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Retrovirology: Research and Treatment

Perspective on Providing Partner Notification Services for HIV in Sub-Saharan Africa

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ABSTRACT: Formal attempts to notify human immunodeficiency virus (HIV)-exposed persons have seldom been used in Africa. Two recent partner notification (PN) trials provide strong evidence that HIV PN is feasible, acceptable to Africans, safe, probably cost-effective, and, above all, capable of producing high proportions of newly identified HIV-infected partners. Referring infected partners to medical (potentially life-saving and transmission-dampening) care should help interrupt onward HIV transmission. Moreover, multiple recent reports indicating the need to reassess transmission dynamics to explain Africa's striking regional differences in HIV prevalence provide a powerful rationale for PN programs, especially those willing to investigate both sexual (including, specifically, anal intercourse) and non-sexual (puncturing exposures) transmission modes. Data from such focused PN initiatives are likely to help elucidate the time-honored question: "Why Africa?" and hence to recalibrate local prevention messages and priorities. The encouraging results from these trials should help efforts to obtain funding assistance from governments and other donors.

KEYWORDS: HIV/AIDS epidemiology, partner notification, contact tracing, anal intercourse, Africa

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> "Always listen to the experts.
> They'll tell you what can't be done and why. Then do it."
> —Robert Heinlein

Introduction: Partner Notification's (PN's) Three Essential Functions

PN, formerly known as "contact tracing," is a tool of many uses. It is the public health practice of notifying contacts of persons with infectious conditions, such as sexually transmissible or blood-borne infection, that they may have been exposed to a specific infectious agent. Although the fundamental reason for PN is ethical (exposed individuals have a right to know), it also serves two important population-level functions: reduction of the community's disease burden (via case-finding, which helps interrupt onward transmission), and elucidation of epidemiologic patterns (via tracing infections on the ground and connecting-related cases). While each of these three PN functions is important, some may be more important at times than others, depending on epidemiologic context, availability of disease control resources, and local values. How may such considerations be applied to present day human immunodeficiency virus (HIV) epidemics in sub-Saharan Africa?

Pilot Testing HIV PN and its Uses in Sub-Saharan Africa

Although a modest amount of attention had been paid to PN for selected bacterial sexually transmitted infections (STI) in sub-Saharan Africa mostly starting in the early to mid-1990s,[1] PN for HIV infection got a more tremulous start about a decade and a half later. Specifically, two recently reported trials, one each from Cameroon and Malawi,[2,3]

tested the feasibility, acceptability, and potential yield of PN for HIV. Each trial consisted of interviewing newly diagnosed HIV/AIDS cases to collect identifying data on sexual partners and to assist in confidentially referring them to medical examination. Each demonstrated that HIV PN was feasible, acceptable to the affected populations, safe, probably cost-effective[4] and, above all, capable of producing high proportions of newly identified HIV-infected partners. Encouraging as these proof-of-concept field trials may be, implementation of similar initiatives in other parts of Africa will require political will and public health enthusiasm. Likelier than not, presence of these attributes would help generate the necessary medical infrastructure funding from governments and other donors.

PN as a Tool to Help Elucidate "Why Africa?"

Cost-effective as HIV PN endeavors might be for sub-Saharan Africa,[4] it is likely that Cameroon- and Malawi-like initiatives will, at least initially, exceed the capabilities of currently available medical and social resources in many districts. What to do? Often, the best solution to a seemingly intractable problem is to break it down into smaller pieces and then prioritize these pieces to guide scarce resource allocation. Given several recent reports[5–7] indicating an urgent need in sub-Saharan Africa's HIV epidemics for improved investigation into sharply differing regional HIV epidemic patterns, this writer can think of few tools better suited to elucidate local HIV dynamics than the person-to-person transmission data routinely collected by conscientious application of PN. Linking connected cases has often yielded reliable epidemiologic pictures[8]—more reliable than inferences drawn from risk factor data alone or from ecologic observations. This is because contact tracing data are much closer to transmission events on the ground than are (more distant) risk markers or (most distant) ecologic inferences.[9]

