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Predicting pharmacy syringe sales to people who inject drugs: Policy, practice and perceptions

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Abstract

Background: Pharmacies have much to contribute to the health of people who inject drugs (PWID) and to community efforts in HIV and hepatitis C (HCV) prevention through syringe access. However, little is known about what predicts pharmacy syringe sales without a prescription.

Objective: To identify factors predicting pharmacy syringes sales to PWID.

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Contributors

All authors have nothing to disclose.

Conflict of interest

All authors declare no conflict of interests to report.

Methods: A hybrid staggered online survey of 298 Indiana community pharmacists occurred from July-September 2016 measuring pharmacy policy, practice, and pharmacist perceptions about syringe sales to PWID. Separate bivariate logistical regressions were followed by multivariable logistic regression to predict pharmacy syringe sales and pharmacist comfort dispensing syringes to PWID.

Results: Half (50.5%) of Indiana pharmacies sold syringes without a prescription to PWID. Pharmacy syringe sales was strongly associated with pharmacist supportive beliefs about syringe access by PWID and their comfort level selling syringes to PWID. Notably, pharmacies located in communities with high rates of opioid overdose mortality were 56% less likely to sell syringes without a prescription than those in communities with lower rates. Pharmacist comfort dispensing syringes was associated with being male, working at a pharmacy that sold syringes to PWID and one that stocked naloxone, having been asked about syringe access by medical providers, and agreement that PWID should be able to buy syringes without a prescription.

Conclusions: As communities with high rates of opioid overdose mortality were less likely to have pharmacies that dispensed syringes to PWID, a concerted effort with these communities and their pharmacies should be made to understand opportunities to increase syringe access. Future studies should explore nuances between theoretical support for syringe access by PWID without a prescription and actual dispensing behaviors. Addressing potential policy conflicts and offering continuing education on non-prescription syringe distribution for pharmacists may improve comfort distributing syringes to PWID, and therefore increase pharmacy syringe sales.

Keywords

Syringe access; Hepatitis C prevention; Pharmacy public health; HIV prevention

Introduction

Pharmacies are often overlooked as public health partners, despite their ubiquity and access by populations underserved by the primary healthcare system (Smith et al., 2005; Calis et al., 2004; Meyerson, Ryder & Richey-Smith, 2013; Meyerson, Ryder, Von Hippel, & Coy, 2013). Recent studies report the success of pharmacy-based vaccination and medication management, and the importance of pharmacies for populations socially and structurally marginalized due to chemical dependency and HIV status or risk (Deas & McCree, 2010; Hirsch, Rosenquist, Best, Miller, & Gilmer, 2009; Amesty, Blaney, Crawford, Rivera, & Fuller, 2012; Lutnik, Case, & Kral, 2012; Murphy et al., 2012; Meyerson, Carter et al., 2016; Meyerson, Agley et al., 2016).

The 2015 HIV outbreak among people injecting the opioid oxycodone in a rural Indiana community highlighted the significant health and systems disparities long experienced by rural communities and by people who inject drugs (PWID) (Conrad et al., 2015; Meyerson et al., 2017). Like several states, Indiana faces a wave of opioid addiction and overdose death (Rudd, Aleshire, Zibbell, & Gladden, 2016; Dombrowski, Crawford, Khan, & Tyler, 2016; Jones, Christensen, & Gladden, 2017) without a strong public health infrastructure to adequately address the need (Trust for America's Health, 2016).

Public policy to improve PWID health outcomes in the wake of the 2015 HIV outbreak included state law to expand access to sterile syringes by allowing syringe exchange on a county-by-county basis (Indiana Code 16–41–7.5). However, policy adoption has been difficult for myriad reasons detailed elsewhere (Meyerson et al., 2017), and there is some evidence that communities are de-adopting it (Hedger 2017).

Indiana law does, however, permit pharmacy syringe dispensing to adults without a prescription (Indiana Code § 35–48–4–8.5 and 856 Indiana Admin. Code 2–6–18), and state Board of Pharmacy policy adds the exception that if the syringe is for human use, the age restriction does not apply (Indiana Board of Pharmacy; Reg 28, Ch VI, Sec 6.32). Syringe possession remains problematic, however, because Indiana law defines syringes, needles, hypodermic devices or objects used for injection drugs as drug paraphernalia (Temple University Policy Surveillance Program, 2017). That said, given the difficulty of syringe exchange policy adoption and the permissibility of syringe access through pharmacies, it is likely that Indiana pharmacies may be the best point of syringe access to reduce HIV and HCV among PWID.

Indiana pharmacists have supported an expanded public health role for HIV prevention as shown in studies of pharmacist views on HIV testing and over-the-counter HIV test dispensing (Meyerson, Ryder & Richey-Smith, 2013; Meyerson, Ryder, Von Hippel et al., 2013; Ryder, Meyerson, Coy, & Von Hippel, 2013; Meyerson, Carter et al., 2016; Meyerson, Agle et al., 2016). However, little to nothing is known about pharmacist attitudes or pharmacy practice regarding syringe sales to PWID in Indiana. Studies of syringe sales elsewhere have identified potential structural, organizational, and behavioral factors associated with syringe sales (Neaigus et al., 2008; Kerr et al., 2010; Bramson et al., 2015; Ruiz et al., 2016; Sherman et al., 2015), yet many existing studies of pharmacist attitudes about syringe sales are old, as they were conducted in the early 1990s after some state paraphernalia laws were changed to allow pharmacy syringe sales (Gleghorn, Gilbert, & David, 1997; Gostin, Lazzarini, Jones, & Flaherty, 1997; Case, Beckett, & Jones, 1998; Wright-De Agüero, Weinstein, Jones, & Miles, 1998). More recent studies were conducted in 2002, as states investigated pharmacy access options due to the continued ban on federal funding for syringe access programming (Lewis, Koester, & Bush, 2002; Rich et al., 2002). While helpful, these studies have not ‘connected the dots’ by investigating the collection of factors and their contribution to syringe dispensing such as law, pharmacy policy, pharmacist belief/attitudes/comfort levels with and about syringe dispensing, and community need for syringe access. To our knowledge, there have been no attempts to predict pharmacy syringes sales without a prescription to PWID, despite its importance to understanding the current opportunities to improve PWID health through pharmacy partners. Such knowledge could inform the development of pharmacy-based public health practice interventions to increase PWID access to syringes, particularly in areas of high need and low public health resource.

