Published in final edited form as:

Psychiatr Serv. 2013 February 1; 64(2): 127–133. doi:10.1176/appi.ps.000852011.

Costs of a Public Health Model to Increase Receipt of Hepatitis-Related Services for Persons with Mental Illness

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Abstract

Objective—The objective was to contextualize the costs associated with implementation of a specialized HIV/hepatitis preventive services model designed to reach persons with serious mental illness and co-occurring disorders, an underserved population.

Methods—Between 2006 and 2008, a random sample of 236 non-elderly, predominantly African American, male participants with serious mental illness and a co-occurring substance use disorder were recruited at four community mental health outpatient programs in a large metropolitan area. All participants had been diagnosed with a psychotic or major depressive disorder. Participants were randomized within site to receive either the experimental intervention Screen, Test, Immunize, Reduce risk, and Refer (STIRR) or enhanced treatment as usual, which consisted of education and referral to medical testing. We estimated STIRR's standardized costs, the costs of STIRR per person who received hepatitis testing, HIV testing, and/or hepatitis A/B vaccination during the 6-months post-randomization.

Results—The average cost of delivering the STIRR intervention was \$423 (SD±\$90) per participant (in 2008 dollars) and the average cost of delivering the eTAU intervention was \$24 (SD±\$22) per participant (test of difference $t=52.9$, $P<.001$). The standardized costs per person who received hepatitis C testing, hepatitis B testing, HIV testing, and hepatitis A/B vaccination were \$706 (SD±\$165), \$776 (SD±\$181), \$3,630 (SD±\$846), and \$561 (SD±131).

Conclusions—The STIRR model's standardized costs suggest that hepatitis and HIV prevention services delivered in outpatient mental health settings to persons with serious mental illness can be at least as cost-effective as similar interventions designed for other at-risk populations.

Although people with serious mental illness and co-occurring substance use disorders have elevated risk for hepatitis (1-3), they also have lower rates of testing and vaccination compared to other persons (4). To reduce this unmet need, preventive hepatitis services could be offered within public outpatient mental health programs (5, 6). Many people with serious mental illness may be more likely to utilize preventive hepatitis services when they are offered at these locations, because there are both tangible and psychological costs to

receiving these services from other sites (7, 8). However, the additional costs to public mental health systems, many of which are already fiscally strained, are a significant barrier to the implementation and sustainability of these services in outpatient mental health programs. At present, information about approaches that are designed to minimize the costs of providing these services in such programs is limited.

Nearly 3% of persons with serious mental illness are infected with HIV and nearly 20% are infected with the hepatitis C virus (HCV) (3), rates that are 10 to 15 times the overall population rates for these infections (9, 10). The co-occurrence of a substance use disorder greatly increases this level of risk, with almost half of those with a lifetime substance use disorder testing positive for HIV, HCV or both infections (3). However, evidence also indicates that fewer than half of persons with serious mental illness have ever been screened for hepatitis and only 10-18% have been immunized for hepatitis B (4, 11, 12), rates that are well below U.S. population averages (13). This pattern is consistent with evidence of lower rates of receipt of a range of preventive medical care services among people with serious mental illness compared to other persons (14-18). To achieve higher rates of receipt of public health hepatitis and HIV prevention services among persons with serious mental illness and co-occurring disorders, the conventional model for delivering such services may require adaptation for delivery within outpatient mental health treatment settings (5, 6). However, adaptations of existing service delivery models often require costly re-engineering of clinics' operation and/or staffing changes (19). These additional costs could critically affect whether a service model is adopted by already short-staffed, underfunded community mental health programs.

