

children in health care settings is low.” A similar conclusion would be unthinkable if 1% of inpatient children in London, Boston, or Seoul had non-vertical HIV infections.

More recently, WHO’s reaction to a reported 5·6% HIV prevalence in South African children aged 2–14 years from a 2002 survey has been strangely muted.<sup>1</sup> If true, this finding points to hundreds of thousands of children with iatrogenic HIV infections. In rich countries, similar evidence from a government-sponsored national survey would lead to urgent and definitive investigations; but more than a year after publication of the South African data, WHO experts continue to reject their veracity with limited and subjective evidence.<sup>1</sup>

In 2004, Schmid and colleagues accept WHO estimates that 39% of injections in low and middle-income countries are given with syringes or needles reused without sterilisation, but speculate that the risk of HIV transmission would be small because equipment may be rinsed, washed, stored at room temperature, etc. Similar arguments would be unthinkable for public-health experts answering to populations in Europe or North America. The figures they give for Africa imply 300 million annual injections with reused unsterilised equipment (800 million Africans×2·1 injections per person per year×18% with reused, unsterilised equipment); assuming 3·5% HIV prevalence in previous injectees as in all Africans, 10 million injections would reuse unsterilised equipment that previously injected someone with an HIV infection.

Although Schmid and colleagues acknowledge “a clear need to eliminate all unsafe injections”, they express displeasure that a US Senate committee “held hearings to establish whether HIV/AIDS funds should be devoted to programmes that target unsafe injections.” The implication of this complaint is that no HIV prevention money should be so allocated.

Schmid and colleagues’ opposition to including injection safety as a component of HIV prevention is inconsistent with the 2001 United Nations General Assembly Special Session on HIV/AIDS, which set goals to “implement universal precautions in health-care settings to prevent transmission of HIV infection” by 2003, and by 2005 to ensure access to essential commodities, including sterile injection equipment and safe blood supplies.<sup>3</sup> Schmid and colleagues’ paper also reveals WHO as a house divided against itself: WHO’s 2003 World Health Report<sup>4</sup> lists “blood safety and the observance of universal precautions,

including safe injection practices” among HIV prevention measures.

To demonstrate zero tolerance for iatrogenic HIV and to identify risks for HIV transmission in health care in all countries with generalised epidemics, we enjoin ministries of health to take immediate steps to establish registries of unexplained HIV infections; monitor unexplained infections in children (eg, routinely test mothers of children found with HIV infections); and whenever one or more unexplained infections are found, conduct outbreak investigations to find the source and extent of the problem. Countries that implement these programmes—with or without WHO and other international support—can end the long-standing acceptance of unsterile health care for poor countries.

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#### Authors’ reply

Sir—In our paper, we quoted a recent WHO estimate of the proportion of HIV infections in sub-Saharan Africa attributable to unsafe injections of 2·5%.<sup>1</sup> Without attempting to calculate such a figure ourselves, we accept this figure as the best estimation. Our use of the phrase “not a dominant mode” rather than other possible wording such as “important mode” was deliberate, since we felt that it conveyed low numerical value without diminishing the real significance of any infection that might be caused by unsafe injections. Our conclusion that unsafe injection is not a dominant mode of HIV transmission in sub-Saharan Africa precludes our accepting Gisselquist’s estimated proportion of 28%,<sup>2</sup> and the above-suggested wording of “10% or more.”

Gisselquist and colleagues give an inaccurate portrayal of ourselves and of

WHO in alleging our “opposition to including injection safety as a component of HIV prevention.” Gisselquist and colleagues accurately quote our statement of “a clear need to eliminate unsafe injections.” Additionally, they incorrectly imply that we “express displeasure” over the decision of the US Senate Committee on Health, Education, Labor, and Pensions to consider allocating monies towards injection safety. We believe the Committee’s subsequent decision to allocate \$75 million (3·1%) of the \$2·4 Global AIDS Initiative towards unsafe injections, blood safety, and other infection control practices is appropriate; we would disagree if far greater sums had been allocated.

Gisselquist and colleagues inappropriately broaden our addressed issue of HIV acquisition from unsafe injections into the much larger issue of possible HIV acquisition from unsafe health care. Their citing of the 1992–93 WHO report is an example: a skin-piercing procedure is not the same as an injection.<sup>3</sup> In that report, the proportion of seropositive case children receiving an intramuscular injection in the preceding year (16%) was little different from that of the control children (14%: relative risk 1·1, 95% CI 0·4–2·9). Other risk factors referred to as skin-piercing procedures included scarifications and uvulectomies by traditional healers. We have not examined HIV infections that might be acquired from health care other than from injections, nor from traditional medicine practices. This distinction is important, because of the specific nature of interventions.

Lastly, we support scientifically sound efforts to identify and quantify modes of transmission that we might not fully appreciate and, as we have said elsewhere, we wish to hear of the results of such investigations.<sup>4</sup> For instance, we hope that the monies appropriated by the American Senate will lead to a better understanding of the risk of HIV transmission from the health-care practices addressed. More specifically, although we did not identify unsafe injection practices in South Africa and thus do not see how they could meaningfully contribute to the 5·6% seroprevalence rate reported in one survey,<sup>5</sup> we have encouraged and fully supported efforts there to reproduce the study results and search for possible causes of infection in children.