This study sought to identify community, pharmacy, pharmacist attitude, and policy factors associated with pharmacy syringe sale to likely PWID in the state of Indiana. Based on prior pharmacy syringe studies, we hypothesized that pharmacy syringe sales without a prescription to PWID would be a function of community need and pharmacist attitudes and beliefs.

Methods

An online survey of all Indiana managing pharmacists in community pharmacies (N = 850) was conducted from July to September 2016. Managing pharmacists were surveyed in order to avoid selection bias, as it is a singular role in each pharmacy. As is further described elsewhere (Agle et al., 2017; Meyerson et al., 2017), pharmacists were identified by matching a 2016 list of managing pharmacists obtained from the state Board of Pharmacy with a list of retail pharmacies provided by Hayes Directories, Inc. (December 2015, Mission Viejo, CA).

Data were collected using a hybrid method with two staggered, mailed paper invitations followed by a postcard reminder. The invitation contained a brief description of the survey, unique identification number (UID) assigned to the pharmacy, and a Quick Response code linking directly to the survey. The initial survey invitation included a \$5.00 bill as an incentive. The delivery of such a pre-incentive for pharmacist survey research has precedent, and has been used with increasing regularity and good results among physicians (Edwards, Cooper, Roberts, & Frost, 2005; James, Ziegenfuss, Tilburt, Harris, & Beebe, 2011; Klabunde et al., 2012; Hardigan, Popovici, & Carvajal, 2016). This study was deemed exempt by the Indiana University Institutional Review Board.

The survey contained questions about pharmacist demographics, pharmacy policy, pharmacist education and practice, attitudes about pharmacy syringe sales to PWID and the effectiveness of this practice for the health of PWID, and levels of personal comfort with syringe sales under likely and legal scenarios which are reported below in Table 3.

For the regression analyses, there were two outcome measures: 1) pharmacy syringe sales without a prescription to PWID (yes/no) and, based on regression findings, 2) pharmacist comfort dispensing syringes to PWID (yes/no).

Independent variables included pharmacist characteristics (gender, age, race/ethnicity, pharmacy degree, reported receipt of continuing education about nonprescription syringe sales in the past 2 years); pharmacy type (chain, mass merchandiser, food-store pharmacy, independent pharmacy); current pharmacy practice allowing the sale of syringes without a prescription to PWID; pharmacist attitude about the benefit of syringe sales to PWID; and pharmacist personal comfort level regarding dispensing syringes to PWID.

To assess attitudes about the benefit of syringe sales to PWID, pharmacists were asked to rate their level of agreement with two statements about syringe sales to PWID using a 5-point Likert scale: strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, and strongly disagree. The two statements were: 1) *Injection drug users should always be allowed to buy syringes without a prescription, and 2) Dispensing syringes to injection drug users will reduce harm to addicts in my community.* For the analyses, 'strongly agree' and 'somewhat agree' were combined into 'agree' while the remaining categories were combined into 'do not agree' due to small sample sizes.

Community health need for syringe access by PWID was measured by the following proxy indicators: medically underserved area (MUA) designation by the U.S. Health Resources

and Services Administration (HRSA, 2016), average age-adjusted opioid overdose mortality rate for the period from 2002 to 2013 (the most recent available) grouped as high, mid, low/unstable (Indiana State Epidemiologic Outcomes Working Group, 2016), whether the county was adopting syringe exchange (yes/no) (Meyerson et al., 2017), and whether in the past 2 years pharmacists were asked about non-prescription syringe sales by customers, medical providers (physicians or nurses) or other pharmacists (measured as separate items).

Statistical analysis

Bivariate analyses investigated associations between the individual pharmacist level variables, pharmacy characteristics and community need indicators. To determine factors associated with pharmacy syringe sales, we assessed associations between independent variables and pharmacy syringe sales dispensing using bivariate logistic regression to calculate the unadjusted odds ratios (OR) and their 95% confidence intervals (CI). We conducted a second regression using the outcome variable of pharmacist comfort level dispensing syringes to PWID based on the outcomes of the first regression. All covariates were tested for multicollinearity, but none was found. Variables that showed significance at the 0.10 alpha level in the bivariate logistic regression models were included in the multivariable models. For selection of the final models, backward stepwise logistic regression was performed with significant variables from the bivariate analysis. An alpha level of 0.05 was used to determine statistical significance. After including only significant variables in the final models, we then assessed the change-in-estimates of the significant variables and goodness-of-fit by adding non-significant terms back into the models. All analyses were conducted using SPSS version 24 (Durham, NC).

Results

A total of 298 managing pharmacists fully completed the relevant survey items during the study period for an overall response rate of 35.1%. Responding pharmacists practiced in 72.8% of Indiana's 92 counties. The sample was evenly split between male and females, and participants were between 25 and 73 years of age (μ : 42.3yrs). While 65.4% of pharmacists reported receiving continuing education about opioid abuse in the past two years, only 3.4% received continuing education about non-prescription syringe provision.

Pharmacists worked predominantly at chain pharmacies (57.4%), which generally reflected the state distribution of community pharmacy types. Half of pharmacies reported selling syringes without a prescription to PWID; however, 43.4% of pharmacists practicing in pharmacies selling syringes to likely PWID indicated that syringe sale was dependent on which pharmacist was on duty at the time of sale.

