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Injecting Drugs in Tight Spaces: HIV, Cocaine and Collinearity in the Downtown Eastside, Vancouver, BC

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Abstract

This commentary revisits the political turmoil and scientific controversy over epidemiological study findings linking high HIV seroincidence to syringe exchange attendance in Vancouver in the mid-1990s. The association was mobilized polemically by US politicians and hard-line drug warriors to attack needle exchange policies and funding. In turn, program restrictions limiting access to syringes at the Vancouver exchange may have interfaced with a complex conjunction of historical, geographic, political economic and cultural forces and physiological vulnerabilities to create an extraordinary HIV risk environment: 1) ghettoization of services for indigent populations in a rapidly gentrifying, post-industrial city; 2) rural-urban migration of vulnerable populations subject to historical colonization and current patterns of racism; and 3) the flooding of North America with inexpensive powder cocaine and heroin, and the popularity of crack. In fact, we will never know with certainty the precise cause for the extreme seroincidence rates in Vancouver in the early to mid-1990s. The tendency for modern social epidemiology to decontextualize research subjects and assign excessive importance to discrete, “magic bullet” variables resulted in a counterproductive scientific and political debate in the late 1990s that has obfuscated potentially useful practical lessons for organizing the logistics of harm reduction services—especially syringe exchange—to better serve the needs of vulnerable populations and to mitigate the effects of political-economically imposed HIV risk environments. We would benefit from humbly acknowledging the limits of public health science and learn to recognize the unintended consequences of well-intentioned interventions rather than sweep embarrassing histories under the rug.

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Introduction

This commentary revisits the controversy of the scientific evidence and political polemics around syringe exchange as a protective intervention using a historically and geographically based case-study of the 1990's drug use-based HIV epidemic in Vancouver's Downtown Eastside (DTES). We offer suggestions for achieving greater public health understandings of complex overlapping HIV risk environments and risk-taking practices of vulnerable populations. We call for the building of a "good-enough" multi-method social science of harm reduction(1) that humbly recognizes its limits and better serves high-risk, street-based injection drug users (IDU).

Our case-study as commentary is limited to proposing hypotheses for further documentation because it draws on only very limited, qualitative data that was collected on three brief visits during 1999–2000.¹ We collected our qualitative data using classic anthropological participant observation techniques by conducting conversational interviews in the natural environment of injectors. This enabled us to triangulate self-report with direct observation of practices and control for potentially socially desirable responses(2). Our fieldwork was conducted in direct dialogue with the epidemiological researchers, HIV clinicians, risk reduction outreach workers and drug user participants who were concerned with the high HIV rate in the DTES.

Our "good-enough" analysis melds critical social science theory, our qualitative fieldwork data and published public health quantitative data. Critical social science theory directed our observations and analysis towards, on the one hand, the political economy forces (socioeconomic class, race gender, urban gentrification and historical processes of economic restructuring and violent population control) and, on the other hand, to the discursive forms of disciplinary power (knowledge/power disciplinary forces, the effects of biopower and biopolitical mobilization)(1). Subsequently, our retrospective analysis was informed by our theoretical understanding of the concepts of "inner-city HIV risk environment" and "structurally vulnerable populations"(3–6). Our practical ethnographic/clinical documentation of the interactional/organizational logistics of services and injection practices pays special attention to how social inequality drives risk and constrains behavior, knowledge and the interpretation of scientific findings(1).

We are interdisciplinary collaborators (clinician-epidemiologist-ethnographer and a cultural anthropologist) and we are excited by the added insights provoked by attempting a good-enough resolution of the epistemological contradictions between the positivist "truth-seeking" and "promotion of good behavior change" goals of public health with the relativistic critique by humanities and social science theory of the contingency of facts and the moral-driven agendas of biopower. We hope our commentary offers a self-critical, practical *aperçu* on a still-not-well-understood urgent real-world problem of the tragically high HIV seroincidence rates of the Downtown Eastside in the 1990s, and that it might promote a more rigorous, better documented future collaborative historical analysis that

¹There were four equally brief follow-up visits in the 2000s (separate visits by each of the authors and two by graduate students, George Karandinos and Nicholas Iacobelli).

could sharpen public health's awareness of the limits of its knowledge and the potential for unintended negative consequences of well-intentioned interventions.

