

A Successful Strategy for Estimating the Consumption of Needles and Syringes by Injecting Drug Users in the Czech Republic

Una estrategia exitosa para la estimación del consumo de agujas y jeringas en usuarios de drogas inyectables en la República Checa

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Resumen

Los objetivos de este estudio eran: (i) estimar la extensión de los equipos de inyección (EI) proporcionados por los programas de intercambio de jeringuillas (PIJ) para usuarios de drogas inyectables (UDI) en la República Checa en 2010; (ii) posteriormente, validar la metodología utilizada recientemente por el Observatorio Checo de Drogas y Drogadicciones (CMC) para la recopilación de datos, y (iii) estimar el número de jeringas proporcionadas a los UDI checos. Se realizó un análisis simple de documentación con el fin de recoger datos sobre la producción, venta y consumo de material de inyección en la República Checa en combinación con el cuestionario de cribaje de los PIJ y 21 entrevistas breves con informantes clave. Se identificaron los diez tipos de EI más comúnmente utilizados por los usuarios checos para la inyección de drogas. En la República Checa durante 2010 se comercializaron 5.038.000 unidades de EI estériles. De acuerdo con cuatro fabricantes (con una cuota de mercado del 96%) y en relación a 2010, se proporcionaron 5.430.694 unidades estériles para usuarios checos de drogas inyectables (en 2010, 487.694 unidades de EI se vendieron a usuarios de drogas inyectables en farmacias y 5.038.000 unidades fueron distribuidas en PIJ). Se comparó la cantidad de EI proporcionado a los UDI según los datos del registro nacional de los PIJ del CMC (4.943.000) con el de EI distribuidos por fabricantes y distribuidores (5.038.000) en el país en 2010 y se encontró una diferencia de menos del dos por ciento entre ambas metodologías. Este estudio confirma la exactitud de los datos sobre la cantidad de EI intercambiados de acuerdo con el sistema de recogida del observatorio del CMC. Este estudio plantea cuestiones importantes en la práctica de la salud pública y la formulación de políticas. La metodología de este estudio puede ser utilizada en regiones donde hay implantado un sistema de recogida de datos o cuando es necesaria la confirmación de los datos relacionados con los EI.

Palabras clave: intercambio de jeringuillas, agujas, jeringas, equipos de inyección, consumo, usuarios de drogas inyectables.

Abstract

The objectives were to: (i) estimate the extent of the injecting equipment (IE) provided by needle exchange programs (NEPs) to injecting drug users (IDUs) in the Czech Republic in 2010; (ii) subsequently validate the recent methodology used for data collection by the Czech National Monitoring Centre for Drugs and Drug Addiction (CMC), and (iii) estimate the number of syringes provided to Czech IDUs. A simple document analysis was performed in order to collect data on the production, sale, and consumption of injecting equipment in the Czech Republic in combination with questionnaire screening in the NEPs and 21 brief interviews with key informants. Ten types of IE most commonly used for drug injecting by the Czech drug users were identified. Approximately 5,038,000 pieces of sterile IE were marketed in the Czech Republic in 2010. According to four manufacturers (with a market share of 96%) and with reference to the year 2010, 5,430,694 pieces of sterile IE were provided to Czech injecting drug users (487,694 pieces of IE were sold to IDUs in pharmacies and 5,038,000 pieces of IE were distributed by NEPs in 2010). We compared the amount of IE provided to IDUs as reported to the CMC National registry by NEPs (4,943,000) with that of IE distributed by manufacturers and distributors (5,038,000) in the country in 2010 and found a difference of less than two percent using two different methodologies. This study confirms the accuracy of the data on the amount of IE exchanged as collected by the CMC monitoring system. This study opens up important public health practice and policy-making issues. The methodology of this study may be used in regions where no data collection system is present or where confirmation of the data related to IE is needed.

Key words: needle exchange, needles, syringes, injecting equipment, consumption, injecting drug users.

