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# Needle Exchange Programs for the Prevention of Human Immunodeficiency Virus Infection: Epidemiology and Policy

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Needle exchange programs provide a particularly compelling and informative example of the intersection between epidemiology and policy. The concept of needle exchange was developed and initially proposed on the basis of biologic plausibility: providing access to sterile needles and syringes (hereafter referred to as needles) should prevent parenteral transmission of human immunodeficiency virus (HIV) and other bloodborne pathogens, including hepatitis B and C. Nonetheless, various bans on the use of US federal funds for needle exchange program services have been in effect since 1988, limiting implementation and evaluation. The legislation included provisions that the ban on federal funding could be lifted only if the President of the United States or the US Surgeon General determined that needle exchange reduced the transmission of HIV infection and did not increase drug abuse. Indeed, the Secretary of the US Department of Health and Human Services did report in 1998 that the scientific evidence showed that needle exchange programs reduced HIV incidence and did not increase drug abuse. The Surgeon General reiterated this finding in 2000 (1). The administration decided, however, that federal funds would remain unavailable for needle exchange. During this policy stalemate at the federal level, the number of needle exchange programs has grown steadily, from none in 1987 to 160 programs operating in 39 states, the District of Columbia, and Puerto Rico in 1999 (2). In reviewing the history of needle exchange programs, a group was assembled to include perspectives from researchers, activists, and government to reflect on the role of epidemiologists in the development of needle exchange programs.

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Abbreviations: AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus.

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## HISTORIC REVIEW OF NEEDLE EXCHANGE PROGRAMS

In 1982, injection drug users were first identified as a risk group for acquired immunodeficiency syndrome (AIDS) shortly after the epidemic was clinically recognized (3). This early report suggested that AIDS could be transmitted parenterally, similar to transmission of the hepatitis B virus. Originally developed as a strategy to reduce transmission of hepatitis B, the first needle exchange program opened in Amsterdam in 1984. That year, HIV, the virus that causes AIDS, was identified.

In 1985, Des Jarlais and Hopkins published a letter in the *New England Journal of Medicine* (4) calling for expanded access to sterile needles for injection drug users to prevent HIV transmission, and the Health Commissioner of New York City considered the idea of needle exchange in the city. Members of the community, particularly African-American leaders, were vehemently opposed to the idea (5). The Mayor, Edward Koch, stated that this is an idea "whose time has not come" (6).

In 1988, Ernst Buning and colleagues (7), from the Amsterdam Municipal Health Service, provided the first evaluation of their city's program, noting declines in the frequency of injecting and needle sharing among program participants. The United Kingdom and Australia also opened needle exchange programs as part of national strategies to respond to the AIDS epidemic. Meanwhile, an American activist, Jon Parker, began distributing needles to injection drug users in New England municipalities and was repeatedly arrested. Publicly supported needle exchange programs opened in the United States in Tacoma, Washington, in 1988, and in New York City, Portland, Oregon, and San Francisco, California, in 1989 (8–10). The New York City program was started with severe restrictions—a single location near a police station with participant identification required and only one syringe per visit. The Tacoma program was operated from a tray table from the trunk of an automobile. In Canada, the Federal Minister of Health openly supported needle exchange, and programs opened in Vancouver, Montreal, and Toronto in 1988 and 1989. In England, behavioral studies of participants in needle exchange programs were reported and showed decreases in

injection frequency and needle-sharing among participants (11, 12).

On November 4, 1988, a federal ban on funding of needle exchange program services was enacted in the United States (13). The ban was first applied "unless the Surgeon General of the United States determines that a demonstration needle exchange program would be effective in reducing drug abuse and the risk that the public will become infected with the etiologic agent for acquiring immune deficiency syndrome." More stringent language was inserted into the Comprehensive Alcohol Abuse, Drug Abuse, and Mental Health Amendments Act of 1988, specifying that no funding could be spent "to carry out any program of distributing sterile needles for the hypodermic injection of any illegal drug or distributing bleach for the purpose of cleansing needles for such hypodermic injection" (14). Similar language was included in the Ryan White Comprehensive AIDS Resources Emergency Act of 1990 (15), which covered special funds for AIDS care. Two appropriations acts for the US Department of Health and Human Services stipulated a prohibition of funding for needle exchange programs "unless the President of the United States certifies that such programs are effective in stopping the spread of HIV and do not encourage the use of illegal drugs" (16, 17). In 1992, the legislative ban on federal support for operating needle exchange programs was discussed in the ADAMHA (Alcohol, Drug Abuse, and Mental Health Administration) Reorganization Act (18).

