

**Injecting drug use related bacterial infections requiring
hospital care in Gothenburg 2008-2011**

Master thesis in Medicine

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Abstract

Background

14 million people world-wide is estimated to be active injecting drug users. In Gothenburg, this number is at least 922. Injecting drug users (IDUs) have higher incidence of infectious endocarditis (IE) (particularly right-sided) and skin and soft tissue infections (SSTIs) compared to the general population. Many of the risk factors for acquiring these diseases are hygienic, such as the usage of unsterile needles and syringes and needle sharing.

Aim

To estimate the incidence and describe the clinical features of IDUs requiring hospital care in Gothenburg, Sweden for bacterial infections, and to document the injection habits of IDUs in Gothenburg.

Materials and methods

A retrospective study of the Swedish quality register for infectious diseases and hospital records from several departments at the Sahlgrenska university hospital. 171 hospital stays treated for IE and 3468 hospital stays treated for 15 different SSTIs between 2008-2011 were reviewed. When IDUs were found in these groups, additional data from their hospital stays were recorded and analysed for differences between groups.

IDU patients at the department of infectious diseases in Gothenburg were interviewed between February and April of 2014 on their injection habits.

Results

IE incidence was 3.45 for IDUs vs. 0.08 / 1000 person-years for the general population and SSTI incidence requiring hospital care was 19.25 for IDUs vs 1.67 / 1000 person-years for the general population. IDUs were younger than controls and males dominated in the SSTI IDU group compared to the non-IDU group ($p < 0.05$), but not in the IE groups. *S. aureus* was the most frequent cause of infection.

Discussion / conclusions

IDUs had high incidence of hospital care for bacterial infections, most commonly caused by *S. aureus*, and were dominated by men in their thirties. Contrary to previous studies, our IDU IE patients predominantly had a left-sided IE. None of the interviewees took hygienically precautions before injectional drug injections, all reused needles and all had been sharing needles.

Background

General background

The United Nations considers injecting drug use a major public health concern world-wide, with 14.0 million people between 15-64 years estimated to be injection drug users (IDUs) and most of these living in developed countries [1]. IDUs are more susceptible than the general population to bacterial and viral infections due to both immunological mechanisms (especially opioids have been shown to inhibit immune function), social factors, poor nutrition and most importantly hygienic risk behaviour, such as dirty needles and the sharing of needles and syringes [2]. However, there have been few studies analysing the risk for bacterial infections in this patient group.

Injecting drug use is most often initiated after previously having used other drug administration methods. In the baseline study of IDUs in Stockholm, Sweden, by Britton et. al, the mean debut age of any narcotic use was 15 years while the mean age of the first injection was 20 years. No significant gender differences were found. Only 9% had started their illegal drug use with injections. The most common drug for the injection drug use debut was amphetamine, followed by heroin [3]. Mean age of the first injection in an Amsterdam IDU cohort was 22.3 years [4]. Estimating the active number of IDUs in Sweden has been suggested to be difficult, pointing to an uncertain number of hidden users, however, a study in Malmö using respondent-driven sampling failed to find any previously unknown IDUs. The latest estimation of the number of problematic drug users in Sweden from 2007 deployed an algorithm to predict the hidden number from the profiles of IDUs in contact with the criminal care system and patients given a diagnostic code related to substance abuse in the health care systems. This method estimated a total of 29513 problematic drug users in Sweden[5]. The latest estimation on the number of heavy drug users in Gothenburg is

from 2011. It is based on a case finding study with a cooperation of approximately 120 different units. From these reports, 1708 unique heavy drug users were found. 76% were male and 24% female. The median age was 36 years and amphetamine was the most common drug (37%) followed by opiates (19%). 54% reported injecting drug use during the last 12 months, thus the estimated number of active injecting drug users in Gothenburg 2011 were 922. A source of error for this report is that no algorithm was used to find the hidden users, and that some units, for example the infectious department, chose not to be included. This means that 922 might be an underestimation of the number of IDUs [6].

Needle and syringe exchange programs (NSPs) may reduce the risk of infections. The first NSP was launched 1984 in Amsterdam as part of a campaign to reduce the transmission of HIV. Other arms of this campaign included counselling and serological testing. The NSP was considered a success, with reduced risk behaviour among participants and no increase in the number of IDUs, but an even larger effect was seen when the NSP was combined with counselling [7].

Opposite to Gothenburg, a growing number of regions have adopted this strategy. Since 1987, the World Health Organization recommends countries with IDUs to offer NSPs. The EU Council Recommendation of 18 June 2003 on the prevention and reduction of health-related harm associated with drug dependence (2003/488/EC) recommends the EU member states to provide programmes and points for the exchange of injection materials. As of 2012, 86 countries and territories, including Sweden, have implemented NSPs in some form. Drug consumption rooms are provided in 58 cities around the world, a number of those in Norway and Denmark, but none in Sweden [8].

Many reviews on the effectiveness of NSPs have been made, most of these focusing on reducing the number of new infections with HIV, hepatitis B and hepatitis C, but few have studied bacterial infections. The greater number of studies on viral transmission, including a Cochrane review from 1997 support the effectiveness in all or some regards [9, 10] while others, such as a meta-meta review on the subject from 2004 show lesser impact on disease transmission [11].

In Sweden, Lund and Malmö began operating NSPs on a trial basis in 1986 and 1987 respectively. Both of these programs were more or less established [12]. However, it took until 2006 to implement a law allowing county councils to, in cooperation with municipalities, start new NSPs [13]. In 2007, the national board of health and welfare issued completing regulations and guidelines, including having medical and social personnel with special competence on IDUs and offering counselling, testing and vaccinations at NSPs. (SOFS 2007:2) Since then, additional NSPs have opened in Helsingborg, Kalmar and Stockholm [14].

The Gothenburg region does not currently permit NSPs. There is an on-going public debate in Gothenburg over the implementation of a regional NSP, with the ruling Social Democrats opposing this, citing conflicting scientific evidence on the HIV transmission reducing effects of NSPs, not wanting to send “mixed signals” to IDUs and an unwillingness to liberalise drug policies as their reasons [15].

Presently, Swedish pharmacies may, but does not have to, sell needles and syringes to persons over 20 years without a prescription [16]. An addition to this law requires the pharmacy to decline sales if there is a suspicion of the items being used for drug or doping injections [17].

Infective Endocarditis

Infective Endocarditis (IE) is a disease caused by bacterial adherence and colonization of a cardiac valve or other parts of the endocardium. The primary conditions that have to be met are damage or inflammation to the cardiac endothelium and the presence of bacteraemia. Damaged endothelium trigger deposition of a blood clot, allowing bacteria to adhere to the fibrin and thrombocytes. Bacteria stimulate pro-inflammatory factors, expanding the blood clot with adherent bacteria to the vegetation. Local inflammation triggers beta-1 integrin (VLA) expression in endothelial cells, in turn binding fibronectin. Some pathogens, mainly *Staphylococcus aureus* (*S.aureus*), carry fibronectin-binding proteins, allowing them to adhere to the surface. The inflammation can be triggered by repeated impure drug injections or age related valve degeneration [18].

The annual incidence of IE appears to be stable or slightly declining, with figures ranging from 0.031 to 0.116 /1000 person-years [19-21], however, the demographics has changed, with a higher percentage of IE patients having no previously known risk factors, such as a heart condition [19].

Untreated IE is fatal, and quick initiation of bactericidal drug treatment is vital, as animal studies have shown that a delay of three days from the initial infection can result in complete failure of treatment. Benzylpenicillin, isoxazolympenicillins, cephalosporins and aminoglycosides are the most frequently administered drugs [22]. *S.aureus* is the most common blood culture finding, and is together with, *Streptococci* spp. and *Enterococci* spp. responsible for more than 80% of all IE cases. [18, 23, 24] *S.aureus* IE is associated with a higher 1-year mortality rate than IE caused by other IE pathogens. *S.aureus* has emerged as the dominating IE pathogen during the last few decades, parallel to a change in IE epidemiology with patients being older, more

often on haemodialysis or having other forms of nosocomial predispositions and possibly patients with frequent intravenous access. [25] Polymicrobial IE is rare, but has higher mortality and surgery rates compared to IE of a single pathogen [26].

