CME CREDIT ***EDUCATIONAL OBJECTIVE:*** Readers will interpret the results of home tests for human immunodeficiency virus infection and counsel patients appropriately

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Home testing for HIV: Hopefully, a step forward

ABSTRACT

An over-the-counter at-home test for human immunodeficiency virus (HIV) infection has been approved and will likely be available soon. It is intended to decrease the percentage of HIV-infected people unaware of their infection (estimated at 18% of the 1.2 million people infected in the United States). Since early and continued treatment prevents disease progression and reduces HIV transmission, testing is the first step toward effective care.

KEY POINTS

The new test is highly (99.9%) specific for HIV but is not quite as reliable at ruling out infection (93% sensitivity). Therefore, it may miss some cases of HIV, especially during the 90-day window after initial infection.

False-positive test results may occur, especially in people at low risk. A positive result must be confirmed with a laboratory-based third- or fourth-generation blood test.

It is important to continue to assess and counsel patients on how to modify their risk of HIV infection.

Providers are urged to offer HIV testing to all patients ages 13 to 64 at least once, regardless of their risk.

At least once a year, patients at high risk should get one of the more sensitive laboratory blood tests.

People who choose to test themselves at home should seek medical care for verification of the test result and for HIV counseling, and, if the result is confirmed positive, access to HIV care.

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In July 2012, the US Food and Drug Administration approved the first over-the-counter test kit for human immunodeficiency virus (HIV) infection, the OraQuick In-Home HIV Test (OraSure Technologies, Bethlehem, PA). This test is a variation of the currently available OraQuick ADVANCE Rapid HIV-1/2 Antibody Test used in clinical settings by trained personnel for rapid detection of HIV.

The home HIV test is expected to become available in the fall of 2012 from the company's Web site and at retail drugstores. This will put the power of HIV testing into the hands of anyone able to afford the estimated $60 price and willing to purchase the item online or in stores.

GOAL: TO REDUCE THE NUMBER OF INFECTED PEOPLE WHO ARE UNAWARE

How home testing will change the demographics of HIV testing is not clear, but the intention is to reduce the number of HIV-infected people who are unaware of their infection and to get them in for care. Anthony Fauci, MD, the director of the National Institutes of Allergy and Infectious Diseases, has called the new test a "positive step forward" in bringing the HIV epidemic under control.[1]

Recent figures from the US Centers for Disease Control and Prevention (CDC) indicate that, of the 1.2 million HIV-infected people in the United States, up to 220,000 are unaware of their infection.[2,3] Since antiretroviral therapy is now considered beneficial even in the early stages of HIV infection, those who are unaware of their infection are missing an opportunity for the most effective therapies.

They may also be unknowingly transmit-

ting the virus, thus perpetuating the HIV epidemic. Awareness of one's HIV infection may lead to behavioral changes that can reduce the risk of transmission. It has also become clear that antiretroviral therapy can dramatically reduce transmission rates, a concept known as "treatment as prevention."[4] Thus, access to care and initiation of antiretroviral therapy have the potential to prevent progression to acquired immunodeficiency syndrome (AIDS) in the individual and to interrupt the spread of the virus in the community.

There are several steps between awareness of HIV infection and full engagement in HIV care that require attention from the health care community.[5] Only a quarter of those with known HIV infection are in care and adherent to antiretroviral therapy, leaving much work to be done on removing barriers to effective treatment.[5] The first step is still to identify those infected. The effort to increase the percentage of HIV-infected individuals who know their HIV status is one of the goals of the National HIV/AIDS Strategy and HealthyPeople2020.[6]

Nearly 1/5 of the 1.2 million HIV-infected people in the United States are unaware of their infection

HOW THE TEST IS USED

The OraQuick In-Home Test consists of the device and reagents, instructional materials, information on interpreting the results, and contact information for the OraQuick Answer Center for information, support, and local medical referral.[7] The overall time needed for testing is 20 to 40 minutes.

To perform the test, an oral fluid specimen is collected by swabbing the upper and lower buccal mucosa along the gum line. Once inserted into the developer solution the swabbed sample is carried onto a membrane strip containing HIV-1/2 antigens.

The device has two windows, one labelled "T" (for test) and the other labelled "C" (for control). If the patient has sufficient antibodies to HIV proteins, the "T" window indicates a positive result if a band is visible. The "C" (control) window displays a band to indicate if the device and reagents are working. If the control window does not show a band, then the kit has not functioned properly and the test result is not reliable.

SOME PEOPLE MAY STILL NEED HELP

For the test to succeed in informing people of their HIV status, it must be used effectively and the results must be interpretable. Of 5,662 participants in phase III investigational-device studies, 99% were able to use the kit and determine a result.[7] While the test's simplicity is similar to that of pregnancy test kits, it is possible that some people (at least 1% of those using the kit) may seek guidance from medical practitioners because they are unable to understand the test results.