The Polemic

Tension between harm reduction and abstinence-based approaches has been a persistent theme of drug policies since at least the last century. The impact of the AIDS crisis on the relative influence of these policy approaches has varied depending on national contexts and policy processes. In Britain, for example, proponents of harm reduction, who had been losing ground in the 1980s, succeeded in pushing forward their agenda with the result that syringe exchange provision became widespread and officially funded(7). In Australia, Germany, the Netherlands, Switzerland and most of Western Europe, the challenge of preventing HIV brought harm reduction science into the mainstream of public health by the mid-1990s at the latest. In the United States, however, harm reduction advocates faced greater opposition within a highly polarized political landscape(8). This environment was conducive to neither accurate nor nuanced representation of complex scientific evidence and thus has had negative effects on the autonomy of Canada to develop its more harm reduction-oriented public health services for IDU(9).

In the late 1990s and early 2000s, appealing to a puritanical morality seeking to punish non-medical drug users, US politicians hostile to sterile syringe provision repeatedly cited several pieces of evidence from Canada, sometimes unpublished, to buttress their position (See discussions by: Watters, J. K. (1996)(10) and Vlahov, D. et al (2001)(8)). Following the 1998 US Congressional ban on federal funding for syringe exchange, one particular article became a touchstone for polemics: Strathdee et al's 1997 paper 'Needle exchange is not enough: lessons from the Vancouver injecting drug use study'(11). This study utilizing a cohort of IDU followed during the unfortunate epidemic of the early to mid-1990's found that the extraordinarily high HIV incidence of 18.6 per 100 person-years in this sample was associated with frequent attendance at the local high-volume syringe exchange. Despite the fact that Strathdee et al were careful to state that their findings should not be interpreted as causal, because of potential selection bias, and called for more in-depth research combining ethnographic methods, many scientists and politicians interpreted their data as definitively documenting an independent association with needle exchange that had adequately controlled for the known risk factors of the time (borrowing syringes, injecting with others and commercial sex work).

Sparking editorials in newspapers and academic journals(12–16) opponents of syringe exchange in the US Congress cited the disputed data as evidence that attendance actually increased drug users' risk of HIV infection(17). Controversy also blossomed in the scientific literature(16, 18–20) in spite of Strathdee et al's well-reasoned and scientifically restrained conclusions that their findings were likely to have been confounded by the fact that the syringe exchange attracted higher-risk users. Housing had also emerged as an independent risk for HIV, suggesting that ghettoization in a micro-neighborhood with many single room occupancy hotels (SROs) that appeared to sometimes become defacto high-risk "shooting galleries." At the time many Canadian-based outreach workers and researchers were open to debating program logistics, especially the one-for-one needle exchange rule and other limits

placed on the number of syringes distributed to cocaine injectors at each visit to the needle exchange. There was concern over the wisdom of purposefully concentrating indigent populations with distinct vulnerabilities—mental illness, HIV and substance abuse—inside the same public health serviced but privately owned SROs.

Later epidemiological research within the same population supported the notion that the HIV association with syringe exchange was due to greater attendance by IDUs who needed it the most, i.e. they were at higher risk(21) and that residual confounding may persist due to this selection effect(22). Subsequent analyses by Wood et al stratifying by key demographic risk (residence location) and risk taking (high frequency cocaine use) made the association between syringe exchange and HIV become non-significant; in multivariate models inclusion of both of these variables with other known risk factors brought the hazard ratio of daily NEP attendance and HIV down to 1.41 (NS; CI 0.95–2.09). The authors concluded that residual confounding likely explained the remaining, and disturbing, statistical trend towards the association(22). It is this “residual confounding” that is explored in this paper. How did epidemiologically identified yet underexplored social structural risks (First Nation ethnic identification, unstable housing, cocaine injection, and residence in the DTES micro-neighborhood) conspire with potentially ill-designed social services to fuel an HIV epidemic, foster political and scientific controversy, and why did the useful, self-critical debates around the logistics for better organizing syringe exchanges to meet the needs of IDU drop out of the scientific deliberation and the historical record?

