Cost-Effectiveness of Earlier Initiation of Antiretroviral Therapy for Uninsured HIV-Infected Adults

Bruce R. Schackman, PhD, Sue J. Goldie, MD, MPH, Milton C. Weinstein, PhD, Elena Losina, PhD, Hong Zhang, SM, and Kenneth A. Freedberg, MD, MSc

Clinical guidelines for treatment of HIV-infected adults recommend offering antiretroviral therapy to patients with CD4 cell counts lower than 350 per µL or to all patients with HIV RNA greater than 30,000 copies per mL, regardless of CD4 cell count.¹,² Yet recent studies indicate that low-income, uninsured HIV-infected individuals are less likely to receive antiretroviral therapy than those who have higher incomes or private insurance.³,⁴ In most states, Medicaid pays for health services and medications for uninsured HIV-infected adults who have low incomes and limited assets, provided that they meet a definition of disability that generally requires symptoms of HIV infection.⁵,⁶

For uninsured, asymptomatic HIV-infected individuals in the United States, the primary sources of payment for antiretroviral therapy have been state-level AIDS Drug Assistance Programs (ADAPs) funded by the federal Ryan White Comprehensive AIDS Resources Emergency (CARE) Act. ADAPs usually do not cover nondrug services such as HIV RNA (viral load) testing and physician office visits. Moreover, because ADAPs rely on annual appropriations from Congress and state legislatures, coverage varies substantially over time and from state to state. In fiscal year 1998, roughly half of all ADAPs reported budget shortages or program limitations, and approximately 2500 eligible individuals were on waiting lists to enter ADAPs.⁷

In 1997 a proposal to revise federal Medicaid eligibility rules to include asymptomatic HIV-infected individuals was rejected because it was not budget neutral (i.e., it was projected to increase costs to the federal Medicaid budget over 5 years).⁸,⁹ Individual states can still apply to expand Medicaid coverage under a Section 1115 waiver, which requires federal Medicaid budget neutrality, or as a demonstration project under the Ticket to Work and Work Incentives Improvement Act of 1999.⁵,¹⁰,¹¹

We used a computer-based simulation model of HIV disease to estimate the cost-effectiveness from a societal perspective and the financial impact on government payers of providing early versus deferred antiretroviral therapy to uninsured HIV-infected individuals who present for medical care with 500 CD4 cells/µL. We also used this model to determine the budgetary implications of these treatment strategies for 3 US states with different levels of federal support for ADAPs.

**METHODS**

We evaluated 3 different strategies for treating HIV-infected individuals who present for medical care with 500 CD4 cells/µL: (1) immediate antiretroviral therapy, (2) antiretroviral therapy initiated at the first observed CD4 cell count below 200/µL as a proxy for current Medicaid eligibility, and (3) no antiretroviral therapy for comparison to determine incremental cost-effectiveness. Model outcomes included incidence of opportunistic infections, years of life and quality-adjusted life-years (QALYs) gained, and lifetime costs. We adopted a societal perspective and discounted future costs and benefits at an annual rate of 3%.¹²

We also evaluated the financial costs of the 3 treatment strategies from the perspective of all government payers, including federal, state, and county governments. We adjusted medication costs to reflect discounts provided by pharmaceutical manufacturers to Medicaid and ADAPs, and we adjusted patient care costs to reflect estimated national average payments by Medicaid and other government payers. We then compared the financial costs of the 3 treatment strategies for state and county government payers in 3 US states with different levels of federal ADAP support: Massachusetts, New York, and Florida. To determine the impact on the state and county payers’ budgets, we used state-specific estimated Medicaid payments and excluded federal contributions to Medicaid and ADAPs. We did not discount future costs in these analyses.

