



# Intra-Venous Drug Users: Challenges for a Plastic Surgery Trauma Service

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## Abstract

**Background:** Intravenous Drug Users (IVDUs) pose significant clinical challenges within hospital medicine. Their burden on plastic surgery trauma services has not yet been reported within the literature. This study aimed to assess the impact of intra-venous drug users on a plastic surgery trauma unit within the North East of England.

**Methods:** This was a retrospective cohort study in which two groups of patients, IVDUs and non-IVDUs were assessed for demographic details as well as clinical outcomes. One hundred patients were selected randomly from within each group between January 2015 and December 2017. Assessment criteria included; age and sex, injury presented with, level of intervention, evidence of self discharge and compliance with follow up. Data analysis was conducted with Microsoft excel and SPSS version 24. Statistical tests consisting of Pearson chi square assessment as well as Fisher's exact test were used to test the significance of proportional variation for the outcome measures.

**Results:** IVDUs necessitate a higher quantity of care than non users, with 78% admitted on to a ward setting for either surgical or other forms of intervention compared to 58% in the normal cohort ( $\chi^2$ ;  $p < 0.05$ , 95% CI). IVDUs also demonstrated a significantly higher incidence of not attending clinic follow ups with 62% (33/53) missing one or more clinic appointments out of those who were scheduled for routine follow up. This was much higher (Fisher analysis,  $p < 0.05$ , 95% CI) compared with 4.6% (4/86) in the normal cohort. In addition IVDUs showed a higher propensity to self-discharge compared to the normal population ( $\chi^2$ ;  $p < 0.05$ , 95% CI).

**Conclusion:** The IVDU cohort poses a great challenge for plastic surgery trauma services in comparison to a normal patient population. The authors suggest the use of more robust systems to help manage this group efficiently. Pre-planning for known clinical outcomes in this population will help limited NHS resources in plastic surgery run more efficiently.

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Received Date: 08 Mar 2019

Accepted Date: 01 Apr 2019

Published Date: 05 Apr 2019

### Citation:

Rahman S, Mafi P, Allison K. Intra-Venous Drug Users: Challenges for a Plastic Surgery Trauma Service. *Ann Plast Reconstr Surg*. 2019; 3(1): 1024.

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**Keywords:** IVDU; Plastic surgery trauma; PAT

## Introduction

Intravenous injection of illicit substances or Intravenous Drug Use (IVDU) is a significant contributor to the global burden of disease [1]. In the United Kingdom (UK) in 2015/16, according to the Health and Social Care Information Centre (HSCIC) [2], 2.7 million adults (8.4%) used illicit substances. This resulted in more hospital admissions than in 2013/14. The costs of treating the sequelae of IVDU are significant. The annual cost of injecting heroin use at one United States (US) hospital was estimated to be US \$11.4 million [3]. The care of this cohort is complicated by intrinsic differences between the IVDU cohort and the general population, which impact the healthcare outcomes of these vulnerable patients. These include chaotic social circumstances, atypical or delayed presentations and atypical organisms in infective cases. For example, in cardiac surgery this is manifested in patients with a history of IVDU required significantly more re-do operations for infective endocarditis compared to non-IVDU patients [4].

For IVDU patients in our hospital, common presentations are soft tissue infection and/or trauma. Plastic surgeons are often involved in the care of patients with these presentations. Soft tissue complications of IVDU include cellulitis, abscesses and necrotising infections after which IVDU patients usually require more skin grafting than non-IVDU patients [5]. In the US, Takahashi et al. found that between 1998 and 2001, there were approximately 106 126 admissions for illicit drug users with soft tissue infections [6]. This represented 0.07% of all US non-Federal admissions costing over US \$193 million in 2001. In a comparative epidemiological study of IVDU and non-IVDU patients presenting with soft tissue infections between 2010 to 2013 in Brighton, Chotai et

al. [7] found that patients with a history of IVDU had statistically significantly longer hospital admissions (1 vs. 4 days) and greater costs of admission (£580 vs. £1280) ( $p < 0.05$ ). The burden to plastic surgery trauma services has not been studied in the UK. Current studies have focused on infective presentations and have not assessed other common presentations including lacerations and other traumatic soft tissue injuries related to the patients' IVDU. There is an increasing population burden of IVDUs presenting to our plastic surgery unit over recent years.

Currently there is no evidence within the literature assessing the impact of the IVDU patient cohort on plastic surgery trauma services. This study is the first to evaluate the challenges faced by the plastic surgeon in dealing with this patient group and provides an overview of difficulties expected in their management.