Few pharmacists (7.4%) practiced in completely underserved MUAs (designation of "0"), 18.1% practiced in counties completely medically served ("100"), and the average MUA designation was 59.34. Opioid overdose mortality rates in communities of responding pharmacists generally reflected the state as a whole, as 49.5% of all Indiana counties experience low or unstable opioid overdose rates, 22.0% experience mid/moderate levels and 28.6% experience high rates of opioid overdose mortality (Indiana State Epidemiologic Outcomes Working Group, 2016).

Pharmacy sale of syringes to PWID

As shown in Table 1, 50.5% of pharmacies sold syringes without a prescription to PWID. Bivariate analyses identified potential factors that might, upon further analysis, associate with pharmacy syringe sales. In the bivariate analysis, pharmacists who felt comfortable distributing syringes to PWID were over 6 times as likely to work in pharmacies that sold syringes to PWID. Likewise, pharmacists who had been asked about syringe sales by customers, medical professionals, and/or other pharmacists in the past 2 years worked in pharmacies that sold syringes without a prescription to PWID. Pharmacists agreeing that dispensing syringes to PWID would reduce harm to addicts in the community, and those agreeing that PWID should be allowed to buy syringes without a prescription were roughly 5 times as likely to work in a pharmacy that sold non-prescription syringes to PWID. Pharmacy sale of syringes to PWID was also significantly associated with pharmacist beliefs that dispensing barriers were Board of Pharmacy policy, legal restrictions, personal disagreement over syringe distribution, and store policy.

Surprisingly, in the multivariable analysis, pharmacies located in communities with high rates of opioid overdose mortality were 56% less likely to distribute syringes without a prescription than pharmacies in communities with lower rates. In the multivariable analysis, pharmacies that sold syringes to PWID were nearly three times as likely to have pharmacists who felt comfortable distributing syringes to PWID, and over twice as likely to have pharmacists who were asked about the sale of syringes for non-prescription use by customers, pharmacists, or medical professionals. Pharmacies that sold syringes to PWID were nearly three times as likely to have pharmacists who agreed that dispensing syringes to PWID would reduce harm to addicts and twice as likely to have pharmacists who agreed that PWID should be allowed to buy syringes without a prescription. Finally, pharmacist beliefs that legal restrictions and store policy are barriers to syringe distribution also remained significantly associated with pharmacy distribution of syringes to PWID (See Table 2).

Pharmacist attitudes and beliefs about syringe sales to PWID

Roughly half of pharmacists held beliefs supportive of syringe access, as 51.0% agreed that dispensing syringes to PWID would reduce harm to addicts in their communities, 41.3% of agreed that PWID should always be allowed to buy syringes without a prescription at pharmacies, 59.4% believed that syringe exchanges would help protect PWID health, and 53.4% believed that over-the-counter sales of syringes would do the same. Yet despite these supportive views, less than one quarter of pharmacists reported being comfortable dispensing syringes to PWID. In fact, 52.7% indicated that they were not comfortable dispensing syringes to anyone without a prescription (see Table 3).

In the bivariate analysis, male pharmacists were over twice as likely as female pharmacists to report being comfortable dispensing syringes to PWID; as were those who had been asked by medical providers or other pharmacists in the past 2 years about syringe sales to PWID. Pharmacist comfort selling syringes to PWID was also associated with working in a pharmacy that currently sells them to PWID, working in a pharmacy that currently stocks Naloxone, not working in a chain pharmacy, agreeing that dispensing syringes to PWID will reduce harm to addicts, agreeing that PWID should be allowed to buy syringes without a

prescription, and not having a personal disagreement with supplying PWID with syringes (see Table 4).

Also shown in Table 4, in the multivariable analysis, male pharmacists remained over twice as likely as female pharmacists to report being comfortable dispensing syringes to PWID without a prescription. Pharmacists who had been asked by medical providers about the sale of syringes for non-prescription use in the past 2 years had a 2.87 higher odds of being comfortable selling syringes to PWID than those who had never been asked. Working in a pharmacy that currently sold syringes to PWID and working in a one stocking naloxone were significantly associated with pharmacist comfort distributing non-prescription syringes to PWID. Pharmacists who agreed that PWID should be allowed to buy syringes without a prescription were nearly 4 times more likely to be comfortable dispensing syringes to PWID than those who did not agree PWID should be allowed to buy syringes.

Discussion

This study advances awareness of factors contributing to pharmacy syringe sales and to pharmacist comfort dispensing syringes to PWID. It is now clear that supportive attitudes about syringe access by PWID generally can, and do in some cases, predict pharmacist syringe dispensing comfort. That said, it remains unclear why pharmacists are uncomfortable dispensing syringes to PWID when over half held supportive general attitudes about syringe access and recognized the health benefits of it. This observation is important and points to individual level elements that should be further explored, especially as 43% of pharmacists working at syringe dispensing pharmacies indicated that sales were pharmacist dependent.

The incongruity between generally supportive views and personal discomfort could be an expression of social dilemma similar to “NIMBY” (not in my backyard), as 55.4% of pharmacists reported that one barrier to syringe sales to PWID was that it would “*attract the wrong customers*” despite holding generally supportive views about syringe access by PWID (Palma-Oliveira, 2000). This finding appears to contrast with Zaller et al.’s study among Providence, Rhode Island pharmacists and pharmacy staff. They found that those who held beliefs generally supportive of non prescription syringe access tended to believe that PWID customers would not disrupt the pharmacy or make others feel uncomfortable. The key difference with this study and ours, however, was that Zaller interviewed staff of pharmacies that already dispensed syringes without a prescription to PWID. Zaller also observed that even among this generally supportive sample of pharmacists and pharmacy staff, there were concerns about personal safety when considering willingness to provide HIV services to PWID (Zaller, Jeronimo, Bratberg, Case, & Rich, 2010).