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Repeated use of non-sterile injecting equipment (IE) (Mino, 2004) increases the risk of bacterial infections and pulmonary embolism. The sharing of IE among injecting drug users (IDU) is a significant route of transmission of the human immunodeficiency virus (HIV) (Wodak & McLeod, 2008; UNAIDS, 2009) and hepatitis C virus (HCV) (Nelson et al., 2011; Thomas, Leoutsakas, Zabransky, & Kumar, 2011; Alter, 1997). As a reaction to this spreading problem NEPs have been established in most countries that accept the pragmatic public health approach (IHRA, 2012; Trujols et al., 2010). The distribution of IE to injecting drug users (IDUs) is primarily provided in the Czech Republic by needle exchange programs (NEPs) (EMCDDA, 2012; Romero-Vallecillos, Oviedo-Joekes, March-Cerdà y Alonso, 2005), followed by pharmacies and other retailers (such as medical supplies stores). IE distributed by NEPs mainly includes needles and syringes (mostly insulin syringes, which we will call IE from now on), usually together with other paraphernalia, such as syringe filters or alcoholic swabs.

The Czech National Monitoring Centre for Drugs and Drug Addiction (CMC) is responsible for monitoring the drug situation and data collection on the national level. This source provides us with data annually on how many syringes were provided by how many registered NEPs each year. To judge from estimates, there were 37,200 IDUs in the Czech Republic in 2010, out of whom 24,500 were clients of 96 registered NEPs (38,600 IDUs, out of whom 25,300 were clients of 99 NEPs in 2011) (Mravčík et al., 2011, 2012; EMCDDA, 2011). The majority of IDUs are primarily methamphetamine users, comprising approximately 80% of all problem drug users. The remaining 20% are heroin and buprenorphine users. The number of NEPs has remained relatively stable over the years, while the total number of IE exchange acts by NEPs has increased slightly each year (234,900 exchange acts in 2010 compared to 256,500 exchange acts in 2011; Mravčík et al., 2012). The total amounts of IE exchanged have increased steadily over the years as well (4,942,816 pieces in 2010 compared to 5,292,614 in 2011; Mravčík et al., 2012). However, little is known about whether information on the amount of IE exchanged is valid and how many syringes are actually sold to IDUs in pharmacies or through other distribution networks.

Another source of IE is pharmacy-based. IE is sold or distributed to IDUs by pharmacies without a prescription in most European countries (EMCDDA, 2007). Two independent studies were conducted in the Czech Republic in 1998 and 2008 that provided estimates on how much IE was sold to IDUs. Mravčík & Zabranský (2001) estimated 922,616 pieces of IE were sold to approximately 13,659 IDUs in 1998. After 10 years, the estimated amount of IE sold to IDUs in pharmacies was 1,551,503 pieces (CI 1,173,032 – 1,929,975; α 0.05) (Gabrhelík, Miovský, & Miovská, 2008; Gabrhelík & Miovský, 2009). However, both studies were based on data

from pharmacists providing researchers with expert estimates, and had several other limitations (e.g., a lower response rate of about 70%, retrospective data collection).

The aims of this work were to collect, analyze, and interpret data related to injecting material (needles and syringes) used for intravenous drug use in the Czech Republic from the year 2010. The objectives of this study were to: (i) estimate the extent of the exchange (or provision) of syringes reported by NEPs; (ii) subsequently verify the method of reporting to the National Focal Point, i.e. pilot validation of the methodology used for data collection, and (iii) determine the number of syringes provided to IDUs.

