RESEARCH ARTICLE

Difficult Behaviors in the Emergency Department: A Cohort Study of Housed, Homeless and Alcohol Dependent Individuals

Tomislav Svoboda*

Department of Family and Community Medicine, University of Toronto, Centre for Research on Inner-City Health, Li Ka Shing Knowledge Institute—St. Michael’s Hospital, Toronto, Canada

* tomislav.svoboda@utoronto.ca

Abstract

Background
This study contrasted annual rates of difficult behaviours in emergency departments among cohorts of individuals who were homeless and low-income housed and examined predictors of these events.

Methods
Interviews in 1999 with men who were chronically homeless with drinking problems (CHDP) (n = 50), men from the general homeless population (GH) (n = 61), and men residing in low-income housing (LIH) (n = 58) were linked to catchment area emergency department records (n = 2817) from 1994 to 1999. Interview and hospital data were linked to measures of difficult behaviours.

Results
Among the CHDP group, annual rates of visits with difficult behaviours were 5.46; this was 13.4 (95% CI 10.3–16.5) and 14.3 (95% CI 11.2–17.3) times higher than the GH and LIH groups. Difficult behaviour incidents included physical violence, verbal abuse, uncooperativeness, drug seeking, difficult histories and security involvement. Difficult behaviours made up 57.54% (95% CI 55.43–59.65%), 24% (95% CI 19–29%), and 20% (95% CI 16–24%) of CHDP, GH and LIH visits. Among GH and LIH groups, 87% to 95% were never involved in verbal abuse or violence. Intoxication increased all difficult behaviours while decreasing drug seeking and leaving without being seen. Verbal abuse and violence were less likely among those housed, with odds ratios of 0.24 (0.08, 0.72) and 0.32 (0.15, 0.69), respectively.

Conclusions
Violence and difficult behaviours are much higher among chronically homeless men with drinking problems than general homeless and low-income housed populations. They are
Introduction

Individuals who are homeless use emergency departments more heavily than the general population, frequently accessing them as sources of primary care.[1–6] Barriers to accessing care in such settings has been described in the general homeless population and the role of difficult behaviours or interactions with staff has been raised.[7,8] Currently the only available data about homelessness and difficult behaviours shows that homelessness and alcohol use are risk factors.[9,10] Individuals who are chronically homeless and heavy alcohol users form a recognizable subset of the homeless population and are anecdotally known to experience more difficulties with behaviours.[11–15] Terms such as “public inebriates,” “chronic inebriates,” and “frequent fliers” have been used in the medical and lay literature and may reflect a level of visible importance for this subgroup that has led to stigmatization rather than understanding.[16,17] Despite their visibility, policy relevance and need for understanding, information is generally anecdotal with few epidemiological studies of this group. Misunderstandings or misplaced opinions of difficult behaviours in these populations may serve to further stigmatize and marginalize rather than help these already vulnerable groups. Difficult behaviours generally refer to physical or verbal abuse or violence that might discourage staff from providing care due to the threat these behaviours may pose.[18–21] Absent or less well described are non-threatening behaviours that still pose significant barriers to complete assessments, treatments or proper discharge and follow-up plans. These might include difficult histories or leaving before being seen. This retrospective cohort analysis of emergency department records was carried out to answer the following clinically and policy relevant questions: 1) what difficult behaviours are reported by care providers? 2) what proportion of individuals engage in difficult behaviours? 3) how frequently? and 4) what are the risk factors and distribution of different difficult behaviours? These questions were explored in three policy relevant groups: those who are chronically homeless and heavy users of alcohol, those who are in the general homeless population and those who live in low-income housing.

Methods

Design

This study analyzed data from a larger study evaluating the impact of a harm reduction program on individuals who were chronically homeless with severe drinking problems (CHDP) using individuals within low income housing (LIH) and general homeless (GH) populations as non-equivalent controls.[22] A retrospective cohort analysis was used. This approach is useful when resource constraints and characteristics of a study population make it difficult to follow cohorts over time. For this analysis, rates of difficult behaviours found in emergency department records during a six year period prior to subject interviews were compared among the three groups of men.