There may be structural aspects that influenced pharmacy syringe sales and pharmacist comfort with it. The contradictory aspects of Indiana’s law, where pharmacy syringe dispensing is permitted but syringe possession remains defined as drug paraphernalia, may be a barrier to pharmacy sales and pharmacist comfort dispensing syringes. While our study measured legal barriers to syringe sales, we did not explore perception about barriers to syringe possession. It is not clear whether sales/possession legal conflict influenced

pharmacist perception here, because a sizable minority of Indiana pharmacists incorrectly believed that pharmacy policy and law actually *prevented* syringe sales to PWID (18.1% and 19.5% respectively). This belief was held by pharmacists across the board, not just those who were uncomfortable with syringe sales or who worked at pharmacies that did not sell syringes to PWID. Steps to educate this group will be important, as both Indiana law and Board of Pharmacy policy clearly permit pharmacists to sell syringes without a prescription for human use.

The attempt to associate community need indicators with pharmacy sales was novel, and revealed the concerning observation that Indiana communities with high need for syringe access, as measured by opioid overdose mortality, actually had fewer syringe dispensing pharmacies. It is not likely that Indiana pharmacists in these communities deferred to existing syringe exchange programs to provide sterile syringes to PWID in lieu of pharmacies, because syringe exchange services were generally unknown to respondents. Our finding of the incongruity between overdose mortality and pharmacy syringe sales contrasted with Stopka et al.'s findings from Massachusetts which matched syringe sales with "opioid overdose hotspots" (Stopka, Donahue, Hutcheson, & Green, 2017). That said, community, pharmacist or medical professionals asking managing pharmacists about syringes in the past two years contributed to Indiana pharmacy syringe sales and pharmacist comfort dispensing syringes. Perhaps pharmacy practice is more closely aligned with the social interactional elements than with environmental epidemiologic community indicators. Indicators of community need and their relationship with pharmacy practice should continue to be explored and refined.

We also observed the contribution of structural elements beyond law that might provide clues to understanding syringe dispensing: that pharmacists working in pharmacies selling syringes to PWID and those working in naloxone stocking pharmacies were more comfortable dispensing syringes to PWID. Whether this is a matter of pharmacy environment influencing pharmacist comfort level, or pharmacist comfort level affecting the practice environment is not yet clear. Stopka et al.'s finding that pharmacies selling naloxone were more likely to sell non prescription syringes (Stopka et al., 2017) was not observed in our study. That said, we measured syringe sales to "likely injection drug users," whereas Stopka and colleagues asked only about non prescription syringe sales generally. Could this explain the difference in observations, or is this potentially a difference between Massachusetts and Indiana's experience with the pharmacy dispensing laws? For example, Massachusetts permitted pharmacy sale of syringes without a prescription in 2006, whereas Indiana first passed a more restrictive syringe sale law in 2008. Over 90% of Massachusetts pharmacies reported selling syringes without a prescription, compared to 50% in Indiana. These differences are important, especially for the development of pharmacy practice interventions to increase syringe access. National studies comparing jurisdictions would lead to a deeper understanding of the geographic variability of factors contributing to syringe sales to PWID.

A subset of pharmacists reported their syringe sales practice in the past 2 years including customary dispensing volume. These data were not reported here because the subsample was too small for robust analysis. To help understand comfort dispensing, future studies should

explore actual dispensing behaviors by pharmacists to understand factors that could predict pharmacist behavior. That said, if the sale is pharmacist dependent, as 43% indicated that it might be, there should be other factors to explore at social level within the pharmacy.

This study is subject to some limitations. First, not all managing pharmacists who were contacted completed the survey, so it may be possible that there was non-response bias. However, the responding sample reflected pharmacists in Indiana from the standpoint of gender, pharmacy setting, community type (rural/non rural) and opioid overdose mortality rate; indicating that our findings may be representative of the whole state. Second, there is important data limitation due to the self-report nature of the data, especially as relates to a potentially stigmatized population (likely PWID) and social desirability bias. The ways in which this might have influenced the data are unclear and potentially complex. There is some evidence that the extent of social desirability bias in self-report data fluctuates with the perceived ethics of a situation (Chung & Monroe, 2003). Thus, we might expect differences in the extent of this limitation depending on the underlying beliefs about PWID at the level of individual pharmacists. At the same time, examining this was, to some degree, part of the study itself, as we solicited information not only about behavioral performance but also about underlying beliefs. In other research on topics where bias is of significant concern in self-report (e.g., coitus, induced abortion), the use of anonymous and computer-facilitated data collection resulted in more accurate data than face-to-face data collection (Stuart & Grimes, 2009). Our use of the hybrid model was both anonymous and computer-facilitated, serving to reduce the extent to which any given participant might feel compelled to respond in a way that would present him/herself or his/her pharmacy in a socially desirable light.

Finally, the use of the phrase 'likely injecting drug user' versus PWID in survey items was a matter of deep discussion at the time of survey development. The phrase "PWID" is clearly more humanizing and less judgmental or stigmatizing than "injection drug user," and our personal preference was to use PWID in the survey items. That said, the concern was that pharmacists would not be sufficiently aware of the phrase "PWID," and therefore would respond differently. This hypothesis may be unfounded and should be central to discussion in future studies.

Despite these study limitations, this analysis makes an important contribution to the current literature by examining pharmacy non-prescription syringe sales and associated factors in an area of the country that is deeply affected by the growing opioid epidemic.

Conclusion

Distribution of non-prescription syringes in pharmacies has the potential to reduce the spread of HIV and other infectious diseases among the growing population of PWID. As communities with high rates of opioid overdose mortality were less likely to have pharmacies that dispensed syringes to PWID, a concerted effort with these communities and their pharmacies should be made to understand opportunities to increase syringe access. Future studies should continue to explore factors that contribute to pharmacy sales of syringes and pharmacist comfort dispensing them to PWID, especially in areas of high need and low public health resource.