Separately, a memo was circulated to principal investigators funded by the National Institute on Drug Abuse stating that existing National Institutes of Health projects were not permitted to evaluate needle exchange programs (19). Investigators interested in evaluating needle exchange programs were told that proposals submitted would not be reviewed. Limited US needle exchange research was conducted, however, with support from private foundations, notably the American Foundation for AIDS Research and the Robert Wood Johnson Foundation. Administrative procedures at the National Institute on Drug Abuse changed after 1991 and federally-funded research on evaluation of needle exchange programs was permitted.

By this point, needle exchange programs were being widely adopted in Europe. In 1991, the National Commission on AIDS released "The Twin Epidemics of Substance Abuse and HIV" report which called for removing all barriers to distribution and possession of injection equipment, including restrictions on funding for needle exchange programs (20). In response to the National Commission on AIDS, Representative Charles Rangel from New York called for an evaluation of the existing science on needle exchange programs to be conducted by the US General Accounting Office. The report was released in 1993 (21).

One politician who openly supported needle exchange early was John Daniels, the African-American mayor of New Haven, Connecticut. He supported the findings of the first evaluation of the New Haven needle exchange program, which estimated a one-third reduction in HIV incidence among needle exchange program clients and concluded that the program was beneficial (22). The Director of the Office of National Drug Control Policy (the "drug czar"), Robert Martinez, whose office had released a publication criticizing needle exchange programs (23), and the Director of the Centers for Disease Control and Prevention, William Roper, met and agreed to an objective review of needle exchange programs. This led to the release of a report by the University of California in 1993 (24).

Both the US General Accounting Office and University of California reports concluded that the evidence showed that needle exchange does not increase drug abuse and that HIV rates are likely to be reduced in the presence of needle exchange programs. The reports also provided evidence (albeit limited at the time, but shown more strongly since then) that needle exchange programs were a bridge to drug abuse treatment and were not associated with increased crime. The University of California report recommended lifting the ban on federal funds for needle exchange. In 1993, when the University of California report was released, there were 37 needle exchange programs in the United States (24).

Following the release of the University of California report, the Centers for Disease Control and Prevention conducted a review of that report. The review endorsed all of the report's major findings, including its recommendation that the ban on federal needle exchange program funding be lifted (David Satcher, Centers for Disease Control and Prevention, personal communication to Jo Ivey Boufford, Office of the Assistant Secretary for Health, December 10, 1993). The administration, however, refused to release the report, which was ultimately leaked to the *Washington Post* (25, 26). The administration reacted by citing unpublished studies (see below) which they claimed undermined the case for needle exchange.

The results of evaluations of needle exchange programs in the United States appeared in peer-reviewed medical journals for the first time in 1994, with evaluations of the San Francisco and New York City needle exchange programs published in *JAMA* and New Haven reported in the *Journal of Acquired Immune Deficiency Syndromes* (10, 27, 28). Meanwhile, Congress had requested the National Academy of Sciences to study needle exchange programs, focusing upon the same criteria enshrined in law: reducing HIV incidence and not increasing drug abuse. The National Academy of Sciences panel report, which reviewed the previous government reports and subsequently published studies, was released in the fall of 1995 (29). It also included analyses of three unpublished studies addressing the possible limitations of needle exchange (from Chicago, Illinois, San Francisco, and Montreal), that were addressed in an Appendix after the authors of the studies made a presentation to the panel. The report concluded that needle exchange programs, when properly implemented, can reduce HIV infection and do not increase drug use. This report also recommended lifting the ban on federal funding for needle exchange programs. In 1995, there were 77 needle exchange programs in the United States (29).

