
Effectiveness of Syringe Services Programs

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VA



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Veterans Health Administration
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Appendix

SEARCH STRATEGIES

Search Date: 03/01/23	Search Statement	Results
Ovid MEDLINE	1 Needle-Exchange Programs/ or (((needle* or syringe*) adj2 (exchange* or program* or service*)):ti,ab,kf.	3566
	2 limit 1 to English language	3342
CINAHL	1 (MH "Needle Exchange Programs") OR TI (((needle* OR syringe*) N2 (exchange* OR program* OR service*)))	2175
	2 limit 1 to English language	2162
PsycINFO	1 Needle Exchange Programs/ or ((needle* or syringe*) adj2 (exchange* or program* or service*)):ti,ab.	1506
	2 limit 1 to English language	1430
Cochrane Database of Systematic Reviews	1 MeSH descriptor: [Needle-Exchange Programs] this term only	44
	2 (((needle* or syringe*) NEAR/2 (exchange* or program* or service*)) or (supervis* NEAR/2 injecti* NEAR/2 (center* or centre* or facilit*)):ti,ab,kw	195
	3 limit 3 to reviews	2
	4 limit 4 to english language	2
	5 limit 5 to last 7 years	2
Total		6,936
Total after deduplication		3,743

STUDIES EXCLUDED DURING FULL-TEXT SCREENING

Citation	Exclude Reason
Aalto M, Visapaa J-P, Halme JT, Fabritius C, Salaspuro M. Effectiveness of buprenorphine maintenance treatment as compared to a syringe exchange program among buprenorphine misusing opioid-dependent patients. <i>Nordic Journal of Psychiatry</i> . 2011;65(4):238-243.	Ineligible outcome
Abou-Saleh MT, Foley S. Prevalence and incidence of hepatitis C in drug users: A review. <i>Addictive Disorders & Their Treatment</i> . 2008;7(4):190-198.	Ineligible publication type
Adams M, An Q, Broz D, Burnett J, Wejnert C, Paz-Bailey G. Distributive syringe sharing and use of syringe services programs (SSPs) among persons who inject drugs. <i>AIDS and Behavior</i> . 2019;23(12):3306-3314.	Ineligible study design
Aitken CK, Kerger M, Crofts N. Peer-delivered hepatitis C testing and counselling: A means of improving the health of injecting drug users. <i>Drug and Alcohol Review</i> . 2002;21(1):33-37.	Ineligible study design
Alanko Blome M, Bjorkman P, Flamholz L, Jacobsson H, Widell A. Vaccination against hepatitis B virus among people who inject drugs - A 20year experience from a Swedish needle exchange program. <i>Vaccine</i> . 2017;35(1):84-90.	Ineligible outcome
Allen EJ, Palmateer NE, Hutchinson SJ, Cameron S, Goldberg DJ, Taylor A. Association between harm reduction intervention uptake and recent hepatitis C infection among people who inject drugs attending sites that provide sterile injecting equipment in Scotland. <i>International Journal of Drug Policy</i> . 2012;23(5):346-352.	Ineligible study design
Allen ST, Grieb SM, O'Rourke A, et al. Understanding the public health consequences of suspending a rural syringe services program: A qualitative study of the experiences of people who inject drugs. <i>Harm Reduction Journal</i> . 2019;16.	Ineligible comparator
Allen ST, Schneider KE, Mazhnaya A, et al. Factors Associated with Likelihood of Initiating Others into Injection Drug Use Among People Who Inject Drugs in West Virginia. <i>AIDS and behavior</i> . 2022;26(1):47-56.	Ineligible outcome
Alpren C, Dawson EL, John B, et al. Opioid Use Fueling HIV Transmission in an Urban Setting: An Outbreak of HIV Infection Among People Who Inject Drugs-Massachusetts, 2015-2018. <i>American journal of public health</i> . 2020;110(1):37-44.	Ineligible study design
Amundsen EJ, Eskild A, Stigum H, Smith E, Aalen OO. Legal access to needles and syringes/needle exchange programmes versus HIV counselling and testing to prevent transmission of HIV among intravenous drug users: A comparative study of Denmark, Norway and Sweden. <i>European Journal of Public Health</i> . 2003;13(3):252-258.	Ineligible study design
Andia JF, Deren S, Robles RR, Kang S-Y, Colon HM. Peer norms and sharing of injection paraphernalia among Puerto Rican injection drug users in New York and Puerto Rico. <i>AIDS Education and Prevention</i> . 2008;20(3):249-257.	Ineligible study design
Anonymous. Drug abuse. Study says clean drug needles cut HIV infections in half. <i>AIDS policy & law</i> . 1994;9(23):1-7.	Unable to locate FT
Anonymous. Needle exchange ends HIV transmission in Swiss jail. <i>AIDS policy & law</i> . 1996;11(13):9.	Ineligible publication type
Anonymous. Update: syringe exchange programs--United States, 1997. <i>MMWR Morbidity and mortality weekly report</i> . 1998;47(31):652-655.	Ineligible outcome
Anonymous. Update: syringe exchange programs--United States, 2002. <i>MMWR Morbidity and mortality weekly report</i> . 2005;54(27):673-676.	Ineligible comparator
Azores-Gococo NM, Fridberg DJ. Harm-reduction strategies for injection drug use. <i>Psychiatric Annals</i> . 2017;47(1):45-48.	Ineligible publication type

Citation	Exclude Reason
Bartholomew TS, Tookes HE, Serota DP, Behrends CN, Forrest DW, Feaster DJ. Impact of routine opt-out HIV/HCV screening on testing uptake at a syringe services program: An interrupted time series analysis. <i>The International journal on drug policy</i> . 2020;84:102875.	Ineligible outcome
Bayani A, Ghasvand H, Rezaei O, et al. Factors associated with HIV testing among people who inject drugs: a meta-analysis. <i>Journal of addictive diseases</i> . 2020;38(3):361-374.	Ineligible outcome
Behrends CN. Evaluating the impact of satellite syringe exchange on reducing hiv risk behavior and seroconversion among people who inject drugs. <i>Dissertation Abstracts International: Section B: The Sciences and Engineering</i> . 2016;76(7-B(E)):No-Specified.	Ineligible intervention
Behrends CN, Li C-S, Gibson DR. Decreased odds of injection risk behavior associated with direct versus indirect use of syringe exchange: Evidence from two California cities. <i>Substance Use & Misuse</i> . 2017;52(9):1145-1153.	Ineligible study design
Behrends CN, Nugent AV, Des Jarlais DC, Frimpong JA, Perlman DC, Schackman BR. Availability of HIV and HCV On-Site Testing and Treatment at Syringe Service Programs in the United States. <i>Journal of acquired immune deficiency syndromes (1999)</i> . 2018;79(2):e76-e78.	Ineligible outcome
Belisle LA, Solano-Patricio EDC. Harm reduction: a public health approach to prison drug use. <i>International journal of prisoner health</i> . 2021;ahead-of-print(ahead-of-print).	Ineligible publication type
Benninghoff F, Morency P, Geense R, Huissoud T, Dubois-Arber F. Health trends among drug users attending needle exchange programmes in Switzerland (1994-2000). <i>AIDS Care</i> . 2006;18(4):371-375.	Ineligible comparator
Betteridge G. Germany: study shows effectiveness of prison needle exchange. <i>HIV/AIDS policy & law review</i> . 2006;11(1):33-36.	Ineligible publication type
Bhattacharya MK, Naik TN, Palit A, Bhattacharya SK. Impact of a harm-reduction programme on soft tissue infections among injecting drug users of Kolkata, India. <i>Journal of health, population, and nutrition</i> . 2006;24(1):121-122.	Ineligible outcome
Birkhead GS, Klein SJ, Candelas AR, et al. Integrating multiple programme and policy approaches to hepatitis C prevention and care for injection drug users: A comprehensive approach. <i>International Journal of Drug Policy</i> . 2007;18(5):417-425.	Ineligible publication type
Blome MA, Bjorkman P, Flamholz L, Jacobsson H, Molnegren V, Widell A. Minimal transmission of HIV despite persistently high transmission of hepatitis C virus in a Swedish needle exchange program. <i>Journal of viral hepatitis</i> . 2011;18(12):831-839.	Ineligible study design
Bluthenthal RN, Gogineni A, Longshore D, Stein M. Factors associated with readiness to change drug use among needle-exchange users. <i>Drug and Alcohol Dependence</i> . 2001;62(3):225-230.	Ineligible outcome
Bluthenthal RN, Kral AH, Erringer EA, Edlin BR. Use of an illegal syringe exchange and injection-related risk behaviors among street-recruited injection drug users in Oakland, California, 1992 to 1995. <i>Journal of acquired immune deficiency syndromes and human retrovirology : official publication of the International Retrovirology Association</i> . 1998;18(5):505-511.	Ineligible study design
Bluthenthal RN, Kral AH, Gee L, Erringer EA, Edlin BR. The effect of syringe exchange use on high-risk injection drug users: a cohort study. <i>AIDS (London, England)</i> . 2000;14(5):605-611.	Ineligible study design
Borquez A, Abramovitz D, Cepeda J, et al. Syringe sharing among people who inject drugs in Tijuana: Before and after the Global Fund. <i>Salud Mental</i> . 2019;42(4):149-156.	Ineligible study design

Citation	Exclude Reason
Bråbäck M, Ekström L, Troberg K, et al. Malmö Treatment Referral and Intervention Study—High 12-Month Retention Rates in Patients Referred from Syringe Exchange to Methadone or Buprenorphine/Naloxone Treatment. <i>Front Psychiatry</i> . 2017;8:161.	Ineligible comparator
Braine N, Des Jarlais DC, Ahmad S, Purchase D, Turner C. Long-Term Effects of Syringe Exchange on Risk Behavior and HIV Prevention. <i>AIDS Education and Prevention</i> . 2004;16(3):264-275.	Ineligible comparator
Bravo MJ, Royuela L, Barrio G, Brugal MT, Domingo A, de la Fuente L. Access to sterile syringes among young drug injectors in Madrid and Barcelona and its association with risk behaviour. <i>Gaceta sanitaria</i> . 2008;22(2):128-132.	Ineligible study design
Bravo MJ, Royuela L, Barrio G, de la Fuente L, Suarez M, Brugal MT. More free syringes, fewer drug injectors in the case of Spain. <i>Social Science & Medicine</i> . 2007;65(8):1773-1778.	Ineligible outcome
Brennan R, Wells JSG, Van Hout MC. The injecting use of image and performance-enhancing drugs (IPED) in the general population: a systematic review. <i>Health & social care in the community</i> . 2017;25(5):1459-1531.	Ineligible outcome
Broz D, Carnes N, Chapin-Bardales J, et al. Syringe services programs' role in ending the HIV epidemic in the U.S.: Why we cannot do it without them. <i>American Journal of Preventive Medicine</i> . 2021;61(5, Suppl 1):S118-S129.	Ineligible publication type
Bruneau J, Brogly SB, Tyndall MW, Lamothe F, Franco EL. Intensity of drug injection as a determinant of sustained injection cessation among chronic drug users: The interface with social factors and service utilization. <i>Addiction</i> . 2004;99(6):727-737.	Ineligible outcome
Bryant J, Topp L, Hopwood M, Iversen J, Treloar C, Maher L. Is point of access to needles and syringes related to needle sharing? Comparing data collected from pharmacies and needle and syringe programs in South-East Sydney. <i>Drug and Alcohol Review</i> . 2010;29(4):364-370.	Ineligible comparator
Buning EC. Effects of Amsterdam needle and syringe exchange. <i>The International journal of the addictions</i> . 1991;26(12):1303-1311.	Ineligible study design
Bushling C, Walton MT, Conner KL, et al. Syringe services programs in the Bluegrass: Evidence of population health benefits using Kentucky Medicaid data. <i>The Journal of rural health : official journal of the American Rural Health Association and the National Rural Health Care Association</i> . 2022;38(3):620-629.	Ineligible outcome
Cardell D. Maintaining the health of sex workers through outreach work. <i>Professional nurse (London, England)</i> . 2001;17(1):31.	Ineligible outcome
Carvell AM, Hart GJ. Help-seeking and referrals in a needle exchange: A comprehensive service to injecting drug users. <i>British Journal of Addiction</i> . 1990;85(2):235-240.	Ineligible comparator
Castillo T. Spotlight on the Safety Net: Hepatitis C Virus Infection and Syringe Exchange Programs. <i>North Carolina medical journal</i> . 2016;77(3):224-225.	Ineligible publication type
Clarke K. The case of a needle exchange policy debate in Fresno, California. <i>Critical Social Policy</i> . 2016;36(2):289-306.	Ineligible study design
Clarke K, Harris D, Zweifler JA, Lasher M, Mortimer RB, Hughes S. The Significance of Harm Reduction as a Social and Health Care Intervention for Injecting Drug Users: An Exploratory Study of a Needle Exchange Program in Fresno, California. <i>Social work in public health</i> . 2016;31(5):398-407.	Ineligible study design
Coffin P. Syringe availability as HIV prevention: a review of modalities. <i>Journal of urban health : bulletin of the New York Academy of Medicine</i> . 2000;77(3):306-330.	Outdated or ineligible SR
Cooper H, Des Jarlais D, Ross Z, Tempalski B, Bossak BH, Friedman SR. Spatial access to sterile syringes and the odds of injecting with an unsterile syringe among	Ineligible study design

