DRUG & ALCOHOL FINDINGS *Research analysis*

This entry is our analysis of a study considered particularly relevant to improving outcomes from drug or alcohol interventions in the UK. The original study was not published by Findings; click Title to order a copy. The summary conveys the findings and views expressed in the study. Below is a commentary from Drug and Alcohol Findings.

▶ Skin-cleaning among hospitalized people who inject drugs: a randomized controlled trial.

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Addiction: 2020, early view.

Serious bacterial infections are among the most common medical complications in people who inject drugs. Study asks whether an intervention targeting hand washing, injection site skin cleaning, and needle cleaning could reduce the burden, using as its key measure the rate of visits to the emergency department.

SUMMARY Serious bacterial infections such as skin and soft tissue infections, sepsis, and infective endocarditis are the result of bacteria from the patient's own skin or from non-sterile injecting equipment being introduced through a needle and subsequently infecting skin, a heart valve, joint, bone or other organ, and are among the most common medical complications in people who inject drugs (1 2). These infections cause considerable suffering and can result in cardiac surgery, amputation and death.

In the US during the past decade, there has been a dramatic increase in emergency department visits related to injecting drug use. Hospital admissions for injecting-related endocarditis have increased more than 12-fold (1 2 3), while hospital admissions due to skin and soft tissue infections have more than doubled. Furthermore, patients with injecting-related bacterial infections tend to face longer periods of hospitalisation and have an increased risk of death, compared to people with similar infections not attributed to injecting drug use (1 2 3 4).

People who inject drugs frequently interact with healthcare providers, often for reasons other than substance use. This may provide an opportune moment to provide skin hygiene education and training intended to prevent future bacterial skin infections. However, to date this type of harm reduction has not been rigorously tested in inpatient settings.

The featured study involved a randomised controlled trial of an injecting hygiene education programme (known as SKIN), which was instigated during hospitalisation. The SKIN protocol targeted three areas of injecting-related risk behaviour: (1) hand washing; (2) injection site skin cleaning; and (3) needle cleaning. The primary outcome was total number of emergency department visits. Secondary outcomes were total number of hospital admissions, injecting drug use-related emergency department visits and injecting drug use-related hospital admissions.

Key points
From summary and commentary

Serious bacterial infections are among the most common medical complications in people who inject drugs, and can cause considerable suffering and the need for hospital care.

The featured study examined the impact of an injecting hygiene education programme on emergency department visits and hospital admissions. Delivered in hospital by a doctor, the intervention targeted three areas of injecting-related risk behaviours: hand washing; injection site skin cleaning; and needle cleaning.

The intervention significantly reduced injecting-related emergency department visits compared with usual care. However, because injecting-related emergency department visits constitute only a small percentage of total visits among this frequently-returning population, the improvement did not produce a significant reduction in total emergency department visits or total hospital admissions.

A total of 252 patients were recruited between January 2014 and August 2018 from inpatient clinical services at Boston Medical Center – a 'safety net' hospital that provides healthcare for people regardless of their insurance status or ability to pay. They were initially identified for participation by a review of medical records, which looked for evidence of current or past injecting drug use, or a current skin abscess or cellulitis.

Participants met with research assistants, who administered a 90-minute questionnaire, collected a urine sample to test for illicit and licit substances, and then performed a baseline assessment of their skin-cleaning skills. Following this, participants were randomly assigned to one of two arms of the trial: the SKIN intervention (128 participants); or assessment only (124 participants). All participants also received brochures about local substance use treatment options and needle exchange programmes.

The intervention was conducted by a doctoral-level clinician trained previously in motivational interviewing, and involved one 60-minute session with patients at the time of their admission to hospital, and a 30-minute booster intervention session at their one-month follow-up:

- **Session one:** Clinicians met with participants in their hospital rooms and outlined the goals of the session. They provided education around infections and medical complications, including bacterial infections and viral infections that result from injecting drug use. They also provided instructions and demonstrations on best practices for washing hands, cleaning skin at the injecting site and cleaning used needles, and invited participants to practice each task. At the end of the intervention session, the clinician worked with the participant to develop a personalised plan to change behaviour and reduce risk using a personalised risk assessment based on information collected during a baseline assessment (eg, frequency of injection, injection cleaning practices, readiness to change injection practices and barriers to change). A take-home workbook (including participant goals and information on infection and infection risk behaviours) and a clean injection kit (which included two small bottles of water, a small bottle of bleach, a small bottle of hand sanitizer gel, four alcohol pads, a cap to use as a cooker, two micro-cotton balls to use as filters and an instruction sheet about how to clean a syringe) were provided.
- **Booster session:** Practitioners and participants reviewed the risk-reduction plan, examined participant's progress towards their goals and any problems or barriers experienced. They then revised the risk-reduction plan and set new goals.