The Duke criteria, proposed in 1994, are widely used for diagnosing IE. A Trans echocardiogram showing vegetation, together with a positive blood culture defines the major Duke criteria. The minor Duke criteria are predisposition, fever, vascular phenomena, immunologic phenomena, suggestive echocardiogram, and suggestive microbiologic findings. Based on the Duke criteria, a suspected IE is classified as definite, possible or rejected [27]. Diagnostic sensitivity is higher with transesophageal echocardiography (TEE), compared to transthoracic echocardiography (TTE). TEE shows an image more proximal to the aorta and basal septa, has a higher resolution, and can thus be used to visualize smaller vegetations, as well as prosthetic valve infection and perivalvular complications of IE better than TTE[28]. The original Duke criteria have since been modified, for example including *S.aureus* bacteraemia as a major criteria, and recommending TEE instead of TTE for initial diagnosis [29].

Globally, in hospital mortality in IE is around 20% [22, 30] In that perspective, Swedish mortality is low at 10%. This has been attributed to a short delay between symptoms and treatment, high doses of antibiotics and high rates of surgery [22].

IDUs have a substantially higher incidence of IE compared to the general population, estimated to be 1-13 /1000IDUs/year. These numbers are, adjusted for age, up to 60 times higher that of the general population. Frequency of injections and previous episodes of IE are positively correlated to IE incidence in IDUs. HIV is

another risk factor for IE, and many IDUs are infected with HIV, with an incidence for these patients reported at 13,8 /1000IDUs/year [20, 24, 31].

Due to differences in clinical presentation, treatment and outcome, IE can be separated into Left-sided native valve IE (LSIE), prosthetic valve IE, right-sided IE (RSIE) and cardiac device-related IE [32].

Standard length of intravenous antibiotic treatment differs for these groups, and is according to the Swedish guidelines 4 weeks for native LSIE, 2 weeks for uncomplicated viridans Streptococci LSIE and all RSIE, and up to 6 weeks for Prosthetic valve IE [33].

In the general population, IE most often occurs on the left side. This has been attributed to the higher pressure and turbulence, higher oxygen content of the blood and higher incidence of lesions on the left side [34]. A LSIE with aortic involvement is associated with higher rates of surgery and higher mortality in IDUs compared to an isolated mitral infection [35].

Right sided infectious endocarditis (RSIE) of the tricuspid valve, or in more rare cases the pulmonary valve, accounts for 5-10% of all cases of IE [36] but the rates differ between countries and centres. RSIE is associated with significantly less in hospital mortality (less than 10%) and fewer days of treatment than LSIE, and most often patients presents with fever, bacteraemia and pulmonary emboli [22, 23, 37]. A positive correlation between vegetation size and mortality was found in an American material from 1978-1986. [23] RSIE is sometimes referred to as “injecting drug user endocarditis” as it consistently has been shown to be more common in IDUs. Among IDUs in Stockholm, Sweden, 54% had a RSIE, and 43% a LSIE [38]. In Spain, between 1977-1993, 79% of IDUs had a RSIE[39]. At a Finnish hospital, over 60% of

all IE infections in IDUs were RSIE, compared to 7% in non-addicts. Emboli were more common in IDUs, seen in 60% of the patients compared to 35% in non-addicts. [40] At a hospital in Vancouver, 63% of IE hospitalisations were IDUs. 83% of these had RSIE. In-hospital mortality was low at 5% [37] Among IDUs, heroin use was the greatest predictor of RSIE in a Californian study. [41]. Several mechanisms have been proposed to explain the overrepresentation of RSIE in IDUs. These include endothelial damage from injected drugs, diluents and impurities as well as drug-induced pulmonary hypertension leading to damage to the valves [42].

Cocaine use has been associated with a higher incidence of IE among IDUs than other drugs. [43].

Cutaneous injection-related infections

Skin and soft tissue infections (SSTIs) are a multi faceted group of diseases involving the bacterial infection of any of the dermal layers, subcutaneous fat or muscle tissue. They range from mild to severe, and are common world-wide. Antibiotics are often part of the treatment, and the emergence of increasing drug resistance in bacteria, such as methicillin resistant *S.aureus* (MRSA) is a problem in many countries. Diagnostical challenges involve finding signs of deeper and more serious infections such as necrotizing fasciitis, requiring prompt surgery combined with aggressive antibiotic therapy. The most common bacterial findings for mild to moderate infections such as impetigo, erysipelas and cellulitis are *S.aureus* and *S.pyogenes*. *S.aureus*, *Clostridium* spp., *Aeromonas hydrophilia* or other anaerobes can cause the deeper necrotizing infections. Immunocompromised patients often develop opportunistic skin and soft tissue infections [44, 45]. In Sweden, SSTIs accounted for 9.5% of all infections among primary care patients in three years between 2000-2005. [46] MRSA incidence in Sweden is low at 25.4/100000 inhabitants or less than one

per cent of new S.aureus infections, but has been steadily growing since 2000, with many new infections originating from a foreign country [47].

Cutaneous injection-related infections (CIRIs) are common amongst IDUs, with a described lifetime incidence ranging from 55-68%, an infection incidence of 29-36% during the last year, and an active infection rate of 32% [48-50]. In a cohort study from Amsterdam, incidences of abscesses among IDUs were calculated at 33/100 person years [24]. CIRI is the most frequent cause for emergency department visits, and one of the major reasons for hospital admission amidst IDUs [51]. Even so, IDUs are often reluctant to seek medical treatment for infections, and considers frequent minor CIRIs a normal and not serious occurrence. 96% of IDUs in an interview study by Morrison et. al reported a current injection related problem. [52]. Surgical debridement and irrigation, sometimes with adjunctive antibiotics is effective in treating IDU related abscesses [53]. Several risk factors for acquiring CIRIs have been described. Female sex is one such predictor, as is multiple injections per day [51, 54]. In a longitudinal study among IDUs in a supervised injection facility in Vancouver other risk factors included needle sharing. Age and supervised injection facility attendance were negatively correlated with new infections [54]. Subcutaneous and intramuscular drug injections, many of them apparently accidental, are correlated with higher risk of developing an abscess compared to IV administration [1, 55]. IDUs reporting heroin or a mixture of heroin and cocaine known as “speedball” as their most frequently administered drugs have been shown to be more prone to CIRIs than amphetamine users [48].

The most common location of a CIRI requiring hospital care is the forearm, most likely because the greatest numbers of injections are performed in proximity to the cubital fossa[56-59].

In a Norwegian study, 179 IDU were treated for CIRI during the last 4 months of 1998 at Legevakten in Oslo, a primary care facility for the Oslo commune (502535 inhabitants in Q4 1998[60]). 26 of these were hospitalized. Most of the infections were located on an upper extremity. The mean age was 33 and 37,8 for women and men respectively. The majority of the patients were men, but women comprised a proportionally larger group compared to the whole IDU population in Oslo. During the same time period in 1993, 46 patients received primary care. 7 of these were hospitalized; less than a fourth of the number five years later [57].

Hygiene

According to the WHO guidelines for safe injection practise, using sterile needles and syringes is the most important measure to prevent infection. Good hand hygiene is recommended, but skin preparation before injection is considered unnecessary in most circumstances, unless visibly dirty [61]. IDUs may benefit from skin cleaning prior to injecting, as in an IDU cohort in Baltimore, risk of abscesses were significantly lower among IDUs reporting frequent skin cleaning compared to seldom or never [62]. In the Stockholm baseline study, 45% of IUDs reported having used new needles and syringes for their last injection. A large majority reported a larger number of injections compared to the amount of procured needles and syringes during the last months. Almost 80% reported ever having used needles and syringes that another person had been using before [3]. IDUs are most likely to be sharing needles with partners and close friends, and not with casual acquaintances [63]. In an interview-based study in Colorado, USA, reusing of needles and syringes was often practised among IDUs. Cleaning of the injection spot was reported in half of the injections and was most often accomplished by using an alcohol wipe. Bottled or disinfected water was used to mix the drugs [55]. Needle exchange programs implemented in four

American cities reduced the number of injections per syringe between 44% and 71% [64]. The risk of acquiring HCV infection through needle sharing has been estimated at 0,08 per infected syringe, and for HIV at 0,08-0,0008 per infected syringe depending on the viral load and stage of infection [4]. Markers for HIV and HCV have been found on needle tips and syringes after several weeks of storage in room temperature, although the viability of the pathogens was not assessed at the time [65].