It is notable that two of the most seasoned HIV epidemiologists working in sub-Saharan Africa recently concluded[6] that "We urgently need a reliable, easy-to-use tool to measure incidence at a population level. *We still do not fully understand why the spread of HIV has been (and still is) so different in sub-Saharan Africa compared to heterosexual populations in other parts of the world* (emphasis mine) and why the incidence of HIV infection in young women in southern Africa is so high." This conclusion, several decades into the HIV epidemics in Africa, is disturbing and should shake our confidence as epidemiologists. It indicates that the original question "Why Africa?" is still very much with us and, therefore, a crucial and urgent challenge. The following year, their commentary was followed by a report from the University of Zimbabwe listing observations that undermine the assertion that sexual transmission is mostly responsible for observed high HIV prevalence in Africa's heterosexual adult populations.[7] The Zimbabwean researchers detail dissonances, paradoxes, and shortcomings in the mainstream and orthodox view, and offer thoughtful suggestions for obtaining evidence on multiple fronts to solve this puzzle. Here is not the place to summarize this exceptional analysis of the realities on the ground, only to point out a relevant omission: nowhere in their report do the authors suggest using PN/contact tracing as a potentially useful investigatory tool to help close this "research gap"[7] and neither do the seasoned researchers.[6]

Of particular concern to the Zimbabwean researchers is the possibility that observed heterogeneity in HIV prevalence in heterosexuals could be explained by unsafe medical practices, such as the reuse of needles and other sharps, echoing similar conclusions from previous reports.[9–26] As is well known, in poor countries, opportunities for unsanitary medical, dental, ritualistic, or cosmetic procedures abound[27,28] as do, consequently, opportunities for the effective transmission of blood-borne agents such as hepatitis viruses and HIV. Both historically and presently, most investigations into the HIV epidemics in sub-Saharan Africa have (surprisingly) focused almost exclusively on sexual intercourse variables and related risk markers.[9] Rarely are non-sexual modes of transmission considered or measured, a criticism that extends to the otherwise well-conducted PN trials in Cameroon and Malawi,[2,3] where named sexual partners who were identified as HIV-infected were presumed to have acquired HIV, by default, from sex. No attempt was apparently made to consider or investigate non-sexual exposures. This would have been particularly important in cases of unexplained HIV infection, such as very low-risk women and serodiscordant couples reporting no outside partners.

Tracing the likely source of HIV infection could have led to identification of specific blood exposures and settings likely to be involved in local HIV transmission.[29,30] Results of such investigations might point to the necessity of HIV interventions beyond the principally sexual ones traditionally relied upon. Importantly, providing evidence for the non-sexual origin of HIV infection in low-risk women could prevent both insult and injury to the innocent.[1,31] It would also discourage laypersons and health workers alike from automatically assuming that HIV infection, in women or men, was necessarily acquired sexually. Because no prior epidemiologic study in Africa has involved tracing HIV infection and comprehensively assessed all modes of transmission, both sexual and non-sexual, focal use of PN's investigatory function as first PN priority—as previously suggested[32,33]—is rational and easily defensible. (For readers who object to this priority ranking, consider that, as of this writing, not much PN for HIV/AIDS is being conducted in any event, prioritized or not.)[2,34]

Given that the most efficient way to transmit HIV sexually is via (especially receptive) anal intercourse[35] and given the flurry of recent reports from sub-Saharan Africa suggesting that anal intercourse may be much more widely practiced than previously believed,[36–39] specifically asking patients about anal sex, and analyzing the data separately from reports

of penile-vaginal exposure, would provide an evidence-based rationale for warning local populations about very high-risk sexual practices. In the Cameroonian trial, such a question was asked, presumably without embarrassment, but the authors regretfully report findings under the undifferentiated rubric "Any vaginal or anal sex …."[2]:Table 1.

People need to know what types of exposure are especially risky so that they may protect themselves,[30,37,40] especially considering that, in many Africa regions, "penile-anal intercourse is often not considered "sex," and the omission of anal sex in safe-sex messaging is interpreted as meaning that anal sex is safe."[37] Additionally, throughout much of Africa puncturing exposures, such as those encountered in medical, dental, cosmetic, ritualistic, and even home (eg sharing razors or medical injection kits) settings, are not always regarded as HIV risks.[21,26,40] Thus, community education campaigns that focus on all modes of transmission and PN efforts can complement and support each other.