## Methods

Using Hospital Episode Statistics (HES) data from our clinical audit department [8], the total number of patients in plastic surgery department at the James Cook University Hospital between January 2015 and August 2018 was obtained. This included all elective and emergency work. The proportion of the emergency workload was calculated as a fraction of the total number of patients. This was used to estimate what proportion of the workload was dedicated to emergency care as recorded and maintained by the hospital based plastics audit tool.

Referral, initial assessment and treatment details of patients referred to the James Cook University Hospital (JCUH) plastic surgery trauma service have been recorded on the hospital based Plastic Surgery Audit Tool (PAT) database since 2007. To assess what percentage of this work related to IVDU patients a retrospective cohort analysis was performed. A search of PAT using the term 'IVDU' helped to identify a list of eligible patients. A password-protected Microsoft Excel spreadsheet was created to record the following data: Age, sex, presenting complaint (infectious and/or traumatic), treatment received (conservative, pharmacological and/or surgical). Further data related to self-discharge status and compliance with outpatient clinic follow up was recorded from other clinical systems (eCAMIS and WEBICE) within the hospital.

From PAT, all IVDU in-patients between January 2015 and December 2017 were selected and analysed for their presenting complaints. In order to make data collection manageable, one hundred patients were selected randomly from within the IVDU cohorts for which there were available records. Random sequence generation was used to select 100 non-IVDU patients in the same

time period. Microsoft Excel and SPSS version 24 were used to perform the data analysis. Proportional differences in the outcome measures were assessed using the Pearson Chi square test as well as the Fisher exact test.

## Results

From the HES data, there were 27,007 elective and emergency patients treated at the James Cook University Hospital in the plastic surgery department between 2015 and 2018. 4,368 of these were recorded as emergency cases. This constitutes around 16.2% of the total workload.

According to the PAT, our departmental tool, there were a total number of 11,283 patients treated between January 2015 and December 2017. If we estimate that 16.2% of these patients presented as emergency, the total number of emergency cases for this period would be approximately 1,828 patients.

Our PAT data showed 184 unique IVDU presentations. This would indicate that approximately 10% of our emergency work between January 2015 and December 2017 was dedicated to treating IVDU patients.

The Figure 1 summarizes the presenting complaints of the IVDU patient cohort as a percentage of the total.

Abscesses requiring incision and drainage and administration of intravenous antibiotics were the most commonly encountered presenting complaint (34%,  $n=63$ ) followed by pretibial injury (25%,  $n=46$ ), cellulitis of any part of the body (16%,  $n=30$ ) and hand injury (15%,  $n=27$ ), facial injury (5%,  $n=10$ ), burns to any part of the body (3%,  $n=6$ ) and bites ( $n=4$ ).

Some IVDU patients presented into several of the categories above and hence the likely total number 'n' will add up to more than the number of IVDUs presented (186 instead of 184).

In the retrospective random cohort analysis there was a total of 100 patients assessed in each group for both IVDUs and non-IVDUs. The mean age group in the IVDU patient cohort was  $37.2 \pm 7.3$  compared to the non IVDU group of  $32.9 \pm 22.7$ . In the IVDU population, 74% (74/100) of patients were males and the remainder female. In the non-IVDU group 71% (71/100) were males and 29% (29/100) females.

IVDU patients presented with a higher rate of infective complications primarily in the form of abscesses of which there were 29 (29%) compared with none in the normal patient cohort ( $\chi^2$ ;  $p < 0.05$ , 95% CI). These were all treated surgically with incision and

