

Cost Effectiveness of Routine Opt-Out Rapid HIV Screening in the Emergency Department: Results from an Ongoing Prospective Clinical Trial

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Evaluation of Opt-Out Rapid HIV Testing in the Emergency Department

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Background

- ~ 250,000 people in the United States have undiagnosed HIV infection and ~ 56,000 acquire HIV annually
- Undiagnosed HIV infection in the United States continues to significantly contribute to its forward transmission
- The current CDC recommendations for HIV testing in healthcare settings call for increasing opportunities and minimizing barriers for performing routine opt-out rapid HIV screening

Background

- Cost effectiveness is critical when considering potential clinical venues for performing routine HIV screening, including in emergency departments (EDs)
- Routine rapid HIV screening carries significant operational costs
- Costs are frequently cited as a barrier to expanding HIV testing
- Costs are an important component in decision-making

Background

- Several theoretical cost effectiveness models have been developed
- Most conclude that routine HIV screening is cost effective from a societal perspective
- The accuracy of the findings depend on how well the assumptions reflect real-world conditions and the perspective of the analysis
- Thus, outcomes of HIV testing programs based on recommendations and policies suggested by these models need to be evaluated

Objective

- To compare the cost effectiveness of performing routine opt-out rapid HIV screening with physician-directed diagnostic testing in an urban emergency department

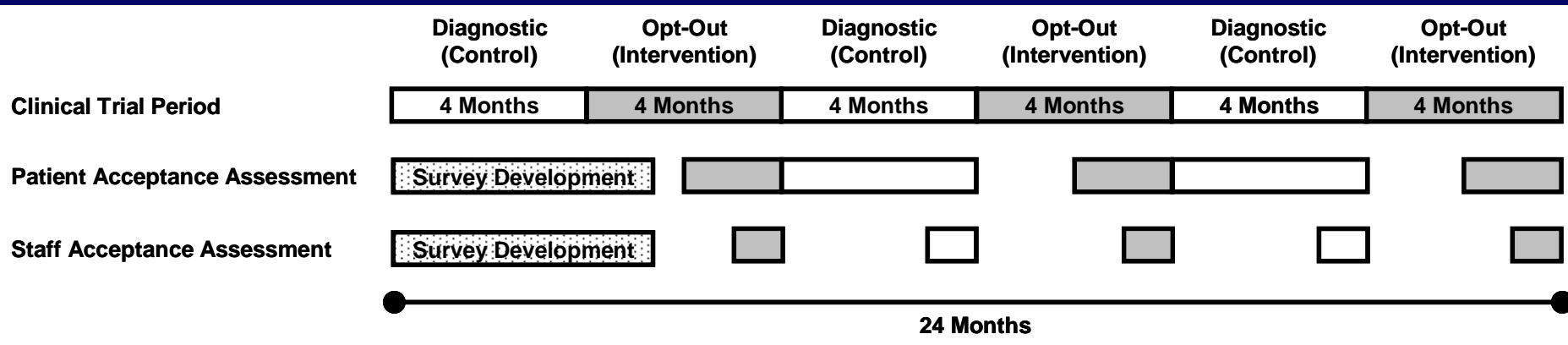
Setting

- Denver Health Medical Center in Denver, Colorado
- 396-bed urban public teaching hospital and level 1 trauma center
- Integrated healthcare system (public hospital, community health clinics, and public health department)
- Annual ED census ~ 55,000 adult patients
- ~ 70% racial/ethnic minorities and ~ 40% uninsured
- Undiagnosed ED HIV seroprevalence ~ 0.7%