Montreal epidemiologists had also identified an association between HIV seroconversion with needle exchange in a specific downtown micro-neighborhood frequented by primarily Francophone cocaine injectors—many of them small town and rural immigrants from Quebec—in an 1989–1995 cohort(23). To address the dramatic lacuna of qualitative data, epidemiological researchers in Vancouver and Montreal designed a joint epidemiological study supported by both the US National Institute on Drug Abuse, and Canada’s Public Health Agency in the late 1990s that included the complementary collection of participant observation data. They invited the second author, Philippe Bourgois, to conduct a pilot ethnography(24) because of his previous pilot work in homeless shooting encampments on high-risk practices associated with cocaine injection binges(25, 26). The ethnographer Steve Koester was also invited to collaborate, but his services were refused by the Canadian public health workers in Vancouver, possibly because of his critique of their one-for-one syringe exchange regulations.

In Montreal the HIV seroincidence association thankfully disappeared after 1995, probably not coincidentally the same year that CACTUS, the largest center city needle exchange, removed quotas on needles and systematically developed support for secondary exchange programs targeting shooting gallery managers and other “poteaux” (support posts/peer-user volunteer outreach workers). At the time there was a productive self-critical debate among some Canadian researchers around what the Quebecois called the *effets pervers* (unintended negative consequences) of well-intended public health interventions –specifically “ghettoization and needle quota systems [that] may have had an adverse impact on prevention programming”(27).

“Up-down” in the Downtown Eastside

On his third brief fieldwork visit to Vancouver in March, 2000, at a seminar organized by the Canadian epidemiologists (Peter Schechter, Steffanie Strathdee, Mark Tyndall, Julie Bruneau, and others) at the Vancouver Injection Drug Users Study (VIDUS), Bourgois invited first author Dan Ciccarone, a physician, to conduct follow-up ethnographic fieldwork and make medical observations with him in the DTES. (Note: all italicized paragraphs are excerpts from fieldwork notes co-written in 2000; all names used are pseudonyms.)

We have come to this spectacularly beautiful cosmopolitan tourist city to hang out in the back alleys, observing and conversing with users, sellers, sex workers, and public health officials and outreach workers to explore troubling questions. Why does seroincidence among injectors remain so high despite the at-first-sight impressive public health response? How did the largest needle exchange in North America become statistically associated with these seroconversions?

Little of our previous fieldwork in New York or San Francisco, however, has prepared us for the initial visual impact of street user life in Vancouver’s DTES. The open drug dealing, street doping and intoxicated wandering are disconcerting. We repeatedly find ourselves surrounded by emaciated users, many of them tweaking in the throes of some form of cocaine psychosis. Many are walking up and down the street in contorted body positions, teeth clenched and faces twisted, limbs shaking uncontrollably.

In front of a SRO an array of users and maybe non-users in wheelchairs are passing through the entranceway, some pausing to buy or sell drugs. People are of all ages, genders, and ethnicities, but there is an overrepresentation of First Nations people.

Rich, a friendly user who offered to guide us around, has just rejoined us after stopping to inject behind a dumpster. He is now standing next to us speechless, shaking uncontrollably on his cane, unable to talk through his gritted teeth. Many others around us are reeling from cocaine rushes, looking hollowed, harried and frankly quite miserable. A few are shouting angrily and waving their arms at their neighbor – or at no one in particular. No one seems offended or bothered by any of this, however. And to our surprise there is no sign of violence.

The Downtown Eastside

Vancouver’s Main Street separates the more prosperous west of the city from the DTES, its oldest, poorest and most violent neighborhood(28). At the time of this research almost half of this urban ghetto was made up of First Nation peoples, most of whom were rural immigrants, many from the Plains, along with many overseas immigrants and displaced unemployed former cannery, lumber and shipyard workers. They often live in the cramped, substandard conditions of SRO hotels(29).ⁱⁱ The DTES is also the location of an intensive

ⁱⁱVancouver’s population overall represented more than 35 First Nations, most of whom were displaced to the city from rural areas of Canada. [30. Peters E. Indigeneity and marginalisation: Planning for and with urban Aboriginal communities in Canada. *Progress in Planning*. 2005;63(4):327–404. doi: <http://dx.doi.org/10.1016/j.progress.2005.03.008>.]

welfare state infrastructure, housing over 35 per cent of the city's social service offices within its 40+ blocks(28).