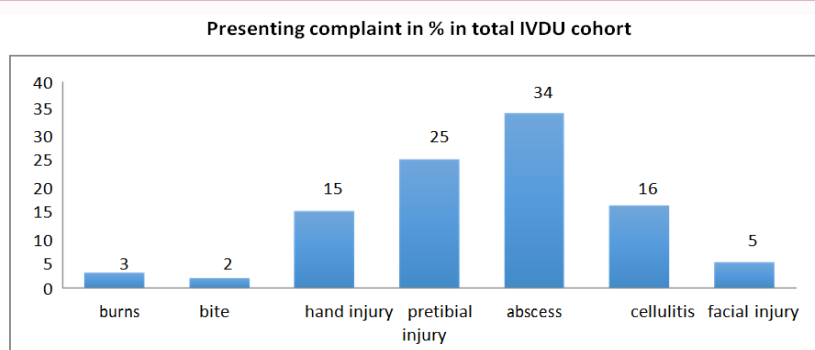
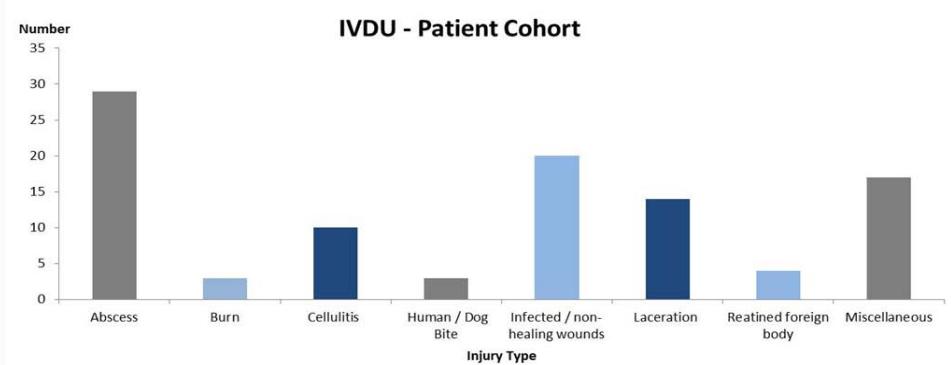
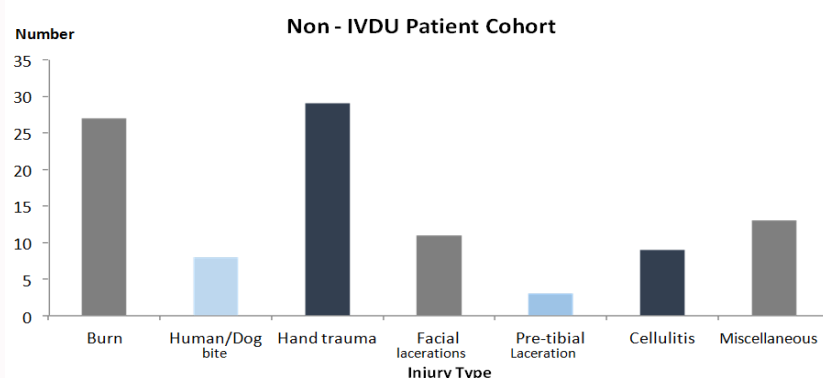


Figure 1: Injury presentation in total IVDU cohort.



**Figure 2:** Injury presentation in IVDU patient cohort.

Figure 1 and 2 closely mirror each other as demonstrated by the high percentage of presentations with abscesses and lacerations/pretibial injuries while burns and bites only make up a small proportion of these.



**Figure 3:** Injury presentation in the non-IVDU patient cohort.

drainage. In addition, IVDUs sustained a higher number of other infections in the form of cellulitis (10%) as well as infected and non-healing wounds (20%). The other presentations in the IVDU cohort consisted of retained foreign bodies, burn wounds, lacerations and other miscellaneous injuries (Figure 1).

The Figure 2 shows the different types of injuries that the one hundred randomly selected IVDU patients presented with.

The non-IVDU cohort of patients presented with a range of different injuries including burns, hand trauma, pretibial lacerations, facial trauma, cellulitis and other miscellaneous injury forms (Figure 3).

IVDUs presenting through our trauma service needed a higher level of care compared to the non IVDU cohort with 78% needing admission for surgery or intravenous antibiotics on to either the ward (74%) or ITU (4%) compared to 58% in the normal population ( $\chi^2$ ;  $p < 0.05$ , 95% CI). Only 22% of patient in the IVDU group were managed in clinic alone compared to 42% in the normal patient population.

IVDUs also had a higher rate of not attending for follow up appointments in clinic with 62% (33) missing one or more clinic appointments out of those who were scheduled for routine follow up (53). This was much higher (Fisher analysis,  $p < 0.05$ , 95% CI) compared with 4.6% (4/86) in the normal cohort who failed to comply with one or more clinic follow up dates.

Twelve percent (12/100) self-discharged compared to 1% (1/100)

in the normal cohort ( $\chi^2$ ;  $p < 0.05$ , 95% CI) (Figure 4). In addition the re-admission rate on to the plastic surgery department was higher for IVDU patients with 6% being re-admitted to hospital after their initial documented presentation compared to none in the normal cohort ( $\chi^2$ ;  $p < 0.05$ , 95% CI).