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References

- Agley J, Meyerson BE, Shannon DJ, Ryder PT, Ritchie K, & Gassman RA (2017). Using the hybrid method to survey U.S. pharmacists: Applying lessons learned to leverage technology. *Research in Social and Administrative Pharmacy*, 13, 250–252. [PubMed: 27743847]
- Amesty S, Blaney S, Crawford ND, Rivera AV, & Fuller C (2012). Pharmacy staff characteristics associated with support for pharmacy-based HIV testing. *Journal of the American Pharmaceutical Association*, 52, 472–479.
- Bramson H, Des Jarlais DC, Arasteh K, Nugent A, Guardino V, Feelemyer J, et al. (2015). State laws syringe exchange, and HIV among persons who inject drugs in the United States: History and effectiveness. *Journal of Public Health Policy*, 36(2), 212–230. [PubMed: 25590514]
- Calis KA, Hutchison LC, Elliott ME, Ives TJ, Zillich AJ, Poirier T, et al. (2004). Healthy people 2010: challenges, opportunities, and a call to action for America's pharmacists. *Pharmacotherapy*, 24, 1241–1294. [PubMed: 15460187]
- Case P, Beckett GA, & Jones TS (1998). Access to sterile syringes in Maine: Pharmacy practice after the 1993 repeal of the syringe prescription law. *Journal of Acquired Immune Deficiency Syndromes Retrovirology*, 18(Suppl. 1), S94–101.
- Chung J, & Monroe GS (2003). Exploring social desirability bias. *Journal of Business Ethics*, 44(4), 291–302.
- Conrad C, Bradley HM, Broz D, Budda S, Chapman E, Galang RR, et al. (2015). Community outbreak of HIV infection linked to injection drug use of Oxycodone—Indiana 2015. *MMWR*, 64(16), 443–444. [PubMed: 25928470]
- Deas C, & McCree DH (2010). Pharmacies and HIV/AIDS prevention: a review of the literature. *Journal of the American Pharmaceutical Association*, 50, 411–415.
- Dombrowski K, Crawford D, Khan B, & Tyler K (2016). Current rural drug use in the US Midwest. *Journal of Drug Abuse*, 2(3).
- Edwards P, Cooper R, Roberts I, & Frost C (2005). Meta-analysis of randomized trials of monetary incentives and response to mailed questionnaires? *Journal of Epidemiology & Community Health*, 59(11), 987–999. [PubMed: 16234429]
- Gleghorn AA, Gilbert G, & David V (1997). Pharmacists' attitudes about pharmacy sale of needles/syringes and needle exchange programs in a city without needle/syringe prescription laws. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology: Official Publication of the International Retrovirology Association*, 18, S89–S93.
- Gostin LO, Lazzarini Z, Jones TS, & Flaherty K (1997). Prevention of HIV/AIDS and other blood-borne diseases among injection drug users: A national survey on the regulation of syringes and needles. *JAMA*, 277(1), 53–62. [PubMed: 8980211]
- Resources Health and Administration Services (2016). Medically underserved areas. [Retrieved 9 1: <https://bhwh.hrsa.gov/shortage-designation/muap>].
- Hardigan PC, Popovici I, & Carvajal JM (2016). Response rate, response time, and economic costs of survey research: A randomized trial of practicing pharmacists. *Research in Social and Administrative Pharmacy*, 36, 387–402.
- Hedger L (2017). Second Indiana county ends needle exchange, with 1 official citing moral concerns. *Indianapolis Star* [October 23, Retrieved 11 3, 2017: <https://www.indystar.com/story/news/2017/10/23/2nd-indiana-county-ends-needle-exchange-one-official-citing-moral-concerns/787740001/>].