Methods

Procedures

The objectives were achieved in a stepwise order and are congruent with the following phases of the research, represented by these questions. (1) What brands and types of injecting equipment were used by NEPs and IDUs? *Data source:* expert estimates of NEPs via brief interviews with key informants. (2) Which manufacturers were producing and which resellers were distributing the IE? *Data source:* manufacturer representatives and resellers via brief interviews. (3) How many syringes were sold by manufacturers and resellers to various distribution channels (NEPs, pharmacies, other retailers, etc.)? *Data source:* manufacturer representatives and resellers via brief interviews and data provided on amounts of IE sold/distributed. (*Aim 1 achieved – extent of exchange verification.*) (4) For what other purposes was IE sold by retailers used? *Data source:* expert estimates of manufacturer representatives and resellers, pharmacists, the Czech Medical Association, Czech Diabetes Society, Beauticians' Union, and Chamber of Veterinary Surgeons via brief telephone interviews and/or written communication. (5) How many syringes from retailers were used (sold) for purposes other than drug injecting? *Data source:* identical to previous question. (6) How many syringes were provided to IDUs (via NEPs and resellers together)? *Data source:* calculation. (*Aim 2 achieved – number of syringes provided.*)

Data sets and samples

Simple document analysis was performed in order to collect data on the production, sale, and consumption of injecting equipment in the Czech Republic. We worked solely with the National Registry data (administered by the CMC; Petroš, Mravčík, & Korčíšová, 2005; Mravčík et al., 2011) and the Annual Reports on the Drug Situation in the Czech Republic (Mravčík et al., 2004, 2005, 2006, 2007, 2008, 2009, 2010).

In the second phase, we conducted questionnaire screening in the NEP services in the Czech Republic in 2010. All 95 registered NEP services (Mravčík et al., 2011) were asked to participate and 69 (72.6%) returned the questionnaire.

re. An electronic version of the questionnaire was sent by email to the key NEP staff members; reminder phone calls were made if it was not returned by the given deadline. A twelve-item questionnaire was constructed for the purpose of this study. We were interested mainly in data on: i) the brands and types of injecting equipment used and ii) the purchase and iii) subsequent distribution of injecting equipment in the NEPs. The data on purchase related mainly to information about suppliers and the conditions for the delivery of syringes.

In the third phase, we conducted a total of 21 brief interviews with key informants. The key informants were contacted via e-mail to establish personal or telephone contact. Now we were interested in data on: i) brands and types of injecting equipment; ii) manufacturers and resellers of syringes; iii) the way of distribution, and iv) other purposes for syringe consumption and the amount of equipment used for purposes other than the injecting of drugs. The key informants were: one expert from the NEPs; four manufacturers' representatives (B-Braun, Terumo, Eli Lilly & Company, Chirana), and six distributors' representatives

(Zelená Hvězda, Rent – Pharm, Phoenix, Gehe, Pharmos, Alliance HealthCare). Four brief interviews were conducted with representatives of professional groups (the Czech Medical Association of J. E. Purkyně, Czech Diabetes Society, Beauticians' Union, and Chamber of Veterinary Surgeons of the Czech Republic). Additionally, six brief confirmatory interviews were conducted with two veterinary surgeons and four beauticians. Two manufacturers (Chirana, Eli Lilly & Company) refused to give the data on the exact number of syringes sold directly to NEPs.

Data analysis

To estimate the provision and coverage of and need for syringes in the Czech Republic the following indicators were included in the analyses: Syringe Provision (SP), Syringe Sales (SS), drug Injection prevalence (I), Syringe Need (SN), Syringe Coverage (SC), Unmet Need for Syringes (UNS), and Syringes Provided per IDU (SPI). The algorithms and assumptions used, together with definitions and intermediate estimates, as well as data sources, are presented for each indicator in Table 1.

