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Social and structural aspects of the overdose risk environment in St. Petersburg, Russia

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Abstract

Background—While overdose is a common cause of mortality among opioid injectors worldwide, little information exists on opioid overdoses or how context may influence overdose risk in Russia. This study sought to uncover social and structural aspects contributing to fatal overdose risk in St. Petersburg and assess prevention intervention feasibility.

Methods—Twenty-one key informant interviews were conducted with drug users, treatment providers, toxicologists, police, and ambulance staff. Thematic coding of interview content was conducted to elucidate elements of the overdose risk environment.

Results—Several factors within St. Petersburg's environment were identified as shaping illicit drug users' risk behaviors and contributing to conditions of suboptimal response to overdose in the community. Most drug users live and experience overdoses at home, where family and home environment may mediate or moderate risk behaviors. The overdose risk environment is also worsened by inefficient emergency response infrastructure, insufficient cardiopulmonary or naloxone training resources, and the preponderance of abstinence-based treatment approaches to the exclusion of other treatment modalities. However, attitudes of drug users and law enforcement officials generally support overdose prevention intervention feasibility. Modifiable aspects of the risk environment suggest community-based and structural interventions, including overdose response training for drug users and professionals that encompasses naloxone distribution to the users and equipping more ambulances with naloxone.

Conclusion—Local social and structural elements influence risk environments for overdose. Interventions at the community and structural levels to prevent and respond to opioid overdoses are needed for and integral to reducing overdose mortality in St. Petersburg.

Keywords

naloxone; overdose; risk environment; emergency medical services; Russia; structural intervention

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Background

Illegal use and injection of drugs have increased dramatically in the Russian Federation since the 1990s (Koshkina, 2000). In addition to an injection-driven HIV epidemic, approximately 100,000 Russians die annually from overdoses and problems related to drug use, a mortality rate higher than that for motor-vehicle incidents and homicide in Russia (Bureau for International Narcotics and Law Enforcement Affairs, 2008). St. Petersburg, the second largest city in Russia, is home to an estimated 70,000 injecting drug users (IDU) (4% of adults), making it one of the largest subnational injecting populations of the developing and transitional countries (Burrows, 2006; Central and Eastern European Harm Reduction Network, 2006; Long et al., 2006). Compared to the 59% lifetime overdose experience reported in a 16-city survey of Russian IDUs that did not include St. Petersburg (Sergeev, Karpets, Sarang, & Tikhonov, 2003), 75% of IDUs surveyed in St. Petersburg had ever overdosed, 60% having experienced one or more in the past year (Grau et al., 2008).

The risk of dying from overdose encompasses not only factors precipitating overdose but also appropriateness of response when it occurs. Studies of overdose typically focus on individual behaviors such as injecting alone and concurrent alcohol use (Coffin et al., 2003; Melent'ev & Novikov, 2002; Sherman, Cheng, & Kral, 2007), a tendency that may obscure the role of other important aspects contributing to overdose causation and death. Social and structural factors can also influence drug users' ability to prevent overdose, respond effectively, and reduce likelihood of fatality (Dietze, Jolley, Fry, Bammer, & Moore, 2006; Galea et al., 2003; Hembree et al., 2005; Tobin, Davey, & Latkin, 2005). In Russia, distrust of medical institutions arising from mistreatment, fear of police, and perceived ineffectiveness deterred people from seeking medical help (Sergeev et al., 2003). Consideration of the "risk environment" (Rhodes & Simic, 2005; Rhodes, Singer, Bourgois, Friedman, & Strathdee, 2005; Rhodes, Stimson et al., 1999) includes the interplay of physical, social, economic, and policy factors, that influence production of risk and may determine intervention effectiveness (Kerr, Kimber, & Rhodes, 2007; Kerr, Small, Moore, & Wood, 2007; Van Beek, Dakin, Kimber, & Gilmour, 2004). Building upon this, we sought to uncover factors contributing to the overdose risk environment in St. Petersburg and to assess feasibility of a prevention intervention.

Methods

From September 2006 to June 2007, 21 interviews (n=3 for each group) were conducted with informants key to understanding overdose experiences and current response practices in St. Petersburg: drug users in treatment, drug users not in treatment, ambulance staff, toxicologists from the poisoning ward at the city's primary hospital, policemen, inpatient narcologists (psychiatrists with sole authority for treating addiction) and outpatient narcologists. Topics included interviewee's biographical details (age, sex, work experience), perceptions about overdose, causes and responses, details of overdoses witnessed and responded to, knowledge about naloxone (Bigg, 2002; Chamberlain & Klein, 1994), awareness of prevention overdose programmes, and attitudes toward a possible overdose prevention and naloxone training programme. Recruitment of drug users was based on random selection of: a) patients who had been in detoxification for seven or more days for the in-treatment subset (Bekhterev Institute), and b) for those out-of-treatment, drug users visiting The Biomedical Center, a not-for-profit health and research organization for drug users. Their inclusion criteria were past month drug use and history of witnessing or experiencing overdose. Recruitment of professionals occurred only after gaining approval from a supervisor/chief (i.e., of police, of the ward), who typically nominated interviewees. Eligibility criterion for interviewing professionals was experience working with drug users. Interviews were audio-taped, transcribed, translated and coded thematically using inductive techniques (Layder, 1993) by two team members [TCG, LEG] in