**The Model**

We used a computer-based state-transition simulation model of the progression of HIV disease.¹³ The model is programmed in C and compiled in C++ (Microsoft, Seattle, Wash). A
hypothesized cohort of 1 million HIV-infected individuals with CD4 cell counts of 500/µL enters the model a person at a time, and each person is followed until death. Live health states are categorized as chronic or acute and are stratified by CD4 cell count and HIV RNA. Patients move from chronic to acute health states when they develop opportunistic infections. Deaths can occur from opportunistic infections, be HIV-related in the chronic health state, or be non–HIV-related.14

The efficacy of an antiretroviral regimen is represented by HIV RNA suppression, which results in an increased CD4 cell count.15 Antiretroviral treatment is considered to have failed when a 0.5 log increase in HIV RNA is observed for 2 consecutive months while the patient is on antiretroviral therapy. Once failure occurs, and after a 6-month delay, patients’ CD4 cell counts begin to decline at a rate based on their original HIV RNA setpoint. The cost and QALY impact of drug-specific toxicities observed in published clinical trials are incorporated into the model.

We assumed that patients were aware of their HIV infection, had never received anti-retroviral treatment, lacked private insurance, met financial eligibility requirements for ADAPs and Medicaid, and would remain enrolled in all government programs when they became eligible. Except in the case of a Medicaid waiver, we assumed that all patients initially were enrolled in an ADAP and became eligible for Medicaid on the basis of disability when their CD4 cell count fell below 200/µL (although in fact the determination of eligibility in most states is based on the presence of clinical symptoms).5 We did not take Medicare enrollment into account, because the analysis of the impact on state and county budgets was limited to the first 5 years in a population with early-stage HIV disease.

We evaluated a hypothetical cohort with a mean age of 36 years, based on the age distribution of uninsured patients in the HIV Cost and Services Utilization Study.16 We assumed that the cohort was 80% male, based on the sex distribution of ADAP participants nationally.7

Data

Clinical data. We derived the HIV RNA setpoint distribution, the average monthly rate of CD4 decline without antiretroviral therapy, and the monthly risks of (1) opportunistic infections, (2) acute mortality, and (3) chronic AIDS mortality from the Multicenter AIDS Cohort Study data set.17–20 Although the Multicenter AIDS Cohort Study included mainly White homosexual men, the natural history of HIV infection predicted by the model was consistent with observations among women, nonwhites, and injection drug users.21 Patients received standard opportunistic infection prophylaxis, and their HIV RNA and CD4 cell counts were measured every 3 months.1,12

For the efficacy of initial antiretroviral therapy, we used data from the 3-drug therapy arm of the AIDS Clinical Trials Group Protocol 320, which included indinavir, zidovudine, and lamivudine.22 We modeled efficacy by calibrating monthly HIV RNA levels transition probabilities to the trial’s efficacy results (60% of patients in the 3-drug arm with no detectable HIV RNA below 500 copies/mL at 2.4 weeks). The efficacy of subsequent 3-drug antiretroviral therapy in patients who experienced treatment failure in their initial regimen was based on data from the Community Programs for Clinical Research on AIDS Protocol 046.24 We used the same modeling approach with efficacy data from the control arm of this study, which included no resistance testing and a variety of second-line regimens selected by treating physicians (22% of patients with no detectable HIV RNA below 500 copies/mL at 12 weeks).25 We assumed that the first- and second-line regimens were each efficacious for 2 years for patients who had not experienced treatment failure in the interim.25 We assumed that all antiretroviral therapy was discontinued at the time of second-line treatment failure. We considered alternative efficacy assumptions, including first-line regimens with better efficacy and additional salvage therapies, in sensitivity analyses.

Costs and quality of life. Cost input data are summarized in Table 1. Patient care costs were derived from the AIDS Costs and Services Utilization Survey and were adjusted to include HIV RNA monitoring every 3 months.1,12,16 For analyses conducted from the societal perspective, we converted charges to estimates of cost by using a national cost-to-charge ratio.18 For analyses conducted from the all-government payer perspective and the state and county budget perspective, we assumed that charges reported in the AIDS Costs and Services Utilization Survey were representative of charges to private payers. We reduced these charges on the basis of published comparisons between physician fee levels or hospital payments by state Medicaid programs and payments by Medicare and by private payers, except in New York (where we used an HIV-specific Medicaid fee schedule for physician services).27–29 We converted all patient care costs to 1998 dollars by using the medical care component of the Consumer Price Index.14