- Hirsch JD, Rosenquist A, Best BM, Miller TA, & Gilmer TP (2009). Evaluation of the first year of a pilot program in community pharmacy: HIV/AIDS medication therapy management for Medi-Cal beneficiaries. *Journal of Managed Care Pharmacy*, 15, 32–41. [PubMed: 19125548]
- Indiana Board of Pharmacy (2017). Reg 28, Ch VI, Sec 6.32; filed Jul 9, 1974, 9:29 am: Unpublished; filed May 20, 1988, 9:30 am: 11 IR 3565; readopted filed Nov 14, 2001, 2:45 p.m.: 25 IR 1341. [Retrieved 4 11: [http://www.in.gov/pla/files/2011_BoP_and_PLA_Compilation\(1\).pdf](http://www.in.gov/pla/files/2011_BoP_and_PLA_Compilation(1).pdf)].
- Indiana Code § 35-48-4-8.5 and 856 Indiana Admin. Code 2-6-18. Dispensing without Prescription; delivery of devices.
- Indiana Code §16-41-7.5 Senate Enrolled ACT 461 (2015) PL 208–2015.
- Indiana State Epidemiologic Outcomes Working Group (2016). The consumptions and consequences of alcohol, tobacco and drugs in Indiana: A state epidemiological profile, 2014 Center for Health Policy, Indiana University [Retrieved 9 1: <http://www.healthpolicy.iupui.edu/PubsPDFs/2014%20State%20Epi%20Report.pdf>].
- James KM, Ziegenfuss JY, Tilburt JC, Harris AM, & Beebe TJ (2011). Getting physicians to respond: The impact of incentive type and timing on physician survey response rates. *Health Services Research*, 46(1), 232–242. [PubMed: 20880042]
- Jones CM, Christensen A, & Gladden RM (2017). Increases in prescription opioid injection abuse among treatment admissions in the United States, 2004–2013. *Drug and Alcohol Dependence*, 176, 89–95. [PubMed: 28531769]
- Kerr T, Small W, Buchner C, Zhang R, Li K, Montaner J, et al. (2010). Syringe sharing and HIV incidence among injection drug users and increased access to sterile syringes. *American Journal of Public Health*, 100(8), 1449–1453. [PubMed: 20558797]
- Klabunde CN, Willis GB, McLeod CC, Dillman DA, Johnson TP, Greene SM, et al. (2012). Improving the quality of surveys of physicians and medical groups: A research agenda. *Evaluation & Health Professions*, 35(4), 477–506.
- Lewis BA, Koester SK, & Bush TW (2002). Pharmacist's attitudes and concerns regarding syringe sales to injection drug users in Denver, Colorado. *Journal of the American Pharmacists Association*, 42(Suppl. 2), S46–51.
- Lutnik A, Case P, & Kral AH (2012). Injection drug users' perspectives on placing HIV prevention and other clinical services in pharmacy settings. *Journal of Urban Health*, 89, 354–364. [PubMed: 22231488]
- Meyerson BE, Lawrence CA, Miller L, Gillespie A, Raymond D, Kelley K, et al. (2017). Against the odds: Syringe exchange policy implementation in Indiana. *AIDS and Behavior*, 21, 973–981. [PubMed: 28108875]
- Meyerson BE, Agle J, Davis A, Shannon DJ, Ryder PT, Ritchie K, et al. (2016). Predicting pharmacy naloxone stocking and dispensing following a statewide standing order. *Indiana* [In review].
- Meyerson BE, Carter GA, Lawrence CA, Jimison L, Rush N, Carter C, et al. (2016). Expanding HIV testing in African American communities through community-based distribution of test vouchers. *AIDS Patient Care and STDS*, 30(3).
- Meyerson BE, Ryder PT, & Richey-Smith K (2013). Achieving pharmacy-based public health: A call for public health engagement. *Public Health Reports*, 128(May-Jun), 140–143. [PubMed: 23633728]
- Meyerson BE, Ryder PT, Von Hippel CD, & Coy KC (2013). We can do more than just sell the test: Pharmacist perspectives about over the counter rapid HIV tests. *AIDS Behavior*, 17(6), 2109–2113. [PubMed: 23417643]
- Murphy P, Cocohoba J, Tang A, Pietrandoni G, Hou J, & Guglielmo BJ (2012). Impact of HIV-specialized pharmacies on adherence and persistence with anti-retroviral therapy. *AIDS Patient Care and STDS*, 26, 526–531. [PubMed: 22860900]
- Neaigus A, Zhao M, Gyarmathy VA, Cisek L, Friedman SR, & Baxter RC (2008). Greater drug injecting risk for HIV HBV, and HCV infection in a city where syringe exchange and pharmacy syringe distribution are illegal. *Journal of Urban Health*, 85(3), 309–322. [PubMed: 18340537]
- Palma-Oliveira JM (2000). A new theory for the explanation of the NIMBY effect. In Cottam M, Harvey D, Pape R, & Tait J (Eds.). *Foresight and precaution* (pp. 1167–1171). Rotterdam: AA Balkema.

- Rich JD, Martin EG, Macalino GE, Paul RV, McNamara S, & Taylor LE (2002). Pharmacist support for selling syringes without a prescription to injection drug users in Rhode Island. *Journal of the American Pharmacists Association*, 42(suppl.2), S58–61.
- Rudd RA, Aleshire N, Zibbell JE, & Gladden MR (2016). Increases in drug and opioid overdose deaths—United States, 2000–2014. *American Journal of Transplantation*, 16(4), 1323–1327.
- Ruiz MS, O’Rourke A, & Allen ST (2016). Impact evaluation of a policy intervention for HIV prevention in Washington, DC. *AIDS Behavior*, 20(1), 22–28. [PubMed: 26336945]
- Ryder PT, Meyerson BE, Coy KC, & Von Hippel CD (2013). Pharmacists’ perspectives on HIV testing in community pharmacies. *Journal of American Pharmacists Association*, 53, 595–600.
- Sherman SG, Patel SA, Ramachandran DV, Galai N, Chaulk P, Serio-Chapman C, et al. (2015). Consequences of a restrictive syringe exchange policy on utilisation patterns of a syringe exchange program in Baltimore, Maryland: Implications for HIV risk. *Drug and Alcohol Review*, 34(11 (6)), 637–644. [PubMed: 25919590]
- Smith MI, Vertheimer AI, & Fincham JE (Eds.). (2005). *Pharmacy and the U.S. health care system* (3rd ed.). Binghamton (NY): Haworth Press Inc.
- Stopka TJ, Donahue A, Hutcheson M, & Green TC (2017). Nonprescription naloxone and syringe sales in the midst of opioid and hepatitis C virus epidemics: Massachusetts, 2015. *Journal of the American Pharmaceutical Association*, 15, S34–S44.
- Stuart GS, & Grimes DA (2009). Social desirability bias in family planning studies: A neglected problem. *Contraception*, 80(2), 108–112. [PubMed: 19631784]
- Temple University Policy Surveillance Program (2017). Law atlas: Syringe possession laws. [Accessed April 11: <http://lawatlas.org/datasets/paraphernalia-laws>].
- Trust for America’s Health (2016). Investing in America’s Health: A state by state look at public health funding and key health facts. [Washington, DC, Accessed May 13, 2016: <http://healthyamericans.org/assets/files/TFAH-2016-InvestInAmericaRpt-FINAL.pdf>].
- Wright-De Agüero L, Weinstein B, Jones TS, & Miles J (1998). Impact of the change in Connecticut syringe prescription laws on pharmacy sales and pharmacy managers’ practices. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 18(Suppl. 1), S102–S110.
- Zaller N, Jeronimo A, Bratberg J, Case P, & Rich JD (2010). Pharmacist and pharmacy staff experiences with non-prescription (NP) sale of syringes and attitudes toward providing HIV prevention services for injection drug users (IDUs) in Providence, Rhode Island. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 87(6), 942–953. [PubMed: 21116724]

Table 1

Indiana Community Pharmacist and Pharmacy Characteristics (N = 298), 2016.

