

Research Note
**The Damage Done: A Study of Injection Drug Use,
Injection Related Abscesses and Needle
Exchange Regulation**

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QUERY SHEET

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This study investigated the impact of a needle exchange policy change on community health. Data were collected from a needle exchange program in Eureka, California, for clients who participated in the program between the weeks (n = 112) of January 1, 2002, and February 28, 2004. Analysis was done using an autoregressive integrated moving average (ARIMA), indicating that greater utilization of the needle exchange program, in terms of needles exchanged and number of visits, is related to fewer numbers of abscesses treated. Additionally, self-report data collected from former intravenous drug users (n = 62) demonstrated that more needles exchanged were related to fewer occurrences of abscesses. The limitations of this research are discussed.

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Keywords abscesses; injection drug use; substance abuse; needle exchange; harm reduction; public health

Introduction

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Paraphernalia sharing results in some of the most prominent public health risks associated with injection drug use (Singer, Irizarry, and Schensul, 1991). In addition to blood-borne pathogens, injection drug users are prone to infections such as endocarditis, cellulite, and abscesses, which are bacterial infections typically found at the site of injection and often related to shared or otherwise contaminated needles (Rich et al., 2001). Abscesses require costly medical attention (Murphy et al., 2001), with estimated costs to treat abscesses ranging from US\$185 to US\$360 excluding medication and physician fees (Grau, Arevalo, Catchpool, and Heimer, 2002). Left untreated, a limb can be lost or infection can spread through the body, resulting in death. Nearly half of abscesses treated are related to injection-related

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skin infections and a significant proportion of all hospital use by injection drug users is for injection-related skin infections and abscesses (Stein and Sobota, 2001). Clearly, these reasons alone warrant further research into the experiences of injection drug users and their injection equipment sharing behaviors. This article explores the utilization of a needle exchange program (NEP) by injection drug users, abscess frequency, and community-based drug user treatment policies. 35

The goal of NEPs is to reduce the frequency of drug-injecting equipment sharing, thus reducing and/or preventing the transmission of blood-borne pathogens. Programs also offer information, treatment, and medical screening relevant to injection drug use (Hagan et al., 2000). Despite these potential community-wide benefits, NEPs are often imbued with controversy (Singer et al., 1991). Arguments against needle exchange include the fear that having drug-injecting equipment available to the public leads to more frequent injecting practices or even encourages non-injection drug users to start injecting drugs (Hagan et al., 2000). In addition, NEPs are subject to a number of legal restrictions focusing on the location of the program, who can participate, and the number of needles that can be exchanged (Des Jarlais, Paone, Friedman, Peyser, and Newman, 1995). However, despite the controversies that often surround NEPs, a number of studies support their effectiveness (Hagan, Des Jarlais, Friedman, Purchase, and Alter, 1995). For example, NEPs have been found to be effective in reducing the transmission of HIV and other blood-borne pathogens (Bastos and Strathdee, 2000) and are cost-effective compared to other HIV prevention programs (Bluthenthal, 1998). Additionally, using contaminated needles is the second strongest risk factor for skin and soft tissue abscesses (Murphy et al., 2001), suggesting that access to clean needles can reduce the incidence of abscesses. 40 45 50

Q3 Our study examined an NEP in Eureka, California, that was established in August of 2000. This program initially exchanged used needles for clean needles on a one-to-one basis and provided harm reduction education, testing, and treatment services on a walk-in basis. The program typically exchanged 3000 or more needles each week, for an average cost of less than \$300 per week in supplies (R. Rothman, personal communication, December 2002). In April 2003, the program restricted the number of needles exchanged to a maximum of 100 needles and required appointments for exchanges. The purpose of this study was to examine the relationship between utilization of this rural needle exchange program (in the context of the aforementioned policy change) and the occurrence of abscesses in the community. We were also interested in the demographic characteristics and self-reported experiences of the population served by the program. We hypothesized that greater utilization of the NEP, as measured by total number of needles exchanged over time, and frequency of visits would be related to fewer abscesses treated at local community health centers. We also hypothesized that individuals who reported greater numbers of needles exchanged and more frequent use of sterile injecting equipment would report fewer occurrences of lifetime abscesses. 55 60 65 70

Method

The first study reviewed program records from an NEP and an associate community health agency in Eureka, California. The study was approved by the program directors and a university's institutional review board (IRB). From program records, we collected data regarding participant demographics, number of needles exchanged, and abscesses treated for 112 weeks from January 1, 2002, to February 28, 2004. All data were collapsed by week. Table 1 summarizes demographics for samples in Study 1 and Study 2. The Study 75

Table 1
Selected sample demographics of participants for chart review data

Variable	<i>N</i>	%
Gender		
Male	1875	63.7
Female	1045	35.5
Ethnicity		
White	2694	91.6
Native American	114	3.9
Hispanic/Latino	50	1.7
African-American	38	1.3
Pacific Islander	7	0.2
Asian American	3	0.1
Other	32	1.2

Note. $n = 2920$ for gender; $n = 2942$ for ethnicity. Data represent 112 weeks.