Table 1
Methods to estimate provision of syringes in the Czech Republic

Indicator	Algorithms, assumptions	Definitions, intermediate estimates	Data sources
Syringe provision (SP)	$SP = SE + SS$	SP: number of syringes provided to IDUs SE: number of syringes provided to IDUs by NEPs („syringes exchanged“) SS: number of syringes sold to IDUs by pharmacies	National registry
Syringe sale (SS)	$SS = SST - (SSD + SSC + SSV + SSP)$	SST: number of syringes distributed to (sold by) pharmacies (total) SSD, SSC, SSV, SSP: estimated number of syringes sold by pharmacies to diabetics and for cosmetic, veterinary, or plastic surgery purposes	Manufacturer sellers and resellers
	$SSD = DP \times DRS \times SND \times 365$	DP: population of diabetics in need of insulin injections DRS: ratio of diabetics using syringes among population of diabetics SND: average number of syringes needed by 1 diabetic daily	Czech Diabetes Society
	$SSC = CS \times SNC$	CS: number of cosmetic services (cosmetics, beauticians) SNC: average number of syringes needed by 1 cosmetic service annually	Beauticians' Union
	$SSV = VS \times SNV$	VS: number of veterinarians SNV: average number of syringes needed by 1 veterinarian annually	Chamber of Veterinary Surgeons of the Czech Republic
	$SSP = SS \times SNP$	SS: number of plastic surgeons SNP: average number of syringes needed by 1 plastic surgeon annually	Czech Medical Association of J. E. Purkyně
Syringes provided per IDU (SPI)	$SPI = SP/I$	SPI: average number of syringes provided per IDU I: total estimated number of IDUs in the Czech Republic	

Results

On the basis of our findings, the IE present on the Czech drug scene comprises ten most commonly used types that come from four manufacturers: (1) B-Braun, with the types Omnican 50, Omnican 100, and Omnican 40; (2) Terumo, with the types U100 1ml, U40 1ml, U40 2ml, and U100

0.5ml; (3) Eli Lilly & Company, with the type BD U100 1ml, and (4) Chirana, with the types U100 1ml, type 2ml + Medoject needles. These distributors together covered 96% of the market (pharmacies and other medical supplies stores) in the Czech Republic in 2010. The biggest market share of the four manufacturers was that of B-Braun, with 96.4% in the Czech Republic in 2010; see Table 2.

Table 2

The "top ten" syringes used for injecting drugs in 2010 in the Czech Republic, hospitals excluded (in pieces and relatively)

Manufacturer	Type	Absolutely (pieces)	Relatively (percent)	Market share by brand (percent)
B-Braun	Omnican 50	1,850,000	26.6	96.4
	Omnican 100	2,350,000	33.8	
	Omnican 40	2,500,000	36.0	
Terumo	U100, 1ml	170,000	2.4	3.0
	U40, 1ml	24,000	0.3	
	U40, 2ml	10,000	0.1	
	U100, 0.5ml	6,000	0.1	
Eli Lilly & Company*	BD U100, 1ml	7,000	0.1	0.1
Chirana*	U100, 1ml	6,000	0.1	0.5
	2ml + Medoject needle	28,000	0.4	
Total		6,951,000		100.0

* no data about distribution into hospitals

According to the manufacturers, who were referring to the year 2010, 5,038,000 of all the ten IE types that are being used for drug injecting by Czech drug users were sold; see Table 3. The second type of data obtained from IE manufacturers and distributors (resellers) was on the amount of the ten types of IE supplied to the pharmacies in the Czech Republic. A total number of 733 thousand pieces of IE of all four brands was supplied to Czech pharmacies in 2010; see Table 3.

4,943,000 pieces of IE were exchanged, as NEPs reported ("syringes exchanged") to the National Registry in 2010 (Mravčík et al., 2011). This represents a difference of less than two percent compared to the numbers reported by NEPs and the amount of IE distributed by manufacturers and distributors (5,038,000).

In order to obtain the most accurate data on the amount of pharmacy-source IE used by injecting drug users, we had to exclude syringes that were purchased for other purposes than drug injecting in the year 2010, i.e., diabetics, cosmetic services, veterinary services, or plastic surgery services. Our estimates of IE consumption in the year 2010 were based on population size or the total number of services and average

Table 3

Number of syringes by manufacturers and two main channels of distribution in 2010

	NEPs	Pharmacies
B-Braun	4,876,000	645,000
Terumo	162,000	47,000
Chirana	-	34,000
Eli Lilly & Company	-	7,000
Total	5,038,000	733,000

consumption. The estimated consumption of IE for other purposes than drug injecting in the Czech Republic in 2010 was 245,306 pieces; see Table 4.