Citation	Exclude Reason
injectors: a longitudinal multilevel study. <i>Journal of urban health : bulletin of the New York Academy of Medicine</i> . 2012;89(4):678-696.	
Cooper HLF, Des Jarlais DC, Ross Z, Tempalski B, Bossak B, Friedman SR. Spatial access to syringe exchange programs and pharmacies selling over-the-counter syringes as predictors of drug injectors' use of sterile syringes. <i>American journal of public health</i> . 2011;101(6):1118-1125.	Ineligible study design
Crawford ND, Myers S, Young H, Klepser D, Tung E. The Role of Pharmacies in the HIV Prevention and Care Continuums: A Systematic Review. <i>AIDS and behavior</i> . 2021;25(6):1819-1828.	Outdated or ineligible SR
Davis SM. Needle exchange programs to prevent Hepatitis C virus infection in people who inject drugs in rural Appalachia. <i>Dissertation Abstracts International: Section B: The Sciences and Engineering</i> . 2018;79(9-B(E)):No-Specified.	Duplicate
DeCuir J, Lovasi GS, El-Sayed A, Lewis CF. The association between neighborhood socioeconomic disadvantage and high-risk injection behavior among people who inject drugs. <i>Drug and Alcohol Dependence</i> . 2018;183:184-191.	Ineligible study design
Deren S, Naegle M, Hagan H, Ompad DC. Continuing Links Between Substance Use and HIV Highlight the Importance of Nursing Roles. <i>The Journal of the Association of Nurses in AIDS Care : JANAC</i> . 2017;28(4):622-632.	Ineligible publication type
Deryabina AP. An assessment of needle-syringe program for people who inject drugs in the Kyrgyz Republic. <i>Dissertation Abstracts International: Section B: The Sciences and Engineering</i> . 2017;78(2-B(E)):No-Specified.	Ineligible comparator
Des Jarlais DC, Arasteh K, Hagan H, McKnight C, Perlman DC, Friedman SR. Persistence and change in disparities in HIV infection among injection drug users in New York City after large-scale syringe exchange programs. <i>American Journal of Public Health</i> . 2009;99(Suppl 2):S445-S451.	Ineligible study design
Des Jarlais DC, Braine N, Yi H, Turner C. Residual injection risk behavior, HIV infection, and the evaluation of syringe exchange programs. <i>AIDS education and prevention : official publication of the International Society for AIDS Education</i> . 2007;19(2):111-123.	Ineligible comparator
Des Jarlais DC, Feelemyer JP, Modi SN, Abdul-Quader A, Hagan H. High coverage needle/syringe programs for people who inject drugs in low and middle income countries: a systematic review. <i>BMC public health</i> . 2013;13:53.	Outdated or ineligible SR
Des Jarlais DC, Fisher DG, Newman JC, et al. Providing hepatitis B vaccination to injection drug users: referral to health clinics vs on-site vaccination at a syringe exchange program. <i>American journal of public health</i> . 2001;91(11):1791-1792.	Ineligible intervention
Des Jarlais DC, Friedmann P, Grund J-P, et al. HIV risk behaviour among participants of syringe exchange programmes in central/eastern Europe and Russia. <i>International Journal of Drug Policy</i> . 2002;13(3):165-170.	Ineligible comparator
Des Jarlais DC, Kling R, Hammett TM, et al. Reducing HIV infection among new injecting drug users in the China-Vietnam Cross Border Project. <i>AIDS</i> . 2007;21(Suppl8):S109-S114.	Ineligible study design
Des Jarlais DC, Marmor M, Paone D, et al. HIV incidence among injecting drug users in New York City syringe-exchange programmes. <i>Lancet (London, England)</i> . 1996;348(9033):987-991.	Ineligible study design
Des Jarlais DC, Perlis T, Arasteh K, et al. Reductions in hepatitis C virus and HIV infections among injecting drug users in New York City, 1990-2001. <i>AIDS (London, England)</i> . 2005;19 Suppl 3:S20-25.	Ineligible study design
Des Jarlais DC, Sloboda Z, Friedman SR, Tempalski B, McKnight C, Braine N. Diffusion of the D.A.R.E and Syringe Exchange Programs. <i>American Journal of Public Health</i> . 2006;96(8):1354-1357.	Ineligible publication type

Citation	Exclude Reason
Dickson NP, Austin FJ, Paul C, Sharples KJ, Skegg DC. HIV surveillance by testing saliva from injecting drug users: a national study in New Zealand. <i>Journal of epidemiology and community health</i> . 1994;48(1):55-57.	Ineligible comparator
Dolan KA, Donoghoe MC, Stimson GV. Reductions in HIV risk behaviour and stable HIV prevalence in syringe-exchange clients and other injectors in England. <i>Drug and alcohol review</i> . 1993;12(2):133-142.	Ineligible outcome
Dolan K, Rutter S, Wodak AD. Prison-based syringe exchange programmes: A review of international research and development. <i>Addiction</i> . 2003;98(2):153-158.	Outdated or ineligible SR
Drucker E, Lurie P, Wodak A, Alcabes P. Measuring harm reduction: the effects of needle and syringe exchange programs and methadone maintenance on the ecology of HIV. <i>AIDS (London, England)</i> . 1998;12 Suppl A:S217-230.	Outdated or ineligible SR
Durante AJ, Hart GJ, Brady AR, Madden PB, Noone A. The Health of the Nation target on syringe sharing: A role for routine surveillance in assessing progress and targeting interventions. <i>Addiction</i> . 1995;90(10):1389-1396.	Ineligible study design
Dutta A, Wirtz AL, Baral S, Beyrer C, Cleghorn FR. Key harm reduction interventions and their impact on the reduction of risky behavior and HIV incidence among people who inject drugs in low-income and middle-income countries. <i>Current opinion in HIV and AIDS</i> . 2012;7(4):362-368.	Ineligible study design
Fernando D. Syringe and needle exchange to prevent HIV infection. <i>JAMA</i> . 1994;271(23):1825-1827.	Ineligible publication type
Fisher DG, Fenaughty AM, Cagle HH, Reynolds GL. Injection drug users' use of pharmacies for purchasing needles in Anchorage, Alaska. <i>Special Issue: Sterile Syringe Access for Injection Drug Users in the 21st Century: Progress and prospects</i> . 2003;14(5-6):381-387.	Ineligible comparator
Fisher DG, Harbke CR, Canty JR, Reynolds GL. Needle and syringe cleaning practices among injection drug users. <i>Journal of Drug Education</i> . 2002;32(2):167-178.	Ineligible study design
Fisher DG, Reynolds GL, Harbke CR. Selection effect of needle exchange in Anchorage, Alaska. <i>Journal of urban health : bulletin of the New York Academy of Medicine</i> . 2002;79(1):128-135.	Ineligible outcome
Frangakis CE, Brookmeyer RS, Varadhan R, Safaeian M, Vlahov D, Strathdee SA. Methodology for Evaluating a Partially Controlled Longitudinal Treatment Using Principal Stratification, With Application to a Needle Exchange Program. <i>Journal of the American Statistical Association</i> . 2004;99(465):239-249.	Ineligible publication type
Franken IH, Kaplan CD. Risk contexts and risk behaviors in the Euregion Maas-Rhein: the Boule de Neige intervention for AIDS prevention among drug users. <i>AIDS education and prevention : official publication of the International Society for AIDS Education</i> . 1997;9(2):161-180.	Unable to locate FT
Friedman SR, West BS, Tempalski B, et al. Do metropolitan HIV epidemic histories and programs for people who inject drugs and men who have sex with men predict AIDS incidence and mortality among heterosexuals? <i>Annals of epidemiology</i> . 2014;24(4):304-311.	Ineligible study design
Frischer M, Elliott L, Taylor A, et al. Do needle exchanges help to control the spread of HIV among injecting drug users? <i>AIDS (London, England)</i> . 1993;7(12):1677-1678.	Ineligible study design
Frischer M, Taylor A, Goldberg D, Elliott L. Direct evaluation of needle and syringe exchange programmes. <i>Lancet (London, England)</i> . 1996;347(9003):768.	Ineligible study design
Gagnon H, Godin G, Alary M, Bruneau J, Otis J. A randomized trial to evaluate the efficacy of a computer-tailored intervention to promote safer injection practices among drug users. <i>AIDS & Behavior</i> . 2010;14(3):538-548.	Ineligible intervention

Citation	Exclude Reason
Gibson DR, Flynn NM, Perales D. Effectiveness of syringe exchange programs in reducing HIV risk behavior and HIV seroconversion among injecting drug users. <i>AIDS</i> (London, England). 2001;15(11):1329-1341.	Outdated or ineligible SR
Gibson EK, Exner H, Stone R, Lindquist J, Cowen L, Roth EA. A mixed methods approach to delineating and understanding injection practices among clientele of a Victoria, British Columbia needle exchange program. <i>Drug and Alcohol Review</i> . 2011;30(4):360-365.	Ineligible study design
Gicquelais RE, Genberg BL, Astemborski J, Celentano DD, Kirk GD, Mehta SH. Association of Injection Practices and Overdose With Drug Use Typologies: A Latent Class Analysis Among People Who Inject Drugs in Baltimore, 2017. <i>AIDS Education & Prevention</i> . 2019;31(4):344-362.	Ineligible outcome
Goldberg D, Burns S, Taylor A, Cameron S, Hargreaves D, Hutchinson S. Trends in HCV prevalence among injecting drug users in Glasgow and Edinburgh during the era of needle/syringe exchange. <i>Scandinavian journal of infectious diseases</i> . 2001;33(6):457-461.	Ineligible study design
Golub ET, Strathdee SA, Bailey SL, et al. Distributive syringe sharing among young adult injection drug users in five U.S. Cities. <i>Drug and Alcohol Dependence</i> . 2007;91(Suppl 1):S30-S38.	Ineligible study design
Gostin LO, Lazzarini Z. Prevention of HIV/AIDS among injection drug users: the theory and science of public health and criminal justice approaches to disease prevention. <i>Emory law journal</i> . 1997;46(2):587-696.	Ineligible publication type
Gray J. Operating needle exchange programmes in the hills of Thailand. <i>AIDS Care</i> . 1995;7(4):489-499.	Ineligible study design
Gray J. Harm reduction in the hills of Northern Thailand. Special Issue: Needle exchange policy and practice: International perspective. 1998;33(5):1075-1091.	Ineligible study design
Gruer L, Cameron J, Elliott L. Building a city wide service for exchanging needles and syringes. <i>BMJ (Clinical research ed)</i> . 1993;306(6889):1394-1397.	Ineligible comparator
Guenter CD, Fonseca K, Nielsen DM, Wheeler VJ, Pim CP. HIV prevalence remains low among Calgary's needle exchange program participants. <i>Canadian journal of public health = Revue canadienne de sante publique</i> . 2000;91(2):129-132.	Ineligible comparator
Guydish J, Bucardo J, Clark G, Bernheim S. Evaluating needle exchange: a description of client characteristics, health status, program utilization, and HIV risk behavior. <i>Substance use & misuse</i> . 1998;33(5):1173-1196.	Ineligible study design
Guydish J, Bucardo J, Young M, Woods W, Grinstead O, Clark W. Evaluating needle exchange: are there negative effects? <i>AIDS</i> (London, England). 1993;7(6):871-876.	Ineligible comparator
Hagan H, Des Jarlais DC, Purchase D, Reid T, Friedman SR. The Tacoma Syringe Exchange. <i>Journal of Addictive Diseases</i> . 1991;10(4):81-88.	Ineligible publication type
Hagan H, Jarlais DC, Friedman SR, Purchase D, Alter MJ. Reduced risk of hepatitis B and hepatitis C among injection drug users in the Tacoma syringe exchange program. <i>American journal of public health</i> . 1995;85(11):1531-1537.	Ineligible study design
Hagan H, McGough JP, Thiede H, Weiss NS, Hopkins S, Alexander ER. Syringe exchange and risk of infection with hepatitis B and C viruses. <i>American journal of epidemiology</i> . 1999;149(3):203-213.	Ineligible study design
Hagan H, Reid T, Des Jarlais DC, Purchase D, Friedman SR, Bell TA. The incidence of HBV infection and syringe exchange programs. <i>JAMA</i> . 1991;266(12):1646-1647.	Ineligible publication type
Hagan H, Thiede H. Changes in injection risk behavior associated with participation in the Seattle needle-exchange program. <i>Journal of urban health : bulletin of the New York Academy of Medicine</i> . 2000;77(3):369-382.	Ineligible study design