For a test result to have the desired outcome of leading to HIV care, individuals must act on a positive result. When home test results are positive, the instructions indicate that "you may have HIV" and provide contact information for the OraQuick Answer Center. It is unclear how reliable the counseling, information, and referral process from OraSure will be and if people will use the service.

Individuals may access medical care at a variety of levels for further assistance if they have a positive test result. These may include primary care offices, emergency and urgent care settings, health departments, and HIV clinics.

LESS SENSITIVE THAN BLOOD TESTS

To provide additional care, clinicians must understand the performance of the home HIV test. Most importantly, the test result must be confirmed.

The In-Home test is less sensitive than currently available HIV blood tests used in the clinical setting, particularly the HIV-1/2 enzyme immunoassay (EIA) with confirmatory Western blot testing. The In-Home test is less likely to detect HIV infection during the 90-day "window period" when seroconversion is occurring, and so it should not be relied on to rule out HIV during this early period after infection.

The sensitivity and specificity of the OraQuick In-Home HIV test were determined in a phase III trial in 5,662 people (80% at risk of HIV), who were tested concurrently with the "gold standard" blood tests (EIA and Western blot). The sensitivity was 93% (giving a positive result in 106 of 114 patients who

had a positive result on blood testing), and the specificity was 99.9% (giving a negative result in 5,384 of 5,385 patients who had a negative result on blood testing).[7]

Therefore, a positive In-Home test result is likely to be truly positive, but a negative result is not as reliably truly negative. False-negative results may occur particularly in the window period early after HIV infection, so the test should not be relied on within 90 days of high-risk behavior. In contrast, with the fourth-generation blood HIV tests, the window period is approximately 16 days.

The predictive value of the test will depend on the population using it and on the patient's pretest probability of disease at the time of testing. In the population tested by OraQuick, the positive predictive value was 99.1% and the negative predictive value was 99.9%.[7] Mathematical modeling has been done to examine the potential outcomes for use in subpopulations at lower risk and at higher risk.

As clinicians, we will have to address the potential for both false-positive and false-negative test results. False-positive results may be more likely in low-risk populations and may occur in the setting of cross-reactive antibodies from pregnancy, autoimmune diseases, or previous receipt of an experimental HIV vaccination. False-negative results may occur in the setting of acute HIV infection and in those with severely impaired immunity (eg, from agammaglobulinemia or immunosuppressive drugs) and will be more likely in higher-risk populations, such as men who have sex with men, intravenous drug users, blacks, and Hispanics ages 18 to 35 with multiple sexual partners. A positive In-Home HIV test should be followed up with a blood EIA and confirmed with Western blot in all patients.

WHO WILL USE THIS TEST?

It is unclear who will use this new test. In OraSure's clinical trial, the percentages of people who indicated they would "definitely or probably buy" the test were:

- 20% of the general population
- 27% of those ages 18 to 35
- 49% of blacks ages 18 to 35
- 47% of homosexual men
- 43% of people who said they had more than two sexual partners per year
- 32% who said they use condoms inconsistently.

If this is true, the test may appropriately target several populations that are not currently being tested, either because they lack access to care or because they do not see themselves as being at high risk. Of those with newly diagnosed HIV infection from 2006 to 2009, 40% had had no prior testing, and the groups with the highest percentages of people in this category were black, men with injection drug use as their sole risk factor, those older than 50 years, and those with heterosexual contact as their sole risk factor.[8] Because of difficulties in identifying some of these groups as "at risk," the current CDC guidelines recommend that HIV testing be offered to all patients ages 13 to 64, regardless of their risk factors.[9]

The home HIV test may fill a gap in testing, extending it to those still not tested in the health care setting or to those who have not sought health care. For the home test to fill that gap, people still have to perceive themselves as at risk and then purchase the test. Through public health strategies and at clinical points of care, we must continue to inform our patients about HIV risk and work to identify new or ongoing risk factors that would prompt additional testing.

Only 1/4 of those with known HIV infection are in care and adhering to antiretroviral therapy

MANY QUESTIONS REMAIN

- Will those who need testing want to use this test? People will buy the test only if they perceive themselves to be at risk.
- Is this test affordable for the target populations? $60 will be unaffordable to some.
- Will the directions be followed effectively?
- Will home testing reduce opportunities to counsel patients on their HIV risk factors?
- Will there be situations in which individuals are socially pressured to take the test?
- Can users of the test expect the appropriate amount of privacy? Availability on the Internet and in drug stores is not a guarantee of privacy when purchasing the test, although the result presumably will not be known.
- Will those with positive results seek medical care?

- Will those with negative results who are still at high risk forgo more sensitive testing and continue to engage in high-risk activities?

Nevertheless, since early and continued treatment prevents disease progression and reduces HIV transmission, testing is the first step toward access to effective HIV care. The home HIV test is a step forward in providing high-quality HIV testing to the wider population.

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