Ethics Statement

Independent research ethics review and approval of the larger study was obtained from ethics review committees in the University of Toronto Office of Research Services, St. Michael's
Hospital, the University Health Network, and St. Joseph’s Health Centre. Written informed consent was obtained from all participating study subjects.

Setting and Participants

All adult men were invited to participate from a 60 bed shelter-based alcohol harm reduction program (CHDP) designed for chronically homeless men unable to abstain from alcohol and rejected from typical shelters due to their drinking patterns; a 250 bed men’s shelter for the general homeless population (GH) and three low income housing sites (LIH). The subjects were recruited in April and May 1999. Data from hospital records were abstracted for the period January 1, 1994, to April 14, 1999 inclusive. The two control group samples were identified using systematic sampling with random start, a type of sampling which approximates a simple random sample. Every third individual entering the participating sites during blocks of time spanning the whole time that individuals enter the sites were invited to meet with an interviewer. Harm reduction program recruits not meeting alcohol dependence criteria were excluded from the analysis (n = 9) as they represented residents sheltered for problems unrelated to alcohol use.

Free and informed consent for vulnerable subjects

Recruitment methods to obtain free and informed consent for study participation included recruiter discussion, written information on the consent form, researcher availability to answer questions any time during the study, recruiter training, and competence assessments where recruiters asked subjects to express in their own words 1) the purpose of the study, 2) that only researchers would access their records and 3) how they could withdraw from the study at any time. Participation was hidden from agency staff and express statements were made to clients that their care would not be disadvantaged by non-participation. Additional techniques shown to improve comprehension included: using a lower reading level [23], using larger typeface [24], quizzing [25] and having multiple individuals provide the information.[26]

Data sources and variables

Subject records in all 9 downtown Toronto hospitals were reviewed and validated and study-specific instruments determined subjects’ alcohol dependence status, history of homelessness, and length of time residing in the study hospitals’ catchment area. Data from physician, nurse, and paramedic elements of emergency department records were abstracted using computer forms and pre-defined coding lists and definitions. Abstracted data included: 1) intoxication; and head injury 2) behaviours including: violent behaviour (aggressive, threatening, abusive, etc.); verbal abuse; uncooperative; drug seeking; difficult historian; leaving against medical advice; leaving without being seen by physician; and leaving before discharge and 3) interventions including: presence or involvement of security staff during medical encounter; escort out by security staff; and use of restraints. Behaviours were rated as severe if they included related qualifiers (e.g. “very,” “++,” etc.); a raised voice or threats to staff; or if security or restraints were involved.

The rates of emergency department visits were determined using the total group observation time. Subjects with observation times greater than 6 months were used to determine what proportion of subjects accounted for the majority of annual difficult incidents that occurred for each group.
Reducing Sources of Bias

CHDP clients were approached up to three separate times to reduce the chances of non-selection among more severely intoxicated clients. To maximize response rate in all groups we provided a $20 honorarium for completed interviews, and utilized staff familiar and trusted by clients to introduce recruitment staff using uniform scripts. Standardized training, scripts and probes, supervision by the principal investigator and blinding to group membership reduced interviewer measurement biases. To reduce hospital chart abstraction biases and increase reliability, the abstractors were blind to study group membership, and each record was reviewed twice by two independent teams. To reduce missing hospital records with poorly recorded identifiers due to intoxicated presentations, records were hand-searched by two independent study staff, then further probabilistically matched to the interview subjects. Multiple identifiers were collected including health insurance numbers, and alias names. Data from the time subjects reported living outside the hospital catchment areas, were excluded. Power calculations for detecting changes in social service use in the original study determined sample sizes.

Analyses

Confidence intervals for proportions of visits involving difficult behaviors used a normal approximation of the binomial distribution.[27] Variables predicting the occurrence of difficult behaviours were determined using multivariate logistic regression, controlling for individual subjects and using a binary distribution for the outcome (SAS 9.0 Glimmix Procedure, 2010).

Results

Of the 227 individuals approached for the study, 178 (78%) agreed to participate. In the CHDP group, 9 did not meet alcohol dependence criteria and were excluded from further analysis. Table 1 compares demographic, mental health measures and emergency department visit rates.

