

Bacterial and Viral Infections Among Hospitalized Injection Drug Users in Hamadan, Iran

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Background: Infectious complications among Injection Drug Users (IDUs) are associated with significant morbidity and mortality and place an enormous burden on the healthcare system.

Objectives: The present study aimed to describe the clinical and epidemiological characteristics of infectious complications in a sample of IDUs admitted to a hospital in Hamadan, Iran.

Patients and Methods: In a retrospective manner, medical records of IDUs admitted to an infectious diseases ward between 2007 and 2012 were reviewed. Data on patients' demographic characteristics, reasons for admission, antibiotic treatment prior to admission, duration of hospital stay, mortality, and also the status of infection with hepatitis B, C, and HIV were recorded.

Results: Data for 100 IDUs lead to 115 admission episodes were available during the study. Bacterial infections accounted for 71% of all admissions. Among bacterial infections, skin and soft tissue infections, endocarditis, bone and joint infections emerged as the most common types. For 29% of cases, the reason for admission was due to viral pathogens, among which HIV/AIDS was the most common. The prevalence rates for hepatitis B, hepatitis C and HIV infection were 10.0%, 6.0% and 23.0%, respectively. The mean duration of hospital stay was 15.1 ± 0.9 days (range: 8 - 45 days). During the study period, 13 deaths were documented.

Conclusions: Despite implementation of community-level harm reduction strategies in Iran, infectious complications due to illicit drug use are frequent and often require care at the hospital. Introducing harm reductions services at an inpatient level may improve the quality of care provided and help reduce the burden of accrue from drug use.

Keywords: Drug Users; Bacterial Infections; Virus infections

1. Background

Illicit drug use is an exigent social and health problem in Iran, imposing an immense strain on the healthcare capacity of the country (1). According to a 2014 report by the United Nations Office on Drugs and Crime, 2.27% of Iranian individuals aged 15 to 64 years old, that is an estimated 1.2 million individuals, frequently inhale, ingest, or inject opium and opioids (2, 3). This figure places Iran in the second position globally with regards to drug use; only after Afghanistan, where the largest amount of opium in the world is produced (4). Population-based studies have identified an alarming trend towards increased fraction of Injection Drug Users (IDUs) in the population of drug users in Iran (1, 4). The typical transition pattern includes switching from smoking opium to injecting heroin or highly purified heroin colloquially called 'kerack' in the region (5). Besides this switching pattern, a number of drug users, especially young people, experience drugs with heroin or synthetic amphetamine injections from the beginning (5). Injection drug use is associated with a wide array of social and health perplexities (6, 7). The marginalized population of people who inject illicit

drugs are more likely to engage in high risk behaviors, as well as violent and criminal acts (1). Compared with non-IDUs, individuals who inject drugs are twice more likely to be unemployed, and five times more likely to participate in illegal activities in order to get funds for purchasing drugs (1). High-risk behaviors substantially increase the risk of transmission of blood-borne pathogens including hepatitis B and C, and HIV (8). Furthermore, the mortality rate among IDUs appears to be 13 times greater than that of the general population (9). In the majority of cases, cause of death could be directly (e.g. drug overdose) or indirectly (e.g. medical complications such as infections) ascribed to complications accrued from injections (10). Injection Drug Users are at an increased risk of transmitting bacterial infections due to unsafe injection practices, and these infections are a leading cause of mortality and morbidity in this population (6, 11, 12).

2. Objectives

The present study was designed and conducted to de-

lineate the clinical and epidemiological characteristics of bacterial and viral infections among the IDUs admitted to the infectious diseases ward of a hospital in Hamadan, Iran. We also aimed to determine the prevalence of blood-borne viral pathogens in the study sample.