This article examines the costs and impacts on receipt of preventive hepatitis and HIV services of an experimental service delivery approach called STIRR, which stands for Screen, Test, Immunize, Reduce risk, and Refer (5). STIRR services are delivered and coordinated in three separate sessions by a nurse who has received training in the STIRR approach (5, 20). The first session of the STIRR intervention includes: infectious disease education; screening for risk level; pre-test counseling; blood draw for testing (HIV, HBV and HCV); first vaccination with Twinrix® hepatitis A inactivated & hepatitis B (Recombinant) vaccine; and personalized risk-reduction counseling. During two follow-up sessions clients are provided post-test and risk-reduction counseling, medical referral and linkage (if needed), and additional Twinrix® vaccinations. STIRR services are designed for importation into outpatient mental health programs without significant modification of the programs' service environment or usual processes of service delivery and do not require much up-front investment in personnel, equipment, or administrative overhead. The STIRR nurse does not need to be an employee of any mental health clinic, and the entire STIRR intervention can take place in a small underutilized space inside a clinic, such as a hallway or small room. Training of the STIRR nurse is led by an infectious disease expert (physician or nurse), focuses on how to provide infectious disease prevention services, and includes information on mental illness. Except for this training, the STIRR nurse does not require any extra training or specialized background. As a result, STIRR services may overcome barriers to care integration and implementation that have been identified with collaborative models of integrated mental health and somatic care (19).

Evidence from prior research studies (Table 1) indicates that programs providing hepatitis and HIV screening and hepatitis A/B vaccination achieve acceptable cost-effective ratios when they are targeted to sufficiently high risk populations (21-29). In a 1993 decision analysis, Bloom and colleagues (21) concluded that screening and vaccinating high-risk adults for hepatitis B reduces health care costs (i.e., results in net savings) and extends life. In a 2005 decision analysis, Paltiel and colleagues (28) found that screening for HIV in high-risk adult populations every five years cost \$50,000 per quality-adjusted life-year

(QALY) gained compared to \$71,000 per QALY for a medium risk population, and \$169,000 per QALY for the U.S. general population. In a 2009 decision analysis, Greengold and colleagues (27) found that a nurse-led screening and risk-reduction intervention that improved compliance with a three-part hepatitis A/B vaccination series in homeless adults resulted in net savings and greater quality-adjusted life-years compared to “standard management” plus participant tracking. With regard to hepatitis C, the scarcity of information about the proximal effects of screening on case identification, treatment receipt, and future outcomes has impeded consensus on the cost-effectiveness of screening in the U.S. (29). However, in a 2006 study commissioned for the British National Health Service R&D Health Technology Assessment Programme, Castelnovo and colleagues concluded that screening reaches acceptable levels of cost-effectiveness among former injection drug users and patients receiving substance abuse treatment services, both being high risk populations (23).

The purpose of this costs assessment was to contextualize the costs associated with implementation of STIRR from the payer perspective by contrasting them with the expected improvements in receipt of hepatitis and HIV testing and hepatitis A and B vaccination. The study data are from a randomized trial that compared STIRR to an enhanced treatment as usual condition (eTAU) for clients of community outpatient mental health clinics and day treatment programs who were receiving treatment for a serious mental illness between 2006 and 2008 (20). We report estimates of STIRR services’ costs divided by the additional numbers of clients who are tested for HCV, HBV, and/or HIV and/or immunized for HAV/ HBV. Conceptually, these estimates correspond to the incremental reduction of unmet need for these services that is achieved for a given cost, which is a measure of program efficiency. Although these estimates can in principle be incorporated into a decision analysis to obtain estimates of long-term cost-effectiveness, such an analysis is beyond the scope of this study.