The baseline study with active case findings in Stockholm, Sweden, found a prevalence of 7.1% for HIV infection and 83.0% for HCV infection among 720 active IDUs. No correlation between injection hygiene and viral infection was found in this group. Amphetamine was the most commonly injected drug (72%), followed by Heroin (24%) [3].

In the Gothenburg region, with a population of 533274 persons in december 2013, new HIV infections caused by IDU is rare, with only one such patient reported during 2010- 2013, compared to the 157 total new HIV patients found during the same period. For HCV, the infections in 398 of 712 new patients found between 2010-2013 were caused by injection drug use [66]. In Skåne, Sweden, a region with three NSEs and a population of 1200000, 10 of 161 newly diagnosed HIV infections 2010-2013 were caused by IDU, and 690 of 853 new hepatitis C infections with a known way of transmission were IDU-related [67]. The Stockholm region, with a newly instated NSP (April 2013) had 45 of 857 new HIV and 1098 of 2001 newly diagnosed HCV infections 2010-2013 attributed to IDU [68] The trend for all of these three counties is a slight decline in incidence over the last years.

In addition to needles and syringes, many IDUs use different paraphernalia to prepare their drugs. These have been described in great detail and includes a “cotton”

used to filtrate out larger particles, water containers, a “cooker”, for example a spoon, to heat and dissolve the solution and a tourniquet for making the veins more easily accessible. They are often shared between IDUs, and possibly more frequently than needles and syringes [59, 63, 69].

Aim

To estimate the incidence and describe the clinical features of IDUs requiring hospital care in Gothenburg, Sweden for bacterial infections, and to document the injection habits of IDUs in Gothenburg.

Materials and methods

The study was conducted in two parts, a retrospective register study of IE and soft tissue infections in the Gothenburg region 2008-2011 and a prospective interview study on the injection habits and hygiene of IDUs in the Gothenburg region.

Endocarditis

To find all patients treated for infective endocarditis (ICD 10: I33.0, I33.9) between 20080101-20111231 in the Gothenburg region, the Swedish quality register for infectious diseases [70] was searched for patients matching the criteria. Total number, age, length of the hospital stays and gender was recorded.

We identified 14 patients with an active intravenous substance abuse and additional data were collected from the medical records. The following data was collected: Number of hospital stays 2008-2011, Date of hospital admission, Date of hospital discharge, Length of the hospital stay, Age, Gender, Diagnosis, Initial temperature, Initial Hb, Initial LPK, Initial CRP, Initial Creatinine, Blood cultivation findings, Blood cultivation Date, prevalence of MRSA, Antibiotics used, Total days

of antibiotic treatment, Complications, Surgical Interventions, Day of surgery, Affected valve, In hospital mortality, HBV, HCV and HIV antibodies, embolic events, 1-year mortality and Substance of abuse. Laboratory values were taken from the first day of admission, with the exception of CRP, where the highest reading from the first week was used.

Cutaneous injection-related infections

From an earlier, as of yet unpublished study, "Observational database study to assess the treatment reality of patients with complicated skin and skin structure infections" [71], the names, social security numbers, length of the hospital stay and other parameters for all patients hospitalized at the departments of Infectious Diseases, Surgery, Orthopaedics and Internal Medicine at the Sahlgrenska University hospital, Gothenburg, Sweden, with a hospitalization date between 20080101 and 20111231 and 1 or more of the 14 diagnostic codes in table 1 had been gathered. In total, 3468 hospital stays were identified and screened for inclusion in this study.

As the relevant ICD-10 codes related to substance abuse (F11, F12, F13, F14, F19) were suspected not to have been included for all relevant patients, the medical records of all patients in this group were manually searched for information to identify injecting drug use as the direct cause of the infection.

When an IDU patient was found, clinical, laboratory and data on cultivation results from the hospital stay was recorded in a Microsoft Excel worksheet. The following data were collected: Number of hospital stays 2008-2011, Date of hospital admission, Date of hospital discharge, Length of the hospital stay, Age, Gender, Diagnosis, Initial temperature, Initial Hb, Initial LPK, Initial CRP, Initial Creatinine, Location of the infection, Prevalence of abscesses, Size of abscesses, Number of abscesses, Prevalence of ulcer, Cultivation findings, Cultivation Date, prevalence of MRSA, Positive blood culture, Antibiotics used, Total days of antibiotic treatment, Complications, Surgical Interventions, Day of surgery, Bedside incisions, Day of incision, In hospital mortality, HBV, HCV and HIV antibodies, 1-year mortality, Substance of abuse. Laboratory values were taken from the first day of admission, with the exception of CRP, where the highest reading from the first week was used.

Demographic data for the Gothenburg region between 2008-2011 was based on reports from Statistics Sweden. [72] A mean of the 4 years was used to calculate the incidence of Soft Tissue and Skin infections requiring hospital care and resulting from abuse.

| | |
|--------------|--|
| A46 | Erysipelas |
| A48.0 | Gas Gangrene |
| L02 | Cutaneous abscess, furuncle or carbuncle |
| L03 | Cellulitis |
| L04 | Acute Lymph Adenitis |
| L05 | Pilonidal Cyst |
| L08 | Local Infection, dermal or hypodermal |
| L97 | Leg Ulcer |
| M72.6 | Necrotizing Fasciitis |
| O86.0 | Wound Infection After Obstetric Procedure |
| T79.3 | Posttraumatic Wound Infection |
| T81.4 | Infection After Surgical or Medical Procedure not classified elsewhere |
| T82.7 | Infection and Inflammatory Reaction caused by other Instruments, implants and transplants in the heart or blood vessels |
| T87.4 | Infection in an amputation stump |

Table 1: Diagnostic Codes (ICD-10) used to identify intravenous drug users with cutaneous injection-related infections from the journals.

Prospective interviews

Between 20140201 and 20140431, an interview questionnaire with 6 questions related to hygiene in conjunction with injection of illicit drugs (Table A) was used to interview voluntary patients at the department of Infectious Diseases, Sahlgrenska University Hospital, with recent personal experience of drug injection practises. The interviews were conducted in Swedish. Some of the questions were open ended, and the patients were asked to elaborate on all questions and not just provide a yes or no answer. All answers were transcribed and are summarized in the results part. See Appendix A for the separate transcripts in Swedish.

Interview Questionnaire

1. What/Which drug(s) have you been injecting?
2. Where on your body have you been injecting the drugs?
3. How do you procure your needles and syringes (tools)?
4.
 - a) Have you been taking any hygienical precautions before injecting the drugs?
 - b) Have you been using an alcohol wipe before injection?
 - c) Have you been changing the tools between each injection?
 - d) If no:: How do you clean your tools?
5. Have you been practising needle sharing? If yes, how frequent?
6. Is there anything you would like to add, concerning injectional practises and hygiene?

Analysis

Analysis was carried out with IBM SPSS Version 22. Independent Samples Students T-Test , equal variances not assumed was primarily used to compare age, length of the hospital stays and the gender distribution in both groups. Several other factors, including age, abuse, CRP , anti hepatitis-C antibodies and abscess prevalence were also analysed for gender differences with Student's T-Test. One-way ANOVA was used to search for differences between the multiple subsets of IDUs (e.g. users of the

different classes of drugs) and bivariate analysis was used, for example to search for correlations related to the haematological values and length of hospital stay.

Results

Cutaneous injection-related infections

A total of 3468 in hospital stays with the relevant diagnostic codes for complicated skin and soft tissue infections were identified from the hospital records during 2008-2011. Intravenous drug abuse as the direct cause of the infection was found in 71 of these cases. There were 60 unique patients, of whom five had multiple infectious episodes, ranging from two to four.