Methods: Clinical Trial

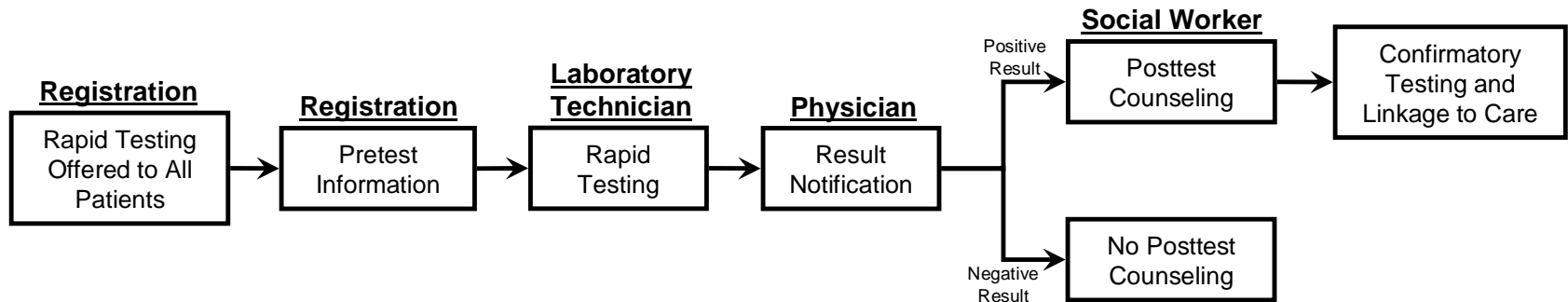
- Clinical trial aims:
 - 1: Clinical effectiveness (of routine opt-out rapid HIV screening versus physician-directed diagnostic rapid HIV testing)
 - 2a: Clinical efficiency
 - 2b: **Cost effectiveness**
 - 3: Patient and staff acceptance

Methods: Design Schema

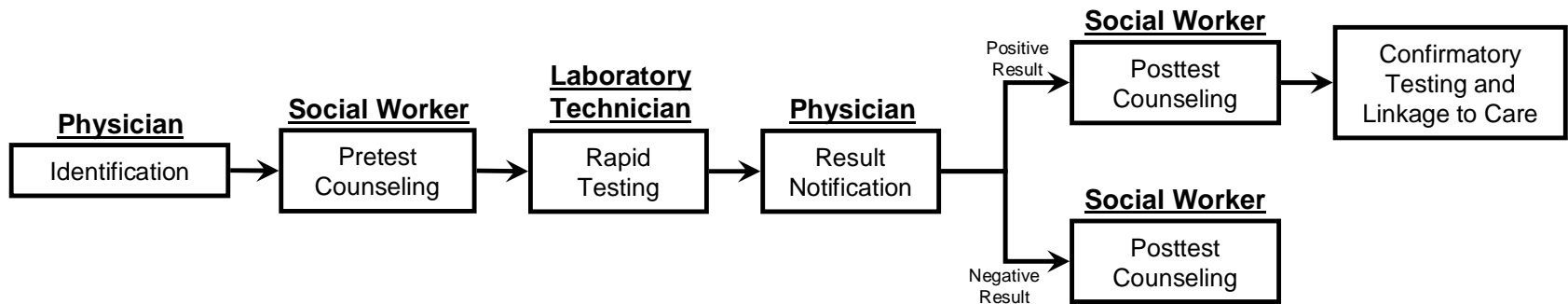


Methods: Operational Schema

OPT-OUT RAPID HIV SCREENING



DIAGNOSTIC RAPID HIV TESTING



Methods: Cost Effectiveness

- Nested cohort study
- Direct program costs were determined using the perspective of the payer
- Costs included startup, personnel, test kit, and supplies and equipment
- Time-motion methodology was used to estimate costs related to the performance of all personnel activities related to each testing method

Methods: Cost Effectiveness

- Outcome was the number of patients diagnosed with HIV infection
- Outcome stratified by those with newly-diagnosed HIV infection and those with repeat HIV diagnoses
- All data were annualized and reported as average and incremental cost effectiveness ratios
- Sensitivity analyses were performed to evaluate the influence of multiple variables

Table. Patient characteristics for those who were eligible to be tested for HIV infection and those actually tested during each study phase.