Citation	Exclude Reason
Hainsworth SW, Dietze PM, Wilson DP, Sutton B, Hellard ME, Scott N. Hepatitis C virus notification rates in Australia are highest in socioeconomically disadvantaged areas. <i>PloS one</i> . 2018;13(6):e0198336.	Ineligible study design
Handanagic S, Sevic S, Barbaric J, et al. Correlates of anti-hepatitis C positivity and use of harm reduction services among people who inject drugs in two cities in Croatia. <i>Drug and alcohol dependence</i> . 2017;171:132-139.	Ineligible study design
Hart GJ, Carvell AL, Woodward N, Johnson AM, Williams P, Parry JV. Evaluation of needle exchange in central London: Behaviour change and anti-HIV status over one year. <i>AIDS</i> . 1989;3(5):261-265.	Ineligible study design
Heimer R. Can syringe exchange serve as a conduit to substance abuse treatment? <i>Journal of Substance Abuse Treatment</i> . 1998;15(3):183-191.	Ineligible comparator
Heimer R. Community coverage and HIV prevention: Assessing metrics for estimating HIV incidence through syringe exchange. <i>International Journal of Drug Policy</i> . 2008;19(S).	Ineligible outcome
Heimer R, Kaplan EH, Khoshnood K, Jariwala B, Cadman EC. Needle exchange decreases the prevalence of HIV-1 proviral DNA in returned syringes in New Haven, Connecticut. <i>The American journal of medicine</i> . 1993;95(2):214-220.	Ineligible study design
Heimer R, Khoshnood K, Bigg D, Guydish J, Junge B. Syringe use and reuse: effects of syringe exchange programs in four cities. <i>Journal of acquired immune deficiency syndromes and human retrovirology : official publication of the International Retrovirology Association</i> . 1998;18 Suppl 1:S37-44.	Ineligible comparator
Henderson LA, Vlahov D, Celentano DD, Strathdee SA. Readiness for cessation of drug use among recent attenders and nonattenders of a needle exchange program. <i>Journal of acquired immune deficiency syndromes (1999)</i> . 2003;32(2):229-237.	Ineligible outcome
Hope V, Parry JV, Marongui A, Ncube F. Hepatitis C infection among recent initiates to injecting in England 2000-2008: Is a national hepatitis C action plan making a difference? <i>Journal of viral hepatitis</i> . 2012;19(1):55-64.	Ineligible study design
Hope VD, McVeigh J, Begley E, et al. Factors associated with hepatitis C and HIV testing uptake among men who inject image and performance enhancing drugs. <i>Drug and alcohol review</i> . 2021;40(4):586-596.	Ineligible intervention
Howell J, Traeger MW, Williams B, et al. The impact of point-of-care hepatitis C testing in needle and syringe exchange programs on linkage to care and treatment uptake among people who inject drugs: An Australian pilot study. <i>Journal of viral hepatitis</i> . 2022;29(5):375-384.	Ineligible comparator
Hu Y. Evaluation of hepatitis B vaccination of injection drug users through syringe exchange programs. <i>Dissertation Abstracts International: Section B: The Sciences and Engineering</i> . 2009;70(1-B):238.	Ineligible intervention
Huang S-P, Huang S-D. Determination of organochlorine pesticides in water using solvent cooling assisted dynamic hollow-fiber-supported headspace liquid-phase microextraction. <i>Journal of chromatography A</i> . 2007;1176(1-2):19-25.	Ineligible study design
Hudoba M, Grenyer B, O'Toole M. Development of an enhanced needle and syringe programme: the First Step programme pilot. <i>Drug and alcohol review</i> . 2004;23(3):295-297.	Ineligible comparator
Huo D, Bailey SL, Garfein RS, Ouellet LJ. Changes in the Sharing of Drug Injection Equipment among Street-Recruited Injection Drug Users in Chicago, Illinois, 1994-1996. <i>Substance Use & Misuse</i> . 2005;40(1):63-76.	Ineligible intervention
Huo D, Bailey SL, Hershow RC, Ouellet L. Drug Use and HIV Risk Practices of Secondary and Primary Needle Exchange Users. <i>AIDS Education and Prevention</i> . 2005;17(2):170-184.	Ineligible study design

Citation	Exclude Reason
Huo D, Ouellet LJ. Needle exchange and injection-related risk behaviors in Chicago: A longitudinal study. <i>JAIDS Journal of Acquired Immune Deficiency Syndromes</i> . 2007;45(1):108-114.	Ineligible study design
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Stimson G, Alldritt L, Dolan K, Donoghoe M. Preventing the spread of HIV in injecting drug users--the experience of syringe-exchange schemes in England and Scotland. <i>NIDA research monograph</i> . 1988;90:302-310.	Ineligible publication type
Stover H. Evaluation of needle exchange pilot projects shows positive results. <i>Canadian HIV-AIDS policy & law newsletter</i> . 2000;5(2-3):60-69.	Unable to locate FT
Strathdee SA, Lozada R, Martinez G, et al. Social and structural factors associated with HIV infection among female sex workers who inject drugs in the Mexico-US border region. <i>PLoS one</i> . 2011;6(4):e19048.	Ineligible study design
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Strike C, Miskovic M. Scoping out the literature on mobile needle and syringe programs-review of service delivery and client characteristics, operation, utilization, referrals, and impact. <i>Harm reduction journal</i> . 2018;15(1):6.	Ineligible publication type
Strike C, Rudzinski K, Patterson J, Millson M. Frequent food insecurity among injection drug users: correlates and concerns. <i>BMC public health</i> . 2012;12:1058.	Ineligible intervention
Telles PR. Preventing HIV/AIDS and other sexually transmitted diseases among injecting drug users in Rio de Janeiro. <i>International Journal of Drug Policy</i> . 1999;10(5):365-373.	Ineligible outcome
Tempalski B, Beane S, Cooper HLF, et al. Structural determinants of Black MSM HIV testing coverage (2011-2016). <i>AIDS and Behavior</i> . 2020;24(9):2572-2587.	Ineligible outcome
Todd CS, Nasir A, Stanekzai MR, et al. Hepatitis C and HIV incidence and harm reduction program use in a conflict setting: an observational cohort of injecting drug users in Kabul, Afghanistan. <i>Harm reduction journal</i> . 2015;12:22.	Ineligible study design
Todd CS, Stibich MA, Stanekzai MR, et al. A qualitative assessment of injection drug use and harm reduction programmes in Kabul, Afghanistan: 2006-2007. <i>International Journal of Drug Policy</i> . 2009;20(2):111-120.	Ineligible outcome
Tomolillo CM, Crothers LJ, Aberson CL. The damage done: A study of injection drug use, injection related abscesses and needle exchange regulation. <i>Substance Use & Misuse</i> . 2007;42(10):1603-1611.	Ineligible outcome
Tookes H, Bartholomew TS, Geary S, et al. Rapid identification and investigation of an HIV risk network among people who inject drugs -Miami, FL, 2018. <i>AIDS and Behavior</i> . 2020;24(1):246-256.	Ineligible intervention
Tookes HE, Oxner A, Serota DP, et al. Project T-SHARP: study protocol for a multi-site randomized controlled trial of tele-harm reduction for people with HIV who inject drugs. <i>Trials</i> . 2023;24(1):96.	Ineligible intervention
Tortu S, Deren S, Beardsely M, Hamid R. Factors associated with needle exchange use in East Harlem, New York City. <i>Journal of Drug Issues</i> . 1996;26(4):735-749.	Unable to locate FT
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Uuskula A, McMahon JM, Raag M, et al. Emergent properties of HIV risk among injection drug users in Tallinn, Estonia: synthesis of individual and neighbourhood-level factors. <i>Sexually transmitted infections</i> . 2010;86 Suppl 3:iii79-84.	Ineligible study design
Valenciano M, Emmanuelli J, Lert F. Unsafe injecting practices among attendees of syringe exchange programmes in France. <i>Addiction</i> . 2001;96(4):597-606.	Ineligible comparator
van Ameijden EJ, van den Hoek AR, Coutinho RA. Injecting risk behavior among drug users in Amsterdam, 1986 to 1992, and its relationship to AIDS prevention programs. <i>American journal of public health</i> . 1994;84(2):275-281.	Ineligible study design
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Citation	Exclude Reason
van der Meulen E, Watson TM, De Shalit A. Insights on prison needle and syringe programs: Research with former prisoners in Canada. <i>The Prison Journal</i> . 2017;97(5):628-643.	Ineligible comparator
van Santen DK, Boyd A, Matser A, et al. The effect of needle and syringe program and opioid agonist therapy on the risk of HIV, hepatitis B and C virus infection for people who inject drugs in Amsterdam, the Netherlands: findings from an emulated target trial. <i>Addiction</i> . 2021;116(11):3115-3126.	Ineligible study design
van Santen DK, Coutinho RA, van den Hoek A, van Brussel G, Buster M, Prins M. Lessons learned from the Amsterdam Cohort Studies among people who use drugs: A historical perspective. <i>Harm Reduction Journal</i> . 2021;18.	Ineligible study design
van Santen DK, Lodi S, Dietze P, et al. Comprehensive needle and syringe program and opioid agonist therapy reduce HIV and hepatitis c virus acquisition among people who inject drugs in different settings: A pooled analysis of emulated trials. <i>Addiction</i> (Abingdon, England). 2023.	Ineligible study design
Vlahov D, Brookmeyer RS. The evaluation of needle exchange programs. <i>American journal of public health</i> . 1994;84(12):1889-1891.	Ineligible publication type
Vlahov D, Junge B. The role of needle exchange programs in HIV prevention. <i>Public health reports</i> (Washington, DC : 1974). 1998;113 Suppl 1:75-80.	Ineligible publication type
Vlahov D, Robertson AM, Strathdee SA. Prevention of HIV infection among injection drug users in resource-limited settings. <i>Clinical infectious diseases : an official publication of the Infectious Diseases Society of America</i> . 2010;50 Suppl 3:S114-121.	Ineligible publication type
Vlahov D, Ryan C, Solomon L, Cohn S, Holt MR, Akhter MN. A pilot syringe exchange program in Washington, DC. <i>American Journal of Public Health</i> . 1994;84(2):303-304.	Ineligible comparator
Watson DP, Swartz JA, Robison-Taylor L, et al. Syringe service program-based telemedicine linkage to opioid use disorder treatment: protocol for the STAMINA randomized control trial. <i>BMC public health</i> . 2021;21(1):630.	Ineligible publication type
Werb D, Kerr T, Buxton J, et al. Patterns of injection drug use cessation during an expansion of syringe exchange services in a Canadian setting. <i>Drug and alcohol dependence</i> . 2013;132(3):535-540.	Ineligible outcome
White RH, O'Rourke A, Kilkenny ME, et al. Prevalence and correlates of receptive syringe-sharing among people who inject drugs in rural Appalachia. <i>Addiction</i> . 2021;116(2):328-336.	Ineligible study design
Whiteman A, Burnett J, Handanagic S, Wejnert C, Broz D. Distance matters: The association of proximity to syringe services programs with sharing of syringes and injecting equipment-17 U.S. cities, 2015. <i>International Journal of Drug Policy</i> . 2020;85.	Ineligible study design
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Wodak A. Lessons From the First International Review of the Evidence for Needle Syringe Programs: The Band Still Plays On. Special Issue: Syringe Access and Secondary Syringe Exchange: International Perspectives and Future Directions. 2006;41(6-7):837-839.	Ineligible publication type
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Citation	Exclude Reason
Wolk J, Wodak A, Guinan JJ, Macaskill P, Simpson JM. The effect of a needle and syringe exchange on a methadone maintenance unit. <i>British Journal of Addiction</i> . 1990;85(1):1445-1450.	Ineligible outcome
Wood E, Lloyd-Smith E, Li K, et al. Frequent needle exchange use and HIV incidence in Vancouver, Canada. <i>The American journal of medicine</i> . 2007;120(2):172-179.	Ineligible study design
Wood E, Tyndall MW, Spittal PM, et al. Factors associated with persistent high-risk syringe sharing in the presence of an established needle exchange programme. <i>AIDS</i> . 2002;16(6):941-943.	Unable to locate FT
Wu Q, Kamphuis C, Duo L, Luo J, Chen Y, Richardus JH. Coverage of harm reduction services and HIV infection: A multilevel analysis of five Chinese cities. <i>Harm Reduction Journal</i> . 2017;14.	Ineligible study design
Yang C-H, Yang S-Y, Shen M-H, Kuo H-S. The changing epidemiology of prevalent diagnosed HIV infections in Taiwan, 1984-2005. <i>International Journal of Drug Policy</i> . 2008;19(4):317-323.	Ineligible study design
Yee WL, Draper B, Myint KT, et al. Access to needles and syringes and methadone maintenance therapy among people who inject drugs in Yangon, Myanmar: a qualitative study. <i>Harm reduction journal</i> . 2022;19(1):107.	Ineligible comparator
Yoast R, Williams MA, Deitchman SD, Champion HC. Report of the Council on Scientific Affairs: Methadone maintenance and needle-exchange programs to reduce the medical and public health consequences of drug abuse. <i>Journal of Addictive Diseases</i> . 2001;20(2):15-40.	Ineligible publication type
Zaw C, Mehra D. The efficacy of syringe services programs in reducing skin and soft tissue infection-associated healthcare costs and multidrug-resistant bacteria. <i>American journal of infection control</i> . 2020;48(4):467-468.	Ineligible publication type