1 sample reflects program visits, so some individuals were likely counted more than once. To test the hypothesis that a greater numbers of needles exchanged and visits to the NEP correspond with fewer numbers of abscesses reported at area clinics, we used autoregressive integrated moving average (ARIMA) analysis¹ (Box and Jenkins, 1976). ARIMA accounts for factors, such as correlations from one week to the next, that inflate relationships observed by procedures such as regression.

A second study recruited former intravenous drug users from local 12-step meetings and was also approved by the IRB. These participants did not receive any payment for their participation. Participants completed a consent form and an anonymous self-report measure that took approximately 15 minutes and were then were debriefed. Demographic information for participants in the self-report survey study ($n = 62$) is found in Table 1. The questionnaire included items addressing experiences with abscesses, medical treatment, and use of sterile injecting equipment and only this portion of the measure was utilized. All questions from the survey were self-report in nature and were completed anonymously by individual participants.

Results

Study 1 (chart review) analyses examined relationships between utilization of the NEP and abscesses treated at area clinics. Analyses with ARIMA ($p = 1$) yielded a significant negative relationship between number of needles exchanged and number of abscesses treated, $b = -.001$, $t(109) = -3.1$, $p = .002$, supporting Hypothesis 1 (see Figure 1). Based on this model, every 1000 needles exchanged resulted in one fewer abscess, suggesting that needle exchange is an effective abscess reduction strategy. Supporting Hypothesis 2 and demonstrated by Figure 2, ARIMA ($p = 1$) yielded a significant negative relationship between number of needle exchange program visits and the number of abscesses treated in the community, $b = -.12$, $t(109) = -3.7$, $p < .001$. For every eight visits to the needle exchange program, there was one fewer abscess treated in the community health care system.

Table 2
Selected sample demographics for survey data

Variable	<i>N</i>	%
Gender		
Male	36	58.1
Female	26	41.9
Ethnicity		
White	53	85.5
Native American	8	12.9
Asian/Pacific Islander	1	1.6
Type of insurance		
State	27	43.5
Private	16	25.8
Other	13	21.0
None	6	9.7

Note. *n* = 62 for all variables.

Also of note are the sharp drops in needle exchanges and visits at week 66, corresponding to changes in program availability resulting from a policy change (see Table 3).

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Hypothesis 3 (self-report data) predicted greater NEP utilization related to fewer occurrences of abscesses and was supported. Self-reports of greater numbers of needles exchanged were significantly related to lower occurrences of abscesses. Regression analysis yielded a significant negative relationship between number of needles exchanged and occurrences of abscesses, $R^2 = .10$, $F(1, 60) = 6.41$, $p = .01$, $B = -.68$. Consistent with time series results, individuals who reported fewer abscesses exchanged more needles per visit. Hypothesis 4 predicted that more use of sterile injecting equipment (new points, sterile water, alcohol wipes) related to fewer occurrences of abscesses but was not supported. Use of sterile injecting equipment was not related to abscesses reported, $R^2 = .10$, $F(3, 58) = 2.23$, $p = .10$.

