

Prevalence of injections and knowledge of safe injections among rural residents in Central China

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ABSTRACT

Introduction: Abuse of the injection services, namely unnecessary injections and unsafe injections, exists extensively in developing countries. Unsafe injection practices contribute to the transmission of blood-borne pathogens. The aims of this study were to survey the prevalence of injections and knowledge of injection safety among the rural residents in Jingzhou district, Hubei, China and to provide scientific data for developing a health educational programme.

Methods: A retrospective cross-sectional study was conducted in 12 villages, which were selected from the Jingzhou district by the random sampling method. 50 rural residents were interviewed per village using a questionnaire.

Results: Among the 595 residents studied, 192 had received at least one injection in the past three months, with an injection prevalence of 32.3 percent and an average of 0.93 injections. 90.3 percent of the rural residents knew that unsafe injections could transmit the following blood-borne pathogens: human immunodeficiency virus (74.4 percent), hepatitis B virus (55.8 percent) and hepatitis C virus (22.9 percent). Logistic regression analysis showed that the residents' age, educational level and residential area were important factors in influencing their knowledge about injection safety.

Conclusion: The results indicated that the injection prevalence was high among rural residents in the study area, and their knowledge regarding injection safety should be further improved.

Keywords: blood-borne pathogens, injections, patients' knowledge, patient safety,

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INTRODUCTION

At present, transmission of blood-borne pathogens through unsafe injection practices, i.e. defined as one that harms the recipient, exposes the provider to an avoidable risk and results in waste that is dangerous to other people (based on the World Health Organisation's (WHO) definition of safe injections),⁽¹⁾ is an important public health problem worldwide; and many countries have paid a great deal of attention to this problem.^(2,3) Some studies demonstrated that the prevalence of unsafe injections and unnecessary injections, the latter defined by WHO as one where oral alternatives are available, where the injected substance is inappropriate or harmful, or where the symptoms or diagnoses do not warrant treatment by injection⁽³⁾ were very high among the general population in developing countries.^(2,6) The knowledge of the healthcare workers and general residents with regard to injection safety were also unsatisfactory.^(4,7-10) Knowledge about, and attitude towards, safe injections of residents are also important indirect influences on the quality of injection practices. This is due to the supervisory function of these influences during the injection practices.⁽¹¹⁾ Other important factors include theoretical knowledge and technical competency of health workers, medical conditions and management policies of the health facility. In order to survey the prevalence of injections in rural residents and their knowledge and attitude on injection safety, as well as to provide scientific data for developing health educational programmes and promote further development of safe injection services, we conducted a retrospective cross-sectional study in the rural area of Jingzhou district, Hubei province, Central China in July 2005.

METHODS

12 villages were selected from six townships by stratified random sampling method. A resident group, serving as a starting point for interviews, was then selected from every sampled village by drawing lots. The study sample of about 600 rural residents was based on a formula recommended in the literature,⁽¹²⁾ and according to another study result

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Table I. Questionnaire on demographics and knowledge of study participants regarding safe injections.

Interview items	Values
X1. Gender	1: Male; 2: Female
X2. Age (years)	1: < 10; 2: 10–19; 3: 20–29; 4: 30–39; 5: 40–49; 6: 50–59; 7: ≥ 60
X3. Occupation‡	1: Infant; 2: Preschool child; 3: Student; 4: Teacher; 6: Catering trade; 7: Business; 8: Health worker; 9: Worker; 11: Peasant; 13: Manager
X4. Education	1: College; 2: Middle school; 3: Primary school; 4: Illiterate
X5. Residential area	1: Chuandian; 2: Jinan; 3: Mashan; 4: Balin; 5: Libu
X6. Medical system	1: Cooperative medical services; 2: Social medical services
X7. What is your first consideration in treatment?	1: Effect; 2: Change
Y1. What method of treatment do you seek for a common cold?	1: Injection; 2: Oral; 3: Doctor's advice
Y2. Could unsafe injections transmit diseases?	1: Yes; 2: No or don't know
Y3. Could HIV be transmitted by unsafe injections?	1: Yes; 2: No or don't know
Y4. Could HCV be transmitted by unsafe injections?	1: Yes; 2: No or don't know
Y5. Could HBV be transmitted by unsafe injections?	1: Yes; 2: No or don't know
Y6. Which method of treatment has a better effect?	1: Injection; 2: Oral; 3: Don't know

X represents independent variable; Y represents dependent variable; ‡Occupation numbers are assigned according to the number of different occupations on the report card of infectious diseases provided by the Health Ministry of China.