Pharmacist Characteristics	
Age	$\mu = 42.3$ yrs (r:25–73, SD:11.7)
Race/Ethnicity	
White, Non-Hispanic	272 (91.3%)
Other Race/Ethnicity	26 (8.7%)
Gender	
Female	149 (50.0%)
Male	149 (50.0%)
Years of pharmacy practice	Median (17 years; r:1–51, SD:12.0)
PharmD degree	180 (60.4%)
Received continuing education about opioid abuse in the past 2 years	195 (65.4%)
Received continuing education about hepatitis C management	77 (25.8%)
Received continuing education about non-prescription syringe provision in past 2 years	10 (3.4%)
Pharmacy Characteristics and Practice	
Type of pharmacy	
Chain	171 (57.4%)
Food Store	67 (22.5%)
Mass Merchandiser	49 (16.4%)
Independent	11 (3.7%)
Pharmacy sells syringes without a prescription to likely injection drug users	145 (50.5%)
Pharmacy stocks naloxone	169 (56.7%)
Community Need Characteristics	
Medically Underserved Area Designation	Mean: 59.34 (SD:29.43)
Rurality	
Metro	236 (79.2%)
Non-metro	62 (20.8%)
County average age-adjusted opioid overdose mortality rate, 2002–2013	
Low/unstable	132 (44.3%)
Mid	96 (32.2%)
High	70 (23.5%)
Pharmacy is located in a county that is adopting syringe exchange programming	110 (36.9%)
Was asked about syringe sales without a prescription in last two years by	
Customers	231 (77.5%)
Medical providers (nurses or physicians)	34 (11.4%)
Other pharmacists	40 (13.4%)
By any (Customers, medical providers or other pharmacists)	230 (79.5%)

Table 2

Odds ratios and Adjusted odds ratios for factors associated with pharmacy sales of syringes without a prescription to PWID, Indiana 2016 (N = 298).

Variable	Prevalence N (%)	OR [CI]	P-value	AOR [CI]	P-value
Pharmacist feels comfortable distributing syringes to PWID			.000		.040
Yes	42 (14.1%)	6.14 [2.62–14.35]		2.86 [1.05–7.81]	
No	256 (85.9%)	Ref.		Ref.	
Asked by anyone about the sale of syringes for non-prescription use			.018		.027
Yes	237 (79.5%)	2.14 [1.14–4.01]		2.33 [1.10–4.93]	
No	61 (20.5%)	Ref.		Ref.	
Chain pharmacy			.575		
Yes	171 (57.4%)	Ref.			
No	127 (42.6%)	1.14 [0.72–1.82]			
Agree that dispensing syringes to PWID will reduce harm to addicts in my community			.000		.006
Yes	152 (51.0%)	5.31 [3.20–8.79]		2.93 [1.37–6.25]	
No	146 (49.0%)	Ref.		Ref.	
Agree that PWID should be allowed to buy syringes without a prescription			.000		.027
Yes	123 (41.3%)	5.05 [3.03–8.41]		2.41 [1.01–5.26]	
No	175 (58.7%)	Ref.		Ref.	
Believes Board of Pharmacy policy is a barrier to syringe distribution			.029 ^a		
Yes	54 (18.1%)	Ref.			
No	244 (81.9%)	1.97 [1.07–3.62]			
Believes non-prescription syringe distribution will attract the wrong customers to the pharmacy			.079		
Yes	165 (55.4%)	Ref.			
No	133 (44.6%)	1.53 [0.95–2.44]			
Believes legal restrictions are a barrier to syringe distribution			.003		.001
Yes	58 (19.5%)	Ref.		Ref.	
No	240 (80.5%)	2.51 [1.37–4.61]		3.49 [1.65–7.41]	
Believes other customers might disapprove of selling syringes to PWID			.542		
Yes	40 (13.4%)	Ref.			
No	258 (86.6%)	0.81 [0.42–1.59]			
Believes other pharmacists might disapprove of selling syringes to PWID			.599		

Variable	Prevalence N (%)	OR [CI]	P-value	AOR [CI]	P-value
Yes	87 (29.2%)	Ref.			
No	211 (70.8%)	0.87 [0.53–1.45]	.001		
Personal disagreement with supplying PWID with syringes					
Yes	138 (46.3%)	Ref.			
No	160 (53.7%)	2.30 [1.43–3.70]	.000		
Store policy is a barrier to syringe distribution					
Yes	78 (26.2%)	6.91 [3.69–12.96]		Ref.	
No	220 (73.8%)	Ref.		6.19 [3.05–12.58]	.021
High opioid overdose mortality rate					
Yes	70 (23.5%)	0.61 [0.35–1.06]	.079	0.44 [0.22–0.88]	
No	228 (76.5%)	Ref.		Ref.	

^b Correct classification of pharmacies who were not selling syringes increased from 0% to 69.7%. –2LL was 283.76 in the final model compared to 397.84 in the constant model.

^a Odds ratios (OR) were derived from independent bivariate analyses. Adjusted ORs were derived from a final model in which all variables significant at the 0.10 alpha level in the bivariate analysis were initially included in a backwards stepwise regression. Variables in the AOR column are those that remained significant and were included in the final regression.

Table 3
 Indiana Pharmacist Attitudes Toward and Beliefs about Syringe Sales to PWID (N = 298), 2016.