UNDERWAY STUDIES

Citation

NCT02654366. Community Supported Risk Reduction for Syringe Exchange Participants. CN-01555077.
<https://clinicaltrials.gov/show/NCT02654366>.

NCT01557998. Testing and Linkage to Care for Injecting Drug Users in Kenya. CN-01591363.
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CHARACTERISTICS OF INCLUDED PRIMARY STUDIES

Study	City/State Country	Sample Size Follow-up	Participant Characteristics	Non-Prescribed Substance(s) Use	Intervention/Exposure and Comparator (if applicable)	Included Outcome(s)
RCTs						
Braback 2016 ⁸⁵	Skane Sweden	N=75 NR	Mean age: 37 % Male: 73 Race/ethnicity NR	Heroin	SSP clients receiving a strength-based case management intervention to facilitate treatment referral compared to SSP clients receiving referral only	Linkage to treatment/utilization of referred services ^a
Fisher 2003 ³	Alaska US	N=600 12 mos	Mean age: 39 % Male: 76 % AA/Black: 19 % Native American: 20 % Other: 5 % White: 56	Heroin, cocaine, speedball, other opioids, amphetamines	Randomized to SSP access or training on acquiring needles from pharmacies	Injection frequency
Lewis 2015 ^{b 29}	New York, NY US	N=592 3 mos	Mean age: 44 % Male: 69 % AA/Black: 29 % Hispanic: 51 % White: 16	NR	Pharmacies that received harm reduction training and provided additional services compared to pharmacies providing usual care	Unsafe disposal of syringes
Cohort Studies						
Broner 1998 ^{28,87}	Baltimore, MD US	N=325 1 yr	Mean age: 38 % Male: 50 % White: 41	Heroin, cocaine, sedative, cannabis	Referred to OAT from SSP compared to other referral sources	Linkage to treatment/utilization of referred services
Hagan 2000 ⁴	Seattle, WA US	N=Variable 1 yr	Age NR % Male: 62 % AA/Black: 20 % Other: 11 % White: 69	Heroin, speedball, cocaine, amphetamines	Current exchange users, new exchange users, ex-exchangers compared to never exchangers	Injection frequency, linkage to treatment/utilization of referred services
Hartgers 1989 ⁵	Amsterdam, Netherlands	N=54 Mean 13.5 mos	Mean age: 32 % Male: 70 NR	Heroin, cocaine, methadone, hashish, marijuana, tranquilizers, amphetamines	Regular exchangers (used SSP > 90% of the time) compared to irregular exchangers or non-exchangers	Injection frequency, linkage to treatment/utilization of referred services
Huo 2006 ⁹	Chicago, IL US	N=707 3 yrs	Mean age: 40 % Male: 71 % AA/Black: 44 % Non-AA/Black: 55	Heroin, speedball, powder/crack cocaine	SSP users (used SSP at least twice ever and enrolled for at least 30 days) compared to non-SSP users	Injection frequency

Study	City/State Country	Sample Size Follow-up	Participant Characteristics	Non-Prescribed Substance(s) Use	Intervention/Exposure and Comparator (if applicable)	Included Outcome(s)
Kuo 2003 ²⁶	Baltimore, MD US	N=163 3 mos	Mean age: 43 % Male: 68 % AA/Black: 99	Heroin, cocaine	Duration and frequency of SSP use	Linkage to treatment/utilization of referred services
Latkin 2006 ²⁵	Baltimore, MD US	N=440 Average 15 mos	57% age >39 yrs % Male: 68 % AA/Black: 94	Heroin, speedball, powder/crack cocaine	Current SSP utilization (past 6 mo) compared to no SSP use	Linkage to treatment/utilization of referred services
Marmor 2000 ⁶	New York, NY US	N=328 Median 29.7 mos	Mean age: 40 % Male: 78 29% AA/Black: 29 % Asian: <1 % Hispanic: 28 % Native American: <1 % Other: <1 % White: 42	Heroin, powder/crack cocaine, marijuana	Consistent or sporadic SSP users compared to no SSP use	Injection frequency
Monterroso 2000 ⁷	Multiple US	N=2,306 Mean 7.8 mos	Mean age: 38 % Male: 63 % AA/Black: 43 % Hispanic: 32 % White: 21	NR	Ever used an SSP compared to never used an SSP	Injection frequency
Schoenbaum 1996 ⁸	New York, NY US	N=329 5 yrs	Median age: 30 % Male: 65 % Black: 17 % Hispanic: 67 % White: 16	Heroin, cocaine, speedball	Ever used an SSP compared to never used an SSP	Injection frequency
Strathdee 1999 ^{27,86}	Baltimore, MD US	N=1,483 4.5 yrs	Median age: 40 % Male: 74 % AA/Black: 95 % Non-AA/Black: 5	Heroin, cocaine, speedball	SSP attendance compared to no attendance	Linkage to treatment/utilization of referred services
Pre-Post Studies						
Bartholomew 2021 ¹⁰	Miami, FL US	N=115 Variable	Median age: 38 % Male: 77 % Hispanic: 45 % Non-Hispanic Black: 4 % Non-Hispanic White: 50	Heroin, powder/crack cocaine, methamphetamine, speedball, fentanyl	SSP clients	Injection frequency

Study	City/State Country	Sample Size Follow-up	Participant Characteristics	Non-Prescribed Substance(s) Use	Intervention/Exposure and Comparator (if applicable)	Included Outcome(s)
Cox 2000 ¹¹	Ireland	N=370 3 mos	Mean age: 23 % Male: 79 Race/ethnicity NR	Heroin	SSP attendance	Injection frequency, linkage to treatment/utilization of referred services
Donoghoe 1989 ¹²	England and Scotland	N=142 Variable	Mean age: 30 % Male: 86 Race/ethnicity: NR	Heroin, methadone, amphetamine, cocaine, barbiturates, tranquilizers, others	Attendance at an SSP at least once during the 1 year period prior to the study	Injection frequency
Iversen 2013 ¹³	Multiple Australia	N=724 Variable	Mean age: 32 % Male: 65 Race/ethnicity NR	Methamphetamine, heroin, cocaine, methadone or buprenorphine, pharmaceutical opioids, others	SSP users across 3 time periods	Injection frequency
Patel 2018 ¹⁴	Indiana US	N=148 Median 10 wks	Median age: 34 % Male: 56 % Non-Hispanic White: 98 % Other: 2	Opana, heroin, methamphetamines, others	SSP clients at first and most recent visit to the SSP	Injection frequency
Schechter 1999 ¹⁵	Vancouver Canada	N=694 6 mos	Median age: 36 % Male: 68 % Aboriginal: 25 % Other: 10 % White: 65	Heroin, cocaine	Frequent SSP attendance compared to no attendance	Injection frequency
Vertefeuille 2000 ¹⁶	Baltimore, MD US	N=112 6 mos	Mean age: 40 % Male: 71 % AA/Black: 89 % Other: 11	Heroin, cocaine, speedball	SSP enrollees	Injection frequency, linkage to treatment/utilization of referred services, unsafe disposal of syringes
Vlahov 1997 ¹⁷	Baltimore, MD US	N=422 6 mos	Mean age: 38 % Male: 67 % AA/Black: 87	Heroin, speedball, cocaine	SSP enrollees	Injection frequency, linkage to treatment/utilization of referred services, unsafe disposal of syringes
Vogt 1998 ¹⁸	Hawaii US	N=208 NR	NR	NR	SSP attenders	Injection frequency