	Opt-Out Rapid HIV Screening	Diagnostic Rapid HIV Testing
Total number of eligible patients	30,281	29,171
Total number of eligible patient-hours	161,973	163,976
Median age (range)	40 (16-104)	40 (16-103)
Male sex	17,165 (57%)	16,540 (57%)
Race/Ethnicity		
African-American	4,199 (14%)	4,069 (14%)
Asian	321 (1%)	296 (1%)
Caucasian	11,651 (38%)	11,571 (40%)
Hispanic	10,260 (34%)	9,816 (34%)
Other	535 (2%)	445 (2%)
Unknown/Missing	3,314 (11%)	2,974 (10%)
Admitted to the hospital	6,882 (23%)	6,415 (22%)
Opt-Out		
Yes	22,829 (75%)	- -
No	7,098 (23%)	- -
Incomplete registration	354 (1%)	- -
Tested for HIV infection	5,377 (18%)	166 (0.6%)
Diagnosed with HIV infection	14 (0.3%)	3 (1.8%)

Table. Annual program costs for routine opt-out rapid HIV screening and physician-directed diagnostic rapid HIV testing in an urban emergency department (ED).

Cost Variable	Unit Cost (U.S. Dollars)	Routine Opt-Out Screening (Intervention)		Physician-Directed Diagnostic Testing (Control)	
		Number of Units	Cost (U.S. Dollars)	Number of Units	Cost (U.S. Dollars)
Startup					
Computer software	N/A	N/A	\$1,844.00	N/A	\$0.00
ED and laboratory staff training	N/A	N/A	\$7,687.31	N/A	\$1,694.19
Personnel					
ED and laboratory staff time	N/A	N/A	\$23,085.64	N/A	\$9,788.59
Administrative staff time	N/A	N/A	\$31,272.80	N/A	\$15,636.40
Test Kit					
Uni-Gold rapid test	\$10.00	7,872	\$78,717.58	254	\$2,541.85
Oraquick rapid test	\$11.60	24	\$276.13	0	\$0.00
Multispot rapid test	\$31.00	8	\$246.00	0	\$0.00
Confirmatory WB test	\$110.00	15	\$1,637.00	5	\$499.93
Supplies and Equipment					
Blood draw supplies					
Entire blood draw kit	\$1.05	2,838	\$2,980.33	254	\$266.89
Blood tube only	\$0.06	5,034	\$302.06	0	\$0.00
Other supplies and printing					
Opt-out consent form	\$0.08	43,467	\$3,477.34	N/A	\$0.00
Patient information sheet	\$0.002	43,467	\$86.93	254	\$0.51
Targeted testing consent form	\$0.002	N/A	\$0.00	254	\$0.51
TOTAL			\$151,652.63		\$30,418.87