Table 1. Comparison of Demographic and Mental Health Measures between study subject cohorts.

| Characteristic                                      | Chronically homeless with drinking problems (CHDP) n = 50(95% CI) | General Homeless (GH) n = (95% CI) | Low-Income Housed (LIH) Cohort n = (95% CI) |
|----------------------------------------------------|---------------------------------------------------------------|-----------------------------------|--------------------------------------------|
| Median Age                                         | 45–49                                                        | 30–34                             | 45–49                                      |
| single                                             | 46% (33%-60%)                                                | 72% (61%-86%)                     | 68% (56%-82%)                              |
| post-secondary education†                           | 22% (12%-34%)                                                | 26% (15%-38%)                     | 24% (13%-35%)                              |
| Life time years homeless†                          | 13.9 (11.2,16.7)                                             | 5.0 (3.3, 6.6)                    | 2.5 (1.5, 3.5)                             |
| Years of residence in inner city study area†        | 17.8 (13.9, 21.8)                                            | 5.5 (3.7,7.2)                     | 13.1 (8.9,17.2)                            |
| Major Depressive Episode in past year†             | 6.9% (0.3%-13.6%)                                            | 9.0% (1.6%-16.6%)                 | 5.6% (0%-11.7%)                            |
| Generalized Anxiety Disorder in past year‡         | 12.1% (3.7%-20.8%)                                           | 10.2% (2.4%-18.4%)                | 18.9% (8.8%-29.6%)                         |
| Drug Dependence in past year†                       | 22.4% (11.7%-33.9%)                                          | 11% (2.8%-20%)                   | 5.1% (0.0%-10.8%)                          |
| Alcohol Dependence in past year†                   | 100%                                                        | 30% (18%-43%)                     | 23% (12%-34%)                              |
| Emergency Department visits in past year           | 9.5 (9.09–9.90)                                              | 1.54 (1.36–1.72)                  | 1.81 (1.64–1.98)                           |

* CI denotes confidence interval
† After direct age standardized to the CHDP cohort.
‡ Alcohol dependence, Major Depressive Episode, Generalized Anxiety Disorder and Drug Dependence meeting DSM IIIR criteria using the WHO Composite International Diagnostic Interview Short Form instrumen
doi:10.1371/journal.pone.0124528.t001

Difficult Behaviours in the Emergency Department
among the three groups. The CHDP group tended to be older, homeless longer and have more emergency department visits than the other groups.

The study spanned 641 subject years and 2817 emergency department records were reviewed. The absolute annual crude rate of emergency department visits with any difficult behaviour was 5.46 (95% CI 5.16–5.77) for the CHDP group; this was 13.4 (95% CI 10.3–16.5) times higher than the GH group with a rate of 0.408 (95% CI 0.315–0.500) and 14.3 (95% CI 11.2–17.3) times higher than the LIH group with a rate of 0.383 (95% CI 0.304–0.462). More than half (0.575, 95% CI 0.554–0.597) of the visits by the CHDP group included difficult behaviours. This was more than double the proportion for the GH group (0.24, 95% CI 0.19–0.29) and the LIH group (0.20, 95% CI 0.16–0.24), who were not significantly different (p = 0.18).

Table 2 shows a similar proportional breakdown of difficult behaviours among the three groups. There were more verbal abuse incidents and security staff interventions in the CHDP group. Uncooperative behaviours within the medical encounter were higher in the CHDP group. In the groups combined, severe difficult behaviours were 18.4% (95% CI 16.4–20.4%) of