It contains many if not most, of the SRO hotels, social services, cheap food pantries, as well as the city's largest needle exchange and other medical services serving the marginalized poor of Vancouver. It also contains in a central section of eight or so square blocks the open-air drug copping corners, shooting alleys, and sex strolls. It is this geographic concentration and co-situation of service and risk that needed further contextualization as gentrification and social service policies have made it a magnet (or ghetto) for highly vulnerable indigent populations – both drug using and non-using.

Like many North American inner-cities the DTES is a place steeped in history and violence:

Lined in cobblestone and rimmed with iron balconies, the back street known as “Blood Alley” has two alternative histories. It was either the historic butchering district or the site of a massacre or both. It now houses multiple one-stop-shop social service agencies, including a methadone clinic, shelters, food pantries, the needle exchange, free clinics, etc. There are many “blood alleys” in this part of town. The entire neighborhood was a former warehouse and light industrial district for processing extractive agricultural and fishing resources. The warren of alleys running between the main streets is still contains loading areas for the few surviving businesses. Loading docks, dumpsters, doorways, and piles of trash provide modest discretion for drugs sales and sexual exchanges, but above all are used for injecting heroin and cocaine, or smoking crack. There has been a notable shift from cocaine injection to crack smoking since Philippe's last visit only ten months ago, although many people clearly still prefer to inject their cocaine. The heroin business is obviously booming and most of it seems to be injected by users, not sniffed or smoked.

Open air drug markets

“Carnegie corner” is a focal drug purchasing/using and hangout point of this neighborhood. There are 20–50 people always milling about during daylight hours. A bright yellow banner, reading “Hepatitis Testing Day”, hangs between neo-classical columns holding up the carved granite bearing Andrew's family name. He would roll over in his grave at the sight of these “free market forces” operating on his namesake corner! Here, beneath these public health HCV-prevention signs, hawkers for both the helping agencies housed in the building and the street-side dealing clique work their beats.

The sales points have a frenetic sense of urgency consistent with the dominant merchandise: crack, cocaine and heroin. There is a polyglot of sellers and buyers here: White, Hispanic and First Nations.

In the course of several days we were able to observe innumerable drug exchanges, injections, and inhalations - in plain sight - without suspicion or avoidance. Only subtle and momentary shifts in activity occurred when police patrol cars passed and we did not see any arrests. No matter how many times we introduced ourselves to users as “a public health

researcher and a physician from the States,” we were assumed to be part of the action: constantly offered “up/down” (coke/heroin); crack stems and lighters.

People are friendly here; even when spazzing out on cocaine overdoses. They are downright social and generous. Is it because they are small town rural immigrants? It is a pleasure to be here.

First Nations diaspora

Wandering late at night we run into Moondance. Gregarious, he eagerly offers to help (and/or hustle us). “What do you guys want? Where can I take you?” He also introduces himself as a First Nation person. He wants to give a broken crack pipe to me [Dan] and a lighter to Philippe in exchange for conversation and cigarettes.

Another First Nations person, a woman, who also seems completely trusting of us, immediately bursts into friendly conversation. She does not ask for any money and even shares half her cigarette with Philippe. That is the general theme of interactions we have had: the hustling is so low-key and friendly, and everyone appears remarkably easygoing and trusting—almost naively openly vulnerable to our jaded, urbanized US-eyes.

This phenomenon of exchange, even if symbolic, seemed quite pronounced to us in the DTES. Rather than just asking for a cigarette, people offered to pay for it or tried to give something preemptively before asking for anything. There was much less of the just take-take-hustle-threaten-to-bash-you-over-the-head that we have experienced in US inner-cities. We wondered at the time if this sociable and sharing street culture—perhaps rural immigrant-inflected—promoted the promiscuity of drug sharing, making it a more extreme example of the “moral economy” of gift exchange logics identified by Bourgois in his San Francisco work among the homeless(31).

Like many of the indigenous injectors we spoke with, Moondance is not from Vancouver. He is a Plains First Nation person. During childhood, he moved around between relatives and foster care after being sexually abused by an older trusted man. He did not speak much about his parents who had both been taken forcibly from the community to Catholic boarding schools at a young age. He talked openly about his childhood abuse. He explained that he was taken from his relatives into childcare by social services, “as were many” First Nations persons he grew up with. During our fieldwork we heard several historical stories of sexual abuse and domestic violence, leading to social disruption and “kidnapping” by social services and boarding school educational institutions.