Perceived and Real Obstacles to HIV PN in Africa

Whatever the merits of the presently suggested priority ranking, barriers to the implementation of PN generically must be considered. Concerns are principally of three kinds: PN is expensive, unduly invasive of privacy, and potentially harmful to HIV index patients or their named partners.[41,42] Both the Malawi and Cameroon trials have mostly laid these concerns to rest, as could have been predicted from a reading of the previous literature on STD PN in sub-Saharan Africa.[1] The reported HIV PN trials[2,3] suggest that the financial burden is not prohibitive and, being remarkably productive and cost-effective[4] in identifying HIV-infected individuals and referring them to (life-saving and transmission-dampening) HIV care, could therefore probably persuade funding agencies, foreign and domestic, to provide resources. As Hosseinipour and Rosenberg reflect in the editorial accompanying the Cameroonian PN initiative,[42] similar a priori concerns were expressed "against many new HIV-related services in sub-Saharan Africa—[like] the introduction of HIV counseling and testing and the use of ART. However, each of these concerns has been addressed by resource commitments and careful implementation approaches resulting in significant gains in improving health-related outcomes." This is an encouraging and, indeed, accurate reflection. In addition there is no suggestion in the available STD or HIV PN literature that the affected populations consider PN unduly invasive; indeed, the high degree of cooperation recorded between STD/HIV health workers, index patients, and named partners in sub-Saharan Africa is strongly supportive evidence. There is only scant anecdotal or literature-based evidence to suggest that implementation of PN services results in personal or social harms.[42,43] Certainly, in neither PN trials were instances of harm, defined as physical violence or/and domestic abuse, common: a 0.5% incidence in the Malawi trial[3] and a vanishingly small percentage for the Cameroon trial (two instances in 9100 persons given partner services).[2]

Inherent Weakness of PN Trials or Initiatives

Neither the Cameroonian nor Malawian HIV PN trial used a control group. From a strictly scientific point of view, this is a notable weakness. While a control group is not required to assess PN feasibility, acceptability, or safety, it is necessary to assess both epidemiologic yield and cost-effectiveness. Without a control group, how can one *know* that simply asking the HIV index patient to refer acquaintances, friends, or persons they suspect are at high risk for HIV to be tested, whether they had sex with them or not, would not produce comparable yields? Indeed, how can one know that a simple screening effort in specific age groups, especially in high-prevalence communities, would not produce substantial yields in newly diagnosed HIV/AIDS cases? What public health workers are interested in are strategies that efficiently identify HIV-infected persons, so that they can be referred to care—care that can both prolong their lives and reduce their infectiousness vis-à-vis others. In brief, traditional PN, where high-risk (sexual or non-sexual) exposed partners are identified, may not be the only way to get the job done cost-effectively. Such approaches should be empirically tested to see if they could be of value.

PN's Raison D'etre and Operational Options

PN's fundamental function is ethical: simply put, persons exposed to communicable infections have a right to know. Historically, three main methods of notifying partners exposed to STD/HIV have been used: self-referral, contract referral, and provider referral.[44] Self-referral simply means that the index STD/HIV case patient is encouraged and trusted to refer his/her own partners to medical examination. With contract referral, the names and locating information of each exposed partner is obtained by the health worker, who allows the index patient to notify partners first; should partners not appear for examination within a reasonable period (eg 7–10 days), the health care worker reserves the right (contracts) to notify named partners anonymously (viz, the name of the index patient is not revealed). Provider referral follows the same method as contract referral except that the health worker, and not the index patient, notifies partners anonymously as soon as possible. Self-referral is least resource intensive, requiring only a short counseling session on how to break the news to partners accurately and safely. Provider referral is labor intensive, because health workers carry the entire burden of notification and referral to medical facilities. Contract referral is roughly intermediate in labor intensity. For both STD and HIV PN, self-referral has been shown to be an inefficient way to assure notification, and provider-assisted referral, the most efficient.[45] For Africa, for example, the Malawi HIV PN initiative followed the predicted pattern, with only about one-fifth of partners successfully referred by the index patient and about two-fifths for each provider-assisted (includes provider and contract) referral strategy.[3] A broadly similar profile was noted in the Cameroon trial, where only 6.7% of partners were successfully referred by the index patient and the rest via provider-assisted referral.[2]