METHODS

Sample and Participants

Between 2006 and 2008, 236 participants were recruited from four publicly funded community mental health programs in Baltimore City that primarily serve persons with serious mental illness. Two of the programs were free-standing not-for-profit community clinics, which provide outpatient mental health and substance abuse treatment and rehabilitation services. The third and fourth programs were an outpatient mental health clinic and a Program for Assertive Community Treatment at a university-affiliated teaching hospital. Human subjects approvals were obtained from the [LEAD AUTHOR’S UNIVERSITY] and [OTHER AUTHORS’ UNIVERSITY] and the Institutional Review Boards associated with each study site. All participants were English speaking, aged 18-65 years, and had a (current or lifetime) substance use disorder diagnosis. Most of the participants were African-American (N=170, 72%) and male (N=146, 62%). Their mean age was 46 (std. dev. of 8.1) years. Forty-two percent (N=136) had not completed high school. All participants had been diagnosed (based on chart review and confirmation by clinic staff) with either a schizophrenia spectrum disorder (ICD-9-CM 295.1-7; N=165; 70%), a bipolar disorder (ICD-9-CM 296.0x, 296.4-7, 296.80 and 296.89; N=40; 17%), or a major depressive disorder (ICD-9-CM 296.20-36; N=31; 13%). After complete description of the study to the participants, written informed consent was obtained.

Design

Participants were randomized independently within each of the study sites to receive either STIRR (n=118) or eTAU (n=118). Upon being randomized to STIRR, persons proceeded

directly to the first session of the intervention. The eTAU condition was similar to typical services received by serious mental illness clients in publicly funded mental health service systems in the U.S. Participants were offered the same educational materials about blood-borne diseases that were offered in the STIRR condition. For testing and vaccination, participants either were directed to their current medical care provider, or, if not engaged with a physician or medical group, were given a list of accessible public clinics that offered blood testing and vaccination for HAV and HBV.

Clinical Outcomes

Outcomes were measured by the numbers of persons who self-reported having received hepatitis B or C testing, HIV testing, and/or hepatitis A/B vaccination during the 6-months post-randomization, as reported previously (20). We used outcomes data only from those (N=202) study participants who had a clinical need for screening or vaccination, operationalized as: no HIV or hepatitis blood test within the 6-month period that preceded the study baseline, or no prior hepatitis A/B vaccination. Of the 202 participants with clinical need, 105 were in the STIRR condition and 97 were in eTAU. Thirty-four other participants who recently had been tested and were already immunized were not included in the sample for this study because they were not eligible for blood testing or vaccination, the two sources of benefit measured in this study. Even though study records documented vaccinations and blood tests received by participants assigned to the STIRR condition, only self-reported measures were available for the eTAU condition. Consequently, to be consistent across conditions, only self-reported measures of testing and vaccination were used here.

Costs

Total implementation and delivery costs included the costs of training and setting up STIRR services within the four programs, blood draws and tests, vaccine supplies, consumer products provided to clients, and counseling and case management around referral to medical care and reminding patients about upcoming appointments. To assign costs, the quantity of each resource was multiplied by either an observed or an imputed unit cost value, using standard methods (30). Unit costs values and sources are shown in Table 2. All dollar amounts are expressed in 2008 dollars. The duration of staff participation in training and setup—training the STIRR nurse in the delivery of STIRR services, orienting staff at outpatient programs, and arranging for space at the programs—was recorded by a research assistant. We included the costs of the time spent by the STIRR nurse and other providers in encounters with clients and administrative (non-encounter) nurse time for interfacing with staff at each clinical site, completing referrals of patients to external providers, record keeping and preparing clinical encounter notes, and attending staff meetings. In addition, the nurse spent some amount of time waiting for patients who were late or missed their appointment. Based on the nurse's experience with STIRR, the total amount of time spent in these activities was estimated as being equal to 1.5 times the total nurse time in clinical encounters. The STIRR nurse also sometimes consulted with an M.D. infectious disease specialist, a psychiatrist, and/or a Ph.D. psychologist, who were available on an ad hoc basis, and their time costs were included. In the present randomized trial, a research administrator obtained medical supplies and contacted clients to remind them of upcoming STIRR appointments. In calculating costs for personnel, salary plus a 34% mark-up for fringe benefits was used. An administrative overhead cost rate of 15%, which is a typical rate in many non-profit health care organizations (31), was applied proportionally to personnel time. In terms of other cost components, counts of blood tests were abstracted from billing invoices sent by the laboratory where blood samples were processed and were confirmed using study checklists. Vaccinations were recorded by the STIRR nurse. Equipment costs for use of a previously owned centrifuge, used in collecting blood samples,

were estimated using the straight-line depreciation method. Rental costs for use of clinic space were imputed, using a rental fee of \$60 per clinic per year.