Follow-up assessments were scheduled at intervals up to a year after the initial assessment – at one week, one month, three months, six months, nine months, and 12 months' after the assessment. The patients' medical records were also reviewed across this period to gather key information such as diagnoses and dates of emergency

department visits and hospital admissions/discharges.

The average age of patients was 38 years, over half were male (58%) and of white ethnicity (60%). The average length of time in education was 12 years, 62% had spent at least one night on the street or in a shelter in the previous 90 days, and 66% said they had been prescribed either methadone or buprenorphine during the same period.

The initial hospital admission (at the time of recruitment to the study) was related to injecting drug use for 61% of participants. On average, participants had injected on 61 days in the past three months, and an average of six times on injecting days. Over half (60%) reported "rarely or never" cleaning their skin before injecting during the past three months. The average percentage of correct responses on the skin-cleaning demonstration was 39%. The average number of emergency department visits in the past year was 2.5, and the average number of hospital admissions over that period was 1.6. Of the participants allocated to SKIN, 66 completed both sessions, 55 completed one session and seven did not complete any sessions.

Main findings

Overall, the findings were not consistent with the hypothesis that the intervention would result in greater reductions in emergency department attendance (the primary outcome) compared with usual care. Although there was a significant reduction in injecting-related emergency department visits (a secondary outcome), the rate of injecting-related emergency department visits was quite low and represented a relatively small component of total emergency department visits.

While all study participants injected drugs, some were not admitted to hospital for injecting-related infections at the time of recruitment to the study. The researchers therefore also tested the hypothesis that those with active infections under treatment might be most receptive to the SKIN intervention. This analysis did not indicate that people with recent infections derived greater benefit from the intervention than other people who inject drugs allocated to the intervention.

Primary outcome

Total number of emergency department visits. Adjusting for demographic differences between the two groups, total emergency department visits were higher in the intervention group than the usual treatment group in the 12 months following the intervention, although not to a statistically significant degree. The average rates of emergency department visits were 4.30 in the SKIN group and 3.96 in the control group. To guard against a false negative (or counterintuitive) result, an alternative method of analysis was conducted. This did not find support for the assumption that the intervention would have a superior effect versus no effect.

Secondary outcomes

Injecting-related emergency department visits. Adjusting for demographic differences between the two groups, the average rate of injecting-related emergency department visits was approximately 43% lower in the intervention arm than in the control arm – a statistically significant difference in favour of the intervention. Additional analysis, however, provided only weak evidence for the assumption that the intervention would have a superior effect versus no effect.

Total hospital admissions. Adjusting for demographic differences between the two groups, there was no difference or little difference in the rate of total hospital admissions.

Injecting-related hospital admissions. Adjusting for demographic differences between the two groups, there was no difference or little difference in the rate of injecting-related hospital admissions.

The authors' conclusions

The featured study tested whether SKIN, an injecting hygiene education programme, could reduce the infections that contribute to people who inject drugs needing to access high-cost emergency department and hospital services. It found that the brief two-session, skills-based intervention significantly reduced injecting-related emergency department visits compared with usual treatment. However, because injecting-related emergency department visits constituted only a small percentage of total visits among this frequently-returning population, the reduction in injecting-related emergency department visits did not bring about a significant reduction in total emergency department visits or total hospital admissions.

There was no evidence that people who inject drugs with recent infections would derive greater benefit from the intervention, which suggests that if SKIN were to be made available in hospitals, it could be offered to all people who inject drugs that attend.

According to the baseline questionnaire, over half (60%) of participants "rarely or never" cleaned their skin before injecting, and prior to any training the average percentage of correct responses on the skin-cleaning demonstration was low (39%). These findings affirmed a gap in practice and knowledge that could benefit from intervention. However, as people with opioid use disorders are known to have high rates of re-admission to hospital, a single intervention may not be sufficient to reduce the need for inpatient care. It could perhaps be added to a menu of interventions, including medication-based treatment for opioid use disorders (eg, opioid substitution therapy).