consultation with the Russian-speaking interviewers [KNB, MT]. Emergent themes typically pertained to individual circumstances and behaviors surrounding overdose; many were exogenous to the individual and suggested mediation of behaviors. To conceptualize and interpret these contextual drivers, we subsequently drew upon the risk environment framework for this analysis. Institutional Review Boards at Yale University, the Biomedical Center, and the Bekhterev Psychoneurological Institute approved this study.

Results

“An overdose problem has existed, does exist and will continue to exist in St. Petersburg... because overdose depends on heroin quality-and heroin quality comes down. But other reasons for overdose will exist forever.” (male, 35, heroin injector, 18 years injecting).

Home and family conditions

Interviews with drug users and narcologists revealed that home and family conditions might contribute to overdose risk, since drug use and overdoses often occur at home. Russian IDU tend to be younger than their Western counterparts and to live with partners, parents, or other relatives (Grau et al., 2008; Sergeev et al., 2003; Shaboltas et al., 2006), similar to IDUs in other non-Western settings (Dorabjee & Samson, 2000; Kartikeyan, Chaturvedi, & Bhalerao, 1992; Kumar et al., 2000). While this situation is observed elsewhere in Russia (Sergeev et al., 2003), the home is not typically considered a setting mediating overdose risk. Mechanisms by which family environment can influence their relative's drug use and overdose risk emerged in interviews.

Some drug users inject at other (and potentially less safe) locations in order to avoid discovery of their drug use by other family members: “Usually I inject at home or when my parents are not at home, but sometimes I have to inject on the street.” (male, 32, injecting heroin and other opioids 9 years).

Injecting secretly at home under physical or time constraints increases the potential of doing something careless or too quickly, which can result in overdose. “My last overdose was a heroin overdose ... at home. I'd been in the toilet and I made an injection. My relatives felt that something was wrong, that I was in the toilet for too long, and then they opened the door and called an ambulance and began to slap my cheeks.” (male, 35, injecting heroin 18 years).

Family can also play a powerful preventive role in reducing fatal overdose risk when a harm reduction approach is embraced. A rare report of naloxone administration illustrates one parent's modification to the home environment: “I used my ordinary dose, but the quality was better and I ended up unconscious. My friend was with me. He injected some medicine (naloxone). It was in his home. His mother works in narcology and had some of the medicine at home.” (male, 32, heroin injector, 7 years injecting).

Fear as a contextualizing factor of the overdose risk environment

Linked to broader stigmatisation of IDU in Russia, professional's fears of drug users and drug user's fears of professionals both contributed to suboptimal overdose response conditions. Fear of drug users legitimized professionals' inaction to a witnessed overdose: “We have no instructions on how to respond [to] an overdose and I will not perform rescue breathing on a drug user- he can have AIDS!” (Policeman, policing 17 years). This fear was also a rationale for exerting greater control over emergency response encouraging emergency medical services (EMS) staff to alter protocols to include police escort, opening the possibility of harassment and arrest: “... sometimes the ambulance staff calls the police ... when there are many drug

users and the ambulance staff is just afraid.” (Dispensary narcologist, female, practicing 21 years).

This perpetuates the impression among drug users that a *sine qua non* in calling an ambulance is involvement of police. Drug users commonly expressed a potent fear of arrest, interrogation, and criminal prosecution whether they were receiving care within a hospital or from EMS. “My friend was hospitalized after an overdose... when he woke up in the hospital, he hit and beat the doctors and ran away. He did it because he feared the police were there.” (female, 28, injects heroin and methadone, injecting 10 years).

Consistently, drug users cited fear that police will arrive with the ambulance as motivation not to call for one. In the rare instance when ambulances were called, drug users engaged in protective behaviors. “We never tell them that it’s an overdose....we say that something is wrong with the person’s heart, unconscious, drunk on alcohol... On the question about drug use, we say that we don’t know, but think that he didn’t take any.” (male, 32, heroin injector, 7 years injecting). But such actions may have unintended negative consequence. Reporting only selected details of the emergency situation determines the type of ambulance dispatched (see next section) which, in the Russian EMS system, may reduce the likelihood of naloxone being available for successful overdose reversal.