RESULTS

As shown in Table 3, the average total cost of the STIRR intervention was \$423 (SD±\$90) per participant. The average total cost of the eTAU intervention—\$24 (SD±\$22) per participant—was \$399 less than the cost of STIRR ($t=52.9$, $P<.001$). The last frame of Table 3 shows standardized costs, the total costs of STIRR implementation and operation costs plus additional costs for testing and vaccination divided by additional units of outcome, separately for each study outcome (i.e., tested for hepatitis C or B, tested for HIV, or vaccinated for hepatitis A/B). The cost of STIRR per additional participant tested for hepatitis C was \$706 (SD±\$165). Similarly, the cost per participant tested for hepatitis B was \$776 (SD±\$181), the cost per person tested for HIV was \$3,630 (SD±\$846), and the cost per participant vaccinated for hepatitis A/B was \$561 (SD±131).

To interpret the standardized costs (from the previous paragraph) it is helpful to extrapolate the predicted effects achieved by a given dollar expenditure on STIRR services. These improvements can be calculated by dividing a hypothetical level of expenditure by each standardized cost. For example, suppose a public agency spends \$482,000 on STIRR services, the approximate annual cost of a STIRR program including blood testing and hepatitis vaccination costs. If the STIRR nurse sees 1140 clients during a year (22.8 clients per week worked)—the expected annual number of clients based on 760 hours total annual nurse clinical time and 40 minutes average time duration of STIRR encounters—the STIRR program would be expected to result in 683 additional persons tested for hepatitis C, 621 additional persons tested for hepatitis B, 133 additional persons tested for HIV, and 859 persons vaccinated for hepatitis A/B, on average, during the first year of operation. However, if the nurse sees two-thirds this many clients (752 clients per year or 15 per week), the cost per additional person tested and/or vaccinated would increase 50%. Thus, the STIRR intervention's cost-effectiveness is sensitive to whether a program's volume of new clients remains consistent over time.

DISCUSSION

Offering STIRR services in four test sites cost \$399 more per client than did education and referral to offsite testing but resulted in improvements in hepatitis and HIV testing and hepatitis vaccination among persons with serious mental illness and a co-occurring substance use disorder (20). These results suggest that during the first year of operation a full-time STIRR program may cost around \$482,000 and may result in 683 additional at-risk persons tested for hepatitis C, 621 additional persons tested for hepatitis B, 133 additional persons tested for HIV, and 859 persons vaccinated for hepatitis A/B. Evidence from past research suggests that STIRR may achieve acceptable levels of cost-effectiveness provided that STIRR services are targeted to sufficiently high-risk populations and that a program sustains a sufficient volume of clients (21-25, 27-29).

STIRR services cost slightly less and achieved a higher rate of hepatitis B vaccination in comparison to a similar nurse case management intervention for vaccinating homeless adults (6, 27). That intervention cost \$432 per person (\$10 more than STIRR), achieved a 68% hepatitis A/B vaccination rate at 6 months compared to 78% in STIRR, and was deemed cost-saving in a decision analysis (20, 27). Risk levels among persons with serious mental illness and co-occurring substance use disorder are similar to those for other "high risk" groups (23, 28). Future hepatitis-related medical care costs are likely to be high in this population. Published prevalence estimates (3) suggest that 8.4-16.9% of these persons may

develop chronic hepatitis C (i.e., a persistence of hepatitis C RNA in the blood for six months or more). Discounted lifetime treatment costs per person treated for chronic hepatitis C are estimated to exceed \$100,000 (32). Thus, expected hepatitis C costs could be as much as \$8.4-16.9 million for every 1000 at-risk persons. STIRR services would consequently be cost-neutral if they reduce costs by only 2.4-4.8%.