One limitation of the study was that it may have undercounted hospital or emergency department visits during the follow-up period, for example if participants sought emergency department or hospital services at other facilities. Similarly, it is possible that the study undercounted skin or soft tissue infections, for example if people attended other facilities or self-treated their infections. Another limitation was that the study fell just short of the 280 participants the researchers calculated they needed to detect an intervention effect if the effect was really there (they recruited 252 participants). These types of limitations suggest that the findings may provide a conservative picture of the effect of the SKIN intervention on the primary and secondary outcomes.

FINDINGS **COMMENTARY** Fatal overdoses and blood-borne viruses are the 'headline harms' among people who use drugs. The featured study examined the effectiveness of an intervention designed to address a lesser-known form of harm and suffering – serious bacterial infections caused by bacteria from the patient's own skin or from non-sterile injecting equipment being introduced through a needle and subsequently infecting skin, a heart valve, joint, bone or other organ.

Against the primary outcome of reducing the total number of emergency department visits, the intervention was not associated with a benefit for patients. The intervention did, however, significantly reduce *injecting-*

related emergency department visits compared with usual treatment. Overall, the study indicated that the intervention was *probably* effective, but also *probably not* going to make a big impact on total number of emergency department visits or hospital admissions as there are other reasons why people who inject drugs may disproportionately use secondary care.

Furthermore, while the intervention did not result in greater reductions in emergency department attendance or hospitalisation compared with usual care, this did not mean that the intervention was unsuccessful in creating behavioural change. At the start of the study, 60% of participants reported rarely or never cleaning their skin before injecting during the previous three months. If a figure such as this improved considerably in later follow-ups – the paper did not provide an end-of-study comparison – it is possible that the intervention brought about a positive change in behaviour without this translating into a significant reduction in harm according to the measure of hospital treatment.

Hand washing, injection site skin cleaning, and needle cleaning are examples of modifiable behaviours. However, there are many factors outside of an individual's behaviour that impact injecting hygiene. Appreciable risk of harm comes from the physical environment people inject drugs in, which is not always within their sphere of control. The lacklustre findings of the featured study could therefore be explained, at least in part, by the fact that hygienic injecting is not something everyone is able to practise. An education-based intervention might check an important box, but it seems clear that factors such as homelessness, poverty and cuts to health and social care services must also be addressed in order to eliminate the main causes of injecting-related infections. While these structural inequalities persist, a pragmatic approach is to implement drug consumption rooms, which provide hygienic and supervised spaces for people to inject or otherwise consume illicit drugs, and thereby radically change the conditions in which people take drugs.

Access to healthcare

Surveys of people who inject drugs suggest a high prevalence of injecting-related skin and soft tissue infections among people who inject drugs in the UK: 52% of 2,874 respondents from a national survey reported having such an infection in the past 12 months, and 65% of 455 respondents in London reported a lifetime history of injecting-related infections. The factors associated with injecting-related infections in both surveys were similar, including older age, number of years injecting, number of attempts required to inject into the vein, injecting into the hands, feet, groin or neck, and re-using or sharing needles/syringes.

As the featured study noted, in the US there has been a considerable rise in hospital admissions related to injecting drug use, including for skin and soft tissue infections. In England too, an analysis of hospital data showed a substantial increase in episodes of serious infection among people who inject drugs since 2012.

Ensuring that people who have injecting-related infections can access timely treatment is vital in order to prevent suffering and the serious consequences that come with invasive infections such as sepsis, necrotising fasciitis and death. However, the barriers to timely healthcare are numerous and well-documented, and include feeling marginalised, judged, or criminalised in relation to drug use, being stigmatised due to wound odour or appearance of homelessness, struggling to navigate unfamiliar environments, unequal power relations with medical professionals, prior negative experiences of care (eg, pejorative treatment by staff and intense discomfort due to withdrawal or pain), restrictive opening hours, and competing priorities. This can have far-reaching consequences for people who use drugs. For example, a study following 6,683 people who use heroin in London found major disparities in cancer management and cancer outcomes: they were twice as likely to die from cancer; and they were half as likely to have a hospital admission for cancer treatment.