Medical response to opioid overdose

An emergency call identified as a drug-involved event dispatches a special narcological ambulance, equipped with naloxone and staff trained in its administration. According to ambulance staff interviewed, *only two of the more than 190 ambulance cars in St. Petersburg are narcological*. If the caller indicates that the victim is not breathing but does not mention involvement of drugs, the case may instead be responded to by a resuscitation ambulance with advanced life support capabilities or, if neither involvement of drugs nor apnea is mentioned, by typical EMS ambulances with more limited staffing. Gaufberg also describes this sequence (Gaufberg, 2007).

Interviews with toxicologists and narcologists independently described the same overdose treatment protocol. Victims are taken directly to the toxicology department of the one emergency hospital in St. Petersburg (St. Petersburg Emergency Institute), which is well-known for its overdose care. Toxicologists reported that their department treats 1,600 opioid overdoses annually, constituting over 40% of their patient load. Once in the unit, serious cases are placed on a special ‘emergency regimen’ while less serious cases are monitored, possibly re-administered large doses of naloxone, and typically subjected to a detoxification regimen consisting of a saline solution infusion and other medications to manage symptoms. Patients can opt to enter hospital-based drug treatment in the narcology unit, where they receive a 7–14 day detoxification. Other treatment options include dispensary narcology clinics, akin to American outpatient drug treatment. However, maintenance therapy is legally prohibited in the Russian Federation (Butler, 2003). Standard care consists of a cocktail of tranquilizers, antipsychotics, and anticonvulsants to stave off withdrawal coupled with psychotherapy. Successful treatment outcomes are rare (<10%, (R. Heimer, Booth, R.E., Irwin, K.S., Merson, M.H., 2007)). Usually drug users leave after a 1–3 day hospital stay, a function of ineffective treatment options, fearing police stationed at the hospital, motivation level, inability to pay for treatment, or “just because they need a dose”, among others.

Detoxification protocols may contribute to high risk of overdose—Detoxification, as an interruption in drug use that can alter users’s tolerance (Warner-Smith, Darke, Lynskey, & Hall, 2001), has been associated with elevated overdose risk (Buster, van Brussel, & van den Brink, 2002; Strang et al., 2003). Moreover, co-administration of sedatives and opioids can increase risk of fatal overdose (Rubio, 2004; Warner-Smith et al., 2001) because they act

to depress the central nervous system. Both the protocol of compulsory detoxification for drug users admitted to toxicology units after opioid overdose and the extant sedative-reliant treatment protocols in dispensary and inpatient narcology clinics described by the nine medical professionals may therefore actually be *creating* a subsequent risk of fatal overdose upon release from care. One drug user's story illustrates possible consequences: "The last heroin overdose I witnessed was my brother's overdose. He had just come home from the hospital and he asked me to prepare a dose of heroin for him. The overdose happened on the stairs [outside]; it was only me and him. I did CPR (cardiopulmonary resuscitation) on him ... I called the ambulance, but it came too late. So, they called the police 'for the corpse'." (male, 35, heroin injector, 18 years injecting).

Misinformation about naloxone at the professional level—Common to several interviews was a degree of misinformation about naloxone. Toxicologists were quick to point out contraindications for its use and reflected reservations about administering it in the hospital due to "complications such as cardiovascular problems, overexcitation, and naloxone-induced seizures". Medical professionals were consistently adamant about dangers of using naloxone in cases of "coma ...[or] ... severe breathing problems", a directive that appeared institutionalized. Yet, in accepted medical practice, naloxone is indicated in cases of dyspnea to restore normal ventilation. In rare occasions where an opioid overdose occurred among asthmatics, naloxone can exacerbate respiratory depression (Allegretti, Bzdusek, & Leonard, 2006). The interviewees' focus on contraindications and complications may illustrate a common bias in medical decision-making, confirmation bias, i.e., selectively accepting information about rare cases when naloxone was ineffectual and ignoring information on more typical effectual cases that appear outside of their unit. Regardless of origin, perpetuation and institutionalization of such misinformation may contribute to underutilization of naloxone in opioid overdose cases where it is medically indicated.

The missing 'first responder': compartmentalization and limited responsibilities—In Russia, there is no parallel concept of 'first-aid' nor of 'first responder', the medically-trained person to initially respond to an emergency. Interviews consistently highlighted that police do not view themselves as nor are they trained to be first responders to emergencies. Set within a highly compartmentalized system, the city police have specific, narrowly defined job descriptions and will not engage in medical treatment or public health work. Their duties entail responding to crimes or, in the case of fatal overdose, reporting the "when, where, who of the death, not helping (a victim)". While fear may drive some of this inaction, lack of training and the pervasive excuse that it is "not my job" distances them from responsibility to respond: "We come only if there is a corpse. We have no instructions on what to do in cases of overdose. I don't know what to do to save a life. Maybe rescue breathing, but I will not do it." (Policeman, policing 10 years). Moreover, these roles are affirmed by members of the medical community who view themselves as uniquely capable and motivated to care for overdose victims.