3. Patients and Methods

In a retrospective manner, medical records of all referred IDUs to the infectious diseases ward of the Farschchian hospital in Hamadan (Iran) were investigated during a five-year period (2007-2012). The diagnosis of IDU was ascertained if the patient had self-reported injecting drugs, during the previous month before referring to the hospital, and this information was documented in case notes. In cases where a high degree of suspicion for drug injection existed, yet the patient denied use, the patient was excluded; thus we limited our findings to confirmed cases only. During the designated timeframe, occurrence of multiple episodes was common, and some patients were admitted more than once. If the second and subsequent admissions were related to the first admission and entailed the same chief complaint, they were discarded and only the first episode was included. However, if the subsequent admissions occurred due to emergence of new infectious complications, they were regarded as separate episodes. After retrieving patients' medical records from the hospital archive, principal investigators reviewed case notes, history, physical examination, treatments/procedures/performed intervention for the patient, and also discharge notes. Using a pre-designed checklist, data on patients' demographic characteristics (age, sex, marital status and insurance coverage), reason for admission/primary diagnosis, antibiotic treatment prior to inpatient admission, length of hospital stay, method of patient discharge (discharge by the physician, absconding from the hospital, or early self-discharge against medical advice), mortality, and also the status of infection with hepatitis B and C, and HIV were recorded. In bacterial infections, cellulitis, skin abscess, pyomyositis and thrombophlebitis were grouped under the umbrella term 'skin and soft tissue infections'. Osteomyelitis and septic arthritis were grouped under the category of "bone and joint infections". The primary diagnosis of "viral infection" was assigned if the patient's admission could be attributed to presentations or complications of hepatitis B, hepatitis C, HIV infection or AIDS. The ethics committee of the Hamadan University of Medical Sciences approved the study protocol.

3.1. Statistical Analysis

Statistical analyses were done using the Statistical Package for Social Sciences (SPSS) version 17.0. Categorical variables were described as proportions and continuous variables were depicted as means \pm standard deviations. The frequencies of outcome variables were calculated by direct counting. For main outcome variables, 95% confidence interval (95% CI) was determined using the Wald method (13).

4. Results

Between 2007 and 2012, complete records for 100 IDUs necessitating 115 admission episodes were collected. The average length of hospital stay was 15.1 ± 0.9 days (ranging from 8 to 45 days). Ninety-four percent of patients were males. The average age of the patients was 33.6 ± 9.0 years (ranging from 16 to 54 years). Demographic characteristics of the included IDUs are presented in Table 1. The frequencies of bacterial and viral infections are presented in Table 2. Overall, bacterial infections accounted for more than two-thirds of all admission episodes (71.0%, 95% CI: 63.0 - 80.0). Skin and soft tissue infections, followed by endocarditis were the most common bacterial infections. Among skin and soft tissue infections, cellulitis was the most frequent disease, affecting 71.7% of the studied cases. Other uncommon infections each comprising less than 10% of all diagnoses were, in order of frequency, bone and joint infections, pneumonia, septicemia, meningitis and urinary tract infection. In 33 cases the reason for admission could be ascribed to viral blood-borne pathogens among which HIV infection and AIDS were the most common (Table 2). The prevalence rates for viral infections are presented in Table 3. The most frequent viral pathogen was HIV, affecting almost one in four IDUs admitted to the infectious diseases ward. During the study period, 13 cases of death were documented, giving rise to an overall mortality of 13% among admitted IDUs. The causes of death were all directly or indirectly attributable to injecting drugs. Moreover, in 20 episodes (17%), the hospital stay was shortened due to patient absconding from the hospital or self-discharging against medical advice and before the completion of the treatment course. Review of case notes revealed that 33 patients treated themselves with oral or intravenous antibiotics before admission without the provision of a professional healthcare provider. Amoxicillin was the most common antibiotic used (Table 4).

Table 1. Demographic Characteristics of Inpatient Injection Drug Users at the Infectious Disease Ward^a

Variables	Percentage
Age, y	
10 - 19	6
20 - 29	33
30 - 39	34
40 - 49	22
50 - 59	5
Gender	
Male	94
Female	6
Marital status	
Married	52
Single	48
Insurance status	
Insured	75
Uninsured	25

^a For all proportions, the denominator is the total number of patients (n = 100).

Table 2. Diagnosis on Admission of Injection Drug users at the Infectious Disease Ward^{a, b, c}

Diagnosis	Values
Bacterial infections	82 (71.0), 95% CI: (63.0 - 80.0)
Skin and soft tissue infections	46 (40.0)
Cellulitis	33 (28.8)
Skin abscess	9 (7.8)
Pyomyositis	2 (1.7)
Thrombophlebitis	2 (1.7)
Endocarditis	12 (10.5)
Bone and joint infections	8 (7.0)
Osteomyelitis	7 (6.1)
Septic arthritis	1 (0.9)
Pneumonia	7 (6.1)
Septicemia	6 (5.3)
Meningitis	2 (1.7)
Urinary tract infection	1 (0.9)
Viral infections	33 (29.0), 95% CI: (20.4 - 37.0)
Hepatitis C	3 (2.6)
Hepatitis B	14 (12.2)
HIV infection or AIDS	16 (13.9)

^a Abbreviations: HIV, human immunodeficiency virus; AIDS, acquired immunodeficiency syndrome.