This recent historical and developmental social disruption, exacerbated by repressive, over-interventionist, and sometimes even hostile and inappropriate, childhood services, are likely at the heart of the unidentified structural risks identified as proxy risk variables in HIV multivariate models; in Wood 2007 aboriginal ethnicity and DTES residency remained as independent risks for HIV(22). Poverty and low employment, housing and food insecurity, discrimination, partner violence, stigma around drug use and aboriginal ethnicity, and trauma - physical, emotional and sexual – are likely to conspire to create a miasma within

which mental ill-health and substance dependency thrive, but are irreducible causally to a single meaningful or statistically useful individual-level variable.

Cocaine Dystonia: the “Hastings Street shuffle”

We saw no guns or knives and the Canadian public health outreach workers kept reassuring us that we should set aside our US-induced hyper-vigilance re violence. Nevertheless, [*Dan*] did manage to witness deadly violence: a random and traumatic collision between a public bus and a man. This man, whose locomotion was frenetically paced yet staggering, had attempted to cross the main thoroughfare, Hastings Street, in the middle of a block and was hit at high speed. Dan attended to the victim in the immediate aftermath. Down on the curb, semi-conscious, head on the curb, the accident victim was drifting down the Glasgow coma scale; bleeding from the mouth, his body contorted, unmoving...Rapidly approaching, the siren of an ambulance relieved [*Dan*] of his emergency medicine duties. [*The visiting doctor*] was off the hook, but the man was not; one of his pupils looked suspiciously larger than the other—a sign of brain trauma or bleeding, it foreshadowed a tragic future outcome.

Whose fault was this unfortunate accident? Did the bus hit him or did cocaine intoxication propel him in front of the vehicle? The local dismissive quip, “Hastings Street shuffle,” describes a frequently seen type of locomotion among those very high on cocaine, and dangerously oblivious to protecting themselves from the commotion around them. All through the evening, we repeatedly find ourselves surrounded by men and women jerking their arms and legs in staccato fashion; neuromuscular synapses firing without the smoothness of a body’s normal feedback inhibition.

At this time Vancouver, along with other cities in Canada, was clearly in the tail-end of a transition from an intense cocaine injection epidemic to a crack smoking one—both being supplemented by ample supplies of inexpensive high-quality heroin(9, 32). The purity of the cocaine was evidenced by numerous clinically-oriented observations of the neuromuscular dis-coordination, described in the “Hastings Street shuffle” fieldnote above. This disconcerting sight is not routinely seen in low-cocaine-purity US cities, or even high purity 1 where visible cocaine psychosis marks a user for violent abuse.ⁱⁱⁱ

Our observations pointed not only to extraordinary levels of cocaine availability, but to binge usage coupled with an unfortunate needle exchange logistics that ideologically—ironically in the name of science—favored one-for-one exchange and imposed a confusing quota on the maximum number of needles distributed to an individual. One of the needle exchange program managers we interviewed proudly referred to this policy as the “high intensity

ⁱⁱⁱCocaine toxicity leads to numerous hyper-adrenergic physiological complications including hyperkinesia and hyperreflexia leading in severe cases to muscle damage and rhabdomyolysis. [33. Ciccarone D. Stimulant abuse: pharmacology, cocaine, methamphetamine, treatment, attempts at pharmacotherapy. Primary care. 2011;38(1):41–58, v–vi. Epub 2011/03/02. doi: 10.1016/j.pop.2010.11.004. PubMed PMID: 21356420; PMCID: 3056348.] Accumulation of dopamine in the basal ganglia of the central nervous system due to regular cocaine exposure can lead to movement disorders including akathisia (uncontrollable limb movements) and chorea (jerky spasmodic movements) once characterized as “crack dancing.”[34. Daras M, Koppel BS, Atos-Radzion E. Cocaine-induced choreoathetoid movements (‘crack dancing’). Neurology. 1994;44(4):751–2. PubMed PMID: 8164838.

model” that “maximizes contact between clients and services.” She was horrified at our and others’ suggestion that they consider “flooding the streets” with needles and purposefully promote secondary exchange, as had already occurred successfully in Montreal. She tried to explain the syringe quota, but the details were hard to follow:

We are told that when the exchange was opened, the initial limit was 14 syringes per person per week. It was increased in 1995 to 14 syringes three times a week and then a couple of years ago—not exactly sure when—to 14 syringes twice a day. We are also told that workers are allowed the discretion of dispensing more or fewer syringes to any given individual, but she insists that they also encourage one-for-one exchange.

