ROUTINE, RAPID HIV TESTING

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HIV testing identifies HIV–positive persons, allowing for reduced future HIV transmission while simultaneously providing policy makers with surveillance data to inform policy planning. If current costs of HIV testing were reduced, these funds could be redirected to increase testing rates or to expand treatment. The cost of testing is lowered and impact increased if noninvasive (oral and urine), rapid–testing modalities are utilized, pretest counseling uses cost–efficient counseling methods (e.g., video, pamphlets, small group discussions), and opt–out consent strategies are implemented while posttest counseling is more narrowly targeted to HIV–positive persons. Rather than relying on one international standard, customizing HIV testing procedures to local environments may be more efficient and effective. In the United States, laboratories with substantial HIV testing revenues are likely to be most resistant to altering current practices. However, AIDS researchers, policy makers, and advocates may dramatically influence the epidemic’s course by encouraging flexibility and innovation in HIV–testing guidelines.

Today, knowing one’s HIV status can significantly improve an individual’s well–being. In increasing numbers of countries, communities and subgroups, HIV–positive adults who are aware of their serostatus can receive prophylactic care for opportunistic infections as well as antiretroviral (ARV) treatment, protect their unborn children from infection, and plan for their children’s long–term well–being (Al–Harthi et al., 2000; Volberding, 1999). If ARVs are accessed and adhered to, the health of a person living with HIV (PLH) is likely to improve and their lowered viral load can further decrease transmission (Pedraza et al., 1999; Quinn et al., 2000).

In addition to benefiting PLH and their families, society benefits from widespread HIV testing. When PLH know their status, across many different countries and settings, most PLH reduce or eliminate their transmission behaviors (50–66%) (Crepaz & Marks, 2002). Increasing the percentage of PLH who know their serostatus is one of the most cost–effective ways to decrease HIV transmission (Creese, Floyd, Alban, & Guiness, 2002; Crepaz & Marks, 2002). In addition, widespread testing in high prevalence countries allows policy makers to more accurately target increases in treatment capacity for seropositive persons.

Despite these benefits, fewer than 10% of PLH in the countries where prevalence rates are highest are aware of their serostatus (Henahan, 1998); most find out they are seropositive through routine testing.
ropositive after being infected for 10 years or more (De Luca et al., 2002; Wortley et al., 1995). To realize the potential benefits of HIV testing, we must reduce HIV testing costs for governments, providers, and consumers. The costs of testing include the direct costs (laboratory procedures, personnel for counseling), as well as indirect costs imposed on consumers (transportation and child care, loss of time from work to get tested, risk of community stigmatization, and other psychological costs to the tester). New technologies have decreased some of the direct costs of testing (e.g., Orasure Corporation). However, policy makers need to consider methods to reduce the substantial indirect costs to consumers and direct costs of the wraparound services to the testing process, such as counseling (Anand, 2001; Inungu, Quist-Adade, Beach, Cook, & Lamerato, 2005).

INCREASING ACCEPTABILITY OF TESTING

CHOICE OF TESTING MODALITY

HIV tests using oral fluid (saliva), urine, dried blood samples from a finger-stick procedure, or whole blood samples produce valid and reliable results with high sensitivity and specificity (Centers for Disease Control and Prevention [CDC], 2001a; Spielberg et al., 2000). Offering a choice of the type of HIV testing modality may increase individuals’ willingness to be tested, because consumers vary in their testing preferences (Wilkinson, 1997). For example, providing a blood sample can be aversive and violates a cultural norm in some settings (Spielberg et al., 2000).

PLACE–BASED TESTING SITES

The indirect costs of traveling to a testing site can be reduced by targeting high-risk individuals in medical settings by offering routine universal testing in emergency departments (Walensky, Losina, Steger–Craven, Freedberg, 2002; Walensky et al., 2005), tuberculosis treatment centers (Weis, Foresman, Cook, & Matty, 1999), and sexually transmitted disease (STD) clinics (Branson, 1998). By sending mobile vans into risk settings such as red-light districts, outreach can also target persons at high risk for HIV, as shown in two U.S. studies (Henrickson, 1990; Sy et al., 1998). Church–based outreach may be particularly useful in countries with high prevalence rates in which a substantial proportion of the population may be at risk (Lightfoot et al., 2000). Alternatively, home–based testing offers much higher rates of HIV testing (e.g., 93%; Were, Mermin, Bunnell, Ekwaru, & Kaharuza, 2003).