For the cost-effectiveness analysis conducted from a societal perspective, we used average wholesale drug prices published in the 1998 Red Book. For analyses conducted from the government payer perspective, we assumed that drug costs were 15% below 1998 Red Book prices, reflecting rebates available to Medicaid and ADAPs under a federally sponsored drug discount program.7,30,31 We obtained the costs of CD4 cell count and HIV RNA tests from the Boston Medical Center cost accounting system. To determine QALYs, we used data from AIDS Clinical Trials Group Protocols 019, 108, 157, and 204 on perceived health status for chronic and acute health states to approximate patients’ preferences for quality of life.13

RESULTS

Cost-Effectiveness Analysis From a Societal Perspective

Initiating antiretroviral therapy earlier (at 500 CD4 cells/µL) rather than later (at 200 CD4 cells/µL) resulted in a higher mean CD4 cell count (383/µL vs 238/µL), 51 fewer deaths per 1000 patients, and 72 fewer opportunistic infections per 1000 patients after 5 years (Figure 1). The mean time on antiretroviral therapy was 2.94 years for patients who receive early therapy and 2.20 years for patients who receive deferred therapy. The undiscounted cost of treatment in the first 5 years was $48,300 with early antiretroviral...
therapy and $34 300 with deferred antiretroviral therapy.

The discounted projected quality-adjusted life expectancy was 6.23 years without antiretroviral therapy, 7.64 years with deferred antiretroviral therapy, and 8.21 years with early antiretroviral therapy (Table 2). The discounted projected per-person lifetime costs of treatment were $69 900 without antiretroviral therapy, $98 000 with deferred antiretroviral therapy, and $104 100 with early antiretroviral therapy. Deferred antiretroviral therapy was less effective because it resulted in more early deaths and more opportunistic infections (which put patients at a higher risk for subsequent HIV-related deaths). The incremental cost-effectiveness ratio for deferred therapy vs no therapy was $20 000 per QALY; the incremental cost-effectiveness ratio for early therapy vs deferred therapy was $18 200 per QALY (Table 2).

Sensitivity Analyses

The strategy of deferred antiretroviral therapy remained weakly dominated by the strategy of early antiretroviral therapy in sensitivity analyses on treatment efficacy, antiretroviral drug costs, and quality of life, provided that the sensitivity assumptions were held constant between the early and deferred treatment strategies. The incremental cost-effectiveness ratio for early vs no therapy was $13 100 with greater treatment efficacy assumptions derived from the Dupont 006 trial conducted in treatment-naive patients (70% of patients with no detectable HIV RNA below 500 copies/mL at 48 weeks) and $14 500 when third- and fourth-line therapies were added to this scenario. The incremental cost-effectiveness ratio of early vs no therapy was $97 000 with a 50% reduction in drug prices, $25 000 with a 50% increase in drug prices, and $22 900 with a 20% reduction in quality of life while receiving antiretroviral therapy as a result of long-term treatment side effects. When long-term treatment side effects were assumed to reduce quality of life by 20% only in the case of early therapy (where more patients are asymptomatic), deferred therapy was no longer dominated, and the incremental cost-effectiveness ratio of early vs deferred therapy was $67 200 in the base efficacy case and $22 900 in the Dupont 006 efficacy case.

All-Government Payer Perspective

We also explored the financial costs paid by federal, state, and county payers in an analysis from the all-government payer perspective. Over the first 5 years, the undiscounted total direct medical costs per patient to these payers were $29 100 for deferred therapy and $40 600 for early therapy. The undiscounted antiretroviral and prophylaxis medication costs for the first 5 years were $33 000 for deferred therapy and $21 500 for early therapy. Thus, in the first 5 years, although drug costs were $18 200 higher for early therapy vs deferred therapy, total costs were only $11 500 higher because of savings from averted HIV-related morbidity (Figure 2).
Early antiretroviral therapy consists of indinavir, zidovudine, and lamivudine from cohort entry (500 CD4 cells/µL), followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class). Deferred antiretroviral therapy consists of indinavir, zidovudine, and lamivudine after first measured CD4 cell count < 200/µL, followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class).

Note. Early antiretroviral therapy consists of indinavir, zidovudine, and lamivudine from cohort entry (500 CD4 cells/µL), followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class). Deferred antiretroviral therapy consists of indinavir, zidovudine, and lamivudine after first measured CD4 cell count < 200/µL, followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class).