Study	City/State Country	Sample Size Follow-up	Participant Characteristics	Non-Prescribed Substance(s) Use	Intervention/Exposure and Comparator (if applicable)	Included Outcome(s)
Cross-Sectional Studies						
Allen 2021 ²⁰	Cabell County, WV US	N=420 NA	Mean age: 36 % Male: 61 % Non-Hispanic White: 84	Heroin, fentanyl, buprenorphine or Suboxone, prescription opioid, crystal methamphetamine, speedball, cocaine	Acquired sterile syringes from an SSP in the past 6 mos compared to those who did not	Naloxone distribution or use
Bluthenthal 2004 ^{32,107}	Multiple US	N=584 NA	Mean age: 41 % Male: 58 % AA/Black: 41 % Hispanic: 38 % Other: 2 % White: 18	Heroin, speedball, amphetamine, powder/crack cocaine	Residence in cities with more permissive exchange policies compared to residence in city with less permissive exchange policy	Unsafe disposal of syringes
Cleland 2007 ³⁰	New York US	N=1,030 NA	Mean age: 37 % Male: 72 % AA/Black: 13 % Hispanic: 77 % White: 11	Heroin, powder/crack cocaine	Obtained syringe used for last injection from SSP or source related to ESAP (<i>i.e.</i> , pharmacy, hospital, clinic, doctor) compared to other source	Unsafe disposal of syringes
Coffin 2007 ³³	Multiple US	N=680 NA	Mean age: 42 % Male: 62 % AA/Black: 59 % Hispanic: 21 % Other: 9 % White: 12	Heroin, powder/crack cocaine	Ever used an SSP or safe syringe source compared to never used an SSP or unsafe syringe source	Unsafe disposal of syringes
Cotton-Oldenburg 2001 ³¹	Minnesota US	N=570 NA	Mean age: 37 % Male: 66 % AA/Black: 36 % American Indian: 9 % Asian: 1 % Hispanic: 14 % Other: 3 % White: 37	Heroin, cocaine, speedball, methamphetamine, others	Time period (9-12 mos) before and after legislation allowing for legal sale of syringes by pharmacies without a prescription	Unsafe disposal of syringes
Dasgupta 2019 ³⁴	Indiana US	N=200 NA	18-25: 13% 25-34: 35% 35-44: 31% ≥45: 31% % Male: 58 % Hispanic: 2	Opana, methamphetamine, heroin, other prescription opioid	Time period before and after start of large-scale public health response to HIV outbreak including establishment of SSP	Unsafe disposal of syringes

Study	City/State Country	Sample Size Follow-up	Participant Characteristics	Non-Prescribed Substance(s) Use	Intervention/Exposure and Comparator (if applicable)	Included Outcome(s)
			% Multiracial: 5 % White: 92			
Jones 2021 ²¹	Baltimore, MD US	N=263 NA	18-44: 42% ≥45: 58% % Male: 70 % AA/Black: 61 % White: 39	Heroin, speedball, marijuana tranquilizer	Registered SSP client compared to non-client peers	Naloxone distribution or use, knowledge of overdose risk
Khoshnood 2000 ³⁵	New Haven, CT US	N=373 NA	Mean age: 40 % Male: 64 % AA/Black: 37 % Hispanic: 16 % White: 44	Heroin	Usual syringe source SSP, pharmacy, or both during past 6 mos compared to other source	Unsafe disposal of syringes
Kim 2021 ²⁴	San Francisco, CA US	N=458 NA	Mean age: 46 % Male: 68 % AA/Black: 26 % Asian/Pacific Islander: 7 % Hispanic: 15 % Native American/Alaska Native: 16 % White: 67	Opioid, methamphetamine	Received needles or syringes from an SSP in the past 12 mos compared to not receiving needles or syringes from SSP	Knowledge of overdose risk
Quinn 2014 ³⁶	Los Angeles, CA US	N=412 NA	Median age: 50 % Male: 69 % AA/Black: 30 % Hispanic: 41 % Other: 9 % White: 21	Heroin, powder/crack cocaine, methamphetamine, tranquilizers, opiates, methadone	Primary source of syringes past 12 mos SSP or pharmacy compared to other source	Unsafe disposal of syringes
Reed 2019 ²²	Philadelphia, PA US	N=571 NA	Median age: 35 % Male: 78 % AA/Black: 12 % Hispanic: 21 % Other: 3 % White: 64	Heroin, speedball, powder/crack cocaine, methamphetamine, opioid analgesics, benzodiazepines	Primary source of syringes past 6 mos SSP compared to pharmacy or other source in the past 12 mos	Naloxone distribution or use
Riley 2010 ³⁷	San Francisco, CA US	N=105 NA	Median age: 42 % Male: 67 % AA/Black: 14 % Hispanic: 12	Heroin, methamphetamine/speed	Obtained syringes from an SSP or pharmacy in the past 30 days compared to not obtaining syringes from an SSP or pharmacy in the past 30 days	Unsafe disposal of syringes

Study	City/State Country	Sample Size Follow-up	Participant Characteristics	Non-Prescribed Substance(s) Use	Intervention/Exposure and Comparator (if applicable)	Included Outcome(s)
			% Other: 18 % White: 51			
Sherman 2004 ³⁸	Baltimore, MD US	N=294 NA	Median age: 25 % Male: 58 % AA/Black: 30 % Other: 3 % White: 67	Heroin, powder/crack cocaine	Safe acquisition of syringes (primarily obtaining syringes from an SSP or pharmacy) compared with unsafe acquisition of syringes (primarily obtaining syringes from other sources) past 6 mos	Unsafe disposal of syringes
Spring 2022 ²³	Multiple UK	N=2,139 NA	Mean age: 40 % Male: 72 Race/ethnicity: NR	Heroin, benzodiazepines, others	Past-year contact with SSP compared to no past-year contact with SSP	Naloxone distribution or use
Turner-Bicknell 2021 ¹⁹	Ohio US	N=NR NA	NR	NR	Before and after implementation of a needs-based distribution model	Naloxone distribution or use
Wood 2003 ³⁹	Vancouver Canada	N=587 NA	Median age: 39 for SSP users; 40 for non-SSP users % Male: 61 % Aboriginal: 32 % non-Aboriginal: 68	Heroin, cocaine	Use of all-night SSP in past 6 mos (includes people who used the city's fixed exchange sites) compared to non-use of SSP	Unsafe disposal of syringes
Zlotorzynska 2018 ⁴⁰	Multiple US	N=6,321 NA	Mean age: 43 % Male: 72 % non-Hispanic White: 45 % Other: 55	Heroin, speedball, powder/crack cocaine, methamphetamines, prescription opioids, others	Primary syringe source SSP compared to pharmacy past 12 mos	Unsafe disposal of syringes
Ecological Studies						
Broadhead 1999 ⁴⁴	Connecticut US	N=NA NA	NA	NR	Time period during operation of an SSP compared to time period following closure of the SSP	Unsafe disposal of syringes
Cooper 2012 ⁴⁸	New York, NY US	N=42 health districts NA	NA	NR	SSP access (percent of each district's surface area within 1 mile of an SSP site) or access to pharmacies selling syringes by study year	Neighborhood crime rates
Doherty 1997 ^{45,88}	Baltimore, MD US	N=32 city blocks 2 yrs	NA	NR	1 and 2 mos after SSP initiation compared to time prior to SSP initiation	Unsafe disposal of syringes
Fuller 2002 ⁴⁶	New York, NY US	N=27 blocks and 10 pharmacies NA	NA	NR	Time period before and after enactment of ESAP (legal pharmacy sale of syringes without a prescription)	Unsafe disposal of syringes

Study	City/State Country	Sample Size Follow-up	Participant Characteristics	Non-Prescribed Substance(s) Use	Intervention/Exposure and Comparator (if applicable)	Included Outcome(s)
Marx 2000 ⁴⁹	Baltimore, MD US	N=NA NA	NA	NR	Program areas (within 0.5-mile radius of SSP site) before and after establishment of SSPs and compared to non-program areas	Neighborhood crime rates
Oliver 1992 ⁴⁷	Portland, OR US	N=NA NA	NA	NR	Immediate vicinity of an SSP before and after establishment	Unsafe disposal of syringes
Ecological and Cross-Sectional Studies						
Levine 2019 ⁴¹	Miami, FL US	N=930 NA	18-29: 12.7% 30-39: 26.3% 40-49: 27.9% ≥50: 33.3% % Male: 78 % Asian or Pacific Islander: 1 % Hispanic: 40 % Multiple races/Other: 1 % Native American: 2 % non-Hispanic Black: 32 % non-Hispanic White: 26	NR	City residence pre- and post-implementation of the SSP	Unsafe disposal of syringes
Tookes 2012 ⁴²	Multiple US	N=1,050 NA	San Francisco: 18-29: 6% 30-39: 18% 40-49: 41% ≥50: 35% % Male: 73 % Asian or Pacific Islander: < 1 % Hispanic: 10 % Multiple races/Other: 5 % Native American: 4 % non-Hispanic Black: 37 % non-Hispanic White: 44 Miami: 18-29: 8% 30-39: 20% 40-49: 31% ≥50: 45% % Male: 79 % Asian or Pacific Islander: 1	NR	City with an SSP and residents of city with an SSP compared to city without an SSP and residents of city without an SSP	Unsafe disposal of syringes

Study	City/State Country	Sample Size Follow-up	Participant Characteristics	Non-Prescribed Substance(s) Use	Intervention/Exposure and Comparator (if applicable)	Included Outcome(s)
			% Hispanic: 40 % Native American: 1 % non-Hispanic Black: 36 % non-Hispanic White: 23			
Wenger 2011 ⁴³	San Francisco, CA US	N=602 NA	NR	NR	Syringe source SSP or pharmacy prior 6 mos compared to other source	Unsafe disposal of syringes

Notes. ^a This study was included for a comparison relevant to KQ1a; ^b Data for the outcome of interest were cross-sectional.

Abbreviations. AA=African-American; AIDS=acquired immunodeficiency syndrome; ESAP=Expanded Syringe Access Demonstration Program; HIV=human immunodeficiency virus; MMT=metadone maintenance treatment; mos=months; NA=not applicable; NR=not reported; OAT=opioid agonist therapy; RCT=randomized controlled trial; SSP=syringe services program; wks=weeks.



RISK OF BIAS ASSESSMENTS

RANDOMIZED CONTROLLED TRIALS (ROB-2)

Trial Name or Author Year	Bias from randomization process	Bias from deviation from intended interventions (Assignment)	Bias from deviation from intended interventions (Adherence)	Bias from missing outcome data	Bias in measurement of outcome	Bias in selection of reported result	Overall risk of bias (Low, Some concerns, High)
Braback 2016 ⁸⁵	Low Computer generated block randomization with allocation concealed	Some concerns Participants were likely unblinded, unclear if carers were blinded. Unclear if there were deviations in intervention.	Some concerns Participants were likely unblinded, unclear if carers were blinded. Intervention occurred right after initial assessment, so likely adhered to.	Low Low number of dropouts and regarded as non-attenders	Low Outcome measured as showing up for treatment in both groups.	Low Main outcome reported	Some concerns
Fisher 2003 ³	Low Concealed randomization by a separate person	Some concerns Patients and intervention administrators unblinded at time of giving intervention. Unclear if there were deviations in intervention.	Some concerns Participants were likely unblinded, unclear if carers were blinded. Intervention occurred right after initial assessment, so likely adhered to.	Some concerns Unclear what the "305 complete observations" in the GLM corresponds to in terms of patients assessed. 81% had at least 1 follow-up. No difference in baseline variables between those who completed at least 1 follow-up and those completely lost to follow-up.	Some concerns Injection frequency assessed by RBA in interview, potential for recall bias based on intervention.	Low Main outcome reported	Some concerns

Abbreviations. GLM=generalized linear model; RBA=Risk Behavior Assessment.