| Variable                          | All Groups | Chronically Homeless with Drinking Problems (CHDP) Group | General Homeless (GH) Group | Low-Income Housed (LIH) Group |
|-----------------------------------|------------|--------------------------------------------------------|----------------------------|--------------------------------|
| Any difficult behaviour           | 1378       | 1213                                                   | 75                          | 90                            |
| Violent behaviour                 | 251        | 234                                                    | 8                           | 9                             |
| Verbal abuse                      | 346        | 331                                                    | 9                           | 6                             |
| Uncooperative                     | 1022       | 902                                                    | 52                          | 68                            |
| Drug seeking                      | 248        | 233                                                    | 9                           | 6                             |
| Difficult historian               | 125        | 104                                                    | 6                           | 15                            |
| Security involved                 | 152        | 143                                                    | 6                           | 3                             |
| Violent behaviour                 | 251        | 234                                                    | 8                           | 9                             |
| Involving security                | 31         | 30                                                     | 1                           | 1                             |
| Use of restraints                 | 107        | 97                                                     | 7                           | 3                             |
| Physical assaults                 | 5          | 5                                                      | 1                           | 3                             |
| Use of restraints                 | 107        | 97                                                     | 7                           | 3                             |
| Patient intoxicated              | 94         | 88                                                     | 4                           | 2                             |
| GCS < 9                           | 26         | 24                                                     | 1                           | 1                             |
| All uncooperative behaviours      | 1022       | 902                                                    | 52                          | 68                            |
| Uncooperative in encounter        | 490        | 461                                                    | 12                          | 17                            |
| Left against medical advice       | 109        | 94                                                     | 7                           | 8                             |
| Left without being seen           | 413        | 353                                                    | 26                          | 34                            |
| Left before discharge             | 230        | 195                                                    | 16                          | 19                            |
| All security involvement          | 152        | 143                                                    | 6                           | 3                             |
| Security at bedside               | 66         | 59                                                     | 5                           | 2                             |
| Security involved due to uncooperativeness | 8    | 8                                                      | 6                           | 3                             |
| Security escort out of department | 55         | 54                                                     | 38                          | 1                             |

All bracketed figures are 95% confidence intervals.

doi:10.1371/journal.pone.0124528.t002
all difficult behaviours, and severe violent behaviours were 43.2% (95% CI 36.8–49.5%) of all violent behaviours; the three groups were not significantly different from each other.

Table 3 summarizes what proportion of subjects accounted for most of the difficult behaviour incidents in each study group.

Table 3. Proportion of subjects who account for annual aggressive and difficult behaviour incidents in each study group.

| Incident Description | All Groups | CHDP Group | GH Group | LIH Group | All Groups | CHDP Group | GH Group | LIH Group |
|----------------------|------------|------------|----------|-----------|------------|------------|----------|-----------|
| Any difficult behaviour | 31.79 | 51.06 | 20.83 | 25 | 55.63 | 95.74 | 35.42 | 39.3 |
| Violent behaviour | 17.9 | 36.2 | 6.25 | 7.1 | 25.8 | 63.8 | 8.33 | 8.9 |
| Verbal abuse | 15.2 | 36.2 | 10 | 5 | 30.5 | 78.7 | 10 | 5 |
| Uncooperative | 31.79 | 53.2 | 19 | 25 | 53 | 95.7 | 31 | 36 |
| Drug seeking | 9.3 | 12.8 | 4 | 4 | 15 | 38.3 | 6 | 4 |
| Difficult historian | 25.2 | 48.9 | 4 | 5.4 | 27.8 | 74.5 | 4 | 8.9 |
| Security involvement | 15.9 | 27.7 | 6 | 4 | 19.9 | 48.9 | 8 | 5 |
| Violent behaviour involving security | 9.9 | 23 | 2 | 0 | 9.9 | 30 | 2 | 0 |
| Use of restraints | 16.6 | 38 | 4 | 4 | 20.5 | 55 | 6 | 4 |
| Physical assault | 1 | 4 | 0 | 0 | 1 | 4 | 0 | 0 |
| Use of restraints | 16.6 | 38 | 4 | 4 | 20.5 | 55 | 6 | 4 |
| Patient intoxicated | 15 | 34 | 4 | 2 | 18 | 49 | 6 | 2 |
| GCS < 9 | 9.3 | 21 | 2 | 2 | 9.9 | 28 | 2 | 2 |
| All uncooperative behaviours | 31.79 | 53.2 | 19 | 25 |
| All security involvement | 15.9 | 27.7 | 6 | 4 |
| Security at bedside | 13 | 23 | 6 | 4 | 15 | 38 | 6 | 4 |
| Security involved due to uncooperativeness | 4 | 10 | 0 | 0 | 5 | 10 | 0 | 0 |
| Security escort out of department | 7.9 | 13 | 0 | 2 | 7.9 | 23 | 0 | 2 |

doi:10.1371/journal.pone.0124528.t003
without being seen and drug seeking were the only difficult behaviours that were less likely among those who were intoxicated; the remaining difficult behaviours were more likely among those intoxicated. The proportion of difficult behaviours in which intoxication was implicated was significantly greater in the CHDP group for verbal abuse (77%, 95% CI 72–81%, p = 0.01), physical violence (81%, 95% CI 75–85, p = 0.02), and leaving without being seen (49%, 95% CI 43–54%, p = 0.001).