FIGURE 1—Clinical outcomes of early vs deferred antiretroviral therapy (ART) for HIV-infected adults with CD4 cell counts of 500/µL at cohort entry. (A) Mean CD4 cells/µL of patients remaining alive. (B) Cumulative deaths per 1000 patients. (C) Cumulative opportunistic infections per 1000 patients.

Although assumptions about treatment efficacy did not have a substantial impact on the results of the societal cost-effectiveness analysis, these assumptions did affect estimated total costs incurred by government payers. When treatment efficacy was reduced to reflect the higher failure rate reported for initial therapy among patients in a clinical setting in Maryland (44% of patients with no detectable HIV RNA below 500 copies/mL at 24 weeks), the 5-year undiscounted total direct medical cost per patient fell to $28,800 for deferred therapy and $36,700 for early therapy, because patients spent less time on antiretroviral therapy before experiencing treatment failure. This observational cohort contains a high proportion of patients who are enrolled in Medicaid in Maryland.

With treatment efficacy rates based on the Dupont 006 trial, the 5-year undiscounted total direct medical costs per patient were similar to those in the base case ($40,000 for early therapy and $28,700 for deferred therapy) because patients spent more time on therapy, but the cost of the treatment regimen was somewhat lower.

State and County Payer Budget Impact

We estimated the impact on state and county budgets per enrollee over 5 years for each of the 3 treatment strategies in 3 different states: Massachusetts, New York, and Florida. For each of these states we projected the budget impact under 2 scenarios: (1) all patients were enrolled in a state ADAP program and then were transferred to Medicaid when their CD4 cell counts reached 200/µL (No Medicaid Waiver scenario), and (2) all patients in the cohort were enrolled in Medicaid with CD4 cell counts of 500/µL (Medicaid Waiver scenario).

Table 3 describes the state or county share of government costs incurred under the No Medicaid Waiver and Medicaid Waiver scenarios in each of the 3 states. The No Medicaid Waiver scenario reflects the fact that 2 of the states have established programs that cover nondrug direct medical costs for uninsured HIV-infected individuals. State officials reported to us that ACT NOW in Massachusetts was 100% supported with state funds, and ADAP Plus in New York was 100% supported with federal Ryan White CARE Act
TABLE 2—Cost, Life Expectancy, and Cost-Effectiveness of Early\textsuperscript{a} vs Deferred\textsuperscript{b} vs No Antiretroviral Therapy for HIV-Infected Adults With CD4 Cell Counts of 500/µL at Cohort Entry: Societal Perspective

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Lifetime Cost, $</th>
<th>Life Expectancy, y</th>
<th>QALE, y</th>
<th>CE Ratio, $/YLS</th>
<th>CE Ratio, $/QALY</th>
</tr>
</thead>
<tbody>
<tr>
<td>No antiretroviral therapy</td>
<td>69 900</td>
<td>7.02</td>
<td>6.23</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Deferred antiretroviral therapy</td>
<td>98 000</td>
<td>8.51</td>
<td>7.64</td>
<td>Dominated\textsuperscript{d}</td>
<td>Dominated\textsuperscript{d}</td>
</tr>
<tr>
<td>Early antiretroviral therapy</td>
<td>104 100</td>
<td>9.10</td>
<td>8.21</td>
<td>16 500</td>
<td>17 300</td>
</tr>
</tbody>
</table>

Note. QALE = quality-adjusted life-expectancy; CE = cost-effectiveness; $/YLS = dollars per year of life saved; $/QALY = dollars per quality-adjusted life year.
\textsuperscript{a}Early antiretroviral therapy is indinavir, zidovudine, and lamivudine from cohort entry (500 CD4/µL), followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class).
\textsuperscript{b}Deferred antiretroviral therapy is indinavir, zidovudine, and lamivudine after first measured CD4 cell count < 200/µL, followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class).
\textsuperscript{c}Difference in cost divided by difference in life expectancy or quality-adjusted life expectancy for each strategy compared with the next best strategy.
\textsuperscript{d}The incremental cost-effectiveness ratio for deferred therapy vs no therapy was $20 000 per QALY, and the incremental cost-effectiveness ratio for early therapy vs deferred therapy was $10 800 per QALY. Because deferred antiretroviral therapy had a higher (i.e., less attractive) cost-effectiveness ratio than early antiretroviral therapy, it was weakly dominated by early therapy and represents an inefficient use of resources.
TABLE 3—Cost-Sharing Assumptions: State or County Share of All-Government Payer Perspective Costs