We routinely witnessed multiple injection sessions that if extrapolated to a daily cycle might add up to dozens of injections per day. Reports of binges lasting days into weeks could mean hundreds of injections per month. These qualitative yet salient observations do not jibe with either the epidemiological survey data, (e.g. Strathdee et al report an average daily injection frequency of 2.5(11) or with the prevailing logic for imposing quotas on syringes. Our observations may be biased and limited by our brief qualitative immersion, but the high levels of visible cocaine consumption on the streets, and the common occurrence of akathisia (see footnoteⁱⁱ) and cocaine-induced psychosis suggests that both injection frequency and syringe sharing might be grossly under-reported in the epidemiological surveys of the late 1990s.

Frequency of injection is crucial to understanding HIV spread; each injection carries a small but distinct probability of HIV transmission risk, assuming a constant probability of syringe sharing per injection. The under-reporting of injection frequency in “self-report” surveys, whether due to participants’ poor recall (intoxication, mental illness or memory deficits) or researcher survey technique (interviewing style, analyses eliminating high frequency responses as “outliers”), is a grave oversight in the epidemiological analyses of the time(35). (More on this in the Collinearity section below.)

SRO Shooting Galleries

Moondance kindly invited us to his SRO room and in the process reinforced our skepticism of self-reports—especially in the frenetic energy and compulsion of the shooting gallery-like drug binging that occurs behind closed SRO doors.

Moondance takes us back to his hotel. The hallways are bustling with activity with people pacing erratically on their coke/crack highs. A Native man with tattoos is doing the “picky-picky” on the floor, hallucinating the retrieval of lost crumbs of crack in every white speck of detritus he thinks he finds embedded in the filthy rug^{iv}. The doorkeeper begs a cigarette and forgoes the door fee. He is clearly high too, and in a good mood, giving breaks on the in-and-out door fee to just about

^{iv}The spectrum of psychotic features stemming from chronic cocaine, or other stimulant, use include hallucinations particularly tactile hallucinations, i.e. formication, colloquially referred to as “tweaking,” or visual hallucinations in which users will commonly perform repetitive searching behaviors of their skin or nearby surfaces.[33].
Ciccarone D. Stimulant abuse: pharmacology, cocaine, methamphetamine, treatment, attempts at pharmacotherapy. Primary care. 2011;38(1):41–58, v–vi. Epub 2011/03/02. doi: 10.1016/j.pop.2010.11.004. PubMed PMID: 21356420; PMCID: 3056348.]

everyone. Moondance leaves us in his hotel room while he goes down the hall to buy drugs.

Philippe recalls a scene from a much larger SRO he visited last time with an HIV outreach nurse. Going up the stairs to monitor a patient's medication therapy, they had to jump aside when a mentally ill woman waving a bloody half-full needle had jumped out at them, begging for help in administering the second half of a missed injection of cocaine into her external jugular vein.

Moondance's living space is reminiscent of a classic de facto shooting gallery: one broken down bed, a decaying, flimsy pillow, one nightstand and a single sink - all in about 80 square feet. On the nightstand are the chaotic signs of a drug using life: syringes, caps and matches. Syringes with and without the bright orange caps identifying their sterility litter the floor, the nightstand and even the top of the refrigerator. Two syringes stick out like darts in the wall.

Upon return, Moondance apologizes for not letting us meet his dealer who lives just a few doors down and pulls out a bright white compressed chunk of what he calls "dope" [heroin], but what looks to Philippe to be cocaine. After backloading the "dope" and water into a syringe, he simply shakes it into solution. He uses no filter or heating despite his having told us he always used one with heroin and always heated it—so much for self-report. Was it even heroin?