In February 1997, a research group in Vancouver presented results at a scientific meeting of a sharp increase in HIV prevalence among injection drug users, despite the

long-time existence of a local needle exchange program; this report was subsequently published (30). Unpublished reports were also circulating of a study in Montreal in which the incidence of HIV was considerably higher in needle exchange program attendees than non-attendees; this report was subsequently published (31). That same month, a National Institutes of Health consensus panel reviewed studies on needle exchange programs, including the Canadian data from Montreal and Vancouver (which at the time were unpublished but made accessible), and concluded that "legislative restriction on needle exchange programs must be lifted" (32). The resulting National Institutes of Health Consensus Statement on Interventions to Prevent HIV Risk Behaviors was released in March 1997.

No other country has ever had a comparable ban on funding to support needle exchange programs or research of needle exchange program effectiveness. By the late 1990s, needle exchange programs were operating in essentially all of Western Europe. In addition, some developing countries (i.e., Brazil, India, and Nepal) were starting to implement needle exchange programs. By April 1998, the administration had decided that it would lift the ban on federal funding of needle exchange programs, and planned to hold a press conference on a Monday morning to announce the new policy. However, President Clinton was dissuaded by his "drug czar" (Director of the Office of National Drug Control Policy), Barry McCaffrey, on Air Force One (the presidential plane) on a return trip from Chile. Late on the Sunday prior to the press conference the President changed his mind (33). Instead, US Department of Health and Human Services Secretary Donna Shalala was forced to do an abrupt about-face. She announced that scientific evidence showed that needle exchange programs can reduce HIV infection without increasing drug use, but that federal funds would remain unavailable for needle exchange. Local communities could decide for themselves whether to initiate these programs using other resources (33).

In 1998, 130 needle exchange programs were in operation in the United States, with coverage of these programs varying widely (34). Fewer than 10 percent of these programs reported exchanging more than half a million needles per year each year. Needle exchange programs that operated illegally were significantly less likely to offer critical ancillary services such as HIV testing and counseling, referrals to drug treatment, and sexually transmitted disease screening (34). In 1999, the US had 160 programs (2), whereas Australia had more than 2,000 programs.

Despite the ban on using federal funds for research to support needle exchange programs between 1988 and 1991, over the past decade there has been an extensive array of research including ethnographic and ecologic studies, public opinion polls, serial cross-sectional surveys, case-control analyses, prospective cohort studies, mathematical modeling, and cost-effectiveness studies (22, 28, 35–40). Outcome variables have included behaviors in individuals and in groups, contents and appearance of syringes, serologic test results for HIV and other bloodborne infections, arrests, police needle stick rates, discarded syringe rates, and legal analyses. The cumulative research has been reviewed in the US Government Accounting Office, the University of California, and the National Academy of Science reports following approaches that use "preponderance of evidence" and "patterns of evidence" to draw causal inferences (21, 24, 29, 41). Thus, researchers have employed a great variety of approaches, perhaps making needle exchange programs among the most thoroughly researched of all HIV interventions.

## LESSONS LEARNED

The major event that emerges in the historic narrative of the development of needle exchange programs is the ban not only on federal funds for such programs, but the administrative ban on research to evaluate the safety and effectiveness of such programs. The irony is that while legislation called for a ban until such time that it could be determined that such programs were shown to be safe and effective (14–17), the administrative ban on federal funds for research (including within existing funded studies) blocked the ability to address these questions. This research was blocked even though early research outside the United States suggested that needle exchange programs might be a promising approach to HIV prevention (7). What were the factors underlying this response and how did epidemiologists respond?

### Conflict between responding to AIDS and the "War on Drugs"

In the United States, epidemiologic data on the transmission of HIV among injection drug users and the potential for needle exchange programs to reduce transmission were perceived within a pre-existing policy context. This policy context may be termed the "War on Drugs" or "zero tolerance" towards illicit drug use, and it had become politically well established prior to the initial discovery of AIDS (41, 42). It describes illicit drug use as a criminal and moral problem more than as a public health problem. Thus, providing needles to injection drug users was seen as inconsistent with an overall War on Drugs, and that doing so would condone if not actually increase drug use. In this context, epidemiologists were not the only persons perceived as authoritative spokespersons on the issue of needle exchange: police, drug treatment counselors, and community leaders (including some clergy) were also looked upon as experts. For some, the opinions of leaders in these other fields were given equal or even greater weight than the opinions of epidemiologists and public health officials in the debate on needle exchange.