Inadequate emergency response: delay, corruption, and bureaucratization of care

Opioid overdoses require immediate attention and resuscitation. Often, reliability of the St. Petersburg EMS response is poor. Timeframes mentioned by interviewees for an ambulance to reach an overdose case ranged from three minutes to one hour. Additionally, drug users and many treatment professionals believed that EMS staff would intentionally "come later or not come at all" if they knew the emergency was an overdose, providing drug users another rationale for not calling for help. Appropriate response upon arrival was also questioned: "I think that ambulance staff won't even approach if they see (a victim) foaming at the mouth. I hope that there are doctors who would help drug users even if they are found in the trash. I really hope, but I'm not sure it happens." (Dispensary narcologist, female, practicing 25 years).

Still, some drug users felt EMS responded effectively, associating success more with medicines EMS carry than with EMS themselves. When there is a successful reversal, it was not uncommon for drug users to experience demand for payment of otherwise free services: “When I called the ambulance, I told them that it was an overdose to make them come faster and send a specialized car [i.e., the narcological ambulance]. They came in 5 minutes. They did a lot, injected something, and he woke up almost immediately. He refused to go to the hospital. They didn’t call the police. We paid them 500 rubles [about \$20] for their help.” (female, 47, heroin injector, 17 years injecting).

Others told of having to pay a bribe for not calling the police after a successful reversal, despite the existing police protocol to respond only in fatal cases: “The ambulance works effectively. They gave me an injection of medicine when they came and saved my life. But you should give them money so that they will not call the police - \$12 is enough.” (male, 26, heroin injector, 8 years injecting).

For those without sufficient funds to cover these hidden and variable costs or who fear repercussions that might involve police if they do not pay, there is little motivation to call an ambulance.

Finally, a compartmentalized EMS in which not all ambulances are equipped with naloxone impedes effective and appropriate overdose responses: “Once the ambulance injected something, but that medicine was very mild. Maybe that was just an ordinary, therapeutical ambulance that was not properly equipped.... If a good ambulance comes, a narcological one, they have all the medications.” (male, 32, heroin injector, 7 years injecting).

In the absence of a first responder role, an EMS system that is ill-equipped to respond to overdoses and often fails to provide consistent and timely care, a medical framework that promotes marginalization by treating narcological emergencies exceptionally, and the unpredictable police involvement with ambulance response, there is good reason that many drug users do not seek professional help when an overdose occurs and instead attempt to help without it.

Prospects for overdose prevention and naloxone training programmes

Overdose prevention and response programmes, including naloxone distribution and training of first-responders, constitute structural interventions that fundamentally alter the overdose risk environment. While CPR and rescue breathing are learned in the military and in certain professions, community-based CPR training programmes are rare. None of those interviewed knew of such programmes or any preventive overdose programmes in St. Petersburg. Providing naloxone to opioid users in Russia is not illegal. As in the U.S., naloxone is viewed as a medication without abuse potential, it is not on the “dangerous drugs” list, and no special forms or licenses are needed to write prescriptions for naloxone. Naloxone is widely available in Russian pharmacies; a package of 10 vials for injection costs about US\$6. Furthermore, administering medication by injection is both culturally acceptable and a norm in Russia (Rhodes, Ball et al., 1999). Interviewed drug users as well as those who took part in a companion survey (Grau et al., 2008) were interested and willing to participate in an overdose prevention and naloxone training programme.

Mutual support between drug users and police suggests opportunities for intervention. Interviewed drug users opined that police were not likely to oppose an overdose intervention programme, as it does not affect their duties. Indeed, police were generally indifferent or marginally supportive of such a programme, noting that there would be fewer dead drug users to deal with. In contrast, medical professionals did not favor intervention, especially naloxone distribution. They worried that it endorses drug use and would encourage more or careless use

of opioids; they preferred “harsh measures” like “toughening the laws” and resumption of Soviet-era compulsory drug abuse treatment, firmly stating “only abstinence could save drug user’s lives”. Further, medical professionals insisted that naloxone administration could *only* be done correctly by a medically-trained professional and they exaggerated naloxone’s side effect risk as justification for limiting administration permissions: “(Drug users)... should never inject naloxone themselves. Naloxone (use)... can lead to life-threatening complications when it’s administered by a non-professional (i.e., seizures, pulmonary edema, brain edema). If drug users will have access to naloxone and start injecting it themselves, the fatality rate will increase.” (Ambulance narcologist, male, practicing 15 years).