There were 13 (18.3%) females and 58 (81.7%) males (n=71) in the IDU group, compared to 1706 (47.8%) females and 1863 (52.2%) males in the non-IDU group. The overrepresentation of men in the IDU group was statistically significant ($p<0.01$).

The mean time of hospital stay in the IDU group was 5.1 days (SD 4.6, range 0-28), 2.4 days shorter ($p<0.05$, 1.3-3.5 days) than in the non-IDU group (7.1 days, SD10.1, range 1-125).

Mean age in the abuse group was 36.4 years, compared to 62.4 years in the whole population, a difference of 26.0 years ($p<0.05$ 23.6-28.4 years). For the IDUs, the mean ages of the men were 36.7 years and the women 35.2 years, a non-significant difference. For all patients, the mean age of the men was 59.3 years and the mean ages of the women 64.3 years, a difference of 4.5 years ($p<0.05$ 3.2-5.8 years).

The most frequent laboratory findings were elevated LPK and CRP as seen in table 2.

The most common substances of abuse were amphetamines (64.8%), followed by opioids (19.7%) and others (15.5%) including methylphenidate, anabolic androgenic steroids and pregabalin.

46 patients had abscesses, of which 15 (33%) required surgery, and 22 (49%) patients had abscesses that were incised bedside. The median hospital stay days for patients with surgery were four days, and for patients with bedside incisions one day. The most

common location of an infection was the upper extremity (n=43) on the lower arm (n=36). Most abscesses (61%) measured 10-50 cm². 21 (29.6%) patients had erysipelas or cellulitis.

Antibiotics were administered to 70 of 71 patients, with the most common substances being Clindamycin (111 patient days), Cloxacillin (94 patient days) and Cefotaxim (45 patient days).

| | Median(Range) |
|-------------------|----------------------|
| Hb | 136 (88-165) |
| LPK | 13.5 (4.4-29) |
| CRP | 98.5 (1-460) |
| Creatinine | 68 (44-180) |

Table 2: Laboratory Findings in intravenous drug users with complicated cutaneous injection-related infections treated in Gothenburg 2008-2011

56 patients (92%) were anti-HCV-positive, 5 (8%) were anti-HCV-negative and for 10 patients, no data on anti-HCV seropositivity were found. None of the patients tested positive for HIV.

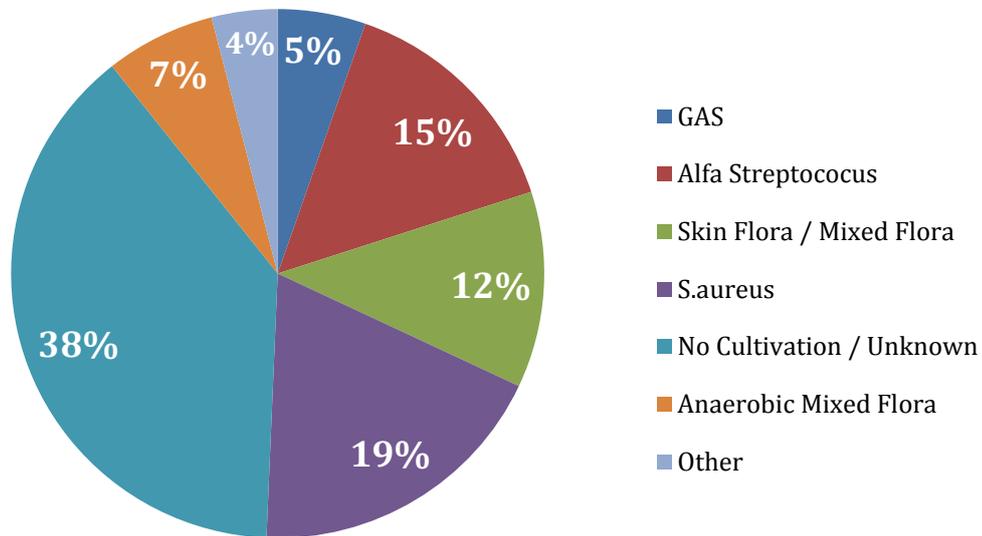


Figure 1: Bacterial cultivational findings in intravenous drug users with cutaneous injection-related infections in Gothenburg 2008-2011

Cultivation findings are shown in Fig.1. *S. aureus* was the most common find (19%), while 24% revealed a polymicrobial infection. No data on cultivation were found in 38% of the patients' journals. No patients were colonized by MRSA.

No significant gender differences or differences between patients primary substances of abuse were found for any of the factors analysed.

The average population in the Gothenburg region from 2008-2011 was 510413 persons, and subtracting the 922 IDUs (in total 509491 non-IDUs) from this number the total incidence for any of the 14 hospital care demanding infections was

1.67/1000 inhabitants/year. For IDUs, the latest estimated number of 922 in the Västra Götaland region gives a CIRI incidence of 19,25/1000 IDUs/year.

| | | IDUs (n=71) | non-IDUs (n=3397) |
|---------------------|--------------|------------------------------|-------------------------------|
| Gender | Female | 13 (19,7%)* | 1644 (48.4%) |
| | Male | 58 (80,3%)* | 1753 (51.6%) |
| Age | Mean (years) | 36,4 (SD 9,7, range 21-53)* | 62,4 (SD 19,75, range 0-100)* |
| Recurrence | Patients | 5 (8%) | |
| Abuse | Opioids | 14 (19.8%) | |
| | Amphetamines | 46 (64.8%) | |
| | Other | 11 (15.5%) | |
| Hospital Stay | Mean, days | 5.1 (SD 4,6, range 0-28)* | 7,5 (SD 10,1, range 1-125)* |
| Location of abscess | Upper arm | 10 (14%) | |
| | Lower arm | 36 (50.7%) | |
| | Hand | 7 (9.9%) | |
| | Thigh | 9 (12.7%) | |
| | Knee | 1 (1.4%) | |
| | Lower leg | 14 (19.7%) | |
| | Foot | 6 (8.5%) | |
| | Torso | 5 (7.0%) | |
| | Buttocks | 6 (8.5%) | |
| | Abscesses | Patients | 46 (64,8%) |
| Temperature | <37,5 | 40 (56.3%) | |
| | 37,5-38,5 | 22 (31.0%) | |
| | >38.5 | 9 (12.7%) | |

Table 3: Clinical characteristics of intravenous drug users with complicated skin and soft tissue infections requiring hospital care in Gothenburg Sweden 2008-2011.

Infective endocarditis

Clinical characteristics are summarized in table 5.

A total of 14 patients were included, of whom 11 were unique. According to the Duke criteria for IE, 13 patients were diagnosed as definite and 1 as a possible endocarditis.

The gender distribution in the abuse group was 14.3% and 85.6% for females and males respectively, compared to 31.8% and 68.2% in the non-IDU group. The difference did not reach statistical significance.

There was a trend for slightly shorter length of hospital stay in the IDU group, but it did not reach statistical significance ($p < 0,07$).

The mean age in the abuse group was 39.1 years, 29.1 years ($p < 0,05$, 21,7-36,4 years) younger than for non-IDU patients.