With flexibility, HIV testing may take many forms. For example, testing may be conducted in:

• Community settings (e.g., markets, STD clinics, wine bars, sex venues) with voluntary consent and with posttest results delivered after a 20–minute wait
• A private home by an adult or a couple after viewing an educational videotape at church
• A mobile van with voluntary consent testing. Results would be delivered after the tester watches a 20–minute prevention video
• A doctor’s office with individualized posttest risk reduction counseling, if a person reports a high number of risk behaviors or tests positive for an STI

REDUCING DIRECT COSTS OF TESTING

ALTERNATIVE COUNSELING MODALITIES

The cost of providing pretest and posttest counseling accounts for a larger share of HIV testing costs now that rapid test kits have reduced the costs of HIV testing by
eliminating expensive laboratory fees. Counseling costs can be reduced by using alternative modes for education and counseling, including video (Wilson, Jaccard, Levinson, Minkoff, & Endias, 1996), pamphlets, social marketing (Rotheram–Borus & Futterman, 2000; Futterman et al., 2001; Wolitski et al., 1996; World Health Organization/UNAIDS, 2001), and small-group discussion (Rotheram–Borus, Lee, Lin, & Lester, 2004). Many people surveyed prefer telephone or peer counseling to individual counseling (Spielberg et al., 2000; Spielberg et al., 2005; Fabbri, 1995). Potentially, consumers could control their own HIV testing results, without-third party notification (Department of Health and Human Services, 2001; Merson, Feldman, Bayer & Stryker, 1997), similar to home pregnancy tests.

**BETTER TARGETING OF PRETEST AND POSTTEST COUNSELING**

Testing for most infectious diseases (e.g., tuberculosis) or life–threatening conditions (e.g., cancer) does not require pretest or posttest counseling. Many have called for an end to HIV exceptionalism (Bayer, 1999; Manavi & Welsby, 2005). In 1998 the Institute of Medicine recommended routine HIV testing without extensive pretest counseling for pregnant women, a population with very low risks of transmitting HIV. Rather than being confined to pregnant women, routine HIV testing might be appropriate for a broad range of populations in low prevalence countries (Paltiel et al., 2005). Beyond arguments of exceptionalism, consumers may be more likely to perceive that HIV is a dangerous and stigmatizing condition by requiring pretest and posttest counseling for HIV (Herek, Capitonia, & Widaman, 2002).

In addition, substantial resources are expended on counseling sessions that do not yield large returns in prevention, especially in low prevalence communities. For example, in a recent U.S. study, 20–minute booster sessions offered at 6 months following initial testing did not significantly reduce risk behaviors (Metcalf et al., 2005). The cost–effectiveness of HIV testing derives primarily from changes in risk behaviors by HIV–infected persons. The differential effectiveness of counseling with HIV–positive and HIV–negative persons is substantial. In a recent analysis, Cohen, Wu, and Farley (2004) found a very high cost per infection averted for counseling with those found to be seronegative for HIV in the United States and a much lower cost per infection averted for those detected as seropositive for HIV. Although the utility of pretest and posttest counseling has been high among serodiscordant couples (Allen et al., 1997), it has been difficult to validate the benefit of the type of routine counseling typically offered with an HIV test for those who test seronegative (Otten, Zaidi, Wroten, Witte, & Peterman, 1993; Weinhart, Carey, Johnson, & Bickham, 1999). There is evidence both supporting (Kamb et al., 1998) and disputing (Koblin, Chesney, & Coates, 2004) the benefit of more extensive counseling for HIV negative persons. Despite the equivocal evidence on the effectiveness of the type of pretest counseling typically offered HIV seronegative persons, it may be more sensible to target efforts elsewhere, particularly in low-incidence settings and countries.

Targeting counseling to those who test seropositive or who report high-risk behaviors would free resources to support referrals and linkages to care for PLH, discussions regarding notification, and case management. In low prevalence countries, pretest and posttest counseling may be appropriately continued in venues that serve persons frequently engaging in transmission acts (e.g., methadone treatment centers). Focusing HIV posttest counseling only on those who test seropositive or report ongoing high–risk behaviors (e.g., unprotected anal sex or drug injection) may result in more effective prevention of HIV transmission.
SIMPLIFYING CONSENT PROCEDURES

HIV testing could be routinely offered, with an opt–out strategy (Rotheram–Borus & Futterman, 2000; Stoto, Almario, & McCormick, 1999). Offering routine testing where adults have the option to refuse leads to much higher rates of acceptance (Jones, 2004; Simpson et al., 1998; Weis, Foresman, Cook, & Matty, 1999), especially among pregnant women (Institute of Medicine, 2000; Kirsche, 2000). Similar to other life–threatening and stigmatizing conditions, informed consent for HIV testing can be obtained without a special counseling session.

PROMOTING RAPID TESTING

The positive predictive ability, sensitivity, and specificity of rapid tests are comparable to enzyme immune assays (EIAs) (CDC, 2001a, 2001b), even in resource–poor settings (Bhore et al., 2003). Rapid testing has been more easily available in the developing world (Kassler et al., 1998) than in Europe or the United States. In both the United States and Africa, HIV testing that requires two appointments leads to only 50-70% of tested persons returning for their results (CDC, 1998; Coovadia, 2000). Furthermore, those more likely to be HIV infected are least likely to return (Valdiserri et al., 1993). Eliminating the delay in receiving test results may also increase the acceptability of HIV testing. However, those who screen seropositive on the initial rapid test will face a delay in receiving test results until the rapid test is confirmed.