Implementing PN requires some training and monitoring of health workers.[44] At minimum, health workers should be taught how to counsel and motivate HIV-infected persons to quickly and safely self-refer partners.[46] Keeping track of how many patients were counseled and trusted with self-referral, or formally interviewed for the names of partners, along with how many of their partners were successfully referred not only provides a sense for efficacy but are the kinds of data that can (should) influence funding decisions. As the Cameroonian experience testifies, monitoring health worker skills is likely to be important: "Although all health advisors were trained in proper data collection procedures, staff's lack of familiarity with the forms resulted in substantial missing data during the first few months of data collection."[2] Relevant data to collect are number of HIV-infected persons approached, number who chose any of the three specific PN strategies, number of partners successfully referred, number of partners *newly* identified as HIV infected, and number of persons successfully referred to HIV medical care. (These may be most efficiently collected using hand-held devices). Lastly, health workers should be trained to look beyond individual cases and their partners and try to see the larger picture by linking related cases[8] and by recording "places of epidemiologic significance,"[47] such as where persons meet socially or may have been exposed to contaminated needles.[47,48] It is usually more revealing to see the forest than the trees that comprise it; in brief, cases and partners matter, as individual trees do, but discerning patterns matters more.

PN on a Tangent: "Look-Back" Investigation

Health workers should also be trained to suspect non-sexual HIV transmission in low-risk patients (especially women) or low-risk couples (especially tested couples where only the woman is HIV positive). "Look-Back" investigation probing for non-sexual (eg skin puncturing) exposures make both ethical and epidemiologic sense,[30] and provides opportunities for fine-tuning prevention messages and local HIV control efforts.[26,40,49]

PN as Springboard for Generic Public Health Training

Training health workers to conduct HIV PN in sub-Saharan Africa may be a wise initial investment in public health skills. Just as occurred in the United States starting a few decades ago with nation-wide implementation of PN for infectious syphilis,[50] a cadre of public health advisors eventually formed and provided a strong infrastructure in local health districts by exporting their skills into a range of other public health programs, such as immunizations, tuberculosis control, measles, and polio eradication, as well as helping to elucidate emerging infections such as Legionnaires' disease, Hanta virus, Lassa fever, SARS, and the anthrax scare in America. Nurturing public health investigatory (and people and community relations) skills that one can acquire by conducting PN would be of great service anywhere that new communicable infections or public health emergencies are likely to emerge.[51]

PN for HIV in Sub-Saharan Africa: The Time is Now

PN may well be the Swiss Army knife of STD/HIV epidemiology and control. Like the knife, it offers several useful tools and, though not inexpensive, is likely to be cost-effective.[4] Cost and cost-effectiveness notwithstanding, PN is certainly the ethical and humane thing to do. Given rapidly improving and available (computer-, mobile phone-, and Internet-based) communication tools, reaching and educating partners should become easier and cheaper than heretofore.[52] Most encouraging is the solid empiric evidence from sub-Saharan Africa that HIV PN is feasible, acceptable, safe, cost-effective, and highly efficient at identifying and referring to care persons previously unaware of their infection. Given the serious lacunae in our understanding of the sharply differing HIV burdens in different regions of sub-Saharan Africa, the apparent puzzle du jour, implementation of PN as a tool to help elucidate differences in HIV transmission dynamics carries special urgency. Effective prevention strategies crucially depend on a more accurate regional picture than has so far been afforded by the conventional "one-size-fits-all" paradigm of Africa's HIV epidemics. As the Cameroonian and Malawian HIV PN trials demonstrate, obstacles to successful implementation of PN initiatives are surmountable. Indeed, on the population level, they achieved commendable results even in the absence of resolving some nagging individual ethical, moral, and legal dilemmas that health workers occasionally face.[53–55] One final thought: tennis coaches frequently advise pupils who might be intimidated by an opponent's serve to "stick your racquet out; something good might happen," in a word: commit.

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