<table>
<thead>
<tr>
<th>No Medicaid Waiver, %</th>
<th>Medicaid Waiver, %</th>
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<tr>
<td></td>
<td>Massachusetts</td>
</tr>
<tr>
<td>200 CD4/µL</td>
<td></td>
</tr>
<tr>
<td>Routine patient care and testing costs</td>
<td>100(^a)</td>
</tr>
<tr>
<td>Drug costs</td>
<td>41(^e)</td>
</tr>
<tr>
<td>&lt;200 CD4/µL</td>
<td></td>
</tr>
<tr>
<td>Routine patient care, testing, and drug costs</td>
<td>50(^f)</td>
</tr>
</tbody>
</table>

\(^a\) ACT NOW program in Massachusetts funded 100% by state funds.
\(^b\) ADAP Plus program in New York funded 100% by federal Ryan White CARE Act funds.
\(^c\) Indigent care in Florida provided at the county level.
\(^d\) Medicaid cost-sharing ratios.
\(^e\) State ADAP program cost-sharing ratios.

Note. ART drug cost, comprising the costs of antiretroviral drugs and drugs for prophylaxis against Pneumocystis carinii pneumonia, Mycobacterium avium complex, and toxoplasmosis, was calculated by discounting average wholesale prices by 15%. Early antiretroviral therapy is indinavir, zidovudine, and lamivudine from cohort entry (500 CD4 cells/µL), followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class). Deferred antiretroviral therapy is indinavir, zidovudine, and lamivudine after first measured CD4 cell count <200/µL, followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class).

FIGURE 2—Budget impact on all government payers of early vs deferred antiretroviral therapy (ART) strategies: undiscounted 1998 dollars per patient with CD4 cell count of 500/µL at cohort entry.

The analysis was limited to patients who were financially eligible for both ADAPs and Medicaid, although income eligibility varies by state, and some states (including Florida) periodically have limited access to ADAPs for eligible new enrollees because of budgetary constraints. We assumed that all patients became eligible for Medicaid as soon as they had an observed CD4 cell count below 200/µL, although actual eligibility for Medicaid depends on clinical symptoms. This assumption may have led to projections of average Medicaid enrollment at an earlier stage of disease than actually occurs. We also assumed that patients remained in the ADAPs and Medicaid. Even though disenrollment does occur, few HIV-infected patients regain private insurance once they have begun receiving benefits from government programs.

We assumed that Medicaid cost-to-charge ratios and state–federal cost-sharing ratios for ADAPs would remain consistent over 5 years in the state and county budgetary analysis. From 1997 to 1998, however, the state share of the ADAP budget fell 19% in Massachusetts, fell less than 1% in New York, and increased 3% in Florida. Future ADAP budget increases may be allocated in ways that significantly alter these ratios. We assumed that nondrug costs for ADAP enrollees were covered only by supplementary ADAPs or indigent care, although some of these services also are provided by other programs.
ported by Ryan White Act Title I and non-ADAP Title II federal funds.

The analysis was restricted to a cohort of patients at the same early stage of disease. We did not simulate a population of patients with a distribution of CD4 values that would match patients who currently are eligible for state assistance or those who are newly diagnosed. We also did not estimate the impact on state budgets of expanding coverage to a population of patients who are not currently in treatment. Any expansion of services to early-stage HIV-infected individuals who are not currently in treatment will result in added expenses for state budgets in the short term. Because the focus of this analysis was on financial cost per patient, the analysis also did not take into account the greater potential financial security to beneficiaries of transferring their insurance coverage to an entitlement program, nor did it capture potential savings deriving from the possibility that patients receiving antiretroviral therapy would be less likely to infect others.