Although it is unknown whether STIRR would produce this level of savings, decision analyses indicate the prospect of substantial savings (21, 23, 27). Besides future savings resulting from vaccination and Hepatitis C treatment benefit, additional savings might accrue from STIRR's other clinical effects, which include reduced alcohol and illicit drug use and increased knowledge of risk-reduction when sharing needles and engaging in other risky behaviors (20). Finally, recent advances in hepatitis C treatment and discoveries regarding the clinical benefits of early entry into HIV treatment may improve the savings from STIRR and other prevention programs. Two novel medications recently approved for use in hepatitis C treatment—boceprevir and telaprevir—have been shown to be more efficacious than prior medications (33-35), and early treatment for HIV has been shown to reduce HIV transmissions and improve clinical outcomes among people who are HIV positive (36).

In relation to dissemination, one of the advantages of the STIRR model is that the STIRR team is designed to have little impact on direct or indirect costs to the host organization (5). Nevertheless, new dedicated financing would be needed to implement and sustain STIRR programs in a city, county, or state system. Managed care organizations that cover somatic care services for STIRR's target population may be willing to finance STIRR services, as these organizations are likely to incur the future health care costs resulting from hepatitis and HIV-related morbidity, especially when care is financed using a population capitation rate. Conversely, managed behavioral healthcare organizations may have little financial incentive to provide STIRR services, unless the same managed care entity is financially at risk for both mental health and somatic care.

In any implementation of STIRR programs, several factors may cause average costs and client outcomes to deviate from estimates presented in this study. First, the number of clients seen by the STIRR nurse in a given period of time could be more or less than was estimated. The study's cost estimates imply that the STIRR nurse completes 1140 encounters per year. A usual care implementation could achieve higher client volumes through routinization of the STIRR schedule at clinics, outreach to potential clients, and integration of STIRR services within clinics' usual care processes. However, inefficiencies due to care coordination problems or poor planning could result in lower volumes and higher costs per person who receives vaccination and/or blood testing. Over time, the proportion of STIRR clients receiving hepatitis A/B vaccinations would also depend on the overall number of unvaccinated people in a target population. This number could either increase or decrease depending on the balance between the number of unvaccinated high-risk persons entering the target population, the number of hepatitis vaccinations given by STIRR and other programs, and attrition. Second, STIRR programs could incur greater-than-estimated or less-than-estimated administrative expenses for bookkeeping, managing supplies, regulatory reporting, patient outreach and payment of invoices. Expenses of \$50 per participant (\$5231 total) were incurred for training the STIRR nurse and coordinator and for orienting collaborating providers to the model. Over time, these expenses would be distributed over an increasing number of clients. However, there could be additional training expenses due to staff turnover and changes in medical practice requiring additional education. Finally, although the STIRR nurse would likely serve multiple clinics on a rotating schedule, we did not explicitly include travel costs in our estimates. Travel costs were subsumed in the nurse's salary, because the nurse was not reimbursed for travel to study sites.

The finding that STIRR services cost an additional \$3630 per person tested for HIV is attributable to the lower level of unmet need for HIV testing reported by participants. Only 21 (of 105) STIRR participants reported that they had not been tested for HIV in the 6 months prior to the study baseline. This pattern, which has been identified in at least one other sample (4), suggests that many persons with serious mental illness either do not receive hepatitis tests when they are tested for HIV, or they underreport hepatitis testing and/or overreport HIV testing. To the extent that persons in this population already are regularly tested for HIV, co-testing for hepatitis at HIV testing sites would improve hepatitis detection and add only approximately \$65 in costs.