^b For all proportions, the denominator is the total number of admission episodes (n = 115).

^c Data are presented as No. (%).

Table 3. Prevalence of Viral Blood-Borne Pathogens Among Injection Drug Users at the Infectious Disease Ward^{a, b}

Variables	No. (%), (95% CI)
Hepatitis C	6 (6.0), (1.3 - 10.7)
Hepatitis B	10 (10.0), (4.1 - 15.9)
HIV	23 (23.0), (14.8 - 31.2)

^a Abbreviations: HIV, human immunodeficiency virus.

^b For all proportions, the denominator is the total number of patients (n = 100).

Table 4. Prevalence of Self-Antibiotic Treatment Prior to Admission Among Injection Drug Users at the Infectious Disease Ward^a

Variables	No. (%), (95% CI)
Self-antibiotic treatment	33 (33.0), (23.8 - 42.2)
Amoxicillin	12
Penicillin	11
Co-amoxiclav	7
Ampicillin	3

^a For all proportions, the denominator is the total number of patients (n = 100).

5. Discussion

In the present study, the clinical and epidemiological characteristics of infectious complications in a sample of inpatient IDUs were investigated. The result showed that more than two-thirds of all admissions were due to infections of bacterial origin and viral pathogens played a part in at least 29% of all admissions. The details of the findings are discussed below:

5.1. Bacterial Infections

In the present study, 71% of all admissions were due to bacterial infections among which skin and soft tissue infections and infective endocarditis were the most common, accounting for more than half of all episodes (40% and 10.5%, respectively). Similar to our findings, a 2013 study in a London teaching hospital (10) demonstrated that skin and soft tissue infections accounted for 58% of all admissions and these were the most frequent medical complications encountered in the sample of hospitalized IDUs. In this study pneumonia was the second most common cause of hospitalization (10), whereas in our patients endocarditis was the second most common infection and pneumonia was the fourth. In a study of hospitalized IDUs in Switzerland, the three most common infections were, in order of frequency, skin and soft tissue infections, pneumonia and endocarditis (37.5%, 21.8% and 15.7%, respectively) (14). Investigations elsewhere have also indicated that skin and soft tissue infections are the most common types of bacterial infections among IDUs (15-19). In general, as shown previously and observed in our study, skin and soft tissue infections are the most common diseases identified in admitted IDUs; the prevalence of other common infections including pneumonia, bone and joint infections, and endocarditis varies between different studies. According to a follow-up study of IDUs in Netherlands, the incidence rate of skin abscess was 33 per 100 person-years, that is, an IDU with identifiable risk factors experiences one abscess every three years (20). In most cases of skin and soft tissue infections, a combination of predisposing factors are readily identified (21). Inadequate disinfection of the site of injection, use of contaminated injection paraphernalia, certain types of drugs (e.g. mixture of heroin and cocaine), damaging of the skin and vasculature during injection, repeated injections, injecting into certain areas (e.g. groin) and also preexisting conditions like HIV infection/AIDS and poor nutrition have all been independently linked to an increased risk of tissue infections (11, 21).

5.2. Viral Infections

In our sample of IDUs, the prevalence rates for hepatitis B and C were 6.0% and 10.0%, respectively. In accordance with our findings, 4.5% and 11.9% of the 177 enrolled male IDUs in a hospital in Kashan had positive test results for hepatitis B antigen, and hepatitis C antibody, respectively (22). Along the same lines, a report from Shahr-e-Kord on

IDUs visited in a rehabilitation center, estimated that 6% and 11.2% of individuals were seropositive for hepatitis B and C, respectively (23). On the other hand, in a study of hospitalized IDUs in Ahvaz, 3.6% and 30.9% of patients were seropositive for hepatitis B and C, respectively (24). In another study conducted in Isfahan, non-institutionalized IDUs were recruited and surveyed. Based on this report, prevalence rates for hepatitis B and C were 0.7% and 59.4%, respectively (25). The prevalence rates for hepatitis B in the mentioned studies were generally in agreement with the rate observed in the present study. Yet, the prevalence rates for hepatitis C vary considerably. The reason behind sizable discrepancies observed in the hepatitis C seroprevalence remains to be elucidated. The lower prevalence of hepatitis B observed herein and elsewhere, in comparison with hepatitis C, is possibly a reflection of successful implementation of hepatitis B vaccination in Iran's national immunization program since 1993 (26). Immunization of high risk groups has led to a substantial decline in the incidence of new cases both in the general population and among IDUs (27). Shared needles are a major route for transmission of blood-borne viral pathogens including HIV. Previous studies in Iran, have suggested that while HIV infection prevalence has remained below 1% in the general population, it is far more prevalent among IDUs (28). In the present study, 13.9% of all admission episodes were due to HIV infection and its associated complications. Moreover, 23% of admitted IDUs were HIV positive. In a systematic review of six studies investigating the epidemiology of HIV infection among IDUs, during the period between 2005 and 2007, pooled analysis of 1910 individuals revealed that 18.4% of IDUs were infected with HIV (28), which is compatible with our findings.