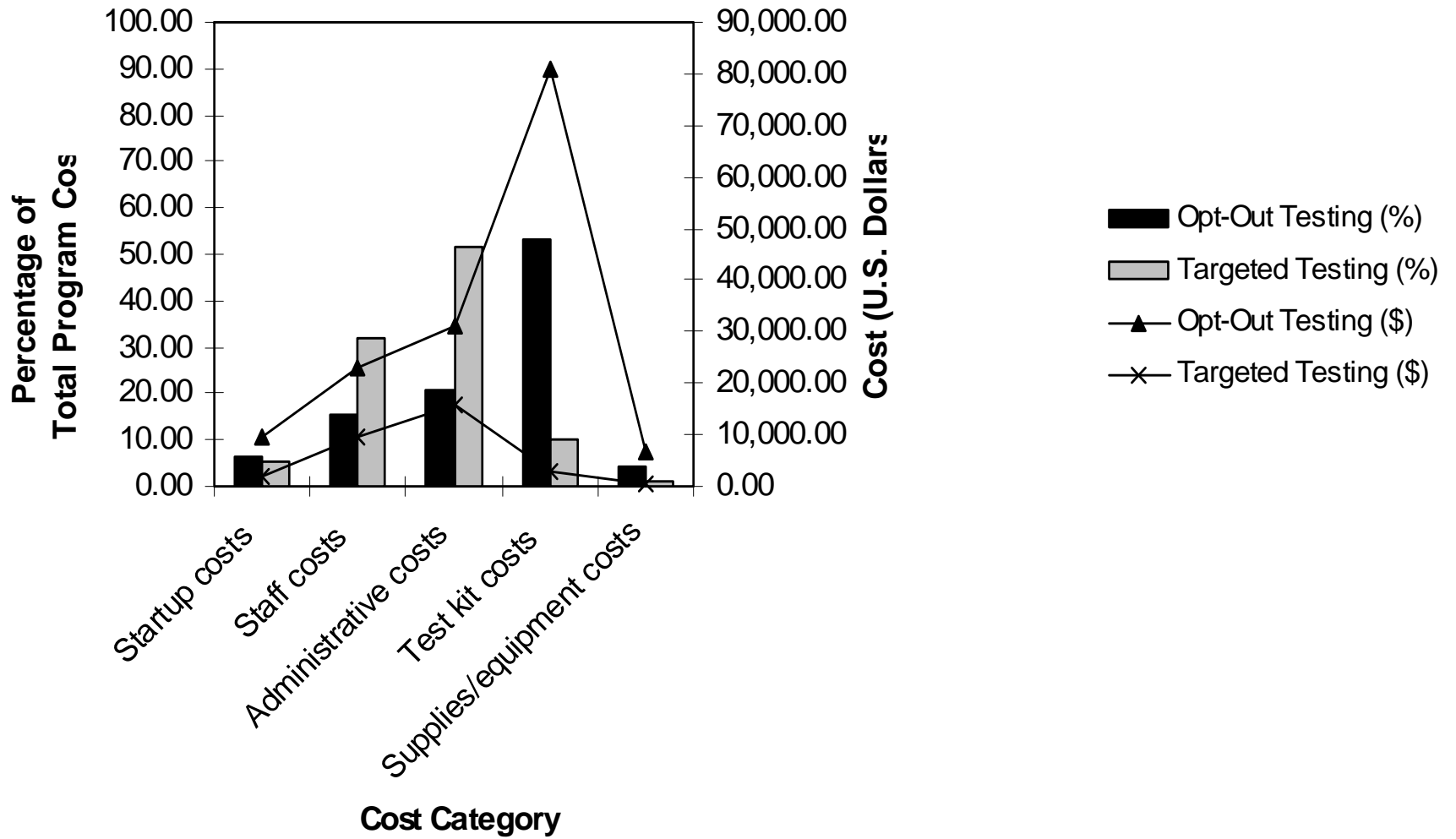


Table. Cost effectiveness ratios (CERs) and incremental cost effectiveness ratios (ICERs) for routine opt-out rapid HIV screening and physician-directed diagnostic rapid HIV testing by the number of total, new, and repeat HIV diagnoses.

Program	Total Cost [C]	Health Effect [E]	Average CER [C/E]	Incremental Cost [ΔC]	Incremental Effect [ΔE]	ICER [ΔC/ΔE]
Total HIV Diagnoses						
Diagnostic HIV Testing	\$30,419	4.54	\$6,693.07	\$30,418.87	4.54	\$6,693.07
Routine Opt-Out HIV Screening	\$151,653	21.25	\$7,135.34	\$121,233.77	16.71	\$7,255.63
New HIV Diagnoses						
Diagnostic HIV Testing	\$30,419	3.03	\$10,052.46	\$30,418.87	3.03	\$10,052.46
Routine Opt-Out HIV Screening	\$151,653	8.66	\$17,541.01	\$121,233.77	5.63	\$21,522.36
Repeat HIV Diagnoses						
Diagnostic HIV Testing	\$30,419	1.50	\$20,282.04	\$30,418.87	1.50	\$20,282.04
Routine Opt-Out HIV Screening	\$151,653	12.14	\$12,487.46	\$121,233.77	10.64	\$11,389.23