A limitation of this study is that the primary measures of clinical outcome (testing and vaccination) could have been unreliably reported by participants. To check their validity, self-reported data were compared to the research study's internal records of vaccinations and laboratory invoices for participants in the STIRR condition. The two independent sources produced nearly identical rates. Another limitation is the unavailability of information about future costs and benefits of hepatitis C treatment in persons with serious mental illness and co-occurring substance use disorder. Although follow-up medical care for chronic hepatitis C is considered cost-effective (23), some medical care providers have reservations about treating people with serious mental illness (37), partly because of the adverse psychological side effects of interferon. Finally, idiosyncratic features of the sample—predominantly low-income African American patients receiving mental health services at four programs in one urban area—could either worsen or improve the cost-effectiveness of STIRR services.

CONCLUSIONS

Investments in service delivery approaches such as STIRR may improve receipt of recommended infectious disease services including screening, hepatitis A and B vaccination, and risk reduction counseling among persons with serious mental illness and co-occurring substance use disorders, an underserved, high-risk population. Dissemination of STIRR services into outpatient mental health programs may especially reduce the future costs and morbidity associated with treatment of hepatitis B in this population. Those benefits alone may be expected to exceed the costs of STIRR services, especially in higher risk areas where persons with serious mental illness are underserved by other providers. However, the effect of disseminating STIRR services on overall health care costs depends critically on unknown or variable quantities, including the preventive effects of risk reduction counseling, the likelihood that STIRR clients successfully complete medical treatment for chronic hepatitis C, and the ability of a STIRR program to sustain a sufficient volume of clients.

Acknowledgments

This project received funding from NIMH 5R01MH072556.

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Table 1
Previous analyses of the cost-effectiveness of hepatitis and HIV screening and hepatitis vaccination

First Author	Year	Type of Analysis	Study Intervention	Populations	Key Assumptions	Results Summary
Bloom	1993	Decision Analysis	Hepatitis B vaccination	High-risk adults with hepatitis B incidence of 5% per annum; general adults	33% completion of 3-part vaccination series among high-risk adults and 50% among general adults. Vaccination costs \$225 per person (in 1989).	For high risk adults, screen and vaccinate results in net savings per case prevented and per year of life saved. For general adults, screen and vaccinate results in costs of \$16274 (in 1989) per case prevented and \$279,184 per year of life saved.
Kim	2006	Decision Analysis	Hepatitis B vaccination	Patients in HIV counseling and testing sites	Routine vaccination costs less and prevents more hepatitis B cases compared to screen and vaccinate	Routine vaccination costs \$4400 (in 2000) per quality adjusted life year gained.
Castelnuovo	2006	Decision Analysis	Hepatitis C screening	Multiple populations	Screening 1000 former injection drug users at general medical practices identifies 77 hepatitis positive cases. Screening 1000 patients at drug/alcohol treatment identifies 106 hepatitis C positive cases.	For former injection drug users, screening costs £20,059 (in 2004) per quality adjusted life year gained. For patients receiving alcohol/drug treatment, screening costs £17,515 per quality adjusted life year gained.
Greengold	2009	Decision Analysis Informed by Randomized Trial	Hepatitis A/B vaccination using four strategies: nurse case management plus incentives and tracking (NCMIT); standard case management plus incentives and tracking (SIT); standard case management plus incentives only (SI); usual care (UC).	Homeless adults	Hepatitis B prevalence among homeless adults is 30.8% and hepatitis A prevalence among high-risk homeless adults is 30%. Completion rates for 3-part vaccination ranged from 54%-67% depending on the intervention. Intervention costs were \$431.90 (in 2006) for NCMIT; \$425.00 for SIT; \$315.00 for SI; and \$241.90 for UC.	Nurse case management plus incentives and patient tracking was less expensive and more effective in terms of quality adjusted life years than all other intervention models, including UC. Lifetime total costs were \$849.20 (in 2006) per person for NCMIT in comparison to \$2153.30 per person for UC.
Paltiel	2005	Decision Analysis	Routine HIV counseling, testing, and referral (HIVCTR)	High-risk adults; CDC threshold risk adults with 1.0% prevalence; and U.S. general adults with .1% prevalence	High risk adults had 3.0% prevalence of undiagnosed HIV and 1.2% annual incidence; CDC threshold risk had 1.0% prevalence and .12% incidence; and U.S. general had .1% prevalence and .01 percent incidence.	For high-risk adults, receipt of HIVCTR every five years resulted in cost-effectiveness ratios of \$50,000 (in 2001) per quality-adjusted life year (QALY) gained. The same strategy resulted in ratios of \$71,000 per QALY for the CDC threshold population and \$169,000 per QALY for the U.S. General population.