## Discussion

The demographic profiles of IVDU patients reveal predominantly males in their thirties. They pose greater challenges compared to the 'normal' patient population with a significantly higher proportion needing surgery. The majority of IVDU patients present with infective complications of their lifestyles. Intravenous drug users are also more likely to self-discharge as well as not comply with follow up clinic appointments. They necessitate a high level of care with the majority needing ward-based admission for surgery compared to the normal cohort.

Intravenous drug users are known to sustain a higher rate of post-operative surgical complications [9], they offer an additional burden on NHS resources. Non-compliance with clinic follow ups, a higher tendency to self-discharge and re-admission rate are some of the caveats to their management. Increasing financial constraints on NHS England has been a deterrent to providing a sustainable health care system long term [10]. Plastic surgery services have been directly affected, with reduced funding by care commissioning groups for Procedures of Limited Clinical Effectiveness (POLCE) in recent years [11]. Many patients are therefore unable to obtain treatment due to revision of (POLCE) guidelines driven by limitations in funding [11].

Such challenges to plastic surgery services nationally have affected patient care [11] and this coupled with difficulties posed by the IVDU cohort can hinder treatment of other patients.

Non-attendance for clinic appointments has been reported to increase waiting times as well as miss-use available resources [12]. The national audit office reported an estimated financial cost of £225 million between 2012 to 2013 from missed hospital appointments [13]. Hardy et al. [12] have suggested the use of simple strategies in the form of “reminder phone calls” as a method that can reduce non-attendance. Our study showed that IVDUs have a greater tendency to self-discharge as well ( $\chi^2$ ;  $p < 0.05$ , 95% CI). This carries a higher incidence of poor patient outcomes [14]; Henson and Vickery [15] had advised that trusts seek to protect themselves medico-legally with more comprehensive documentation.

Intravenous drug use can be a chronic debilitating problem and this study reports a higher re-admission rate amongst this cohort. Predictors for high-risk groups have been developed as a means of focusing intervention and enabling pre-planning of hospital expenditure for patients who are most likely to be re-admitted [16]. Substance abuse has been a reported factor in the algorithm strategy developed by Billings et al. [16] for quantifying the re-admission risk and results in this study shows that intravenous drug use is certainly a positive predictor.

An increased quantity of care has been reported at our institution for IVDU patients with a greater proportion needing ward based admission ( $\chi^2$ ;  $p < 0.05$ , 95% CI). This is in contrast to the normal population that presented to our centre of which a larger number were managed in our plastic trauma clinic alone ( $\chi^2$ ;  $p < 0.05$ , 95% CI).

This study outlines the challenges faced by the plastic surgeon in managing the IVDU patient cohort. The authors suggest that different strategies are adapted to manage this group efficiently. Specific IVDU coding could allow reminder phones calls/text messages to try and improve follow-up compliance.

Similarly, coding lead, permissive clinic overbooking may prevent time being lost in the care for other patients due to the high non attendance rate of IVDU patients.

The use of treatment contracts has previously been reported for a variety of patient cohorts however their efficiency is not fully clear [17]. A customized contract however could be developed specific to the needs of the IVDU patient. This could improve their care as well as reduce the burden on the NHS. A proposed treatment contract by the plastic surgery department at the James Cook Hospital would be:

1. IVDU patients to be referred for outpatient follow up care by the patient's primary care physician (GP) if non-complaint with any aspect of their hospital management plans. Non-compliance to automatically disqualify these from receiving specialist care.
2. Medication and pharmacological treatment to be limited to antibiotics. Strictly no narcotics/opiates or sedatives to be prescribed.
3. Choice of wound dressings to be limited to simple dressings such as Mepitel. No topical negative pressure dressings to be applied for these patients as these are very costly and often are not returned by this cohort of patients.
4. No out-reach specialist nursing care available due to the perceived safety arrangements of staff.
5. Access to plastics dressings clinic restricted to patients

compliant with all aspects of care and the proposed above protocol.

6. No free flaps to be performed for this cohort of patients. This is due to the high flap failure rates complicated by patients' poor vascular status, non-compliance with post-operative treatment protocols and high rate of smoking.

The suggestions above are already in practice at our specialist unit in an informal manner. Our proposal is to formalize these into an agreed treatment contract for this cohort of patients in order to further reduce the burden on an already overstretched and resource-constrained service.

## Conclusion

The clinical management of intravenous drug users places a greater burden on the plastic surgery trauma service in comparison to the normal patient cohort. The authors recommend that more stringent strategies are utilized in order to reduce pressure on NHS resources.

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