Pharmacist Attitudes and Beliefs	
Pharmacists can be important resources for HIV and Hepatitis C prevention (Agree)	259(86.9%)
Pharmacists can be important resources for HIV and Hepatitis C treatment (Agree)	259(86.9%)
Pharmacists can be important resources for PWID who do not have access to health care in the community (Agree)	218(73.2%)
Syringe exchanges are an effective way of protecting the health of injection drug users (Agree)	177(59.4%)
Over-the-counter sale of syringes is an effective way to protect the health of injection drug users (Agree)	159(53.4%)
Dispensing syringes to injection drug users will reduce harm to addicts in the community (Agree)	152(51.0%)
PWID should always be allowed to buy syringes without a prescription (Agree)	123(41.3%)
Barriers to syringe sales to PWID without a prescription	
It will attract the wrong customers to this pharmacy	165(55.4%)
Personal disagreement with supplying injection drug users with syringes	138(46.3%)
Other pharmacists might disapprove	87(29.2%)
Store policy	78(26.2%)
Legal restrictions (the law does not permit it)	58(19.5%)
Board of Pharmacy Policy	54(18.1%)
Other customers might disapprove	40(13.4%)
Pharmacist Comfort with Syringe Sales Under Likely and Legal Scenarios	
Not comfortable dispensing syringes to anyone without a prescription	157 (52.7%)
Comfortable dispensing syringes without a prescription to a person who injects steroids	69(23.2%)
Comfortable dispensing syringes without prescription to a family member of someone who uses injection drugs	51 (17.1%)
Comfortable dispensing syringes without prescription to a person who injects opiates	42 (14.1%)
Comfortable dispensing syringes without prescription to an adult friend of someone who injects opiates	37 (12.4%)
Comfortable dispensing syringes without prescription to a teenage friend (about 15–17 yrs old) of someone who injects opiates	6 (2.0%)
Comfortable with all of these scenarios	41 (13.8%)

Table 4

Odds ratios and Adjusted odds ratios for factors associated with pharmacist comfort selling syringes without a prescription to PWID, Indiana 2016 (N = 298).

Variable	Prevalence N (%)	OR [CI]	P-value	AOR [CI]	P-value
Gender			.022		.012
Female	149 (50.0%)	Ref.		Ref.	
Male	149 (50.0%)	2.23 [1.12–4.44]		2.74 [1.25–6.01]	
Race			.696		
Person of Color	26 (8.7%)	Ref.			
White, non-Hispanic	272 (91.3%)	1.28 [0.37–4.48]			
Asked by patients or customers about the sale of syringes for non-prescription use			.333		
Yes	231 (77.5%)	1.53 [0.65–3.62]			
No	67 (22.5%)	Ref.			
Asked by medical providers about the sale of syringes for non-prescription use			.009		.036
Yes	34 (11.4%)	3.02 [1.32–6.89]		2.87 [1.07–7.69]	
No	264 (88.6%)	Ref.		Ref.	
Asked by other pharmacists about the sale of syringes for non-prescription use			.011		
Yes	40 (13.4%)	2.78 [1.26–6.11]			
No	258 (86.6%)	Ref.			
Pharmacy currently sells syringes to PWID			.000		.008
Yes	145 (48.7%)	6.14 [2.62–14.35]		3.61 [1.40–9.27]	
No	142 (47.7%)	Ref.		Ref.	
Pharmacy currently stocks Naloxone			.028		.014
Yes	169 (56.7%)	2.10 [1.08–4.07]		2.63 [1.22–5.67]	
No	120 (40.3%)	Ref.		Ref.	
Works in a chain pharmacy			.019		
Yes	171 (57.4%)	Ref.			
No	127 (42.6%)	2.22 [1.14–4.32]			
Agree that dispensing syringes to PWID will reduce harm to addicts in the community			.000		
Yes	152 (51.0%)	9.07 [3.45–23.83]			
No	146 (49.0%)	Ref.			

Variable	Prevalence N (%)	OR [CI]	P-value	AOR [CI]	P-value
Agree that PWID should be allowed to buy syringes without a prescription					.007
Yes	123 (41.3%)	9.55 [4.07–22.37]	.000	3.90 [1.45–10.49]	
No	175 (58.7%)	Ref.		Ref.	
Believes Board of Pharmacy policy is a barrier to syringe distribution					.549
Yes	54 (18.1%)	Ref.			
No	244 (81.9%)	0.78 [0.35–1.75]	.157		
Believes non-prescription syringe distribution will attract the wrong customers to the pharmacy					.942
Yes	165 (55.4%)	Ref.			
No	133 (44.6%)	1.61 [0.83–3.10]	.507		
Believes legal restrictions are a barrier to syringe distribution					.318
Yes	58 (19.5%)	Ref.			
No	240 (80.5%)	1.03 [0.45–2.37]			
Believes other customers might disapprove of selling syringes to PWID					.000
Yes	40 (13.4%)	Ref.			
No	258 (86.6%)	0.74 [0.30–1.80]			
Believes other pharmacists might disapprove of selling syringes to PWID					.065
Yes	87 (29.2%)	Ref.			
No	211 (70.8%)	0.70 [0.35–1.40]			
Personal disagreement with supplying PWID with syringes					.465
Yes	138 (46.3%)	Ref.			
No	160 (53.7%)	4.39 [1.95–9.84]			
Store policy is a barrier to syringe distribution					
Yes	78 (26.2%)	Ref.			
No	220 (73.8%)	2.35 [0.95–5.81]			
High prescription drug OD mortality rate					
Yes	70 (23.5%)	Ref.			
No	228 (76.5%)	1.36 [0.60–3.09]			

* Odds ratios were derived from independent bivariate analyses. Adjusted odds ratios were derived from a final model in which all variables significant at the 0.10 alpha level in the bivariate analysis were initially included in a backwards stepwise regression. Variables in the AOR column are those that remained significant and were included in the final regression.

** Correct classification of pharmacists who were comfortable selling syringes increased from 0% to 28.6%. –2LL was 178.88 in the final model compared to 242.37 in the constant model.