Table 2

Unit costs (2008 dollars)

Item	Cost per Unit	Source
Personnel salary plus fringe benefits ^a		
Nurse	\$37.41/hour	Study records
Infectious disease physician	\$126.30/hour	same as above
Physician (psychiatrist or other)	\$120.60/hour	same as above
Psychologist (PhD)	\$63.65/hour	same as above
Appointment & supplies coordinator	\$22.78/hour	same as above
Social worker—mental health clinic	\$40.20/hour	Bureau of Labor Statistics, Occupational Employment Statistics, 2008
Vaccine	\$38.64/dose	Centers for Disease Control vaccine price list, 2008
Information packet with razor and condoms	\$5.20	Study receipts
Blood tests		
Hepatitis B ^b	\$14.17-\$16.84	Medicare Clinical Diagnostic Laboratory Fee Schedule (Maryland), 2008
Hepatitis C antibody	\$19.94	same as above
Hepatitis C RNA, amplified probe confirmation	\$43.42	same as above
HIV-1/HIV-2, single assay	\$19.17	same as above
Vaccine administration ^c	\$20.00	same as above
Blood draw ^c	\$3.00	same as above
Centrifuge	\$284.00	Study receipts

^aFringe benefits costs calculated as 34% of salary^bVaries depending on test used: HBsAb=\$14.17, HBsAG=\$14.43, HBcAb=\$16.84^cIncluded for eTAU only; in STIRR, nurse performs procedure

Table 3

Intervention costs and receipt of hepatitis and HIV services

	STIRR ^a			eTAU ^a			STIRR – eTAU		
	N	%		N	%		N	%	P
Costs (\$) per participant (mean ± SD)									
Total	423±90			24±22			399±93	52.9	<.001
Personnel	168±89			2±10			166±90	26.2	<.001
Blood tests, vaccine, and other supplies	196±13			22±20			174±24	71.7	<.001
Training and setting up	50±0 <i>b</i>			n/a			50±0 <i>b</i>	n/a	n/a
Equipment	3±0 <i>b</i>			n/a			3±0 <i>b</i>	n/a	n/a
Clinic space	6±0 <i>b</i>			n/a			6±0 <i>b</i>	n/a	n/a
Receipt of services									
Tested for Hepatitis C	70	86	10	14					
Tested for Hepatitis B	69	86	14	19					
Tested for HIV	18	86	6	46					
Immunized for Hepatitis A/B	82	78	7	7					
Standardized costs (\$ mean ± SD) ^c									
Tested for Hepatitis C							706±165		
Tested for Hepatitis B							776±181		
Tested for HIV							3630±846		
Immunized for Hepatitis A/B							561±131		

^aOf 105 participants in STIRR, 81 needed a hepatitis C test, 80 needed a hepatitis B test, 21 needed an HIV test, and 105 needed vaccination. Of 97 participants in eTAU, 69 needed a hepatitis C test, 73 needed a hepatitis B test, 13 needed an HIV test, and 97 needed vaccination. All numbers for patient outcomes were derived from Rosenberg, Goldberg, Dixon, et al., 2010 (20)

^bFixed costs do not vary at the individual level

^cTotal costs of STIRR implementation and operation plus additional costs for testing and vaccination divided by additional units of outcome, separately for each outcome.