Diseases. Hepatitis B and C Surveillance Report: New York City, 2013 Available at: <http://www1.nyc.gov/assets/doh/downloads/pdf/cd/cd-hepabc-surveillance-report-13.pdf>. Published February 2015. Accessed January 26, 2017.
7. New York City Department of Health and Mental Hygiene. Hepatitis B and C in New York City 2015: Annual Report. Available at: <https://www1.nyc.gov/assets/doh/downloads/pdf/cd/hepatitis-b-and-c-annual-report-2015.pdf>. Published October 2016 Accessed November 6, 2017.
8. NYC Health. Hepatitis C 2015 Surveillance Update - NYC. Available at: <https://hepfree.nyc/wp-content/uploads/2016/12/Hepatitis-C-2015-Surveillance-Update-%E2%80%9393-NYC.pdf>. Published December 12, 2016. Accessed January 26, 2017.
9. Davis KL, Mitra D, Medjedovic J, Beam C, Rustgi V. Direct economic burden of chronic hepatitis C virus in a United States managed care population. *J Clin Gastroenterol*. 2011;45(2):e17–24. [PubMed: 20628308]
10. Hepatitis C: Drug Therapy In: Micromedex (Columbia Basin College Library ed.). Greenwood Village, CO: Truven Health Analytics Accessed September 20, 2017.
11. Rosenthal ES, Graham CS. Price and affordability of direct-acting antiviral regimens for hepatitis C virus in the United States. *Infect Agent Cancer*. 2016;11:24. [PubMed: 27186235]
12. Laraque F FM, Desai P, Bresnahan MP, Litwin AH, Schwartz JM, Shukla SJ, Weiss JJ, Wyatt B, Perumalswami PV. Comprehensive Care Coordination Reduces Disparities in Access to Hepatitis C Care and Treatment in Highly Complex Patients. *Hepatology*. 2016;64(Suppl 1):95A.
13. Modabbernia A, Poustchi H, Malekzadeh R. Neuropsychiatric and Psychosocial Issues of Patients With Hepatitis C Infection: A Selective Literature Review. *Hepat Mon*. 2013;13(1):e8340. [PubMed: 23550100]
14. Brennan-Ing M, Seidel L, Rodgers L, et al. The Impact of Comprehensive Case Management on HIV Client Outcomes. *PLoS ONE*. 2016;11(2):e0148865. [PubMed: 26849561]
15. Lehrman SE, Gentry D, Yurchak BB, Freedman J. Outcomes of HIV/AIDS case management in New York. *AIDS Care*. 2001;13(4):481–492. [PubMed: 11454269]
16. Ford MM, Johnson N, Rude E, Laraque F, Varma JK, Hagan H. Check Hep C: A Community-Based Approach to Hepatitis C Diagnosis and Linkage to Care in High-Risk Populations. *Journal of public health management and practice: JPHMP*. 2017.
17. Arora S, Kalishman S, Dion D, Som D, Thornton K, Bankhurst A, Boyle J, Harkins M, Moseley K, Murata G, Komaramy M, Katzman J, Colleran K, Deming P, Yutzy S. Partnering urban academic medical centers and rural primary care clinicians to provide complex chronic disease care. *Health affairs (Project Hope)*. 2011;30:1176–1184. [PubMed: 21596757]
18. Arora S, Thornton K, Jenkusky SM, Parish B, Scaletti JV. Project ECHO: linking university specialists with rural and prison-based clinicians to improve care for people with chronic hepatitis C in New Mexico. *Public health reports (Washington, DC : 1974)*. 2007;122 Suppl 2:74–77.
19. Neumann PJ, Sanders GD, Russell LB, Siegel JE, Ganiats TG. *Cost-effectiveness in Health and Medicine*. Second Edition ed. New York, NY USA: Oxford University Press; 2016.
20. Peikes D, Chen A, Schore J, Brown R. Effects of care coordination on hospitalization, quality of care, and health care expenditures among Medicare beneficiaries: 15 randomized trials. *JAMA*. 2009;301(6):603–618. [PubMed: 19211468]
21. Clements KM, Clark RE, Lavitas P, et al. Access to New Medications for Hepatitis C for Medicaid Members: A Retrospective Cohort Study. *J Manag Care Spec Pharm*. 2016;22(6):714–722b. [PubMed: 27231798]
22. Barua S, Greenwald R, Grebely J, Dore GJ, Swan T, Taylor LE. Restrictions for Medicaid Reimbursement of Sofosbuvir for the Treatment of Hepatitis C Virus Infection in the United States. *Ann Intern Med*. 2015;163(3):215–223. [PubMed: 26120969]
23. Canary LA, Kleven RM, Holmberg SD. Limited Access to New Hepatitis C Virus Treatment Under State Medicaid Programs. *Ann Intern Med*. 2015;163(3):226–228. [PubMed: 26121095]