However, medical professionals supported incorporating overdose prevention into continuing medical education for those who treat drug users and providing a comprehensive training on overdose risk, identification, prevention, and response for police, but they stopped short of recommending they be equipped with naloxone: “... police will not administer naloxone even if they are taught how to handle it.” (Dispensary psychiatrist, male, 17 years practicing).

Discussion

This study identified several elements of the environment contributing to overdose risk in St. Petersburg that warrant further investigation. To our knowledge, this is the first study to indicate that family dynamics may mediate or moderate overdose risk. Scientific plausibility of this relationship draws upon empirical studies establishing family environment influences on problem drinking (El-Sheikh & Buckhalt, 2003), drug use (Barrera, Chassin, & Rogosch, 1993) and intentional drug overdose (Al-Jahdali et al., 2004; Al Ansari et al., 2001; Orford, 2005), with or without genetic predisposition for problems (Jacob et al., 2003; Stice, Barrera, & Chassin, 1993). In a companion study conducted in St. Petersburg, we found that recent personal and witnessed overdoses among IDU were associated with family conflict, further suggesting family influence risk context (Grau et al., 2008). The proximity of active drug use to the home (Sergeev et al., 2003), precedence for family involvement in treatment (Krupitsky et al., 2004; Pollini, McCall, Mehta, Vlahov, & Strathdee, 2006), and the profound impact of death from overdose borne by the family (da Silva, Noto, & Formigoni, 2007) suggest a strong motivation (Strang et al., 2008) and an opportunity to organize family-based harm reduction efforts, including naloxone training. There are few examples of family-focused harm reduction interventions (Dear, 1996); to date, none exist in Russia with only one known family-carer naloxone training pilot in the United Kingdom (Strang et al., 2008). Further research on family interventions to mitigate negative consequences of drug use in Russia is warranted. Additionally, to determine a causal link between Russian-specific detoxification regimens and overdose risk suggests future observational study.

Key informant interviews alone cannot comprehensively capture all characteristics of the overdose risk environment. As an exploratory approach, we synthesized our findings, other studies of overdose risk, and the HIV risk environment literature to conceptualize the interacting physical, social, economic, and policy realms (Rhodes & Simic, 2005) of overdose risk (Table 1) in St. Petersburg.

Behavioral interventions to reduce health risks are minimally effective and heavily context dependent (R. Heimer, Bray, Burris, Khoshnood, & Blankenship, 2002). Thus, alone they are insufficient to respond to factors in Table 1. Instead, community-based and structural interventions are warranted (Blankenship, Bray, & Merson, 2000; R. Heimer et al., 2002). While these may not be able to entirely curtail corruption, organize a city’s EMS network, or quickly effect attitudes of police and treatment providers, they might, if implemented on a wide scale, have significant impact on overdose risk. Table 1 suggests such focused interventions arising from our results.

In particular, results revealed prospects for overdose prevention and naloxone distribution programmes aimed at drug users, family members, and others who interact with drug users in St. Petersburg. Insistence that only trained medical professionals can correctly respond to overdose is unfounded: trained drug users identify and respond to opioid overdose with naloxone as well as medical professionals (Green, Heimer, & Grau, 2008). Additional consensus building will have to be undertaken to overcome resistance on the part of some medical professional to training the drug users themselves. On the other hand, training tailored specifically for medical and law enforcement professionals in overdose response appropriate to their societal role appears needed and generally acceptable. Moreover, equipping more ambulances with naloxone and with staff trained in its use would vastly increase its availability, a key component of structural interventions (Blankenship et al., 2000). Given the hierarchical and siloed organization of Russian civil society, it is essential to any social or structural intervention to garner support and cooperation across stakeholders from different occupations. Here this would include the ambulance services, hospitals, medical universities, police, narcologists, and harm reduction services, with strong leadership from the St. Petersburg Public Health Committee, as demonstrated in past local initiatives (e.g., Barents HIV/AIDS Programme). The current political situation in Russia (Garrett, 2000; Knight, 2008) may preclude or constrain controversial or highly unorthodox interventions such as supervised injecting facilities, naloxone distribution may not. Regardless of the feasibility of naloxone provision to active drug users, the range of possible fatal overdose prevention responses emerging from this study provides multiple starting points to explore change, some of which may prove more politically palatable than others.

Study limitations include small sample size and possible interviewer and reporting bias. As a result some social or structural features may have not received sufficient attention (see Table 1). Generalizability of findings beyond this particular sample and city cannot be assumed. As an exploratory exercise, this study uniquely described aspects of the overdose risk landscape and revealed plausible, feasible interventions at the local scale integral to reducing risk of overdose mortality in St. Petersburg.