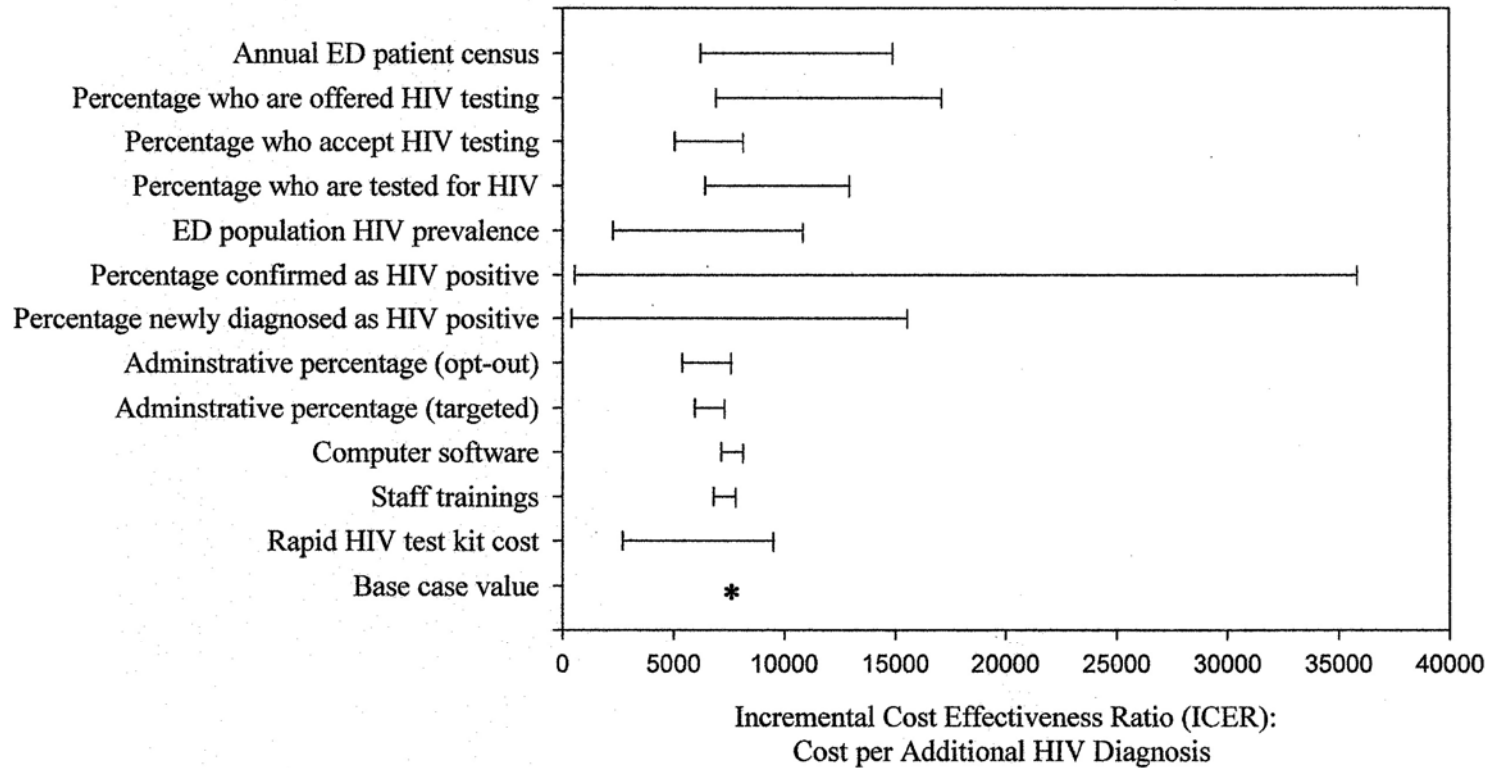


Figure 3.8: Univariate Sensitivity Analysis, Key Variables and the Change in Incremental Cost Effectiveness Ratio (ICER) for Routine Opt-Out Screening Compared to Physician-Based Targeted Testing

Conclusions

- Diagnostic rapid HIV testing is more cost effective than routine opt-out rapid HIV screening in the ED
- More effective and or less costly testing strategies may be required to improve identification of patients with undiagnosed HIV infection
- Differences in the lifetime medical costs and transmissions averted between the two arms may impact the relative cost effectiveness of each strategy