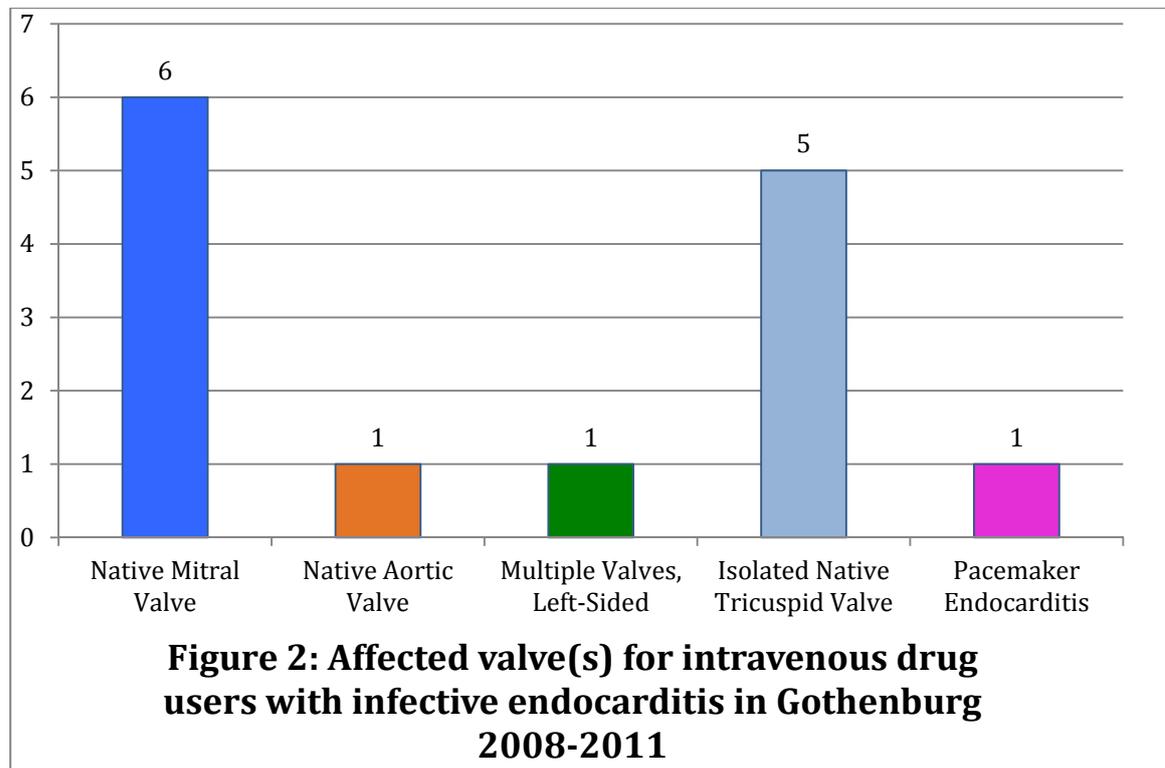
Most patients presented with symptoms of fever (57%), elevated LPK (79%) and elevated CRP(93%).

Eight patients (57%) had a LSIE. One of the LSIE patients had an isolated

| | Median(Range) |
|-------------------|---------------|
| Hb | 122 (96-147) |
| LPK | 12,6 (4,3-22) |
| CRP | 226,5 (5-420) |
| Creatinine | 89,5 (30-205) |

Table 4: Laboratory findings in intravenous drug users with infective endocarditis treated in Gothenburg 2008-2011

aortic vegetation and one had vegetations on both left-sided valves. 5 patients (36%) had a RSIE, all with vegetations on the tricuspid valve. (Fig. 2) One patient had a pacemaker endocarditis. Both opioid users contracted RSIE, and both females had an isolated tricuspid infection.



Six patients had surgery. Three patients got a mechanical prosthesis and two patients got a bioprosthesis. One patient only had repairs on the affected valve. The most common substance of abuse was amphetamine (n=10), followed by opioids. For two patients, no data of the specific substance of their abuse had been recorded.

Six patients had bacterial embolic events, most often to the lung (n=4). Of the 5 patients with RSIE, 4 or 80% had an embolus. One patient had multiple emboli.

Two in hospital mortalities occurred. Both were patients with a history of repeated episodes of the diagnosis. One of the mortalities had a polymicrobial infection. All patients tested positive for anti-HCV antibodies, but none for HIV.

With 509491 Gothenburg non-IDUs and 922 IDUs [6], IE incidence for the general population was 0.077/1000 inhabitants/year and for IDUs 3.80/1000 IDUs/year.

| | | IDUs (n=14) | Non-IDUs (n=157) |
|---------------------------------|--------------------------------------|-----------------------------|-----------------------------|
| Gender | Female | 2 (14,3%) | 50 (31,8%) |
| | Male | 12 (85,7%) | 107 (68,2%) |
| Age | Mean | 39,1 (SD 12.1, range 24-58) | 68,1 (SD 16,0, range 24-95) |
| Recurrence | Patients | 2 (14.3%) | |
| Abuse | Opioids | 2 (14.3%) | |
| | Amphetamines | 10 (71.4%) | |
| | Unknown | 2 (14.3%) | |
| In Hospital Mortality | | 2 (14.3%) | 15 (8,8%) |
| Hospital Stay | Mean, Days | 38,2 (SD 9.1, range 26-54) | 43,7 (SD 19,8, range 8-138) |
| Heart Valve | Native Mitralis | 6 (42,9%) | |
| | Native Aortic Valve | 1 (7,1%) | |
| | Multiple Valves, Right-Sided | 1 (7,1%) | |
| | Isolated Native Tricuspidalis | 5 (35,7%) | |
| | Pacemaker Endocarditis | 1 (7,1%) | |
| Bacterial Embolic Events | CNS | 1 | |
| | Lung | 4 | |
| | Peripheral | 2 | |
| Temperature | <37,5 | 6 (42,8%) | |
| | 37,5-38,5 | 2 (14,2%) | |
| | >38.5 | 6 (42,8%) | |
| Coronar abscess | | 2 (14.3%) | |
| Surgery | | 6 (42.9%) | 52 (33.1%) |

Table 5: Clinical characteristics of intravenous drug abusers with infective endocarditis requiring hospital care in Gothenburg, Sweden 2008-2011

Cultivation rendered *S.aureus* the most common pathogen, being isolated in the blood of eight (57%) patients. Viridans group Streptococci were found in two patients, and other bacteria were represented in one patient each, with no cultivation found in one case and a polymicrobial cultivation in one case. See Fig. 3. Mean time of the hospital stays for the *S.aureus* IEs were 36.2 days, and for the other bacteria 41.8 days, a difference close to significance. ($p=0.07$).

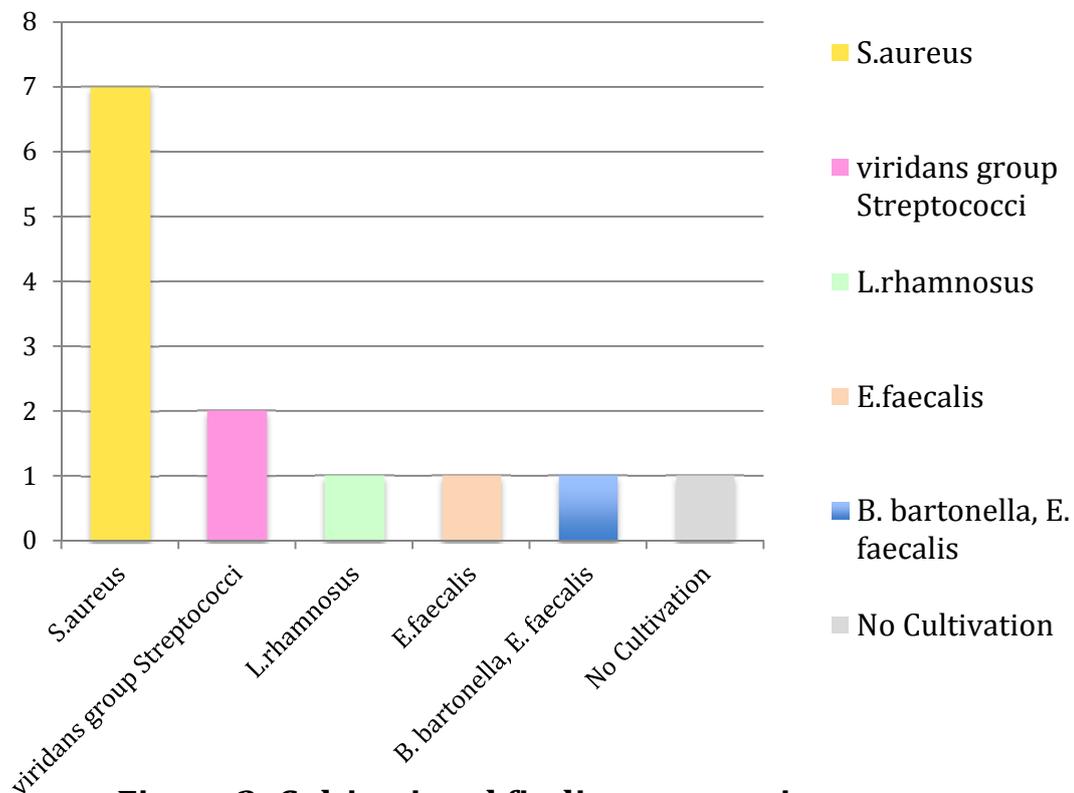


Figure 3: Cultivational findings among intravenous drug users treated for infective endocarditis in Gothenburg 2008-2011

Interviews

A total of five active or former IDUs were interviewed. Their age ranged from 22-48 years. Three patients primarily used opiates and two amphetamines. Three patients described injections of tablets. The tablets were crushed and mixed with tap water

before injection. The substances used were buprenofin, benzodiazepines and codeine. All patients described using multiple injection sites, predominantly having started out with the arms, and as the veins of the arms became difficult to penetrate using other locations, such as the thighs, calves and neck.