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References

- Al-Jahdali H, Al-Johani A, Al-Hakawi A, Arabi Y, Ahmed QA, Altowirky J, et al. Pattern and risk factors for intentional drug overdose in Saudi Arabia. *Can J Psychiatry* 2004;49(5):331–334. [PubMed: 15198470]
- Al Ansari AM, Hamadeh RR, Matar AM, Marhoon H, Buzaboony BY, Raees AG. Risk factors associated with overdose among Bahraini youth. *Suicide Life Threat Behav* 2001;31(2):197–206. [PubMed: 11459252]

- Allegretti PJ, Bzdusek JS, Leonard J. Caution with naloxone use in asthmatic patients. *Am J Emerg Med* 2006;24(4):515–516. [PubMed: 16787825]
- Barrera M Jr, Chassin L, Rogosch F. Effects of social support and conflict on adolescent children of alcoholic and nonalcoholic fathers. *J Pers Soc Psychol* 1993;64(4):602–612. [PubMed: 8473977]
- Bigg D. Data on take home naloxone are unclear but not condemnatory. *Bmj* 2002;324(7338):678. [PubMed: 11895840]
- Blankenship KM, Bray SJ, Merson MH. Structural interventions in public health. *Aids* 2000;14(Suppl 1):S11–21. [PubMed: 10981470]
- Bureau for International Narcotics and Law Enforcement Affairs. International Narcotics Control Strategy Report -Russia. Washington, D.C.: US State Department; 2008.
- Burrows, D. Harm Reduction Programmes in the Civilian and Prison Sectors of the Russian Federation: Assessment of Best Practices. Moscow: Open Health Institute; 2006.
- Buster MC, van Brussel GH, van den Brink W. An increase in overdose mortality during the first 2 weeks after entering or re-entering methadone treatment in Amsterdam. *Addiction* 2002;97(8):993–1001. [PubMed: 12144602]
- Butler, WE. HIV/AIDS and drug misuse in Russia: Harm reduction programmes and the Russian legal system. London, UK: International Family Health; 2003.
- Central and Eastern European Harm Reduction Network (CEEHRN). Syringe exchange & outreach projects in CEE/CIS. from . 2006. <http://www.ceeHRN.org/maps2>
- Chamberlain JM, Klein BL. A comprehensive review of naloxone for the emergency physician. *Am J Emerg Med* 1994;12(6):650–660. [PubMed: 7945608]
- Coffin PO, Galea S, Ahern J, Leon AC, Vlahov D, Tardiff K. Opiates, cocaine and alcohol combinations in accidental drug overdose deaths in New York City, 1990–98. *Addiction* 2003;98(6):739–747. [PubMed: 12780362]
- da Silva EA, Noto AR, Formigoni MLOS. Death by drug overdose: impact on families ([dagger]).(Short Communication). *Journal of Psychoactive Drugs* 2007;39(3):301–306. [PubMed: 18159785]
- Dear GE. What happened to the family in the harm reduction debate? *Drug Alcohol Rev* 1996;15(3):221–223. [PubMed: 16203375]
- Dietze P, Jolley D, Fry CL, Bammer G, Moore D. When is a little knowledge dangerous? Circumstances of recent heroin overdose and links to knowledge of overdose risk factors. *Drug Alcohol Depend* 2006;84(3):223–230. [PubMed: 16542798]
- Dorabjee J, Samson L. A multi-centre rapid assessment of injecting drug use in India. *Int J Drug Policy* 2000;11(1–2):99–112. [PubMed: 10699547]
- El-Sheikh M, Buckhalt JA. Parental problem drinking and children's adjustment: attachment and family functioning as moderators and mediators of risk. *J Fam Psychol* 2003;17(4):510–520. [PubMed: 14640801]
- Galea S, Ahern J, Vlahov D, Coffin PO, Fuller C, Leon AC, et al. Income distribution and risk of fatal drug overdose in New York City neighborhoods. *Drug Alcohol Depend* 2003;70(2):139–148. [PubMed: 12732407]
- Garrett, L. Betrayal of Trust: The Collapse of Global Public Health. New York: Hyperion; 2000. *Bourgeois Physiology*; p. 121–265.
- Gaufberg S. Emergency Medicine in Russia. *eMedicine*. 2007
- Grau, LE.; Green, TC.; Torban, M.; Blinnikova, K.; Krupitsky, EM.; Ilyuk, R., et al. Opioid overdose risk in St. Petersburg, Russia; Paper presented at the International Harm Reduction Association's 19th International Conference; 2008.
- Green TC, Heimer R, Grau LE. Distinguishing signs of opioid overdose and indication for naloxone: an evaluation of six overdose training and naloxone distribution programmes in the United States. *Addiction* 2008;103(6):979–989. [PubMed: 18422830]
- Heimer, R.; Booth, RE.; Irwin, KS.; Merson, MH. HIV and Drug Use in Eurasia. In: Twigg, JL., editor. *HIV/AIDS in Russia and Eurasia*. Basingstoke, Hampshire, UK: Palgrave Macmillan; 2007.
- Heimer R, Bray SJ, Burris S, Khoshnood K, Blankenship KM. Structural interventions to improve opiate maintenance. *Int J Drug Policy* 2002;13(2):103–111.