Unmeasured variance in frequency of injection, due to poor recall or reporting, and type of drug injected may have contributed to the HIV and syringe exchange paradox. In addition, the use of cold water soluble heroin (i.e. powder heroin), as in the vignette above, remains an under-examined factor in injection-mediated HIV transmission(36–38). Ciccarone and Bourgois have proposed that the heating required to but solid "black tar" heroin into solution is one of several factors explaining lower HIV rates in US geographic areas with tar heroin; conversely US regions with powder heroin have higher HIV rates(36).

Hanging out in the hallway of Moondance's SRO, several people we interviewed generously gave us sensitive—even intimate—disclosures of travailed lives of substance abuse, and several recounted their HIV seroconversion history, each time centering on cocaine use:

A man with a bandage on his right arm discloses, with ease, two remarkable things: He is HIV positive and can remember the week that he believes he seroconverted. Despondent after a spell in prison, followed by a breakup with a girlfriend, he went on a wild cocaine run – with full abandonment – shooting in hotels and alleys for the following week. And he has no doubt that he was sharing needles.

On his first visit, Philippe was told that SROs charge an exit/entrance fee to residents, and one outreach worker was upset about a "mistake" her program made of streamlining mental health and HIV services inside a single SRO that resulted in HIV-negative mentally ill patients with no history of drug use being housed next to HIV-positive injectors, and a year later all—or most—testing positive for both HIV and drug use.

Sociability and structural forces

It is interesting to think of the DTES, at the time, as a neighborhood-based, open-air shooting gallery augmented by many more private SRO-based shooting galleries. The rules of social engagement and the abundance of services and subsidies encourages greater friendliness. There seems to be more trust and sharing between strangers and an openness to invite others into one's life. This sociability colluded with population movements created by political economic structural adjustments to create a high-risk situation. The recent history of rural-urban migration, the restructuring of the economy to high-tech financial services away from shipyard work and extractive agricultural and fishing industries, and the history of genocide and ethnocide policies towards the aboriginal population exacerbated more recently by the imposition of disruptive boarding school and social services conspired to create a highly vulnerable rural-to-urban migrant neighborhood with an overrepresentation of First Nations Peoples.

Does the DTES isolate and contain the drug using indigent population, thereby reducing larger (societal) exposure to HIV and drugs, or does it do just the reverse, making chronic drug use so visible, so accessible, so normalized that it becomes a magnet to outsiders who do not already use or who are trying to quit? Worse yet, does the "civilizing biopower rationality[(39)]" for setting quotas on the availability of needles encourage users to spiral off into binges, locked inside their SROs with ample supplies of high-quality cocaine, but no cash or motivation to pay the in-and-out door fee when they need to fetch 14 more sterile needles at the syringe exchange?

Social service agencies with convoluted quota rules, cheap hotels with rapacious rules, and high-quality drugs in a rapidly gentrifying city conspire structurally to concentrate IDUs in one concentrated micro-neighborhood. The concentration of users in a single ghetto in Vancouver, and doubly so, the users, the sellers and the mentally ill in the SRO hotels within this ghetto adds fuel to the HIV fire.

Social-epidemiological conundrum: Collinearity

Multicollinearity is an epidemiological puzzle which occurs when two or more of the independent variables in a multivariate regression are correlated. It is common with observational data which includes most social research. It is a conundrum when trying to tease apart the effects of individual predictor variables(40).

The unfortunate truth is that the services provided by this needle exchange, the largest in North America, correlate completely with the other factors (neighborhood, SRO hotels, sex work and concentration/sheer volume of dealing and using) that are all together driving the epidemic[(35)]. This collinearity is an unfortunate problem for the epidemiologists in that they cannot separate which of the highly correlated predictors are truly responsible. In clinical research a similar problem arises in observational studies on the effects of a specific treatment on a disease that has multiple stages; one needs to control for stage of illness otherwise the treatment looks correlated to worsening disease.

Epidemiologists might have put another well-frequented site of this congested neighborhood, such as a check cashing place or attendance at a social service agency, into their HIV model and it might have also become an independent predictor for HIV incidence. In Philadelphia, for example, criminologists associated gunshot victimhood with recent visits to Chinese takeout restaurants, because of the ubiquity of those cheap, convenient caloric supply houses in the US inner-city food deserts where most shootings take place. Compounding this methodological/analytical challenge is the under-measured risk of injection frequency; this unmeasured risk variance allows other highly correlated, i.e. collinear, variables to tell a bigger story than they should if more nuanced risk variables, *better understood and measured*, were included in the models(35).