It is important to note that while epidemiologists (and public health officials to a very large extent) felt constrained to confine their opinions to what could be supported by existing data, some of the objections to needle exchange programs were not based on "researchable" issues. The concern that needle exchange programs lead to increased illicit drug use can be addressed through empirical research. But the concern that needle exchange programs "condone" or "send a mixed message" about illicit drug use to youth reflects a policy incompatibility between needle exchange and "zero tolerance" that is difficult to resolve through empirical data. In sum, part of the difficulty in resolving

conflict over needle exchange programs is the tension between a pragmatic public health perspective that explicitly includes balancing of risks, costs, and benefits (i.e., "harm reduction") versus an absolutist "zero tolerance" perspective on illicit drug use.

Even with issues that are researchable, the issue of dealing with certainty and uncertainty is common among problems addressed by epidemiologists, and needle exchange programs are no exception. First, obtaining data to inform policy is difficult because injection drug use itself is uncommon, affecting less than 1 percent of the overall US population. In addition, the incidence of HIV among injection drug users has been reported at less than 4 percent per year in most cities (43), although more recently, rates have gone lower (44). In the absence of large-scale studies (which are expensive to mount and require time to obtain answers, and are unlikely to be done when there is a ban on research), available data can be limited by low incidence rates of HIV and initiation of drug injection. Epidemiologists understand this, but the public and politicians (sometimes for self-serving reasons) may not. The result is that there is an absence of data on safety and effectiveness.

Second, as longitudinal studies require time, intermediate outcomes are often invoked as evidence of effectiveness. For needle exchange, intermediate outcomes include self-reports of risk behaviors such as needle sharing. Despite multiple studies showing the validity of self-reports by drug users (45), some are still reluctant to accept self-reports from this population because of concerns that the population is inherently unreliable. Third, while some studies of needle exchange program effectiveness show benefit, some studies do not. Fourth, epidemiologists have to recognize the limitations of the evidence and be able to communicate uncertainty to policy-makers in an informative way. There is a difficult balance between being convincing on the one hand and being true to the data on the other. At times, the fundamental issue becomes not so much advocating for a program as advocating for adequate efforts to evaluate such programs with sufficient rigor.

Finally, for policy-makers who examine controversial interventions, the issue of certainty may be framed as zero tolerance for harm, and a single anecdote of harm may be sufficient to invalidate a large number of studies with consistently positive findings. In contrast, epidemiologists consider case reports to have less weight than large-scale, carefully conducted studies. Thus, some epidemiologists in this framework may advocate for continuing or expansion of efforts to permit adequate evaluation of programs, but may be seen as program advocates simply because they are advocating for evaluation.

### Actions of epidemiologists in the needle exchange controversy

The role of epidemiologists in the needle exchange controversy was framed by political constituencies, and the need to take the data (on how HIV was transmitted, how it could be prevented) to the point of constructing more rigorous evaluations. The political constituency for the War on Drugs policy was large and well financed, though not necessarily well organized in its approach to needle exchange programs. It included law enforcement groups, neighborhood groups, business groups, parents concerned about possible drug use among youth, community leaders concerned about the effects of illicit drug use and distribution on racial/ethnic communities, and persons who believed that drug use was primarily a moral issue. Communication between these constituencies, however, was limited. In contrast, there was a very small political constituency supporting needle exchange, composed primarily of AIDS activists and some public health officials. Unlike the opposition to needle exchange programs, some of the proponents of needle exchange programs were taking on the task as a near full-time commitment. Injection drug users, the primary beneficiaries of needle exchange programs, constituted a politically weak and highly stigmatized group. Over time, the constituency supporting needle exchange has grown to include more leaders of racial/ethnic groups in which the problem of AIDS among injection drug users has had significant impact.