A 2015 Canadian paper described the consequences of being disenfranchised from the healthcare system for communities of people who inject drugs. In particular, it showed how the absence of formal harm reduction, but expressed need for or expectation of harm reduction, may place an unfair burden on some people who inject drugs, including those termed "natural helpers", who may find themselves in the role of "informal doctor" – providing syringes, training people in safe injecting procedures, promoting the use of sterile equipment, trying to dissuade people from moving from other forms of drug-taking to injecting, acting as first responders for overdoses, testing the potency of drugs, administering first aid, sharing prescription drugs such as antibiotics, and lancing and caring for abscesses.

The following quotes highlight the types of experiences of "natural helpers":

> *"I got meds and bandages at the house and stuff like that and I medicate us. We works on our own selves. "*
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> *"If someone came into the house and they had one [abscess] that was bothering them really bad, I say to them you have to go to the hospital. Well I don't want to go to the hospital. So I say, Ok, I'll do it. Because they were going to lose their arm, they wouldn't go to the hospital."*
>
> *"I help other people with antibiotics and stuff for abscesses that were afraid of going to the hospital because of fear of not being treated the same as everybody else."*
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> *"I know damn well that there's antibiotics passed around all the time. You gotta watch certain kinds cause you can get different antibiotics for different infections in your body."*
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> *"You're supposed to finish your antibiotics. Yes you are, you're supposed to finish them I know but. And, yeah, we are supposed to finish our antibiotics but I don't think I ever finished a bottle in my life… We just put them to the side and whenever anybody needed one."*

Scotland: a case study on botulism

Glasgow (Scotland) has seen a concentration of injecting-related harms, including a large outbreak of anthrax in 2009/10, the largest documented outbreak of wound botulism in Europe in 2015, and what has been described as "the largest cluster of people who inject drugs infected with HIV…in the United Kingdom since the 1980s".

In Scotland on 24th of December 2014, the Public Health Protection Unit in the Greater Glasgow

and Clyde health board were notified that a Glasgow resident in their thirties with a history of injecting drug use had been admitted to hospital with neurological symptoms suggestive of the bacterial infection botulism:

> *"Botulism is a very rare but life-threatening condition caused by toxins produced by Clostridium botulinum bacteria."*
>
> *"These toxins are some of the most powerful known to science. They attack the nervous system (nerves, brain and spinal cord) and cause paralysis (muscle weakness)."*
>
> *"Most people will make a full recovery with treatment, but the paralysis can spread to the muscles that control breathing if it isn't treated quickly. This is fatal in around 5 to 10% of cases."*

Exactly one week later, they were notified of a further suspected case – also a person in their thirties with a history of injecting drug use. The identification of two probable cases of wound botulism in a short period of time under similar circumstances raised the possibility that a batch of heroin and/or the cutting agent had been contaminated. In the following weeks, further cases of suspected wound botulism were reported across six NHS health boards in Scotland. In 2015 alone, there were 47 reported cases centred in Glasgow.

A multidisciplinary incident management team was convened. This concluded that the only way to completely eliminate the risk of infection (including wound botulism) would be to remove all contaminated drugs from the market, or to eliminate drug use among the susceptible population – neither of which were realistic to expect. In the absence of intelligence on which (or how many) batches of heroin in circulation were potentially contaminated, all people who inject drugs were considered to be at risk of exposure and infection. They therefore recommended a pragmatic approach, designed to reduce the risk of infection for all those who continued to inject drugs, and limiting the consequences for those who became infected. The overall strategy to manage the outbreak was predicated on enhancing the comprehensive harm reduction services currently deployed in Scotland, including interventions aimed specifically at reducing risk of exposure (eg, the provision of foil to encourage smoking as an alternative to injecting, and reviewing and expanding access to injecting equipment provision and opiate substitution therapy services).

A postcard was created to raise awareness of the outbreak, communicate safer injecting practices, and encourage early recognition of signs and symptoms, and made available to those at risk via all frontline and addiction services (particularly needle exchange services) across the geographical areas involved. An information booklet, "Wound botulism and drug use: What workers need to know" was developed by the Scottish Drug Forum and also distributed to frontline staff, with an opportunity to reinforce the learning through a workshop. This ensured that staff were equipped to answer questions from people who inject drugs about the outbreak.

Thanks for their comments on this entry in draft to Dr Magdalena Harris of the London School of Hygiene and Tropical Medicine in England. Her research interests include the social relations of harm reduction, community participation and mobilisation, and stigma and discrimination. Commentators bear no responsibility for the text including the interpretations and any remaining errors.

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