All patients had, with some regularity, been buying needles and syringes from friends and acquaintances. Two patients brought needles and syringes from harm reduction facilities in Copenhagen, Denmark, where they were available for free or in vending machines. Two patients used illegal domestic web shops for procurement of their injection tools.

None of the patients regularly washed their hands or used alcohol wipes before drug injections, though most described initially having done so.

All interviewees frequently reused needles and syringes. The tools were sometimes cleansed before the next injection, the most common method being boiling, while others described wiping dirt off with a rag soaked with water or ethanol.

All patients had been practising sharing of needles and syringes. They described that with great emphasis on the unhygienic methods of the practise, and they stressed that they had only done so a few times. Three of the interviewees recognised this as the source of their hepatitis C infection.

Two patients added that they were positive to syringe exchange programs, currently not available in Gothenburg. One patient had only been injecting drugs while under the influence of other inhaled or oral drugs.

Discussion

This is a study including a geographically well-defined area, with only one hospital organization, the Sahlgrenska University Hospital in Gothenburg, Sweden. The hospital records being screened spanned over a period of four years, and a total number of over 3600 patients were screened.

The diagnoses screened for included 14 of the most common soft tissue infections and all different types of IE. There are other more rare infections not included in this material and thus, more IDU infections could possibly have been found. The departments of surgery, orthopaedics, medicine and infection were included, but other potential departments to screen could have been the departments of otolaryngology, ophthalmology, gynaecology and neurology. This was a limitation of the material included in the “Observational database study to assess the treatment reality of patients with complicated skin and skin structure infections”, on which the present study is based. However, the number of patients with injection drug related infections cared for in these wards is likely to be limited, if any.

The number of IDUs in Gothenburg might have been underestimated due to several factors, primarily that some units in Gothenburg in contact with IDUs chose not to be included, for example the infectious department and ER. Secondly, no algorithm was used to compensate for a number of hidden users. Thus, the incidences of bacterial infections might be slightly overestimated. [6] On the other hand, none of the incidence numbers are age-adjusted, and since the IDUs on average were significantly younger the true numbers could be even higher.

The main drug for most of the IDUs in both groups was amphetamine, followed by heroin. This was not surprising, considering those are the most

commonly used drugs in Gothenburg [15]. None of the patients described regular cocaine use, cocaine being a prevalent drug for IDUs in many other European countries and the U.S. [24, 54], but not among IDUs in Gothenburg [6]

64% of the problematic drug users in Gothenburg are male, and this was reflected in our patient cohorts. This differs from the even distribution of males and females in an earlier study from the Gothenburg region[20] A similar male overweight has been found in other IDU populations, such as in England (70% males) [73].

S. aureus was the most prevalent pathogen in both patient groups. Persistent nasal carriage of *S. aureus* is routinely found in over 20% of the individuals in a population [74, 75]. Colonization increases the risk of community acquired skin infections [76] and is a common source of the infection in *S. aureus* bacteraemia [77]. Elimination of *S. aureus* from the vestibulum nasi has been shown to lower infection rates in haemodialysis patients [78], but not in a cohort of non-surgical patients [79].

Our results were hard to compare with other cities in Sweden who have NSPs. The total number of IDU-related HIV and hepatitis C infections were slightly higher in Skåne, a region with two established NSPs, but this was not adjusted for number of inhabitants, and might have been influenced by the close proximity to the European continent and Denmark. The impact of NSPs on incidences of CIRIs, IE and disease transmission among IDUs in Sweden might be a subject for future research, especially if a regional NSP is implemented in Gothenburg.

Infective endocarditis

We found that IDUs had almost forty-five times higher IE incidence compared to the general population in the area. At 3.45/1000 IDUs/year vs. 0.078 /1000

inhabitants/year, incidence of IE in our cohort was much higher in the prospective study of IE in IDUs in Gothenburg by Hogevik et. al from 1996 where they found an incidence of 1 IE/ 1000 IDUs/year, 16 times higher than for the general population at 0.062/1000 inhabitants/year [20]. Our numbers are on the lower spectrum of other comparable studies from Europe and the U.S. (3.3-13/1000 IDUs/year) [24, 31].

The IDUs, with a mean age of 39 years, were on average 27 years younger than non-IDU patients. This was expected, since several previous studies have described younger age and fewer predisposing cardiac conditions in IDU IE patients [80].

Mean time of the hospital stays for IDUs were 38.2 days, 33.4 days for RSIE, and 40.9 days for other IE (not significant). The two mortalities could have influenced this result due to their falsely low value, and removing them yielded a difference close to significance ($p < 0.65$).

Males dominated both groups, with a nonsignificant difference in distribution. Other studies of IDUs with IE have had similar results, with 70% of the patients being male [81]. Interestingly, although a majority of IDUs in many previous studies, especially those infected with *S.aureus* had RSIE [80], in this material, 57% of the patients were diagnosed with LSIE and only 35,7% with RSIE. One possible partial explanation for this could be the negative correlation between amphetamine use and the positive correlation for cocaine and RSIE incidence among IDUs that has been reported [43]. Amphetamine was the most common drug among our patients, and none reported cocaine as their primary drug. A Californian study found heroin use to be correlated to higher risk of contracting RSIE [41], and in our study, both heroin users had a RSIE.

Elevated CRP was the most frequent haematological find, found in 13 patients (93%). This is in line with research by Hoegvik et. al. finding a normal CRP in only 4% of IE patients [82]. In that study, a greater elevation in CRP at diagnosis was correlated with a more aggressive infection. The two in hospital mortalities in our group had CRP readings on the lower end of the spectrum with 30 and 129. No relation between CRP and length of hospital stay was found using bivariate analysis.

Six (43%) of the IDUs had surgery, and three of these patients (50%) got mechanical prostheses. In an American IE IDU cohort, 87% got a bioprosthetic, and only 3.5% a mechanical prosthesis. [81] Rates of surgery were higher than for non-IDUs in Gothenburg during the same period (33.1%) and also higher than the 19.4% found in a Swedish study on IDU IE [38]. It was however lower than the 52% surgery rate found in a recent study based on the Euro heart survey from 22 European centres [83], surprising perhaps, considering Sweden's traditionally high levels of IE surgery.

S.aureus IE has a higher mortality rate and more complications than other forms of IE. [25] It is the leading cause of IE in many countries, with viridans group Streptococci being the second most common [80]. In an English IDU population, viridans group streptococci were more frequently found than *S.aureus* [84]. In our patient group, 57% had *S.aureus* IE and 14% viridans group Streptococci IE. There was no difference in length of hospital stays for *S.aureus* IE in our patient cohort. Neither was there a difference between IDUs and non-IDUs, although a trend could be seen for shorter length of hospital stay for IDUs ($p < 0.07$). Other studies have also failed to find a difference in length of hospital stay for IDU IE patients [38, 84].