Table 6 provides difficult behaviour descriptions found in the emergency records.

### Interpretation

This is the first cohort study examining difficult behaviours in emergency departments among homeless, and low-income housed individuals. Difficult behaviours occurred in a quarter to a half of all emergency department encounters in these groups. Uncooperative behaviours made up three-quarters of difficult behaviours across all groups, while up to a fifth of difficult behaviours included violence. Nearly half of violent behaviours were severe, resulting in restraint or security interventions.

This study challenges conclusions that might be drawn from other studies suggesting that being homeless is an independent risk factor for difficult behaviours in the emergency department. These studies considered emergency room records as the units of...
Table 5. Odds ratios of factors impacts on rates of difficult behaviours in emergency departments based on a multivariate model that included all of these factors.

| Difficult behaviour or incident | Intoxication during visit | Record of head injury | Major reduced level unconscious | Problem drinker | Age | Housed | Mood disorder at study follow up |
|--------------------------------|--------------------------|-----------------------|--------------------------------|----------------|-----|--------|--------------------------------|
| Any difficult behaviour        | 1.79 (1.47, 2.17)*       | 0.96 (0.73, 1.26)     | 1.81 (1.24, 2.65)*             | 1.46 (0.91, 2.36) | 1.01 | 0.61 (0.36, 1.03) | 0.86 (0.53, 1.39)          |
| Violent behaviour             | 3.23 (2.29, 4.58)*       | 0.85 (0.55, 1.32)     | 3.97 (2.52, 6.26)*             | 1.03 (0.49, 2.16) | 0.98 | 0.50 (0.20, 1.26) | 0.60 (0.32, 1.15)          |
| Verbal abuse                  | 2.91 (2.16, 3.92)*       | 1.13 (0.77, 1.67)     | 1.79 (1.12, 2.87)*             | 1.64 (0.76, 3.52) | 0.99 | 0.24 (0.08, 0.72)* | 0.47 (0.24, 0.91)*         |
| Uncooperative                 | 1.71 (1.42, 2.07)*       | 1.09 (0.83, 1.43)     | 1.36 (0.95, 1.96)              | 1.38 (0.87, 2.19) | 1.01 | 0.65 (0.38, 1.09) | 0.90 (0.57, 1.42)          |
| Drug seeking                  | 0.52 (0.35, 0.76)*       | 0.31 (0.12, 0.81)*    | 0.29 (0.07, 1.29)              | 3.45 (0.92, 12.90) | 0.99 | 0.82 (0.20, 3.47) | 0.87 (0.28, 2.67)          |
| Difficult historian           | 2.78 (1.76, 4.40)*       | 1.23 (0.74, 2.06)     | 0.85 (0.39, 1.84)              | 0.80 (0.38, 1.71) | 1.00 | 0.75 (0.32, 1.76) | 1.32 (0.72, 2.41)          |
| Security involvement          | 3.12 (2.04, 4.78)        | 0.93 (0.51, 1.70)     | 1.33 (0.66, 2.68)              | 1.15 (0.43, 3.08) | 0.97 | 1.01 (0.97, 1.04) | 1.04 (0.47, 2.29)          |
| Violent behaviour             | 3.21 (2.27, 4.54)        | 0.82 (0.52, 1.28)     | 4.09 (2.59, 6.47)              | 1.23 (0.61, 2.49) | 0.98 | 1.01 (0.98, 1.04) | 0.60 (0.31, 1.19)          |
| Involving security            | Did not converge         |                       |                                |                |     |        |                                |
| Use of restraints             | 5.16 (2.80, 9.52)*       | 0.60 (0.31, 1.16)     | 6.40 (3.67, 11.18)             | 0.56 (0.21, 1.52) | 0.99 | 0.28 (0.07, 1.16) | 0.83 (0.36, 1.92)          |
| Physical assault              | Did not converge         |                       |                                |                |     |        |                                |
| Use of restraints             | 5.08 (2.74, 9.41)        | 0.55 (0.28, 1.10)     | 6.84 (3.89, 12.03)             | 0.53 (0.19, 1.47) | 0.99 | 1.01 (0.97, 1.05) | 0.93 (0.38, 2.26)          |
| Patient intoxicated          | Did not converge         |                       |                                |                |     |        |                                |
| Unconscious                   | Did not converge         |                       |                                |                |     |        |                                |
| All uncooperative behaviours  | 1.71 (1.42, 2.07)*       | 1.09 (0.83, 1.43)     | 1.36 (0.95, 1.96)              | 1.38 (0.87, 2.19) | 1.01 | 0.65 (0.38, 1.09) | 0.90 (0.57, 1.42)          |
| Uncooperative in encounter    | 4.08 (3.10, 5.37)*       | 1.46 (1.06, 2.00)*    | 2.25 (1.50, 3.37)*             | 0.90 (0.49, 1.65) | 1.01 | 0.32 (0.15, 0.69)* | 0.72 (0.40, 1.27)          |
| Left against medical advice   | 1.60 (1.01, 2.54)*       | 1.64 (0.98, 2.75)     | 2.13 (1.13, 3.99)*             | 1.15 (0.53, 2.51) | 1.00 | 0.68 (0.27, 1.71) | 1.12 (0.62, 2.03)          |
| Left without being seen       | 0.59 (0.47, 0.75)*       | 0.75 (0.49, 1.14)     | 0.21 (0.09, 0.50)*             | 2.40 (1.31, 4.41)* | 1.00 | 1.07 (0.55, 2.07) | 0.97 (0.55, 1.72)          |
| Left before discharge         | 1.79 (1.31, 2.46)*       | 0.82 (0.52, 1.30)     | 1.84 (1.12, 3.03)*             | 1.14 (0.67, 1.94) | 1.00 | 0.72 (0.39, 1.33) | 1.13 (0.76, 1.66)          |
| All security involvement      | 3.12 (2.04, 4.77)*       | 0.92 (0.50, 1.67)     | 1.33 (0.66, 2.67)              | 1.14 (0.43, 3.04) | 0.97 | 0.34 (0.09, 1.35) | 1.01 (0.48, 2.14)          |