Table II. Rate and average number of injections among the rural residents in different townships.

Townships	No. of residents who interviewed	No. of residents who received injections	%	Total number of injections	Average of injections per person
Chuandian	102	49	48.0	226	2.22
Jinan	100	23	23.0	71	0.71
Mashan	99	25	25.3	86	0.87
Balin	101	27	26.7	40	0.40
Libu	99	30	30.3	63	0.64
Mishi	94	38	40.4	65	0.69
Total	595	192	32.3	551	0.93

in China (injection rate of 14.4% in rural residents).⁽⁵⁾ 50 rural residents who had travelled in the past three months were interviewed in every village. In order to reflect the status of injection in the study area, investigators asked for, and recorded, the subjects' data, using a structured questionnaire. Contents of the questionnaire included: (1) demographical features; (2) injection history in the past three months; and (3) knowledge regarding safe injections. Details of the interview items, and the values assigned to each item, are tabulated in Table I. The residents who had complete demographical and injection data were used as the subjects for calculating the prevalence of injections, and analysing knowledge and factors affecting injection safety, while the residents with incomplete data were omitted from analysis. Approval from the legal office of Health Bureau of Jingzhou District and oral consent of all participants were obtained.

Researchers consisted of health workers from the Health Bureau of Jingzhou District and six township health centres. Before the survey began, all

investigators had received strict training to ensure the consistency of the contents, methods of interview and the criteria used for judging the results. All data was keyed into Microsoft Excel 2000 and was checked to establish an Excel database. The Statistical Package for Social Sciences version 13.0 for Windows (SPSS Inc, Chicago, IL, USA) was used for data analysis. Taking age composition of the general population in the rural disease surveillance area of Jingzhou district in 1995 as a standard, an injection rate of the rural residents was standardised using a direct standardisation method. The comparison of the injection rates was done by the χ^2 test. The F-test was used for comparing the means of injections. Knowledge of safe injections and their influencing factors in rural residents were analysed by logistic regression analysis.

RESULTS

In this study, a total of 595 rural residents were interviewed, with a response rate of 100%. Their gender

ratio and age composition were consistent with that of the general population in the rural Jingzhou district, indicating that this sample was a good representation of all rural residents in the study area. Of the 595 rural residents, 192 had received at least one injection in the past three months, with an injection rate of 32.3% and a standardised injection rate of 39.5%. Jilan township had the lowest rate (23%) and Chuandian township had the highest (48%), and the remaining townships had rates in-between ($\chi^2 = 22.22$, $p < 0.0001$) (Table II). Of a total number of 551 injections, with an average of 0.93 injections per person, the lowest mean (0.40 injections) was seen in Balin township and the highest mean (2.22 injections) in Chuandian township. Means of injections was statistically different between townships ($F = 9.696$, $p < 0.0001$) (Table II). Therapeutic injections accounted for 94.6% (521 injections) of the total number of injections and precautionary injections for 5.4% (30 injections).

The prevalence of injections among all age groups was significantly different ($\chi^2 = 54.392$, $p < 0.0001$). The highest injection rate was found in children aged < 10 years (89.5%), followed by ≥ 60 years age group (50%), 10–39 years age groups (28.0%–38.3%) and 40–59 years age group (14.9%). The average number of injections among all age groups was in range of 0.45–2.05 injections per person, showing a significant difference ($F = 8.112$, $p < 0.0001$). All injections in adults ≥ 20 years of age were classified as therapeutic injections, while the majority of injections in children ≤ 10 years of age were classified as immunisation injections, accounting for 51.3%.

Except for Mishi township, which had incomplete records regarding knowledge of safe injections, data from the other five townships were analysed to assess the rural residents' knowledge of safe injections. The demographical features of the interviewed residents, such as age, gender, occupation and education in Mishi township were consistent with the participants of the other five townships. The results showed that 36.1% of the 493 rural residents surveyed preferred choosing an injection for treatment when they had caught a cold with fever, while 50.5% preferred oral drugs. The rest of the residents preferred leaving the method for administering drugs to the doctor's discretion. The relationship between the resident's preference for a medication method (as dependent variable Y1) and independent variables X1–X6 (Table I) were analysed by univariable logistic regression analysis. The results indicated that gender, educational level, residential area and medical system had an obvious influence over the dependent variable Y1 (all $p < 0.0001$); namely, factors affecting preference for injections are: female, illiterate, residing in Jinan and Balin townships, and using cooperative medical services (Chuandian township). Multivariable logistic regression analysis did not find any significant independent variable influencing

the Y1 variable.