5.3. Implications for Harm Reduction

One-third of IDUs in the present study took antibiotics without adequate medical supervision. Injection Drug Users often refrain from hospital admission and delay receiving proper care for as long as possible (19, 29). An infection that could be easily treated with a proper combination of intravenous and oral antibiotics is only partially treated, thus markedly prolonging the course of the disease. As a result of mistreatment and delays in seeking care, skin and soft tissue infections in IDUs are often dealt with in the emergency department, thus exhausting a sizable fraction of limited and expensive resources available to emergency care services (18, 19, 30). Poor adherence to treatment is a challenge for the physician caring for IDUs and the issue seems to be of more concern among patients who leave the hospital early (19). Leaving the hospital causes treatment failure, increases the rate of avertable complications, and results in repeat visits to the emergency department and subsequent admissions (10, 29, 31). In an astounding 17% of all episodes, in the current study, the patient did not complete the

course of offered treatment, and either absconded from the hospital, or requested self-discharge against medical advice. Harm reduction policies on a national level have commenced in Iran since 2002 by the Ministry of Health and the Welfare Organization (5, 8). Our study included medical records spanning a five year period beginning in 2007 and ending in 2012. Therefore, when the present study was initiated, community-level harm reduction services were already in place for at least five years. In a 2007 survey of IDUs in Tehran, the capital city of Iran, it was demonstrated that while 62.8% and 54.8% of the respondents were aware of the existence of needle exchange and methadone maintenance programs in the city, respectively; only 19.7% and 9.1% reported ever using such services (8). Therefore, it appears that harm reduction services at the community level have not yet found their projected position and have not been able to reach their full potential of delivering services to the targeted population of individuals at risk. Although no similar report regarding the provision of harm reduction services in Hamadan is available, the authors assume that the coverage of the aforementioned services is far below the rates reported for the capital. Notwithstanding the importance of community-level harm reduction centers, services offered at hospitals could improve the awareness and use of harm reduction services by IDUs. In a study of IDUs in London, patients visited by a drug dependency unit were more likely to find proper accommodation after discharge and also were less likely to leave the hospital without notifying the staff (10). By harnessing the infrastructure already available at secondary and tertiary care levels, educational programs aimed at promoting safer injecting practices could be tailored to improve the knowledge, attitude, and practice of IDUs in this regards. In particular, emphasis should be placed on training the house staff on specific dimensions of providing care for IDUs, as well as educating and supporting the patient himself, in order to promote adherence to treatment protocols. Patient education, during and after the hospital stay, could decrease the rate of absconding and propagate the knowledge of safe injecting methods.

5.4. Limitations

The present study had a number of limitations, which are important to mention. Under-sampling of women in studies of IDUs remains an unresolved problem. In the present study, only six women were recruited. Convenient, random and respondent-driven sampling methods often result in inclusion of a negligible number of women (8). Although this reflects the fact that the prevalence of injection drug users is considerably lower in women compared with men (1, 5) yet, since women are more likely to accrue harm from drug injection (11, 18), epidemiology of ensued complications should be explored more thoroughly for this gender. It is suggested that women are more likely to depend on their partner to

help them with injections, hence augmenting the risk of using shared paraphernalia (32, 33). In the current study, we only included IDUs admitted to the infectious disease ward and patients admitted elsewhere were not covered. Patients with more life-threatening conditions might have been managed in the emergency department and were directly transferred to the intensive care unit, cardiology, surgery, orthopedics or general medicine wards. Therefore, the rates reported for some complications might have been underestimated. Despite these limitations, the present study complements previous studies on infectious complications among admitted IDUs in a country where drug abuse causes a substantial burden to the healthcare care system. Our findings provide useful information for policy makers involved in risk-reducing strategies as well as for physicians providing care for injection drug users.

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