- Hembree C, Galea S, Ahern J, Tracy M, Markham Piper T, Miller J, et al. The urban built environment and overdose mortality in New York City neighborhoods. *Health Place* 2005;11(2):147–156. [PubMed: 15629682]
- Jacob T, Waterman B, Heath A, True W, Bucholz KK, Haber R, et al. Genetic and environmental effects on offspring alcoholism: new insights using an offspring-of-twins design. *Arch Gen Psychiatry* 2003;60(12):1265–1272. [PubMed: 14662559]
- Kartikeyan SK, Chaturvedi RM, Bhalerao VR. Role of the family in drug abuse. *J Postgrad Med* 1992;38(1):5–7. [PubMed: 1512731]
- Kerr T, Kimber J, Rhodes T. Drug use settings: an emerging focus for research and intervention. *Int J Drug Policy* 2007;18(1):1–4. [PubMed: 17689337]
- Kerr T, Small W, Moore D, Wood E. A micro-environmental intervention to reduce the harms associated with drug-related overdose: evidence from the evaluation of Vancouver's safer injection facility. *Int J Drug Policy* 2007;18(1):37–45. [PubMed: 17689342]
- Knight A. The Truth About Putin and Medvedev. *The New York Review of Books* 2008;55(8)
- Koshkina EA. [The prevalence of the use of narcotics and other psychoactive substances in Russia today]. *Zh Mikrobiol Epidemiol Immunobiol* 2000;(4):15–19. [PubMed: 10994094]
- Krupitsky EM, Zvartau EE, Masalov DV, Tsoi MV, Burakov AM, Egorova VY, et al. Naltrexone for heroin dependence treatment in St. Petersburg, Russia. *J Subst Abuse Treat* 2004;26(4):285–294. [PubMed: 15182893]
- Kumar MS, Mudaliar S, Thyagarajan SP, Kumar S, Selvanayagam A, Daniels D. Rapid assessment and response to injecting drug use in Madras, south India. *Int J Drug Policy* 2000;11(1–2):83–98. [PubMed: 10699546]
- Layder, D. *New Strategies in Social Research*. Cambridge: Polity; 1993.
- Long EF, Brandeau ML, Galvin CM, Vinichenko T, Tole SP, Schwartz A, et al. Effectiveness and cost-effectiveness of strategies to expand antiretroviral therapy in St. Petersburg, Russia. *Aids* 2006;20(17):2207–2215. [PubMed: 17086061]
- Melent'ev AB, Novikov PI. [Role of alcohol in heroin overdose]. *Sud Med Ekspert* 2002;45(1):12–17.
- Orford, J. *Coping with alcohol and drug problems: the experiences of family members in three contrasting cultures*. London; New York: Routledge; 2005.
- Pollini RA, McCall L, Mehta SH, Vlahov D, Strathdee SA. Non-fatal overdose and subsequent drug treatment among injection drug users. *Drug Alcohol Depend* 2006;83(2):104–110. [PubMed: 16310322]
- Rhodes T, Ball A, Stimson GV, Kobysheva Y, Fitch C, Pokrovsky V, et al. HIV infection associated with drug injecting in the newly independent states, eastern Europe: the social and economic context of epidemics. *Addiction* 1999;94(9):1323–1336. [PubMed: 10615718]
- Rhodes T, Simic M. Transition and the HIV risk environment. *Bmj* 2005;331(7510):220–223. [PubMed: 16037463]
- Rhodes T, Singer M, Bourgois P, Friedman SR, Strathdee SA. The social structural production of HIV risk among injecting drug users. *Soc Sci Med* 2005;61(5):1026–1044. [PubMed: 15955404]
- Rhodes T, Stimson GV, Crofts N, Ball A, Dehne K, Khodakevich L. Drug injecting, rapid HIV spread, and the 'risk environment': implications for assessment and response. *Aids* 1999;13(Suppl A):S259–269. [PubMed: 10885783]
- Rubio G. Individuals with opioid dependence who leave drug treatment have higher overdose and death rates than those still in treatment. *Evid Based Ment Health* 2004;7(4):122. [PubMed: 15504810]
- Sergeev B, Karpets A, Sarang A, Tikhonov M. Prevalence and circumstances of opiate overdose among injection drug users in the Russian Federation. *J Urban Health* 2003;80(2):212–219. [PubMed: 12791797]
- Shaboltas AV, Tousseva OV, Hoffman IF, Heimer R, Verevchkin SV, Ryder RW, et al. HIV prevalence, sociodemographic, and behavioral correlates and recruitment methods among injection drug users in St. Petersburg, Russia. *J Acquir Immune Defic Syndr* 2006;41(5):657–663. [PubMed: 16652041]
- Sherman SG, Cheng Y, Kral AH. Prevalence and correlates of opiate overdose among young injection drug users in a large U.S. city. *Drug Alcohol Depend* 2007;88(2–3):182–187. [PubMed: 17110058]