Cutaneous injection-related infections

A factor to consider is that any patients who were treated at more than one department or ward during their hospital stay might have been counted as several admissions, thus giving falsely low values of the lengths of the hospital stays and overestimating the number of patients. We have tried to eradicate this problem by mending false multiple hospital admissions from the registers when found.

Incidence for IDUs was almost 12 times that of the general population (1.67 inhabitants/year vs. 19.25 /1000 IDUs/year), but since this exclusively included directly injection-related infections, the total overrepresentation of IDUs for all bacterial infections is likely to be higher.

On average, the IDU patients were over 25 years younger than all patients. They also had shorter lengths of hospital stays. The median length of the hospital stays for the IDUs were four days, longer than the median two days reported from an urban hospital in the U.S. [54]. No gender differences for these factors were found for the IDUs, but for the whole group, mean ages of females were five years older than males.

Five patients (8.3%) were treated at a hospital in Gothenburg multiple times during these four years. The patient with the highest number of admissions had five different episodes of abscess-related infections, while the median number of hospital stays for these patients were three. In the Norwegian study by Larsen et. al, 60% of 148 IDU patients had been treated at a primary care facility for more than one infectious episode during the last 6 years [57].

As expected, the most common location of an infection was on the cubital fossa and forearm (n=36 (50.7%)). The second most common location was on the

lower half of the leg (n=14 (19.7%)). 10 patients had upper extremity infections. Deltoid infections were correlated to a higher incidence of surgical intervention in a study by Takashi et al. [56]. Of our patients with upper arm infections, 40% had surgery or were incised bedside, a lower number than the 52% of all IDUs who had one of these procedures. However, we did not separate deltoid infections from other upper arm infections.

Female sex has been reported as an independent risk factor for CIRIs [24, 54]. In this material, we found a significant overrepresentation of males. This could be attributed to the larger number of male IDUs in Gothenburg, fewer serious infections or a greater reluctance to seek hospital care among female IDUs in Gothenburg. For the first point, injecting drug use was more frequent among female drug users in Gothenburg, although a lesser total number (60% vs. 52%) [6].

There have been few studies on the bacteria causing infections among IDUs, and those available have mostly focused on MRSA. In an American study in an emergency department, 37.5% of bacterial isolates from IDUs with SSTIs were MRSA and 65.5% of the total number of isolates for all patients were a *S.aureus* strain. [85]. *S.aureus* is a frequent cultivation finding in the most common community-acquired SSTIs [44], and our study *S.aureus* had been isolated from 19% of the patients. None of the strains were MRSA, in line with the low overall MRSA prevalence of under one per cent in Sweden[47]. 15 (21%) of our patients had *Streptococcus* spp. cultures. Five (7%) had an anaerobic flora. A study comparing the bacterial cultures of SSTIs in IDUs compared to non-IDUs found a larger percentage of anaerobes (39% vs. 27%) and *Streptococcus* spp. (37% vs. 19%) in the IDU isolates [86].

70 of 71 CIRI patients (98.6%) were treated with antibiotics. Clindamycin was more frequently administered than isoxazolyl penicillin, even though the Swedish Medical Products Agency and STRAMA recommends benzyl penicillin or penicillin V for treatment of erysipelas and isoxazolyl penicillin for treatment abscesses unless the patient has shown previous hypersensitivity to penicillins [87]. Thus, it is strange that clindamycin, with a higher risk of antibiotic associated diarrhea, was the first choice, since both drugs have good effect on the most commonly found bacteria.

The main drug for three patients (4.2%) was methylphenidate, a drug thought to have limited potential for abuse in its oral form, but there have been reports on increasing intravenous abuse [88].

Interviews

The interviews were conducted during four months, and possible candidates included all IDUs hospitalised at the Infectious Department at the Sahlgrenska University Hospital. At the end of this period, only five patients had been interviewed. An additional two patients were hospitalised, but declined being interviewed. Although an extension of the interview period could have been beneficial for recruiting more patients, the time plan outlined for the study did not allow for this. The possibility of a meagre patient material had been taken into account before the start of the project.

The mean ages of the patients were 31 years, representative of the IDUs in the retrospective study.

All were anti-HCV positive, and three patients put great emphasis on the single instance of needle sharing leading to their infection. Needle sharing was seen as a social stigma, even among IDUs, unhygienic and a source of transmission of infections. In the Stockholm baseline study, sharing of paraphernalia was a risk factor

for HCV infection, but the strongest predictor was the length of the injection drug use. Over 2/3 of the patients had recently shared needles [3]. All of our patients described ever having shared needles, but they seemed reluctant to admit of doing so, and also tended to attenuate the frequency of their needle sharing at first. The format of the personal interviews allowed follow up questions and answers to be expanded upon. Other studies have pointed out the need to ask detailed, graded questions on the sharing of drug injection equipment to better reflect the true incidence among IDUs. One example is “hardly ever” being the most common answer to these questions in a study by Hunter et al. [73].

Boiling of needles and syringes was a common method of cleansing them between uses. Several minutes of boiling deactivates both the HIV and hepatitis C virus, but it takes at least 20 minutes to achieve high-level disinfection of all pathogenic microbes, and spores may still remain [89]. The practise of boiling needles and syringes had a protective effect against HIV transmission among IDUs in a Chinese study from 1994, although it was not clear if these patients were using potentially reusable glass syringes instead of disposable plastic syringes [90].

Two patients described returning needles and syringes from Copenhagen, Denmark to Sweden. This is a legal offence in Sweden, punishable with a fine or imprisonment [16], but neither mentioned ever getting caught, even carrying waste disposal bags full of needles and syringes. Another two patients had been buying tools from domestic web shops, but none had ever tried to buy needles and syringes from regular pharmacies.

We did not specifically ask any questions about drug injection paraphernalia other than needles and syringes. The sharing of these utensils could affect the

incidence of disease transmission. For example, a study by Hagan et al. found a higher incidence of HCV among IDUs who shared cotton and cooker [69].

The patterns of IDUs changing injecting sites as prominent scarring and lumps makes veins become hard to penetrate have previously been documented in Australia. The progression during a decade of injecting usually went from cubital fossa to forearm, upper arm, hand, neck, foot and leg and finally the groin and outermost extremities. The arm was also the site perceived to be the least dangerous for injections [59].

Conclusions

IDUs were significantly overrepresented among the patients treated for 15 bacterial CIRIs and IE at the Sahlgrenska hospital 2008-2011. The exact overrepresentation is a gross estimation based on the unreliability of accurately estimating the number of active IDUs in Gothenburg at a given time, and the absence of age standardization in our study. These infections cause significant morbidity and mortality in a vulnerable social group and burden the hospital care system. Most of the infections are thought to originate from a lack of hygiene related to the injections and should thus be preventable. In Gothenburg, LSIE were more common among IDUs than RSIE, possibly because of the prevalent use of of amphetamine. LSIE have higher morbidity and mortality than RSIE. There have been few studies on the efficacy of preventive measures such as NSPs for limiting bacterial infections among IDUs, and further studies comparing the prevalence of CIRIs and IE among IDUs in cities without NSPs such as Gothenburg to cities with NSPs, such as Stockholm should be beneficial.

Populärvetenskaplig sammanfattning

Intravenöst missbruk är ett stort problem över hela världen, och bara i Göteborg beräknas det finnas nästan tusen personer som regelbundet injicerar narkotika. Vi har undersökt förekomsten av olika sjukhusvårdskrävande hud och mjukddelsinfektioner samt infektiös endokardit (bakterieinfektion på hjärtklaffarna) hos missbrukare i Göteborg under fyra år, 2008-2011.