As a next step we estimated how much IE was sold in pharmacies for drug-injecting purposes. 487,694 pieces of IE were sold to IDUs as a result of sales of syringes by pharmacies ($SS = 733,000 - 245,306 = 487,694$). Therefore, the total estimated number of syringes provided to IDUs in the Czech Republic in 2010 was 5,430,694 (IE provision = $4,943,000 + 487,694$).

Table 4

Consumption of syringes for other purposes than drug injecting in 2010

	Population/total number of services	Average consumption (unit/year)	Total consumption (year)	Variable code used
Diabetics*	215	1,095	235,606	SSD
Cosmetic services	600	10	6,000	SSC
Veterinary services	2,500	1	2,500	SSV
Plastic surgery services	120	10	1,200	SSP
Total consumption			245,306	(SS-SST)

* 0.1% of diabetics (215,165) use syringes three times a day

The average yearly consumption of an average Czech IDU in 2010 was 146 pieces of IE (5,430,694 pieces of IE/37,200 IDUs).

Discussion

This work aimed to assess the extent of the exchange (or provision) of syringes reported by NEPs. According to our data using a specific methodology, the amount of IE distributed by manufacturers and distributors came to approximately 5,430,694 pieces in the Czech Republic in 2010.

We determined the number of syringes provided to IDUs in the Czech Republic in the same year. The total amount of IE provided to Czech IDUs by NEPs, as reported to the CMC National Registry, was 4,943,000 pieces in 2010 (Mravčík et al., 2010). We found a difference of less than two percent using two different methodological approaches. With respect to the two percent difference, the slight variation in the amount of IE exchanged, as reported by NEPs, may be attributed to differences regarding the beginning/end of each year. Clean IE may be purchased at the end of one year and given to IDUs at the beginning of the following year. Additionally, pharmacies sometimes donate sterile injecting material which is close to its expiry date to NEPs (Gabrhelík et al., 2009). On the basis of the results, we consider the data on IE exchange in the Czech Republic reported to the CMC National Registry (Mravčík et al., 2010) by NEPs in 2010 to be valid.

We attempted to verify the method of reporting to the CMC, i.e., pilot validation of the methodology used for the data collection. There are attempts to estimate the syringe coverage to be found in the literature (e.g., Heller et al., 2009), mainly based on surveying IDUs. We applied a different approach to estimates of sterile IE consumption by the drug-injecting population on the national level. The methodology used for the data collection and analyses was based on working with data from different sources than the generally adopted approach of annual IE consumption estimates. Taking into account the fact that the 2% difference in data from the two approaches may be attributable to such factors, which are also easy to monitor, we consider the two methodological approaches to monitoring IE consumption to be valid. This leads us to the conclusion that both approaches are substitutable. To be more specific, the new IE monitoring methodology may be used as an alternative approach in countries where, for example, NEPs do not exist and data on IE provision are not available (Trujols et al., 2010), or the data or methodology call for confirmation.

The findings of this study could be further utilized in subsequent analyses that calculated the unmet need for IE in the country. Knowing the estimates of the average drug injecting prevalence for all types of drugs (methamphetamine, heroin/buprenorphine, cocaine, etc.) in Czech users would allow us to calculate the need for sterile IE in a given