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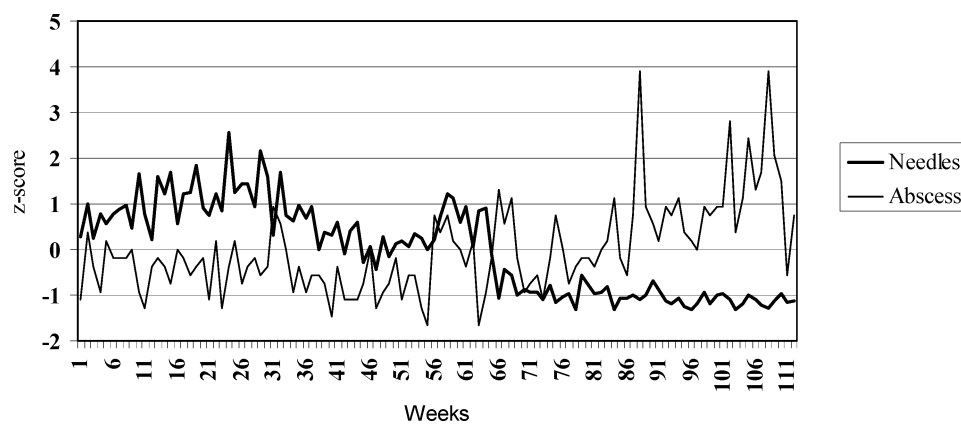
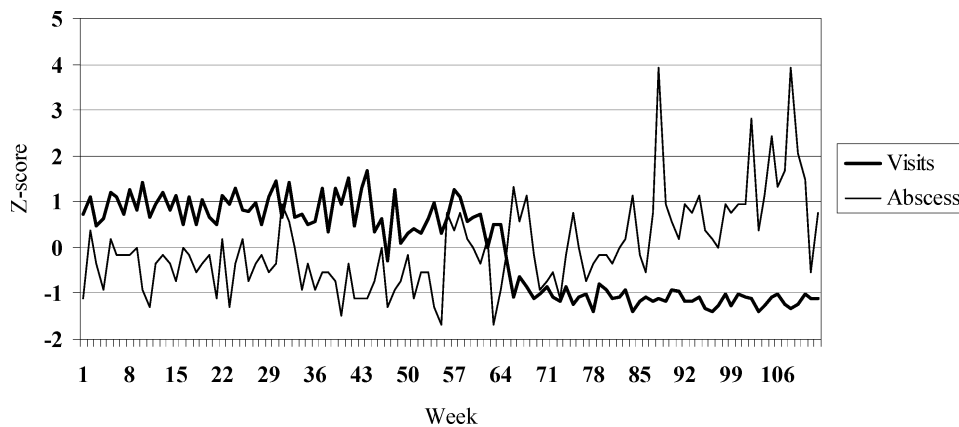


Figure 1. Graph of relationship between number of needles exchanged and number of abscesses.



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Figure 2. Graph of the relationship between number of visits to the NEP and number of abscesses.

115 Discussion

Our analyses of the NEP, as well as community health agency records and self-report data from injection drug users, indicated a significant association between the number of needles exchanged and the rate of abscess occurrence in both community health records and self-reported experience. Surprisingly, we also found that those individuals who reported more frequent utilization of sterile injecting equipment did not necessarily reduce the frequency of their reported abscesses. These findings are discussed.

Our study sought to evaluate an NEP in the rural northwestern United States that changed its needle exchange policy. The program moved from a one-to-one needle exchange rate and walk-in access policy to a more restrictive exchange rate and appointment-only access policy. The results of our study revealed that this change resulted in 2700 fewer needles being exchanged each week and that this policy change corresponded with increases in the number of abscesses treated at community health centers. Specifically, the number of abscesses treated by community health agencies increased by almost three each week following the shift in exchange and access policy within the local NEP. These results appear to broadly support the value of NEPs in promoting public health and suggest that there is a significant correlation between a policy of need-based needle exchange and open access

Table 3

Comparison of needles exchanged and abscesses before and after policy change

Variable	Mean	SD
Needles exchanged		
Before policy change weeks 1–65	3268.32	965.25
After policy change weeks 66–112	470.53	320.75
Abscesses		
Before policy change weeks 1–65	8.51	3.18
After policy change weeks 66–112	14.34	5.95

Note. Data represents 112 weeks.

to harm reduction services for injection drug users and the number of abscesses treated in public health agencies. We also evaluated the self-reported histories and experiences of former injection drug users in the community and found that as self-reported average number of needles exchanged decreased, the number of self-reported abscesses increased. Again, these results broadly support the value of needle exchange in promoting public health. However, we were surprised to find that former injection drug users who reported more frequent use of sterile injecting equipment did not necessarily report fewer occurrences of abscesses. Although we can offer no obvious reason for this finding, it does suggest an area for future research to pursue.

Study's Limitations

Limitations to our study include the nature of archival and self-report data and certain characteristics of the population we sampled. For the survey component of our study, a relatively small sample size ($n = 62$) was obtained from local 12-step participants. This limits our data in terms of generalizability to the experiences, habits, and practices of current injection drug users. Although these limitations temper our conclusions, it is unlikely that poor or inaccurate reporting or the lack of specificity of abscess diagnosis produced the observed and statistically significant results.