90.3% of residents thought the reuse of disposable plastic syringes and needles could transmit blood-borne diseases (Y2). Univariable logistic analysis indicated that age, educational level and residential area had a marked influence on Y2 (all $p < 0.0001$). Multivariable logistic regression analysis of the dependent variable Y2 indicated that two independent variables (residential area and educational level) affected Y2 (Table III). 74.4% of residents knew that unsafe injections could result in the infection of human immunodeficiency virus (HIV), Y3. Univariable logistic regression analysis found that age, educational level and residential area had significant statistical influence on the dependent variable Y3 (all $p < 0.0001$). Multivariable logistic regression analysis found that three independent variables (age, educational level and residential area) affected the dependent variable, Y3 (Table III).

Of the 493 residents interviewed, 22.9% knew that hepatitis C virus (HCV) could be transmitted by unsafe injections (Y4). Univariable logistic analysis yielded three significant independent variables, namely age, residential area and medical system (all $p < 0.0001$). However, only the residential area was included in the model of multivariable logistic analysis for the Y4 (Table III). 55.8% of rural residents interviewed knew that hepatitis B virus (HBV) could be transmitted by unsafe injections (dependent variable Y5). Univariable logistic analysis suggested that age, educational level, residential area and medical system had statistical influence on Y5 (all $p < 0.004$). However, only residential area and age variables were factored into the multivariable logistic regression analysis model of the dependent variable Y5 (Table III).

DISCUSSION

We have shown that the prevalence of injections for rural residents in Jingzhou district, Hubei province, Central China in the past three months is high (32.3%), with a standardised injection rate of 39.5% and a mean of 0.93 injections. This injection rate is higher than Egypt (26.3%)⁽⁴⁾ and Liaolin (14.4%).⁽⁵⁾ The mean is, on the other hand, similar to Egypt and Moldova.^(4,6) Children aged < 10 years and the elderly aged ≥ 60 years had higher injection rates, compared with the young adults. This can be attributed mainly to more protective injections in children and a relatively high incidence of infectious diseases in children and the elderly, due to poor resistance to diseases.

This high prevalence of injections is consistent with results from our investigations carried out in all levels of health facilities, with a very high unnecessary injection rate (55%), in the same study area.⁽¹³⁾ Authors inferred that the abuse of injections for clinical treatment was the most important reason for inducing high prevalence

Table III. Multivariable logistic regression analysis results of factors affecting knowledge of safe injections in rural residents.

Dependent variables*	Independent variables	β	Odds-ratio	95% CI	p-value
Y2	Residential area				
	Jinan	3.565	35.33	4.51–276.63	0.0001
	Balin	3.410	30.26	3.83–239.04	0.0001
	Mashan	0.490	1.63	0.14–19.22	0.697
	Chuangdian	-16.582	1.00	1.00	0.996
	Libu		1.00		
	Education				
	College	-20.124	0.00	0.00–0.00	1.00
	Middle school	-2.632	0.07	0.02–0.32	0.0001
	Primary school	-1.071	0.15	0.34–0.08	0.150
Illiterate		1.00			
Y3	Residential area				
	Jinan	1.627	5.09	2.54–10.19	0.0001
	Chuangdian	-3.981	0.02	0.002–0.15	0.0001
	Mashan	-0.938	0.39	0.17–0.92	0.032
	Balin	0.549	1.73	0.82–3.66	0.150
	Libu		1.00		
	Age (years):				
	0–9	-0.267	0.77	0.07–8.11	0.824
	10–19	-1.061	0.35	0.09–1.36	0.129
	20–29	-2.485	0.08	0.02–0.36	0.001
	30–39	-1.948	0.14	0.04–0.52	0.003
	40–49	-1.465	0.23	0.07–0.78	0.018
	50–59	-0.868	0.42	0.13–1.39	0.155
	≥ 60		1.00		
	Education				
	College	-2.221	0.11	0.01–1.24	0.074
Middle school	-1.326	0.27	0.07–0.99	0.049	
Primary school	-0.675	0.51	0.15–1.71	0.274	
Illiterate		1.00			
Y4	Residential area				
	Balin	1.620	5.05	0.59–43.64	0.141
	Chuangdian	-2.649	0.07	0.03–0.18	0.0001
	Jinan	-0.642	0.53	0.18–1.52	0.236
	Mashan	-2.455	0.05	0.02–0.14	0.0001
	Libu		1.00		
Y5	Residential area				
	Chuangdian	-2.750	0.06	0.03–0.13	0.0001
	Jinan	-0.955	0.39	0.20–0.76	0.006
	Mashan	-2.983	0.05	0.02–0.11	0.0001
	Balin	-2.716	0.07	0.03–0.14	0.0001
	Libu		1.00		
	Age (years):				
	0–9	0.751	2.12	0.31–14.45	0.443
	10–19	-0.189	0.83	0.34–2.03	0.680
	20–29	-1.342	0.26	0.11–0.65	0.004
	30–39	-1.191	0.30	0.13–0.72	0.007
	40–49	-0.120	0.89	0.37–2.13	0.788
	50–59	-0.450	0.64	0.25–1.61	0.343
	≥ 60		1.00		