At the center of the ability to conduct an evaluation of needle exchange programs was the need for a partnership of researchers, service providers, and program participants. The need for researchers to obtain information essential for describing, analyzing, and evaluating needle exchange has meant developing trust, rapport, and empathy with a community of hard-to-reach individuals and their advocates. This connection has drawn criticism, and needle exchange evaluators have sometimes been accused of being too close to the persons operating exchange programs. Some researchers were accused of bias, others were criticized for contributing too many papers to the needle exchange program literature, and others were attacked by name on editorial pages of major newspapers. However, the distinction was that the researchers were advocating not so much for the programs as for a fair evaluation of the programs, irrespective of what the data might finally show.

### Issues in communication of study results

Communication needs to be strengthened on three levels: 1) among epidemiologists (and other scientists), 2) between epidemiologists and policy-makers; and 3) between epidemiologists and the public. On these three levels, epidemiologists need to be able to effectively communicate about conflicting results, and the message should be appropriately tailored to the different audiences. Needle exchange program researchers have gone far beyond the usual academic arenas of journals and conferences in their efforts to ensure science-based public health policies. Although the International AIDS Conferences and the annual North American Syringe Exchange Network meetings have been venues where critical information about needle exchange programs was exchanged, internet "listserves" have allowed more frequent exchange of information. In addition, many researchers have written letters to newspaper editors and testified before federal, state, and local elected bodies about their work. Others have testified as expert witnesses in the series of arrests of

needle exchange program workers that have occurred across the country. At one point, angered by a particularly misleading statement about the scientific evidence on needle exchange programs by US Department of Health and Human Services Secretary Donna Shalala, 32 researchers from four continents wrote her a public letter criticizing her remarks (46). Thus, researchers may need to consider the context that frames the interpretation of their research in the eyes of policy-makers, and expand their array of activities beyond the research itself.

In communicating conflicting results or uncertainties to policy-makers, the press, or the public, the overall message is best delivered when based upon the preponderance of the available evidence. Epidemiologists need an ongoing dialogue with policy-makers to include information on context and the continuing evolution of scientific information. For example, in considering the Canadian studies, the debate about needle exchange program efficacy has been influenced by the circulation of unpublished reports, often before they have undergone peer review (47). These reports have often been as influential as published studies, yet some remain unpublished (e.g., Chicago) and others have had conclusions reversed after peer review and revision (e.g., San Francisco).

In the needle exchange program debate, policy needs led to scientific questions, and the answers often led to an iterative process between policy needs and research. While this points to responsiveness of researchers to the concerns of policy-makers, it raises real issues in the appropriateness of Congress setting scientific priorities. Epidemiologists should listen to all sides to better understand the underlying issues and to determine which questions science can and cannot answer. At the same time, epidemiologists should avoid promises or absolute statements (e.g., needle exchange program is effective 100 percent of the time). Researchers should consult with one another to identify the likely responses to their work. Press releases and even the articles themselves can be crafted to directly contradict possible misuses of scientific data. In one example, a paper from Vancouver had the title "Needle Exchange is Not Enough: Lessons from the Vancouver Injecting Drug Use Study" (30). While the paper was careful to avoid the conclusion that the increased rate of HIV infection among injection drug users was not due to needle exchange, and referred to the needle exchange program as "the cornerstone of HIV prevention among injection drug users" in its discussion, the opposite conclusion was seized upon by some policy-makers whose basis of opinion was formed on the title of the paper, which they interpreted as evidence that needle exchange was ineffective. The authors were prompted to write an op-ed piece for the *New York Times* to clarify their results (48). A follow-up peer-reviewed report has further clarified the findings, noted a decline in HIV incidence, and suggested that expansion of needle exchange programs may have contributed to the termination of the outbreak (40). Wording of documents and reports, including titles and conference proceedings, needs to consider how results may be interpreted or misinterpreted in the context of a polarized policy debate.