Post Hoc Cost Analysis

Our chart analysis found that every 1000 needles exchanged reduced the number of abscesses by one. We determined that 1000 needles cost approximately \$90, while treating one abscess costs from approximately \$185 to \$360, excluding medication and physician fees (Grau et al., 2002). We conducted a post hoc cost analysis and found that although one of the program's goals in implementing change was to reduce cost, this potential savings to the community was unrealized. The money saved on 2700 needles each week was approximately \$243 in 2004. Using a conservative estimate for the treatment costs of additional abscesses, the corresponding cost increase in abscess care was approximately \$500, resulting in a net additional cost of approximately \$257 to the community per week.

Conclusions

In sum, our findings add to the existent literature that suggests that both individual and community-wide health benefits may be gained from harm reduction policies. Specifically, our findings point toward the need for greater support of NEPs and for policies that advocate for greater accessibility to services and less restrictive exchange policies in those programs.

RÉSUMÉ

Q6 Cette étude est basée sur l'impact de la politique de renouvellement des seringues dans la communauté médicale. Des échantillons de données ont été collectés dans la communauté de Eureka, en Californie (USA), un nombre défini de candidats ont été examinés pendant douze semaines ($n = 112$), de 1 Janvier 2002 au 28 Février 2004. L'analyse a été réalisée en utilisant une moyenne régressif à change dans le temps (ARIMA), indiquant qu'une

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plus grande utilisation du programme d'échange d'aiguille, en termes d'aiguille échangée et nombre de visites, est lié à peu de nombres d'abcès traités. En plus, les données de art de l'auto-portrait-report rassemblées d'anciens utilisateurs de drogue intraveineux ($n = 62$) ont démontré que plus d'aiguilles échangées ont été liées à peu d'occurrences des abcès. Les limitations de cette recherche sont discutées.

RESUMEN

Este estudio investigó el impacto de un cambio policial de intercambio de la aguja en salud de la comunidad. Los datos fueron recogidos de un programa del intercambio de la aguja en Eureka, California (USA) para los clientes que participaron en el programa entre las semanas ($n = 112$) del de enero 1 de 2002 y de febrero 28 de 2004. El análisis fue hecho usando un promedio móvil integrado autoregressive (ARIMA), indicando que mayor utilización del programa del intercambio de la aguja, en los términos de la aguja intercambiados y el número de visitas, se relaciona con pocos números de los abscesos tratados. Además, los datos del uno mismo-informe recogieron de usuarios de droga intravenosos anteriores ($n = 62$) demostraron que más agujas intercambiadas fueron relacionadas con pocas ocurrencias de abscesos. Las limitaciones de esta investigación se discuten.

THE AUTHORS

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Christina Tomolillo, currently a graduate student at University of Nevada, Reno, received her master's degree in psychology at Humboldt State University in 2004. Her research interests include community psychology, public health, substance abuse, policy decisions, program evaluation, and attitudes toward marginalized groups.

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Linda Crothers received her Ph.D. from the University of California, Santa Barbara, in 2000 and completed post-doctoral clinical training at the University of California, San Francisco. She served as an assistant professor of psychology at Humboldt State University prior to being appointed as an assistant professor at Pacific Graduate School of Psychology. Research interests include substance abuse treatment evaluation, harm reduction, and assessing the needs and experiences of diverse populations, with an emphasis on the lives of LGBT people. Dr. Crothers is a licensed clinical psychologist and associate director of clinical training for the PGSP-Stanford Psy.D. Consortium.

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Chris Aberson is currently associate professor of psychology at Humboldt State University. He earned his Ph.D. at the Claremont Graduate University in 1999. His research interests include prejudice, racism, and affirmative action as well as interactive tutorials for teaching core statistical concepts. **210**

Glossary

- Abscesses*: bacterial infections typically found at the site of injection and often related to shared or otherwise contaminated needles. **215**
- Blood-Borne Pathogens*: pathogens in the blood that can cause diseases such as HIV, hepatitis viruses, human t-cell, lymphotropic viruses, and malaria.
- Cellulitis*: inflammation caused by bacteria in the skin.
- Endocarditis*: inflammation of the inner lining of the heart. **220**

Notes

1. ARIMA allows for tests of correlations between variables that remove the lingering effects of the preceding week's score as these effects can inflate correlations.

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