*Dependent variable Y1 and Y6 have not been listed in the table due to lack of significant independent variable associated with them. CI: confidence interval.

of injections in rural residents. We found a total number of 551 injections in rural residents, of which therapeutic injections accounted for 94.6%. This figure is remarkably higher than that of Egypt (77.2%) and Liaolin (78.3%).^(4,5) The aim of all injections in adults aged > 20 years are for treatment, while immunisation injections in children < 10 years of age account for 51.3%. This indicates that improving the quality of vaccination injection is an important and pressing task in enhancing injection safety for children.

The knowledge level of the rural residents regarding safe injections is an important influence on injection practices. Improving the health knowledge of residents can decrease unnecessary injections by reducing their misguided need for injection services, and also improve the quality of injections with their informed supervision of the injection practices. This study investigated the knowledge level of the rural residents regarding safe injections by face-to-face completion of a questionnaire. The results show that although these residents have certain knowledge of safe injections, the understanding is superficial. For example, 90.3% of the rural residents knew that infectious diseases could be transmitted via unsafe injections, but the residents who knew the blood infection pathways of HIV, HCV and HBV only accounted for 74.4%, 22.9% and 55.8%, respectively, of the residents interviewed. This is lower than the proportion (95%) of the residents who knew of the blood transmission pathway of HIV in Cambodia.⁽¹⁴⁾

Logistic regression analysis showed that three factors were obviously associated with the knowledge level of safe injections for the residents. These three factors are age, education and residential area. Adults aged 20–40 years have more knowledge of injection safety compared with children and the elderly. This is because young adults are more willing to pay attention to, and to accept, new health knowledge in order to better protect their children from illnesses. Analysis of our results indicated that the educational level of rural residents had a statistically significant influence on many dependent variables. In general, the higher the level of education they receive, the more knowledge of safe injections they have. These findings are similar to results from a study conducted among female college students in Pakistan.⁽⁹⁾ In the five townships, the knowledge level of residents with regard to safe injections in two townships (Jinan and Balin) was lower than that of the other three townships. This can be associated with differences in the breadth and depth of health education in the different townships. There is, on the whole, an inverse relationship between knowledge level of injection safety and the prevalence of injections for residents in the five townships. However, there was a contradictory result in Chuandian township, where a cooperative medical service had persisted for 15 years.

Even with a better health education and a higher level of knowledge regarding safe injections, the injection rate of Chuandian was the highest (48%). After careful analysis, we believe this contradictory result is an isolated anomaly, especially in view of the better medical service condition and prosperous economy in Chuandian. Many factors could have influenced the prevalence and knowledge about safe injections of the rural residents. However, this study has only analysed some of the factors. In order to gain a better understanding of the myriad factors influencing safe injections, other considerations, such as living customs, traditional views, economical situation, model and method of health education and medical ethics should be studied carefully.

In 2004, a large-scale health education programme on the prevention and control of acquired immunodeficiency syndrome (AIDS) was carried out in the Jingzhou district. This campaign could be responsible for the high proportion of the residents who knew the transmission routes of HIV. In Jingzhou district, hepatitis B is a common infectious disease and its prevention and control have been reinforced in recent years. Hence, the majority of rural residents know HBV can be transmitted through unsafe injections. However, the incidence of hepatitis C is lower in the study area, as the health education for it is not conducted regularly. Therefore, many rural residents are not aware of its infection routes. Similar results were also reported by Hu et al.^(2,5) Researchers of Pakistan and China reported that the knowledge regarding the injection safety among the rural residents improved significantly after extensive health education and the patients who received injection services by new syringes and needles also increased from 24% to 59%.^(11,16,17) In order to correct residents' inaccurate view that injection treatment is more effective than oral drugs, increasing their awareness of injection safety and knowledge of alternative treatment is necessary. To achieve this, and to allow full play of the patient's supervisory role in injection services, it is necessary that extensive health education be conducted via the available media and publicity avenues.

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