COHORT STUDIES (ROBINS-I)

Study Name or Author Year	Bias due to confounding	Selection bias	Bias in classification of interventions	Bias due to departures from intended interventions	Bias due to measurement of outcomes	Bias due to missing data	Bias in the selection of reported results	Overall risk of bias (Low, Moderate, Serious, Critical, No Information)
Brooner 1998; ²⁸ Neufeld 2008 ⁸⁷	Unclear Analyses controlled for baseline measures (sociodemographics, drug and psychiatric	Low Includes all who presented for treatment during timeframe.	Low Intervention classified as referral source	Low "Intervention" is referral source, so likely no overlap/departures.	Low Retention in treatment objective measurement. Drug	Low Missing data for urinalysis results only. Analyses conducted without missing	Low All prespecified results appear to be reported.	Unclear

Study Name or Author Year	Bias due to confounding	Selection bias	Bias in classification of interventions	Bias due to departures from intended interventions	Bias due to measurement of outcomes	Bias due to missing data	Bias in the selection of reported results	Overall risk of bias (Low, Moderate, Serious, Critical, No Information)
	disorders), but likely some residual confounding based on high # of differences at baseline in measured variables.		before treatment started.		use confirmed by urinalysis.	data and coding all missing as "positive."		
Hagan 2000 ⁴	Unclear Differences between groups in injection characteristics, adjusted for different variables in different analyses.	Low Includes sample of IDUs from several recruitment points over time.	Low Classified SSP use over follow-up period into distinct categories based on when SSP use started/stopped.	Low Classification of SSP use over time captures changes in use over the follow-up period.	Low Standard questionnaire administered by trained interviewers at all time points.	Unclear 78% completed follow-up and were included in sample, unclear if any differences between those without follow-up.	Low All prespecified results appear to be reported.	Unclear
Hartgers 1989 ⁵	Unclear Differences between groups at baseline in injecting and treatment variables. Includes a logistic regression controlling for some variables for borrowing outcome at first interview.	Low Includes SSP attenders and non-attenders from same geographical region during recruitment.	Low Classified SSP use over follow-up period into distinct categories based on SSP use.	Low Classification of SSP use over time captures changes in use over the follow-up period.	Low Standard questionnaire administered by trained interviewers at all time points.	High 41% completed second interview, others omitted from follow-up analysis.	Low All prespecified results appear to be reported.	High
Huo 2006 ⁹	Unclear Unclear baseline differences between groups, but did adjust for injecting variables, drug treatment, and age.	Unclear One SSP site had different recruitment start and follow-up duration. Adjusted for follow-up duration in analyses. Non-SSP users recruited by different people than SSP users.	Low Classified by SSP use, which was based off neighborhood. Excluded small percentage of participants in neighborhood w/o SSP who travelled to SSP.	Unclear Does not appear to account for starting/stopping SSP use over follow-up period.	Low Standard questionnaire administered by trained interviewers at all time points.	Unclear Excluded participants without at least 1 follow-up (17%), but attrition analysis showed no difference between groups in baseline injection frequency.	Low All prespecified results appear to be reported.	Unclear
Kuo 2003 ²⁶	Unclear Baseline variables by SSP use not reported but does	Low Includes all referred to LAAM program,	Unclear All patients were enrolled in SSP but classifies use	Low Accounts for changes in SSP use by using a	Unclear Doesn't specifically describe how SSP	Unclear Describes level and management of	Low	Unclear



Study Name or Author Year	Bias due to confounding	Selection bias	Bias in classification of interventions	Bias due to departures from intended interventions	Bias due to measurement of outcomes	Bias due to missing data	Bias in the selection of reported results	Overall risk of bias (Low, Moderate, Serious, Critical, No Information)
	adjust for some demographics and other variables.	except for a small proportion who did not have SSP data.	as number of visits per month.	variable of "# SSP visits per month."	visit data was collected.	missing urinalysis data, but level and handling of missing data for other variables not described.	All prespecified results appear to be reported.	
Latkin 2006 ²⁵	Unclear Baseline variables by SSP use not reported but does adjust for demographics and drug use variables.	High Appears that 30% without follow-up data were excluded from the study, but unclear proportion among IDUs.	Low Classified as SSP use within the past 6 months in standard survey responses.	Unclear New use of SSP or stopping SSP use during follow-up does not appear to be evaluated.	Low Standard questionnaire administered by trained interviewers at all time points.	Unclear Excluded participants without follow-up, handling of other missing data not described.	Low All prespecified results appear to be reported.	High
Marmor 2000 ⁶	High Unclear differences at baseline between SSP users and non-users and no adjustment for any variables.	High Excluded 45% of eligible participants without 4 interviews. Did not differ on most variables but did differ in age and use of methadone maintenance and shooting galleries.	Low Classified SSP users by use over time.	Low Classification of SSP use over time captures changes in use over the follow-up period.	Low Interviewer-administered questionnaires at all visits.	Unclear Excluded participants without 4 follow-up visits, handling of other missing data not described.	Low All prespecified results appear to be reported.	High
Monterroso 2000 ⁷	Unclear Unclear differences at baseline between SSP users and non-users. Unclear if SSP use analysis is adjusted.	Low Includes sample of IDUs from several recruitment points over time period.	Unclear Question around SSP use and classification of use not well described.	Unclear Mentions "consistent users" reported SSP use at 2 visits, but other classification of changes over time not described.	Low Interviewer-administered questionnaires at all visits.	High Excluded 39% of participants that did not have follow-up. Similar on most characteristics, but more likely to be homeless.	Low All prespecified results appear to be reported.	High
Schoenbaum 1996 ⁸	High Differences at baseline in drug use treatment, no adjustment for any	Low Includes sample of IDUs recruited over time period.	Unclear Classified as "ever" using SSP or "never" using SSP based on interviews, but	Low Classification of SSP use over time captures changes	Low Interviewer-administered questionnaires at all visits.	High For prospective analyses excluded 36%	Low All prespecified results appear to be reported.	High

Study Name or Author Year	Bias due to confounding	Selection bias	Bias in classification of interventions	Bias due to departures from intended interventions	Bias due to measurement of outcomes	Bias due to missing data	Bias in the selection of reported results	Overall risk of bias (Low, Moderate, Serious, Critical, No Information)
	confounders for outcome analyses.		intervention changed from illegal SSP to legal SSP over study period.	in use over the follow-up period.		without full follow-up data.		
Strathdee 1999; ²⁷ Shah 2000 ⁸⁶	Unclear Baseline variables by SSP use not reported but does adjust for demographics and drug use variables.	High Excluded 50% of original sample who did not inject from enrollment to post-SSP timeframe, but initial inclusion criteria required drug use from 1977.	Unclear SSP variable not well described, unclear if it is any visit over the timeframe.	Unclear SSP variable not well described, unclear if it accounts for potential changes in SSP use over time.	Low Interviewer-administered questionnaires at all visits.	Unclear Individuals who were lost to follow-up were censored. Unclear how many (says "ie, 10%" but unclear if this is the actual % that were censored).	Low All prespecified results appear to be reported.	High

Abbreviations. IDU=injection drug user; LAAM=levomethadyl acetate hydrochloride; SSP=syringe services program.

UNCONTROLLED PRE-POST STUDIES (ROBINS-I)

Study Name or Author Year	Bias due to confounding	Selection bias	Bias in classification of interventions	Bias due to departures from intended interventions	Bias due to measurement of outcomes	Bias due to missing data	Bias in the selection of reported results	Overall risk of bias (Low, Moderate, Serious, Critical, No Information)
Bartholomew 2021 ¹⁰	Unclear Used GEE to account for some potential confounders but did not have multiple pre-intervention measurements.	High Only included 12% of total cohort with 2 follow-up assessments, differences between baseline and follow-up groups.	Low Timepoints based on assessments completed at SSP.	Unclear Time between assessments varied and was based on SSP use.	Low Methods of data collection similar across timepoints after initial enrollment.	Unclear Excluded participants without 2 visits, level of other missing data unclear.	Low All relevant outcomes appear to be reported.	High
Cox 2000 ¹¹	High Single initial measurement, no adjustment for time trends.	Unclear Only included 28% of those invited to participate. Unclear how many completed baseline and no	Low Timepoints based on initial and follow-up visits.	Unclear Defines follow-up at 3 months, but unclear adherence to this timing for all participants. Unclear	Low Structured questionnaires by trained interviewers at both timepoints.	Unclear Missing data appear to be excluded from analyses for individual outcomes.	Low All relevant outcomes appear to be reported.	High



Study Name or Author Year	Bias due to confounding	Selection bias	Bias in classification of interventions	Bias due to departures from intended interventions	Bias due to measurement of outcomes	Bias due to missing data	Bias in the selection of reported results	Overall risk of bias (Low, Moderate, Serious, Critical, No Information)
		follow-up and unclear differences between those included and excluded.		frequency of SSP use.				
Donoghoe 1989 ¹²	High Single initial measurement, no adjustment for time trends, and comparison group of non-attenders showed differences.	High Only included 6% of the initial cohort, differences between those who completed 2nd interview and those who did not.	Low Timepoints based on initial and follow-up visits.	Unclear Defines follow-up at 2-4 months, but unclear adherence to this timing for all participants. Unclear frequency of SSP use.	Low Structured questionnaires by staff at both timepoints.	Unclear Excluded participants without 2 visits, level and handling of other missing data unclear.	Low All relevant outcomes appear to be reported.	High
Iversen 2013 ¹³	Unclear Appears only to have adjustment for HCV incidence outcome. Accounts for time trends by creating separate groups by timeframe.	High Excluded high proportion of original sample without matching. Included 60% of the matched sample with negative HCV tests. Differences between those included and excluded.	Low Timepoints based on repeat surveys and had to be within 1-year.	Unclear Follow-up had to be within 1-year, but unclear how variable time between records was. Unclear frequency of SSP use.	Low Same survey used at all time points.	Unclear Out of original sample, excluded 17% without full data.	Low All relevant outcomes appear to be reported.	High
Patel 2018 ¹⁴	Unclear Single initial measurement, but timeframe within about 1 year.	Unclear Included 62% of original sample with at least 2 visits. Unclear differences between those included and excluded.	Low Timepoints based on visits and had to be at least 7 days apart.	Unclear Follow-up had to be at least 7 days apart, but unclear how variable time between surveys was. Unclear frequency of SSP use.	Low Structured questionnaires by staff at both timepoints.	Low Mentions missing data on only 2 participants.	Low All relevant outcomes appear to be reported.	Unclear
Schechter 1999 ¹⁵	Unclear Single initial measurement, no adjustment for time trends but injection frequency	Unclear Included 80% of original sample with 1 follow-up visit. Unclear differences between those	Low Timepoints based on initial and follow-up visits.	Unclear Unclear how timing of follow-up varied across participants. Classified frequent and	Low Structured questionnaires by staff at both timepoints.	Unclear Unclear level and handling of missing data.	Low All relevant outcomes appear to be reported.	Unclear

Study Name or Author Year	Bias due to confounding	Selection bias	Bias in classification of interventions	Bias due to departures from intended interventions	Bias due to measurement of outcomes	Bias due to missing data	Bias in the selection of reported results	Overall risk of bias (Low, Moderate, Serious, Critical, No Information)
	outcome analysis limited to post-need exchange timeframe.	included and excluded.		infrequent SSP users.				
Vertefeuille 2000 ¹⁶	Unclear Single initial measurement, no adjustment for time trends, but timeframe within 6 months.	Unclear Every 7th enrollee invited, differences between those enrolled and not enrolled in some demographics and drug use variables.	Low Timepoints based on initial and follow-up visits.	Unclear Follow-up at 6 months, but unclear frequency of SSP use.	Low Structured questionnaires by staff at both timepoints.	High Only had follow-up data for 52% of enrollees. Drug injection frequency analysis limited to those with follow-up and who were HIV positive at baseline.	Low All relevant outcomes appear to be reported.	High
Vlahov 1997 ¹⁷	Unclear Single initial measurement, no adjustment for time trends, but timeframe within 2 weeks.	Unclear Every 7th enrollee invited, differences between those enrolled and not enrolled in gender and some drug use variables.	Low Timepoints based on initial and follow-up visits.	Unclear Follow-up at 2 weeks, but unclear frequency of SSP use.	Low Structured questionnaires by staff at both timepoints.	Unclear 79% had follow-up data at 2 weeks, but difference in sharing needles between those with and without follow-up.	Low All relevant outcomes appear to be reported.	Unclear
Vogt 1998 ¹⁸	Unclear Single initial measurement, no adjustment for time trends, unclear follow-up.	Unclear Random selection of clients, but unclear how clients were randomly selected and if they differed from those not selected.	Low Timepoints based on initial and follow-up visits.	Unclear Unclear timing of follow-up visits and unclear frequency of SSP use.	Unclear Unclear if structured questionnaire used for interviews.	High Repeat interviews with 51% of participants included for follow-up analysis. Unclear differences between those with and without follow-up.	Low All relevant outcomes appear to be reported.	High

Abbreviations. GEE=generalized estimating equations; HCV=hepatitis C virus; HIV=human immunodeficiency virus; IDU=injection drug use; SSP=syringe services program.