- Stice E, Barrera M Jr, Chassin L. Relation of parental support and control to adolescents' externalizing symptomatology and substance use: a longitudinal examination of curvilinear effects. *J Abnorm Child Psychol* 1993;21(6):609–629. [PubMed: 8126316]
- Strang J, Manning V, Mayet S, Titherington E, Offor L, Semmler C, et al. Family carers and the prevention of heroin overdose deaths: Unmet training need and overlooked intervention opportunity of resuscitation training and supply of naloxone. *Drugs Educ Prev Policy* 2008;15(2):211–218.
- Strang J, McCambridge J, Best D, Beswick T, Bearn J, Rees S, et al. Loss of tolerance and overdose mortality after inpatient opiate detoxification: follow up study. *Bmj* 2003;326(7396):959–960. [PubMed: 12727768]
- Tobin K, Davey M, Latkin C. Calling emergency medical services during drug overdose: an examination of individual, social and setting correlates. *Addiction* 2005;100(3):397–404. [PubMed: 15733253]
- Van Beek I, Dakin A, Kimber J, Gilmour S. The Sydney Medically Supervised Injecting Centre: Reducing associated with heroin overdose. *Critical Public Health* 2004;14(4):1–406.
- Warner-Smith M, Darke S, Lynskey M, Hall W. Heroin overdose: causes and consequences. *Addiction* 2001;96(8):1113–1125. [PubMed: 11487418]

Table 1

Social and structural elements of the overdose risk environment and possible intervention components to reduce nonfatal and fatal overdose risk in St. Petersburg

	Local social, structural factors detected in this study	Possible intervention components	Other possible social, structural factors that could influence risk environment, not detected in this study
Physical	<ul style="list-style-type: none"> • Detoxification & drug treatment • Medical institutions • Home environment • Ambulance type 	<ul style="list-style-type: none"> • Supervised injecting facilities • Overdose prevention counseling prior to release from detoxification, drug treatment, prison • Remove police stationed at drug treatment wards of medical institutions • Equip all drug using locations (e.g., homes, dealer's home) with overdose prevention education materials & naloxone • Equip all ambulance types with naloxone 	<ul style="list-style-type: none"> • Prison • Public, semi-public spaces • Shooting galleries • Age distribution of drug users • Heroin purity • Availability & number of other opioids • Availability of alcohol
Social	<ul style="list-style-type: none"> • Family (cohesion, adaptability) • Local policing • Medical, police, community attitudes toward drug users, naloxone • Curriculum/ training on overdose recognition, response (police, medical professionals) 	<ul style="list-style-type: none"> • Family-targeted overdose initiatives, orientation to harm reduction approaches • Peer, network, dealer overdose prevention & response interventions • Trainings on overdose recognition, improving attitudes toward drug users for police • Continuing medical education on overdose, naloxone, & reducing stigma of drug use for medical professionals, pharmacists 	<ul style="list-style-type: none"> • Social, drug using networks • Attitudes of pharmacists toward drug users • Attitudes of dealers toward naloxone • Norms (individual, social, cultural) • Civil society & social infrastructure
Economic	<ul style="list-style-type: none"> • Cost of naloxone, drug treatment, ambulance services • Corruption 	<ul style="list-style-type: none"> • Distribution of naloxone for no/ low cost • Improve no/low-cost drug treatment options • Enforcement of anti-corruption laws • Local investment in public health infrastructure, toxicological resources, EMS, law enforcement 	<ul style="list-style-type: none"> • Cost of alcohol, other pharmaceuticals • Local economies of healthcare • Employment practices for medical, law enforcement • National public health & toxicological infrastructure, spending
Policy	<ul style="list-style-type: none"> • Naloxone availability at pharmacies • CPR, rescue breathing trainings in community • Ratio of narcological to non-narcological ambulances 	<ul style="list-style-type: none"> • Improve access to naloxone at pharmacies • Trainings for CPR, rescue breathing in community, for drug users, family members, treatment providers • Increase number of narcological ambulances • Revision of hospital detoxification policies 	<ul style="list-style-type: none"> • Quality, coordination & access to statistics on fatal overdose in the community • Legal status of methadone, buprenorphine • Laws governing drug use, health, welfare, citizen rights, immigration, registration of drug

	Local social, structural factors detected in this study	Possible intervention components	Other possible social, structural factors that could influence risk environment, not detected in this study
	<ul style="list-style-type: none">Hospital detoxification policies		users & city non-residents