Epidemiologists should also consider that some policy-makers may be equally (if not more) influenced by anecdotes (e.g., a child being stuck with a discarded needle) or their personal experience than the weight of cumulative quantitative results. This has been turned to advocate's advantage by inviting injection drug users who can testify to the benefits of needle exchange programs to city council and other hearings. Qualitative research could have generated more such data. The stereotype of the inner-city drug user, however, has a powerful impact on public opinion and policy-makers. By making use of established ties with community activists, drug users, and ex-users, epidemiologists could play a role in de-stigmatizing drug use, which could, in turn, change the context in which the needle exchange program debate operates.

With respect to communication between epidemiologists, policy-makers, and the public, there is a need to recognize that science is only one element in the debate. Other members of the public, such as police, drug abuse counselors, and community spokespersons, are perceived as authorities on needle exchange program-related issues. Since these individuals are often uninformed about epidemiologic methods, these key players need to be identified and educated early on about scientific results in order to ensure that data are responded to in an appropriate context.

## RECOMMENDATIONS

1. When government restrictions or bans are placed on research, professional colleagues should be notified and campaigns started to reinstitute funding. In AIDS research, this issue has extended beyond needle exchange to such contexts as medical marijuana use and adolescent sex surveys. Epidemiologists as a professional group need to learn to respond to restrictions placed upon the proposal, design, conduct, analysis, and dissemination of studies. Concrete responses to such situations include:

- Individual investigator-initiated responses;
- Ad-hoc collective responses; and
- Professional responses from the Association of Schools of Public Health, the American Association of Medical Colleges, the deans of schools of public health, the American Public Health Association, the Society for Epidemiologic Research, the American College of Epidemiology, etc. The example of needle exchange programs offers the disturbing and virtually unprecedented example of prohibition of research funding, with little or no response from these groups.

2. Epidemiologists need to consider the ramifications of their research and the context in which it is delivered.

- Pay particular attention to the title and abstract of the manuscript to avoid unnecessary inflammatory messages.
- Consult widely with key players to predict public reaction and policy impact.
- Share reports with colleagues prior to publication to help generate an appropriate context for public

response.
- Work actively with experienced communicators to write and distribute press releases.
- Consider briefing key policy-makers simultaneously with release of a report.
- Develop relationships with media persons who can accurately convey complex public health issues.
- Train epidemiology students in conveying study results to be able to summarize their findings concisely and clearly.
- Write research summaries and articles appropriate for publication in newspapers and other publications for general consumption.

3. As part of their training, epidemiologists need to learn how to communicate as outside experts to the public and to policy-makers. This could include formal course work and seminars with policy-makers and communications experts to develop the skills for disseminating results beyond peer reviewed journals.

## SUMMARY

This epidemiology and policy case study is noteworthy for several reasons. First, the needs were urgent. Confronted with an epidemic of a previously unknown but highly fatal infectious disease for which there was no effective treatment at the time, epidemiologists scrambled to assemble data rapidly. Second, as strategies for prevention became evident from field studies, epidemiologists were drawn in by the policy relevance of the research. In this case, there were few organized constituencies to support needle exchange as a component within a comprehensive strategy to confront the HIV epidemic in injection drug users. After activists worked to place needle exchange on the agenda for HIV prevention, epidemiologists helped to frame the policy debate. The data provided by epidemiologists were used to shift political and popular opinion towards supporting programs that were initially unthinkable. The scientific case for needle exchange was built on a foundation of several factors: 1) careful epidemiologic investigation of the problem; 2) evaluation of feasible alternatives; 3) generation of hypotheses and studies based on the concerns of policy-makers; and 4) determination to proceed in spite of administrative bans on research and competing political orientations on the drug abuse problem. The process of needle exchange program development and expansion is due in part to epidemiologists who helped to frame a controversial topic in the scientifically grounded area of infection prevention. In this arena, epidemiologists were often drawn beyond detached observations to become advocates of a despised and disenfranchised population in order to improve the public's health.

The controversial nature of needle exchange also illustrates the paradox whereby federal policy called for research but for a time imposed an administrative ban on the research. No groundswell or clamor among researchers occurred, but this was wrong in retrospect. Researchers cannot tolerate such prohibitions. As a profession, epidemiologists need to advocate for openness, even when unpopular, for scientific investigation and evaluation when the root of the issue is protection of the public's health.