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- 3 World Health Organization. 1992–1993 Progress Report, Global Programme on AIDS. Geneva: WHO, 1995. ISBN 92 4 156177 7.
- 4 SIGN Internet Forum. Safe Injection Global Network Signpost, Feb 26, 2004 <http://uqconnect.net/signfiles/Archives/SIG-N-POST00220.txt> (accessed Apr 21, 2004).
- 5 Shisana O. South African national HIV prevalence, behavioural risks and mass media: household survey 2002. Cape Town: Human Sciences Research Council (HSRC), 2002.

Sir—George Schmid and colleagues (Feb 7, p 482)<sup>1</sup> conclude that, contrary to a previous report,<sup>2</sup> no compelling evidence exists to show that injections are a predominant mode of HIV-1 transmission in sub-Saharan Africa. To shed further light on this critically important issue, we examined detailed risk-factor data collected from two studies more than a decade ago when HIV-1 was spreading rapidly in southern Rwanda.<sup>3,4</sup>

To determine whether a history of recent injections was independently associated with incident HIV-1 infection in young women, we have since applied a newly developed IgG-capture BED enzyme immunoassay (BED-CEIA)<sup>5</sup> to stored serum specimens from 639 HIV-1 infected pregnant women (13–30 years of age). These young women were identified as HIV-1 positive at one of five antenatal clinics in the Butare region of Rwanda between October, 1989, and March, 1993.<sup>3</sup> The BED-CEIA assay, developed by the US Centers for Disease Control and Prevention, detects increasing concentrations of anti-HIV-1 IgG after seroconversion to identify recent HIV-1 infection among people infected with diverse HIV-1 subtypes.<sup>5</sup>

Of the 639 women tested, 151 (23.6%) were identified as having recent HIV-1 infections acquired within about 180 days of screening. No clear association was seen between self-reported history of recent injections and recent HIV-1 infection in this population (adjusted odds ratio 1.3, 95% CI 0.9–1.9;  $p=0.16$ ). The lack of a significant association persisted for injections received in the formal health-care system as well as injections received from “magendu” (traditional healers).

Risk factors independently associated ( $p<0.001$ ) with recent infection included age less than 20 years, multiple sex partners, urban

residence, being single, and diagnosis of a sexually transmitted disease within the past 3 years. Young HIV-1-infected women who reported having started sexual activity within the past year were significantly more likely to have recently become infected (adjusted odds ratio 6.2, 95% CI 2.9–13.1) than women who reported 5 or more years of sexual activity. Thus, the first year of sexual activity seems to be a particularly high-risk time for acquisition of HIV-1 infection among young Rwandan women. This finding is consistent with those from a prospective study of HIV-1 incidence in the same population.<sup>3</sup>

If injections had played a major role in the spread of HIV-1 in Rwanda, we would have expected HIV-1 infection to be common among children who were not perinatally HIV exposed. However, among 101 paediatric admissions for protein-energy malnutrition in Butare, Rwanda, in 1989, all but one of the 14 HIV-1-positive children were perinatally HIV-1 exposed; the one child whose mother was HIV-1-negative had a history of multiple blood transfusions as well as injections.<sup>4</sup>

Although we agree that more efforts are needed in sub-Saharan Africa to reduce exposure to, and to protect patients from, bloodborne infections, our data from Rwanda support the conclusion of Schmid and colleagues that sexual transmission of HIV-1 remains the most likely explanation for the rapid spread of HIV-1 in Africa, especially among young women.

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Sir—George Schmid and colleagues<sup>1</sup> note that estimates of the proportion of HIV-1 infections due to medical injections could be biased if HIV-1-positive individuals are more likely to be ill than HIV-1-negative ones, and thus more likely to receive injections. To assess this possibility, we examined data from 9801 adults enrolled in the Rakai Community Cohort, Uganda, who reported on use of medical injections over the past year and symptoms or illnesses requiring bed rest for more than 1 day. There were 1431 prevalent HIV-1 infections (14.6%).

HIV-1-positive individuals were more likely to be symptomatic and more likely to report multiple symptoms than HIV-1-negative individuals (table). The frequency of receipt of injections was lower in symptom-free HIV-1-positive individuals than in HIV-1-positive individuals with two or more symptoms; the same was true among HIV-1-negative individuals. Illnesses requiring 1 or more days of bed rest were more common among the HIV-1-positive than the HIV-1-negative individuals, and the frequency of receipt of injections was greater among both HIV-1-positive and HIV-1-negative individuals reporting bed rest for 1 or more days. The unadjusted rate ratio of injection receipt in HIV-1-positive versus HIV-1-negative individuals was 1.4 (95% CI 1.3–1.5); after adjustment for symptoms and bed rest, the rate ratio was reduced to 1.2 (1.1–1.3).

	HIV-1-positive		HIV-1-negative	
	Number of patients	Number who received injections	Number of patients	Number who received injections
Total	1433 (100.0%)	638 (44.5%)	8368 (100.0%)	2659 (31.8%)
Symptoms				
Asymptomatic	128 (8.9%)	21 (16.4%)	1239 (14.8%)	123 (9.9%)
1 symptom	376 (26.2%)	137 (36.4%)	3215 (38.4%)	894 (27.8%)
≥2 symptoms	929 (64.8%)	480 (51.7%)	3914 (46.8%)	1642 (42.0%)
Bed rest				
<1 day	1188 (82.9%)	483 (40.7%)	7650 (91.4%)	2286 (29.9%)
≥1 day	245 (17.1%)	155 (63.3%)	720 (8.6%)	373 (52.0%)

Frequency of injection receipt among HIV-1-positive and HIV-1-negative adults in the Rakai Community Cohort