Using the cost-effectiveness framework, we found that early antiretroviral therapy for uninsured HIV-infected adults with CD4 cell counts of 500/µL had a cost-effectiveness ratio that was between those reported for *Pneumocystis carinii* pneumonia prophylaxis ($25000 per QALY in 1998 US dollars), and Mycobacterium avium complex prophylaxis ($38400 per QALY in 1998 US dollars), both of which are considered “standard of care” in HIV treatment. The cost-effectiveness ratio also was below the median published cost-effectiveness ratio for all medical interventions ($22800 in 1998 US dollars).

Thus, early antiretroviral therapy appears to offer good value for resources spent. Some states should consider programs to expand access to early antiretroviral therapy in accordance with current treatment guidelines through Medicaid waivers or other Medicaid demonstration projects. The budgetary impact of these programs will vary substantially by state, however, and states will need to carefully assess their attractiveness in the context of future state–federal cost-sharing plans.

### Table 4—Budget Impact of Early vs Deferred Antiretroviral Therapy (ART) per Patient With Cell Count of 500 CD4/µL at Cohort Entry

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Cumulative Years 0–5&lt;sup&gt;4&lt;/sup&gt;</th>
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<tbody>
<tr>
<td>National average (all-government payers)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Deferred ART</td>
<td>3800</td>
<td>3900</td>
<td>4500</td>
<td>6800</td>
<td>10200</td>
<td>29100</td>
</tr>
<tr>
<td>Early ART</td>
<td>12700</td>
<td>9700</td>
<td>7700</td>
<td>5000</td>
<td>5500</td>
<td>40600</td>
</tr>
<tr>
<td>Massachusetts (state budget impact)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Medicaid waiver, deferred ART</td>
<td>3300</td>
<td>3300</td>
<td>3700</td>
<td>5200</td>
<td>6600</td>
<td>22100</td>
</tr>
<tr>
<td>No Medicaid waiver, early ART</td>
<td>6900</td>
<td>5500</td>
<td>4700</td>
<td>3700</td>
<td>4000</td>
<td>24700</td>
</tr>
<tr>
<td>Medicaid waiver, early ART</td>
<td>6300</td>
<td>4700</td>
<td>3700</td>
<td>2400</td>
<td>2600</td>
<td>19800</td>
</tr>
<tr>
<td>New York (state budget impact)</td>
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<td></td>
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<tr>
<td>No Medicaid waiver, deferred ART</td>
<td>300</td>
<td>400</td>
<td>600</td>
<td>1500</td>
<td>3200</td>
<td>6000</td>
</tr>
<tr>
<td>No Medicaid waiver, early ART</td>
<td>1600</td>
<td>1100</td>
<td>1000</td>
<td>700</td>
<td>1100</td>
<td>5500</td>
</tr>
<tr>
<td>Medicaid waiver, early ART</td>
<td>7300</td>
<td>5700</td>
<td>4700</td>
<td>3400</td>
<td>3800</td>
<td>24900</td>
</tr>
<tr>
<td>Florida (state and county budget impact)</td>
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</tr>
<tr>
<td>No Medicaid waiver, deferred ART</td>
<td>3200</td>
<td>3200</td>
<td>3600</td>
<td>5000</td>
<td>5900</td>
<td>20900</td>
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<tr>
<td>No Medicaid waiver, early ART</td>
<td>3800</td>
<td>3300</td>
<td>3400</td>
<td>3300</td>
<td>3600</td>
<td>17400</td>
</tr>
<tr>
<td>Medicaid waiver, early ART</td>
<td>5600</td>
<td>4200</td>
<td>3300</td>
<td>2100</td>
<td>2300</td>
<td>17500</td>
</tr>
</tbody>
</table>

<sup>4</sup>Cumulative years (0–5) calculated as (year 1 + year 2 + year 3 + year 4 + year 5).

<sup>2</sup>Early antiretroviral therapy is indinavir, zidovudine, and lamivudine from cohort entry (500 CD4/µL), followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class).

<sup>3</sup>Deferred antiretroviral therapy is indinavir, zidovudine, and lamivudine after first measured CD4 cell count < 200/µL, followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class).

<sup>4</sup>Annual numbers may not add to cumulative numbers because of rounding.
Acknowledgments
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