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## DISCLOSURES

Dr. David Vlahov is Director of the Center for Urban Epidemiologic Studies at the New York Academy of Medicine and is an Adjunct Professor of Epidemiology at the Bloomberg School of Public Health, Johns Hopkins University. He was the principal scientist for the evaluation of the first Washington, DC, needle exchange program and the Baltimore (Maryland) Needle Exchange Program. He was also a member of the 1995 panel of the National Academy of Sciences charged with evaluating the literature on needle exchange and bleach distribution, as well as a speaker on needle exchange at the 1997 National Institutes of Health Consensus Development Conference on Interventions to Prevent HIV Risk Behaviors. For his scientific productivity, Dr. Vlahov has received a MERIT Award from the National Institutes of Health.

Dr. Don Des Jarlais began research on syringe exchange in 1985, when he served as an advisor to the New York City Department of Health on HIV prevention. He also served on the Panel on AIDS and the Behavior, Social, and Statistical Sciences of the National Academy of Sciences from 1987 to 1991, and on the National Academy of Sciences/Institute of Medicine panel that prepared the 1995 report on syringe exchange. Dr. Des Jarlais was jointly appointed by the President and Congress to serve as a Commissioner on the US National Commission on AIDS from 1989 to 1993. He has testified on many occasions before city and state legislative and Congressional committees on HIV prevention and syringe exchange. His research group at Beth Israel Medical Center has conducted annual surveys of syringe exchange programs in the United States since 1994.

Dr. Eric Goosby was the Director of HIV/AIDS Policy for the Department of Health and Human Services, and past Interim Director of National AIDS Policy for the White House in 1997. In both of these capacities Dr. Goosby has been the principal lead in the Clinton Administration's policy discussion regarding the role needle exchange programs must play in responding to the HIV/AIDS epidemic in the United States. Dr. Goosby has focused on the development of medical delivery systems for HIV-infected populations for the past 18 years, and has developed or supported the development of numerous models of medical care focused on injection drug users. He continues to practice as a primary provider of care for incarcerated, homeless, and indigent HIV-infected patients in the Washington, DC, region.

Senator Paula Hollinger represents District 11 in the State of Maryland. As a Registered Nurse, she has been involved

with the issue of AIDS since it arose as a public health concern, serving on numerous task forces as well as the Governor's Advisory Council on AIDS. In conjunction with the Johns Hopkins School of Public Health and the Baltimore City Health Commissioner, Senator Hollinger sponsored the original Needle Exchange Pilot Program in 1994, which the Maryland General Assembly made into a permanent program in 1997.

Dr. Peter Lurie was Principal Investigator for the 1993 University of California needle exchange study. Since then, he has authored several papers describing the history, cost-effectiveness, ethics, and impact of needle exchange programs and pharmacy-based programs, both in the United States and abroad. He has testified before federal, state, and local elected bodies on needle exchange and written several pieces on the subject for lay audiences.

Mr. Michael Shriver is currently on the staff of the AIDS Policy Research Center of the AIDS Research Institute at the University of California, San Francisco, as the Co-Director for Community Initiatives. He was previously Deputy Executive Director for Policy at the National Association of People with AIDS in Washington, DC. Mr. Shriver has served as a consultant to local, state, and federal agencies and organizations on HIV concerns and was one of the principal architects of HIV Prevention Community Planning (as administered by the Centers for Disease Control and Prevention). He has received several awards for his advocacy on behalf of people living with HIV.

Dr. Steffanie Strathdee is an Associate Professor of Epidemiology at the Bloomberg School of Public Health, Johns Hopkins University. Her research has focused on prevention of bloodborne infections among injection drug users in Canada and the United States. She received the Young Investigator's Award in Epidemiology and Public Health at the International Conference on HIV/AIDS in 1996. In 1997, she identified an outbreak of HIV infection that occurred among drug users in Vancouver despite the existence of a large needle exchange program, which affected policy decisions surrounding needle exchange programs in both countries. She is currently the Principal Investigator of the Baltimore Needle Exchange Evaluation Study and two behavioral intervention studies that aim to reduce the incidence of hepatitis C and HIV among young drug users.

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