Needle exchange *and* epidemiology are not enough

In fact, however, the direct causality of structural forces can rarely be isolated into discretely identified individual variables(41). In other words, the effects of structural forces are likely plagued by collinearity when they are reduced to measurement as discrete variables. Arguably, the harm reduction claim (and riposte by drug warriors) that “Needle exchange is not enough” may have rung true in the late 1990s. Strathdee et al(11), Schechter et al(21) and Hankins(27) all argued convincingly that harm reduction interventions needed to be part of a continuum of strategies including substance treatment. The frequent use of the syringe exchange as it existed in 1999 (2.8 million syringes exchanged per year) among those at higher risk suggests that at first sight the program appeared to be engaging effectively with them. But needle exchanges are not generically standardized institutions. They are complexly organized with distinct rules and are affected by diverse settings and political contexts and shaped by changing patterns of drug preferences and even drug administration preferences, as well as shifts in the larger political economy. Ultimately, the confluences of risks – and the common sense and “good-enough science” of harm reduction(1) – encouraged more appropriate interventions for the Vancouver population that was suffering such high HIV seroconversion rates: 1) the first supervised injection facility in North America(42); and 2) a syringe exchange with relaxed quotas that promotes secondary distribution.

It is time to recognize in the 2010’s that epidemiology is also not enough! Behavioral epidemiology, especially during epidemics of stigmatized illnesses, needs to become a more “*social*” *epidemiology*, incorporating expansive understandings of the differences between risk and risk taking and between structural forces and logistical administrative rules. A structural risk environment approach(4, 43, 44) allows for improved contextual understandings of the social, cultural, historical, economic and political risks *imposed* on persons in a “risk group.” It also permits attention to administrative logistics and infrastructure (needle exchange quotas, abandoned alleys, decrepit SROs, gentrifying cities, drug purity and price, etc.). Vulnerable individuals in this group may or may not express additional risk *behaviors* that compound that structurally-imposed risk. For example poverty is a well-studied force that exerts structural violence on people; additional behavioral risks such as higher smoking rates, lower physical activity, etc. are promoted or enforced by the underlying social and structural risk as well as the micro-administrative stipulations of tobacco sales and smoking laws, packaging, advertising and distributing regulations, etc.

Multiple qualitative studies in Vancouver have documented the extraordinary lives and embedded risk of Vancouver's drug using residents(45–48). Anthropological and qualitative observations before, during and after epidemiological research can add depth that survey research alone cannot achieve. Even greater explanatory value may be achieved by an iterative, multi-disciplinary integrated approach which allows for the rapid development and testing of complex hypotheses and causal relationships to aid the development of a fuller, nuanced and more useful understanding of HIV risk behaviors and substance use(1, 6, 36, 49). "Social plausibility," a concept coined by Ciccarone(35) in collaboration with Bourgois(50) can be a keystone in this multidirectional dialogue helping to explain/justify causality and highlight the hidden social and structural logics for unforeseen outcomes, thus expanding modern epidemiology and promoting more meaningful understandings and durable interventions(1, 6).

Meanwhile, syringe exchange remains surprisingly controversial in the US and federal funding is still a hypothetical proposal. Legal syringe exchange exists in many states but there is grossly incomplete coverage nationwide. And in many US cities police officers routinely harass users on their way to and from syringe exchanges. Outbreaks of HIV will continue to erupt in socio-geographic fault-zones of risk(51) due to gaps in prevention science and lack of political and social courage.

Drug warriors may often manipulate the truth, but if we are committed to serving vulnerable drug users we must acknowledge the gaps in our understanding of the street logics of drug use and the potential for unintended negative consequences of well-intended public health interventions. Moving forward we could benefit from humbly and self-critically remembering the counterproductive follies of our well-intended research/interventions of years past and acknowledging the limits of public health science. By utilizing a modern social epidemiology that re-contextualizes vulnerable populations with geographic, historical, political economic and cultural understandings we can develop more responsive harm reduction services that are better attuned to altering the risk environment faced by vulnerable users.

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