SYSTEMATIC REVIEWS (ROBIS)

Study Name or Author Year	Study Eligibility Criteria	Identification and Selection of Studies	Data Collection and Study Appraisal	Synthesis and Findings	Overall Risk of Bias
Jones 2010 ²	Low Reasonable and mostly clearly defined eligibility criteria. Do not explicitly describe comparator criteria but specify included study designs.	Low Multiple databases searched. Searches included both key words and controlled vocabulary, but full search syntax is not provided. Date limit of 1990 seems roughly in line with start of research on SSPs, but some studies may have been published prior to this date. Hand-searched reference lists of included studies. No grey literature searching conducted. Dual independent study selection indicated for title/abstract screening but not explicitly stated for full-text review.	Low A single reviewer abstracted data and assessed study quality, checked by another reviewer. Study quality was assessed using appropriate criteria.	Unclear Meta-analysis was not conducted due to variability between studies. Narrative synthesis did not address methodological quality; this is addressed in the discussion section, but individual quality assessments are not included.	Low
Palmateer 2022 ¹	Low Reasonable and clearly defined eligibility criteria. Detailed criteria provided in Appendix.	Low Update to a 2011 review of reviews. Searches included an initial search for systematic review and additional searches for primary studies when indicated. Multiple databases searched. Conducted grey literature searches and hand searched reference lists of included records. Searches included key words and controlled vocabulary terms and full syntax is provided in the Appendix.	Unclear Dual independent study selection, data abstraction, and risk of bias assessment. Risk of bias of systematic reviews was assessed using appropriate criteria. Risk of bias of primary studies was not assessed; instead, study design was considered an indicator of quality.	Low Rated the strength of the evidence for each intervention and outcome using a framework that is clearly described in the review.	Low

Abbreviations. SSP=syringe services program.

STRENGTH OF EVIDENCE ASSESSMENTS FOR KQ1 PRIMARY STUDIES

Outcome	Studies	Study Limitations	Directness	Consistency	Precision	Rating and Summary of Evidence
Injection frequency	1 RCT, ³ 6 cohort, ⁴⁻⁹ and 9 pre-post ¹⁰⁻¹⁸ studies	Unclear to high	Direct	Consistent	Precise	Low SSP use does not appear to be associated with an increase in injection frequency.
Naloxone distribution	1 serial cross-sectional ¹⁹ and 4 cross-sectional ²⁰⁻²³ studies	High	Indirect	Consistent	Imprecise	Low SSP use may be associated with higher rates of carrying naloxone.
Overdose education	2 cross-sectional studies ^{21,24}	High	Indirect	Consistent	Imprecise	Low SSP use may be associated with receipt of overdose education.
Linkage to SUD treatment and utilization of treatment services	6 cohort ^{4,5,25-28} and 3 pre-post ^{11,16,17} studies	Unclear to high	Direct	Consistent	Precise	Low SSP use may be associated with increased treatment linkage and/or use of treatment services compared to no SSP use (or less use).
Syringe disposal	1 RCT, ²⁹ 2 pre-post, ^{16,17} 11 cross-sectional, ³⁰⁻⁴⁰ and 7 ecological ⁴¹⁻⁴⁷ studies	Unclear to high	Direct	Consistent	Imprecise	Low SSP use and/or presence of an SSP does not appear to be associated with an increase unsafe syringe disposal practices.
Neighborhood crime rates	2 ecological studies ^{48,49}	High	Direct	Inconsistent	Imprecise	Low Presence of an SSP does not appear to be associated with an increase in neighborhood crime rates.

INCLUDED SYSTEMATIC REVIEWS

Citation

Abdul-Quader AS, Feelemyer J, Modi S, et al. Effectiveness of structural-level needle/syringe programs to reduce HCV and HIV infection among people who inject drugs: A systematic review. *AIDS and Behavior*. 2013;17(9):2878-2892.

Aspinall EJ, Nambiar D, Goldberg DJ, et al. Are needle and syringe programmes associated with a reduction in HIV transmission among people who inject drugs: a systematic review and meta-analysis. *International journal of epidemiology*. 2014;43(1):235-248.

Davis SM, Daily S, Kristjansson AL, et al. Needle exchange programs for the prevention of hepatitis C virus infection in people who inject drugs: a systematic review with meta-analysis. *Harm reduction journal*. 2017;14(1):25.

European Centre for Disease Prevention and Control. *Systematic Review on the Prevention and Control of Blood-Borne Viruses in Prison Settings*.; 2018.

Fernandes RM, Cary M, Duarte G, et al. Effectiveness of needle and syringe Programmes in people who inject drugs - An overview of systematic reviews. *BMC public health*. 2017;17(1):309.

Johnson WD, Rivadeneira N, Adegbite AH, et al. Human Immunodeficiency Virus Prevention for People Who Use Drugs: Overview of Reviews and the ICOS of PICOS. *The Journal of infectious diseases*. 2020;222(S).

Jones L, Pickering L, Sumnall H, McVeigh J, Bellis MA. Optimal provision of needle and syringe programmes for injecting drug users: A systematic review. *The International journal on drug policy*. 2010;21(5):335-342.

Lazarus JV, Safreed-Harmon K, Hetherington KL, et al. Health Outcomes for Clients of Needle and Syringe Programs in Prisons. *Epidemiologic reviews*. 2018;40(1):96-104.

MacArthur GJ, van Velzen E, Palmateer N, et al. Interventions to prevent HIV and Hepatitis C in people who inject drugs: A review of reviews to assess evidence of effectiveness. *International Journal of Drug Policy*. 2014;25(1):34-52.

Mir MU, Akhtar F, Zhang M, Thomas NJ, Shao H. A Meta-analysis of the Association Between Needle Exchange Programs and HIV Seroconversion Among Injection Drug Users. *Cureus*. 2018;10(9).

Palmateer N, Hamill V, Bergenstrom A, et al. Interventions to prevent HIV and Hepatitis C among people who inject drugs: Latest evidence of effectiveness from a systematic review (2011 to 2020). *The International journal on drug policy*. 2022;109:103872.

Palmateer N, Kimber J, Hickman M, Hutchinson S, Rhodes T, Goldberg D. Evidence for the effectiveness of sterile injecting equipment provision in preventing hepatitis C and human immunodeficiency virus transmission among injecting drug users: A review of reviews. *Addiction*. 2010;105(5):844-859.

Platt L, Minozzi S, Reed J, et al. Needle syringe programmes and opioid substitution therapy for preventing hepatitis C transmission in people who inject drugs. *The Cochrane database of systematic reviews*. 2017;9.

Puzhko S, Eisenberg MJ, Filion KB, et al. Effectiveness of Interventions for Prevention of Common Infections Among Opioid Users: A Systematic Review of Systematic Reviews. *Frontiers in public health*. 2022;10:749033.

Sawangjit R, Khan TM, Chaiyakunapruk N. Effectiveness of pharmacy-based needle/syringe exchange programme for people who inject drugs: A systematic review and meta-analysis. *Addiction*. 2017;112(2):236-247.

Thomson K, Hillier-Brown F, Walton N, Bilaj M, Bambra C, Todd A. The effects of community pharmacy-delivered public health interventions on population health and health inequalities: A review of reviews. *Preventive medicine*. 2019;124:98-109.

Wright NMJ, Tompkins CNE. A review of the evidence for the effectiveness of primary prevention interventions for hepatitis C among injecting drug users. *Harm reduction journal*. 2006;3:27.

PEER REVIEW COMMENTS AND RESPONSES

Comment #	Reviewer #	Comment	Author Response
<i>Are the objectives, scope, and methods for this review clearly described?</i>			
1	1	Yes	None
2	2	Yes	None
3	3	Yes	None
4	5	Yes	None
5	6	Yes	None
6	7	Yes	None
7	8	Yes	None
<i>Is there any indication of bias in our synthesis of the evidence?</i>			
8	1	No	None
9	2	No	None
10	3	No	None
11	5	No	None
12	6	No	None
13	7	No	None
14	8	No	None
<i>Are there any published or unpublished studies that we may have overlooked?</i>			
15	1	No	
16	2	Yes - Analisa Packham, Syringe exchange programs and harm reduction: New evidence in the wake of the opioid epidemic, Journal of Public Economics, Volume 215, 2022, 104733, ISSN 0047-2727	Thank you for bringing this study to our attention. It does not meet criteria for inclusion because we did not review evidence from primary studies for HIV incidence or prevalence and drug-related mortality was not one of our pre-specified outcomes. However, this study and the response it inspired from other researchers (Lambdin 2023) is relevant to mention in the discussion section of our review as an example of how misinterpreting

Comment #	Reviewer #	Comment	Author Response
			data can lead to unjustified conclusions regarding SSP use and health outcomes.
17	3	No	None
18	5	Yes - https://doi.org/10.1007/BF02351502 ; https://doi.org/10.1111/jrh.12388	Thank you for highlighting these citations. The first study (Strathdee 1999) is included in our review and synthesis. The second study (Surratt 2020) is also included but was not prioritized for synthesis because it is cross-sectional and we focused on longitudinal evidence for the outcome of treatment linkages.
19	6	No	None
20	7	No	None
21	8	Yes - Packham A. Syringe exchange programs and harm reduction: New evidence in the wake of the opioid epidemic. <i>J Public Economics</i> 2022; 215. https://doi.org/10.1016/j.jpubeco.2022.104733 . Available at https://apackham.github.io/mywebsite/opioidpaper_webcopy.pdf .	Thank you. Please see our response to comment #16.
<i>Additional suggestions or comments can be provided below.</i>			
22	1	Table 5: It is not correct that LAAM is no longer approved in the U.S. It is still FDA approved. It was taken off the market voluntarily by the manufacturer because of poor sales. It is the case that it is no longer approved in Europe.	Thank you for making note of this error. We have revised the text to state that LAAM is an opioid agonist no longer on the US market.
23	1	Table 5: Text in the Neufeld row seems incomplete.	Thank you for this comment. Brooner 1998 and Neufeld 2008 are 2 publications associated with a single study and the results are described in a single row. We have edited the study column to improve clarity.
24	1	Table 6: Dasgupta row. What is the “public health response?”	Thank you for this comment. We have added a footnote to specify that the public health response included establishment of the state’s first legal SSP.
25	1	Page 25, line 37: Change “along” to “alone.” Table 9, Harm Reduction row: Remove either “detox” or “detoxification.”	Thank you for making note of these errors. We have made the recommended corrections.

Comment #	Reviewer #	Comment	Author Response
26	1	Page 27, line 35: Change “justice” to “legal.” The supposed “justice” system is anything but “just.”	Thank you for this recommendation. We have revised the text to state “legal system.”
27	1	Page 28, lines 56-57: The trend toward non-injecting of fentanyl may have been short lived. Increasingly, fentanyl is showing up in powder form which is likely to be injected.	Thank you for this comment. We removed the specific reference to fentanyl and instead highlight that drug use patterns are constantly evolving, and future research could help identify best practices for SSPs to respond and maintain relevance.
28	2	<p>Did the ESP review the extant literature for any association between SSP use and substance use? It was included in the SOW we reviewed in late Feb of this year that included the following outcomes:</p> <p>Drug use behaviors (e.g., sharing, borrowing, lending, reuse, or unsafe disposal of syringes; amount, speed, or frequency of use; etc); knowledge of overdose risk; naloxone distribution/use; linkage to treatment for substance use disorder, HIV/HCV, or other medical needs, or to HIV pre-exposure prophylaxis; utilization of referred services.</p> <p>Please note that one recent study (albeit with several methodological flaws) suggests an association between SSP implementation and increases in opioid use: "https://www.sciencedirect.com/science/article/abs/pii/S0047272722001359" Syringe exchange programs and harm reduction: New evidence in the wake of the opioid epidemic - ScienceDirect. However, the author (Analisa Packham) also notes the following: “I note that my findings imply that SEPs do little to reduce drug overdoses and may even exacerbate opioid abuse and misuse. However, the results do not suggest that SEPs are ineffective at curbing addiction for all clients. Moreover, prescription drugs, such as Buprenorphine that reduce symptoms of opiate addiction and withdrawal, or other opiate antagonists, which work in the brain to prevent opiate effects and decreases the desire to take opiate, could be one way for SEPs to mitigate clients' opioid dependence in the future.”</p>	<p>Thank you for your comments.</p> <p>The association between SSPs and substance use was partly addressed through our inclusion of injection frequency, but we did not specifically review evidence on whether use of SSPs is associated with more or less frequent drug use overall. This decision reflects the review’s focus on the role of SSPs in harm reduction.</p> <p>While we reviewed evidence related to naloxone distribution and overdose education, we did not include drug-related mortality as an outcome of interest. Regarding the Packham 2022 study, please see our response to comment #16.</p>
29	2	[In second bullet of Key Findings, add ‘s’ to ‘encourage’ and ‘facilitate.’]	We have left the wording of the key findings as written, since the phrases regarding naloxone, overdose education, and treatment referral follow “may.”