24. Lo Re V, 3rd, Gowda C, Urick PN, et al. Disparities in Absolute Denial of Modern Hepatitis C Therapy by Type of Insurance. *Clin Gastroenterol Hepatol*. 2016;14(7):1035–1043. [PubMed: 27062903]
25. Saab S, Jimenez M, Fong T, et al. Accessibility to Oral Antiviral Therapy for Patients with Chronic Hepatitis C in the United States. *J Clin Transl Hepatol*. 2016;4(2):76–82. [PubMed: 27350937]
26. AASLD-IDSA. When and In Whom to Initiate HCV Therapy. <http://www.hcvguidelines.org/full-report/when-and-whom-initiate-hcv-therapy>. Published September 21, 2017. Accessed January 30, 2017.
27. National Viral Hepatitis Roundtable. Hepatitis C: The State of Medicaid Access Preliminary Findings National Summary Report. Available at: <http://www.chlpi.org/wp-content/uploads/2013/12/HCV-Report-Card-National-SummaryFINAL.pdf> Published November 14, 2016. Accessed January 30, 2017.
28. Press MJ, Howe R, Schoenbaum M, et al. Medicare Payment for Behavioral Health Integration. *N Engl J Med*. 2017;376(5):405–407. [PubMed: 27973984]

Implications for Policy & Practice:

- Project INSPIRE's HCV care coordination program provides good value for a cost of less than \$95 per participant per month, particularly for public payers concerned about downstream medical costs from untreated hepatitis C.
- The proposed value-based payment model provides one example of a mechanism that could help support HCV care coordination for payers aiming to improve HCV treatment outcomes, expand treatment access, and reduce costs.
- The payment model provides an incentive for successful cure of hepatitis C with a bonus payment; using the bonus payment to support HCV tele-mentoring expands HCV treatment capacity and empowers more primary care providers to treat their own patients with HCV.

Figure 1:
Clinic Level Phase I and Phase II Costs (\$2015) for Clinical Partner 1

Figure 2:
Clinic Level Phase I and Phase II Costs (\$2015) for Clinical Partner 2

Table 1.

Care Coordination Activities for Treatment Phase I, II, & III

Phase I: Enrollment to Treatment Initiation	Phase II: Treatment Initiation to Treatment Completion
VARIABLE COSTS: <ul style="list-style-type: none"> • Accompaniment • Health promotion #1-3 modules • Alcohol counseling • Case conferencing with medical providers and multi-disciplinary teams • Treatment readiness counseling • Medication and pharmacy coordination • HCV medical care appointments • Referrals • Prior authorization • Lost to follow up tracking • Assessments 	VARIABLE COSTS: <ul style="list-style-type: none"> • Health promotion #4-7 modules • Case conferencing with medical providers and multi-disciplinary teams • Treatment adherence • Discharge planning • HCV medical care appointments and appointment reminders
TIME-DEPENDENT COSTS: <ul style="list-style-type: none"> • Patient communication • Data entry • Case conferencing with peers • Team meetings • Pharmacy team coordination meeting • Care coordination training 	TIME-DEPENDENT COSTS: <ul style="list-style-type: none"> • Patient communication • Data entry • Case conferencing with peers • Team meetings • Pharmacy team coordination meeting • Care coordination training
Phase III: Bonus Payment for Sustained Virological Response (SVR)	
Tele-mentoring costs*	

Note: Time-dependent costs are the same in Phase I & II

* Tele-mentoring education includes one hour consults on HCV cases and/or educational presentations on HCV care and treatment that occur on a weekly basis. Costs for the one hour, weekly tele-mentoring sessions were calculated using provider time obtained from clinical partner tele-mentoring logs divided by the number of SVRs per month at each clinical partner.

Table 2.

Project INSPIRE Estimated Cost per Participant per Month and per Participant Episode of Care (\$2015)

	CLINICAL PARTNER 1	CLINICAL PARTNER 2
Care coordinator		
Variable	53	43
Time-dependent	15	11
Peer	2	1
Supervisor	2	4
Provider		
Variable	13	8
Time-dependent	<1	3
Tele-mentoring	8	5
Total cost per participant per month (\$/ppm)	93	75
Average number of months in project inspire	5.6	5.7
Total cost per participant per episode of care without overhead (\$/episode)	522	429
Overhead	264	227
Total cost per participant per episode of care with overhead (\$/episode)	787	656

Note: Costs are in 2015 US dollars (\$2015)

Table 3.

Project INSPIRE Estimated Phase Based Payments (\$2015)

	CLINICAL PARTNER 1			CLINICAL PARTNER 2		
	Phase I*	Phase II**	Bonus***	Phase I*	Phase II**	Bonus***
Total cost per participant per month	110	46	122	92	42	121
Average number of months per treatment phase	2.4	3.2	-	2.0	3.4	-
Total cost per participant per treatment phase period without overhead	263	147	-	185	141	-
Overhead cost per participant per month	133	74	-	98	75	-
Total cost per participant per treatment phase period with overhead[†]	396	221	184	283	216	185

Note: Costs are in 2015 US dollars (\$2015). Phase I costs are for participants enrolled in Project INSPIRE; Phase II costs are for participants who initiated treatment.

* Enrollment to treatment initiation

** Treatment initiation to treatment completion

*** Bonus payment is the proposed payment for each person achieving SVR that is intended to cover tele-mentoring costs

[†] For the bonus payment column, this number is the total cost per participant reaching SVR per month with overhead