Våra resultat tyder på att missbrukare löper en nära fyrtiofem gånger ökad risk att drabbas av infektiös endokardit och nästan tolv gånger ökad risk att drabbas av hud och mjukddelsinfektioner jämfört med resterande befolkning. Om hänsyn tas till att missbrukarna även var väsentligt yngre än icke-missbrukarna är infektionsrisken ännu högre för missbrukarna. Många studier har tidigare visat att missbrukare ofta får endokarditer på höger hjärthalva, medan icke-missbrukare sällan får det. I vår studie hade missbrukarna tvärtom fler vänstersidiga än högersidiga endokarditer. Detta skulle kunna ha att göra med vilken drog de använder, och amfetamin var den vanligaste drogen bland patienterna. Den vanligaste orsaken till missbrukarnas infektioner var gula Stafylokocker, en bakterie som naturligt förekommer hos cirka 20% av befolkningen och som har varit det vanligaste odlingsfyndet i flera tidigare studier på infektioner hos missbrukare. I princip alla missbrukare hade hepatit C (gulstot), men ingen bar på HIV. Antibiotikavalet för mjukddelsinfektionerna hos missbrukarna var till vår förvåning ofta klindamycin, som i riktlinjerna främst används till penicillinallergiker. En biverkning som är vanligare med klindamycin än penicillin är diarré till följd av att bakteriesammansättningen i tarmen ändras.

I studiens andra del intervjuade vi missbrukare som var intagna på Östra Sjukhuset för bakteriella infektioner om deras injektionsvanor, främst ur

hygiensynvinkel. Totalt intervjuades fem patienter. Alla hade delat sprutor och alla återvände regelbundet sprutor. Den vanligaste metoden för att rengöra sprutorna mellan injektionerna var kokning. Sprutdelning ansågs generellt skamligt och en smittkälla till hepatit C . Det var ovanligt att rengöra injektionsområdet innan injektionen, något som kan ge minskad infektionsrisk hos gruppen missbrukare.

Det finns ännu inget sprututbytesprogram i Göteborg, och ytterligare studier som jämför med städer som Lund, som har haft sprututbyte sedan mitten av 1980-talet, skulle behövas för att kunna jämföra om ett sådant program kan ha en dämpande effekt på den missbruksrelaterade överrepresentationen av bakteriella infektioner som vi hittade.

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Appendix A: Complete transcripts of interviews

Man, 29, abscess i höger ben

1. Huvuddrogen är Heroin. Han använder även amfetamin, kodein, temgesic och olika typer av benzodiazepiner intravenöst. Tabletterna krossas och blandas med kranvatten för att kunna injiceras. Använder även buprenofentabletter i syfte att trappa ned opioidberoendet.
2. Vid det aktuella infektionstillfället injicerade han i högra ljumsken, detta för att de flesta andra vener på kroppen inte går att sticka i längre.
3. Hämtar framförallt sprutor i Danmark. På Istedtgade finns speciella lokaler där det går att hämta sprutor samt injicera. Han brukar hämta hem en soppåse åt gången. Denna räcker i ungefär ett år. En del av sprutorna säljs också av. En spruta och två nålar tar patienten tjugo kronor för. Ibland köper han också sprutor och kanyler av kompisar.

4. Torkar aldrig med alkohol innan injektionerna. Använder ibland samma sprutor flera gånger. Det händer att han kokar verktygen mellan gångerna de gånger han återanvänder sprutor, men oftast gör han det inte.
5. Endast vid ett tillfälle har han delat sprutor med ågon annan. Han misstänker att det var vid detta tillfälle han smittades med Hepatit C.
6. Har inga ytterliga funderingar kring detta.

Man, 48, pneumokocker samt H1N1-influensa

1. Har enbart injicerat amfetamin i drogväg. Använder även cannabis. Tidigare Anabola Androgena Steroider.
2. Injicerar i vaderna eftersom det syns minst, men har även injicerat sig på andra ställen, tex I armarna..
3. Har fått kassar med sprutor och kanyler av en kompis. Haft kvar av dessa länge och kunnat använda. Han har svårt att erinra sig var verktygen han använder nu kommer ifrån.
4. Torkar rent med papper eller trasa i den mån det går. Ibland gör han rent injektionsstället med alkohol. Han tar nya verktyg ibland om det finns. När han använder samma sprutor och kanyler mellan gångerna torkar han antingen rent dem med papper eller trasa, spritar eller kokar dem.
5. Tycker att det är äckligt att dela verktyg, men har gjort det några gånger. Har kokat verktygen mellan användningarna hos olika personer någon eller några av dessa gånger.
6. Har inget att tillägga kring hygien.

Man, 34. Endocarditrecidiv. Nu ren.

1. Heroin har varit huvuddrogen, men vid senaste endocarditen var det subutetabletter som krossats och tillsammans med okokat kranvatten injicerats. Han har när han var yngre även injicerat olika benzodiazepiner.
2. Patienten har injicerat på de flesta ställen på kroppen, han nämner armar, fötter, ben och halsen. Han byter plats när venerna tar slut. Vid det senaste tillfället skedde injektionen i armvecket.
3. Sprutor och kanyler har främst köpts via bekanta, men han har även vid några tillfällen varit i Köpenhamn och köpt hundratals sprutor åt gången via automater. Detta var flera år sedan.
4. Har ibland spritat innan han injicerar. Byter sällan verktyg mellan gångerna, det har hänt att det gått 2-3 månader innan han bytt verktyg. Sprutorna och nålarna har rengjorts med kranvatten innan de använts igen och ibland även kokats.
5. Patienten lägger stor emphasis vid att det är äckligt och ett stort problem ur smittspridningssynpunkt med sprutdelning. Han har själv väldigt sällan gjort det, men tror att det var vid ett sådant tillfälle han blev smittad med Hepatit.
6. Han förstår inte varför det inte finns ett sprututbytesprogram i Göteborg. Daniel tror själv att han skulle ha varit hjälpt av ett sådant program och undvikit blodsmitta.

Kvinna, 22, tidigare missbruk och nekrotiserande fasciit, sedan tre år ren.

1. Injicerade subutex som hon blandade med vanligt kranvatten. Ingen kokning eller liknande har skett av vattnet innan injektion.

2. Stack sig i början i armarna, men när det blev svårare att spruta där så började hon sticka sig bland annat på halsen.
3. Köpte oftast via Internet, främst sista tiden som hon missbrukade. Köpte även sprutor och kanyler i stängda förpackningar av bekanta. Uppger att vissa av dem ”hämtade” verktyg på sjukhusen. En del av det hon köpte via Internet såldes vidare till andra, enligt henne även i syfte att minska smittspridning .
4. Hon hade inga speciella hygienrutiner, och tänkte inte så mycket på detta. Spritade händerna någon gång innan injektion. Verktygen användes flera gånger, men max i tre dagar innan de kastades. Mellan gångerna kokades de.
5. Delade verktyg hela tiden, men enbart med sin syster. Fick hepatit på grund av detta.
6. Läger till att hon brukade vässa kanylerna med sanpapper och nagelfilar när de blev slöa för att återställa skärpan.

Kvinna, 27, Dubbelsidig Endocardit

1. Enbart injicerat Amfetamin. Andra droger som hon tagit är bland annat Heroin, Subutex, olika Bensodiazepiner och lagliga droger som hon köpt på Internet, t.ex. Spice och Amfetaminliknande preparat.
2. Har tidigare oftast sprutat i armvecken, men i samband med insjuknandet den här gången har hon injicerat i högerhandens vener. Detta för att armveckens kärl inte längre gick att penetrera. Tidigare även stuckit i kärl på låren.
3. Främst har kanyler och sprutor köpts via Internet, men hon har även lånat och köpt verktyg av bekanta och vänner. Med lånar syftar hon på sprutdelning.
4. I början av sitt missbruk var hon noga med att tvätta med handsprit innan, men hon slarvade mer och mer med detta för att till slut upphöra helt. Bland annat

därför att det sved vid appliceringen av spriten. Hon försöker alltid byta verktyg mellan varje injektionstillfälle, men eftersom hon inte alltid har hemma tillräckligt många så händer det att hon använder samma verktyg flera gånger. I dessa fall kokas sprutorna oftast, men ibland så gör hon inte rent alls mellan gångerna.

5. Har delat verktyg med andra uppskattningsvis vid 5-10 tillfällen. Ingen rengöring av sprutor och kanyler har skett mellan injektionstillfällena.
6. Hon vill tillägga att sprutdelningarna för henne alltid skett när hon redan har varit påverkad av andra droger, vilka har sänkt hennes spärrar mot sådant.