Comment #	Reviewer #	Comment	Author Response
30	2	[Insert citation substantiating first statement of executive summary.]	To be consistent with our usual style, we did not include citations in the executive summary but did include citations related to increased drug use and HIV/HCV in the background section.
31	2	Please define "needs-based" SSP. Are participants required to submit used syringes to get sterile ones? If not, needs-based seems synonymous with the "distribution" model of SSPs.	Thank you for this comment. In the section on SSP models, we have revised the text to use more precise language referring to syringe distribution policies (which may be needs-based or offer a set number of syringes regardless of how many are returned) and exchange policies (which require returning used syringes).
32	2	Are SSPs that use a distribution model (no exchange) considered "more permissive?"	Thank you for this comment. Please see our response to comment #32. We have revised this section to improve clarity regarding the term "permissive."
33	3	One area that is not discussed but may be equally important is acquired bacterial infections from using clean needles when the skin has not been cleansed using an alcohol wipe or other procedure. Cellulitis is prevalent among PWID and can lead to severe adverse outcomes. This reviewer realizes that this may not be within scope, however, due to the newest issue - fentanyl adulterated with xylazine wound issues is becoming a hot topic area.	Thank you for this comment. We agree that bacterial infections related to injection-drug use are an important outcome, but this outcome was not within the scope of this review. In the Future Research section, we added a reference to the emergence of xylazine and importance of studying best practices for SSPs to provide PWID with information and tools to reduce xylazine-specific harms.
34	5	This was a well thought out review recognizing that the research methodology is mixed. The review was concise and appropriately addressed the limitation as well as areas for future research. If I might suggest also adding improving in HIV/HCV treatment as part of linkage to care. For example, a pilot study done in 2003 points to the idea that "health services based on needle exchange may enhance access to HAART among out-of-treatment HIV-infected IDUs" (https://doi.org/10.1093/jurban/jtg053). There's another review that may be helpful, most of the references are already in the current manuscript. however, this article may provide additional references/perspectives (https://doi.org/10.1186/s13722-023-	Thank you for your comments. We included linkage to HIV treatment as an outcome but did not identify any studies that met criteria for inclusion in our synthesis. We did not include studies evaluating HIV or HCV treatment services co-located with SSPs as stand-alone interventions, which the study by Altice 2003 is an example of. We realize that the body of literature on co-located treatment services is of high interest, but reviewing this evidence

Comment #	Reviewer #	Comment	Author Response
		00394-x). Looks great and thank you for sharing and allowing me to be a part of this!	would have made the scope of this review unfeasibly large. Thank you for providing the link to the scoping review. We hand-searched this publication for relevant references as part of our search process.
35	6	This is my first review of the “Effectiveness of Syringe Service Programs: A Systematic Review”. Page numbers reference the page in the PDF document. Generally, the title and corollary mentions of SSPs should be referred to as Syringe Services Programs (missing “s” in services throughout the document; cf. https://www.cdc.gov/ssp/index.html). Not sure if there was any examination of drug test strips (e.g., fentanyl test strips) in this review. Also there is frequent reference to the Office of National Drug Control Policy; however, these efforts also align with other key initiatives related to infectious disease—recommend checking with David Ross and Lorenzo McFarland on the appropriate initiatives to cite (e.g., Ending the HIV Epidemic, etc.).	Thank you for your comments. We have corrected the text to refer to Syringe Services Programs (plural) throughout the document. We did not specifically examine evidence related to drug testing strips. We would have included evidence regarding drug testing strips as a component of harm reduction services provided at SSPs but did not identify such evidence. We specifically highlighted the Office of National Drug Control Policy (ONDCP) because this review was requested in part to inform ONDCP efforts. We added a sentence to the beginning of the Discussion to highlight that harm reduction is a goal of VA Offices of Mental Health and Suicide Prevention, Research and Development, and Specialty Care Services.
36	6	1. Page 9, line 10—Key Findings—“carriage” is an uncommon word used regarding naloxone—consider changing to “carrying naloxone” (also on page 10, line 32; page 30, line 50; page 31, line 14; page 40, line 14)	Thank you for this suggestion. We have revised the text to state “carrying” or “possession” of naloxone rather than “carriage.”
37	6	2. Page 10—it may be helpful to clarify the difference between “Linkage to SUD treatment and utilization of treatment services” and “Additional harm reduction and referral services” (the latter seems to combine a number of services—e.g., motivation interviewing, case management, pharmacy-based SSP referral which seem to be different things). In general, these	Thank you for this comment. We reorganized the findings in this table to improve clarity and removed the row describing “Additional harm reduction and referral services.” These findings are best described in the results section where additional context is provided.

Comment #	Reviewer #	Comment	Author Response
		seem like blended concepts. Not sure if it would help to better explain the universe of what is included.	
38	6	3. Page 15, lines 11-15—suggest using the term “stimulants” to refer to cocaine and psychostimulants (latter is primarily methamphetamine). Even in reference #4, psychostimulants are reported separately from cocaine (see Figure 1, https://www.cdc.gov/mmwr/volumes/70/wr/pdfs/mm7006a4-H.pdf)	Thank you for this suggestion. We have revised the text to use the term “stimulants.”
39	6	4. Page 16, lines 5-9—not sure if you want to use the NASEN reference; https://www.nasen.org/ (over 500 SSPs).	Thank you for this suggestion. We have updated this text to reflect current data from NASEN.
40	6	5. Page 16, line 16—There is also funding from OMHSP’s SUD program to fund harm reduction coordinators (should check with them about that sentence); also the “(PMOP)” should come after Program	Thank you for this comment. Because this paragraph is specific to SSPs funding, we did not expand on other VHA initiatives to promote harm reduction (of which there are many). We have corrected the placement of the PMOP acronym.
41	6	6. Page 20, line 44—based on the 95% CI that is non-significant right? Not “bordered on non-significant” but actually not statistically significant since it include 1.0	Thank you for this comment. We have corrected this statement to say “bordered on significance.”
42	6	7. Page 22, line 31—superscript after 5 is underlined and doesn’t need to be	Thank you for making note of this error. We have corrected this text.
43	6	8. Injection Frequency/Table 3—Bartholomew 2021 seems to indicate an increased average # of injections per day. So does Patel 2018. That is 2 of the 16 studies included in this section. Bringing this up in case it needs to be addressed to fend off potential critics.	Thank you for this comment. We added to the section on injection frequency to discuss these 2 studies specifically and provide more context for their findings.
44	6	9. Page 30, line 14—what is NEP? I don’t see it defined anywhere.	Thank you for this comment. NEP refers to “needle exchange program.” We have changed this reference to “NEP” to “SSP” instead to be consistent with the language of our review.
45	6	10. Page 32, lines 11-12—The confidence interval includes 1.0, is this not statistically significant? (same as Page 33, line 11)	Thank you for this comment. You are correct that this finding was not statistically significant. We have revised the text to include that point.
46	6	11. Page 32, line 30—square typo	Thank you for making note of this error. We have corrected this text.

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47	6	12. Page 32, line 49-50—this is not statistically significant right?	Thank you for this comment. You are correct that this finding was not statistically significant. In most cases, we do not comment on statistical significance in the table (regardless of whether a given finding was significant or non-significant) for the sake of brevity.
48	6	13. Page 32, line 55—this is not statistically significant right?	Please see the response to comment # 47.
49	6	14. Page 33, line 21—IVDU=Intravenous Drug Use right?	Thank you for making note of this error. We have corrected this text.
50	6	15. Page 34, line 5—this is not statistically significant right?	Please see the response to comment # 47.
51	6	16. Page 35, lines 6-7—is there an extra number in the 2nd set of parentheses?	Thank you for this comment. We have added a footnote to specify that counts were made at 2 time points pre-SSP and 3 time points post-SSP.
52	6	17. Page 36 line 37—think “along” should be “alone”; should probably be a comma after “meta-analysis” as well	Thank you for making note of these errors. We have corrected the text.
53	7	Comments to the author: This is a timely and important systematic review of the association of syringe service programs and relevant outcomes such as HIV and HCV prevalence and incidence. This report has a potential for high impact by encouraging the implementation of syringe service programs in the VA. There are several strengths to this review which include clear writing, rigorous and thorough methods, use of person-first language, and including a comprehensive group of outcomes.	Thank you for this comment.
54	7	Minor comments: 1. The statements from public health organization and professional society regarding syringe service programs are greatly appreciated. The authors may also consider adding statements from the American Academy of Addiction Psychiatry (AAAP) and American Society of Addiction Medicine (ASAM).	Thank you for this suggestion. We have added a policy statement from AAAP but could not locate a current statement from ASAM.
55	7	2. Including a description of the cost-benefits of implementing syringe service programs may strengthen the discussion, given the relatively low cost of syringes.	Thank you for this suggestion. We revised the Discussion text to specifically highlight the CDC’s statements regarding SSPs as “cost-saving.”

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56	8	<p>1. p. 9 (pdf p. 20) – Re: Reference 24 Palmateer et al. <i>Int J Drug Policy</i>. 2022;109:103872.</p> <p>Regarding conclusion that pooled studies did not show an effect on HCV transmission, please consider commenting on whether:</p> <ul style="list-style-type: none"> • Studies were appropriate for pooling, e.g., similar populations, interventions, and outcomes. • pooled studies had adequate power to detect a difference in HCV transmission. • ascertainment bias may have been present, e.g., low HCV testing rates in SSP utilizers 	<p>Thank you for your comments. We did not directly assess the quality of evidence for this outcome because we relied on the evidence synthesis conducted by the Palmateer et al. review of reviews, which we assessed to have a low overall risk of bias based on the ROBIS tool. The Palmateer et al. review in turn primarily relied on a Cochrane review and meta-analysis (Platt et al.). While we are unable to address your comments in detail, we have no reason to suspect that the conclusions reached by Palmateer et al. and Platt et al. were inappropriate.</p>
57	8	<p>2. p. 11 (pdf p. 22) – Primary studies</p> <p>Please consider comment on the following:</p> <p>a. Adequacy of statistical methods. Did studies have:</p> <ul style="list-style-type: none"> • Pre-specified hypotheses? • Pre-specified statistical analysis plan? • Appropriate adjustments for multiple comparisons? <p>b. Confounders. Did studies address or have data on:</p> <ul style="list-style-type: none"> • population shifts in or out of the SSP's catchment? • Other factors which may have affected outcomes, e.g., public health campaigns on HIV testing, promotion of SSPs in community? • Length of time over which the study measured outcomes? <p>c. Outcomes. Did any studies examine:</p> <ul style="list-style-type: none"> • HIV or HCV testing rates • Deaths or hospitalizations due to overdoses? 	<p>Thank you for your comments. Duration of follow-up for primary studies is reported in Table 2. Statistical methods and potential risk of bias due to confounding were evaluated as part of the quality assessment of primary studies (details are located in the Appendix).</p> <p>HIV/HCV testing rates and overdose hospitalizations and deaths were not within the scope of this review.</p>