Rapid testing is as effective as traditional testing with pretest posttest counseling strategies in reducing STDs but is much more likely to result in receiving results (99% vs. 69%) (Metcalf et al., 2005). This allows test sites to more effectively target counseling to a larger share of those who test positive. Rapid testing also allows interventions in crisis situations, averting new infections. For example, women presenting for birth with no previous prenatal care may learn of their HIV status and can then protect their infant (Grobman & Garcia, 1999; Wang, Larke, Gabos, Hanrahan, & Schopflocher, 2005).

Finally, the cost savings with rapid tests are critical (Branson, 2000). The Western blot test requires a laboratory certified as capable of reliably and validly performing highly complex tests (U.S. Food & Drug Administration, 2003). In contrast, rapid testing sites may require only annual licensing (U.S. Food & Drug Administration, 2003) and routine certification (D. Sykes, personal communication, California State Office of AIDS, 2003). The accuracy of the rapid oral test utilized by untrained users is very high (96.6%), higher than the 80% proficiency rate expected of those using EIAs (Delaney, Branson, & Fridlund, 2004).

Self–administered home tests allow an individual to take a rapid test for HIV in their own home. Home tests eliminate the overhead costs of taking a rapid test in a clinic or outreach setting and also reduce the indirect costs to consumers owing to stigma or inconvenience.

POTENTIAL BARRIERS

IMPROVING LINKAGES TO CARE

Many barriers are encountered when linking seropositive persons to care. In the developed world, freestanding anonymous test sites were established early in the epidemic (CDC, 2001a; Klosinski, 2000). The need to link these testing services to care was attenuated because no treatments were available. Now that prophylactic treatments are routine (Shapiro et al., 1999), an additional and difficult transfer must occur from the freestanding test site to the health care setting. Although stand–alone
HIV testing sites encourage testing by lowering indirect costs, the value of increasing testing must be weighted against the greater difficulty in linking persons identified as seropositive to care or case management (Shapiro et al., 1999).

Redefining HIV testing procedures will face many challenges, including ethical concerns and confronting the providers and laboratories who have a vested interest in the status quo.

ETHICAL ISSUES
Given the high rates of HIV stigma, there are many opportunities for discrimination against PLH. More flexible counseling strategies and mainstreaming of HIV may have a variety of negative consequences, including:

- Pressure on all community members to be tested, even if they do not wish to be tested, pressure that could be even greater in societies with strong orientation to group and community norms
- Increase of stigmatization or marginalization of HIV–positive adults who are identified
- Violations of civil liberties of HIV–positive adults who are identified

These challenges are likely to evolve over time. For example, businesses in Africa are conducting voluntary anonymous HIV testing in order to estimate the number of infections in their workforce and plan more effectively for training and hiring needs. Although some multinational corporations have shifted their labor force to areas with lower rates of HIV infection, other companies have assumed responsibility for their employees’ health (e.g., Heineken Beer Corporation in Nigeria; Kahn, 2003).

SHIFTING CURRENT PRACTICE
Over the past 20 years, HIV testing has become a substantial funding stream for community providers in a variety of settings: public health clinics, blood donation centers, substance abuse treatment settings, and anonymous HIV testing sites. Allowing flexibility in HIV testing, especially allowing client–controlled or home testing, is likely to shift funding allocations for HIV testing providers (Anand, 2001). To fully take advantage of new rapid–test technology for identifying PLH, it will be necessary to redirect resources from counseling to increasing the number of tests administered and improving linkages to care; these changes may be disruptive to laboratories and pharmaceutical companies, which have substantial revenue streams from existing technologies, as well as to community–based agencies and stand–alone HIV testing sites. Given these disruptions, changes in health care practices, such as HIV testing, are likely to evolve slowly over time.

CONCLUSIONS
Broad accessibility of cost–efficient, rapid HIV testing has the potential to inform HIV–positive adults of their infection status soon after viral acquisition, likely leading to substantial reductions in HIV transmission internationally. To fully capitalize on this potential, it will be necessary to streamline testing procedures in order to maximize the number of tests and the number of HIV–positive adults who are linked to care. Encouraging flexibility and innovation in HIV testing procedures at the local level while requiring responsible implementation is a necessary component of streamlining.

In reality, countries have already moved to a flexible model; studies on the practice of testing indicate that implementation does not match the UNAIDS guidelines
(Cranley, 1992; Loft, Marder, Bresolin, & Rinaldi, 1992; Rotheram–Borus, Newman, & Etzel, 2000; Simmons, Rogers, Frierson, Beckwith, & Flanigan, 2003; UNAIDS, 1997) and varies substantially based on the HIV testing venue (e.g., public vs. private settings) (CDC, 1993) and the counselor (Royce, Walter, Fernandez, Minkoff, Ickovics, & Simonds, 1998). Now is the time to have our policies mirror our behavior, as well as to allow experimentation that may: (a) identify circumstances and policies that warrant and may encourage universal testing; (b) allow for efficient and reliable procedures that support HIV testing at a low cost to providers, consumers, and society; and (c) encourage the tailoring of HIV testing protocols based on the epidemiology of risk at the local level. With such flexibility, the potential public health benefits of HIV testing will be realized at a new level, with substantial reductions in transmission and greater care provided to PLH.

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