time in a defined region. Then, unmet IE coverage could be calculated as the difference between the estimated IE need and relative IE coverage. On the basis of rough estimate calculations (not presented in this study), we hypothesize that the need is unmet to a large degree. We calculated the quantity of IE used on the basis of frequency of use as reported by Petroš and his colleagues (Petroš, Mravčík, & Korčíšová, 2005). The calculated ratio between the needles and syringes provided (obtained directly from the sources – exchange and sale) and needed (estimated) was 22.26%. Our estimate, however, must be interpreted with caution and further studies must be carried out in order to verify this hypothesis. Knowledge of how much sterile IE is still needed has major importance for public health practice and policymaking. The unmet need for sterile IE may have a major impact on the prevention of the spread of blood-borne infections related to drug use (Mehta et al., 2011; Nelson et al., 2011; Thomas et al., 2011; UNAIDS, 2009) and other harms, such as venous damage (Pieper et al., 2007). Enough sterile IE should be made available to all drug users and their social networks for their self-protection (Friedman et al., 2007). Important sub-populations of IDUs that should also have easy access to sterile IE guaranteed are the early-career and naïve IDUs, hidden populations (Grund et al., 1992), and IDUs in prisons (WHO, 2007). Another explanation, maybe even more striking, may lie in the methodology that is recently used for estimating the number of IDUs in the country. The gap between the IE that is needed and what is available may not be the case but the overestimation of the number of IDUs may.

Aside from the main focus of the study, the findings about the amount of IE sold in pharmacies in the Czech Republic in 2010 allow us to compare data with other studies. On the basis of our calculations, 487,694 pieces of IE were sold to IDUs by pharmacies in 2010. According to a recent study from 2008, the amount of IE sold to IDUs in pharmacies, on the basis of pharmacists' estimates, was 1,551,503 pieces (Gabrhelík, Miovský, & Miovská, 2008). But no dramatic change in NEPs or pharmacies was noted by the authors between the years 2008 and 2010. With respect to the contradictory findings in both studies, the threefold difference indicates that the data from the 2008 study may be flawed. Such a vast difference may have been caused by multiple factors that contributed to inaccuracy in the reported findings of the earlier study. One possible source of bias in the 2008 study may be the source of information used while collecting the data. It was mainly based on pharmacists' retrospective estimates of IE sales to IDUs. Also, as the authors of the study note, the pharmacists behind the counter rotate during their shifts but only one took part in the survey (Gabrhelík, Miovský, & Miovská, 2008). Regarding the methodological implications, more sensitive validation techniques should be employed in future studies with similar research

designs using expert estimates in pharmacies or a different approach to the data collection should be considered.

The main strength of this study is that it introduces a new methodology for how to estimate IE consumption by IDUs in a specific region. Another strength is the confirmation of the quality of the data reported to the Czech harm reduction registry. This study also has several limitations that are worth noting. We were not able to collect data regarding the Chirana and BD brands of injecting equipment. Therefore we had to rely on the data about these two brands from the distributors with a 96% market share in the Czech Republic in 2010. Second, at the time of the study, we did not know the exact figures on how much injecting material was withdrawn from sale in pharmacies because of the expiry date. These data are not included in the calculations. Despite this, we do not expect this number to be of major importance. Another limitation is that all 95 registered NEP services (Mravčík et al., 2011) were asked to participate in the questionnaire survey (Step 1) but only 69 (72.6%) returned the questionnaire. As a result of time and resource constraints we were not able to reach the satisfactory 80% response rate. Another of the limitations resides in the estimates of the consumption of IE used for other purposes than drug injecting. We did not manage to collect relevant data on the use of IE for injecting anabolic steroids. Finally, we did not account for IE from neighboring countries, i.e., mainly from Poland and Slovakia. IE of German and Austrian origin is expected to be less prevalent in the Czech Republic.

Conclusions

In conclusion, our results confirm that the data on the amount of IE exchanged in the Czech Republic in 2010 (Mravčík et al., 2010) may be considered highly valid and the method of data collection seems appropriate. The introduction of a new methodology for IE monitoring in a given year may be an alternative in countries or regions where no national data collection system is present or where confirmation of such data is needed. This study lays the groundwork for more accurate estimation of IE coverage and sterile IE need.

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Contributors

All the authors contributed to the manuscript and have approved the final version.

Conflict of interest

None of the authors has any conflict of interest.

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