(Continued)
analysis in a single point in time. In contrast, this study followed individuals over time to examine their rates of presenting with difficult behaviours. This approach suggests that the vast majority of individuals in these populations do not exhibit difficult behaviours and when they do, it is because they are presenting intoxicated or otherwise acutely brain injured rather than being homeless or having a drinking problem. Rates of difficult behaviours were not found to be significantly different between the GH population and the LIH population, while the rates among the frequently intoxicated CHDP population were 14.3 times greater. Among the GH and LIH groups, 87% and 90%, respectively, were never involved in any recorded verbal abuse, while 90% and 95%, respectively, did not present with violent behaviours. In the CHDP group, more individuals exhibited difficult behaviours; however, they occurred in less than 10% of visits for 56% and 72% of subjects and less than half the time for the rest (Table 4). Out of 17 different measures examined, intoxication was a moderate to strong predictor of 11. Being identified as a problem drinker or being housed was significant for 1 or two. Membership in the chronically homeless problem drinking group was not a significant predictor of difficult behaviours when intoxication was taken into account. These types of variable interactions, suggest that the housing effect may be confounded by lower intoxicated presentation rates in the housed group. This analysis cannot resolve whether housing reduces substance use or whether reduced substance use makes it easier to be housed as the effects of changing housing status were not evaluated. Growing evidence that housing interventions lead to reductions in hospital utilization support the first interpretation.[30] Studies of difficult behaviours in emergency departments suggest that alcohol is implicated in 50% to 77% of abuse-of-staff incidents and 3% to 11% of incidents of leaving without being seen, however tests of association were not made in these studies. [18,20,31–33]

Multivariate analyses in this study suggest that being unconscious at some point during the visit is a strong predictor of being restrained, being verbally abusive, leaving against medical advice, and leaving before discharge. Unconsciousness was predictive of difficult behaviours independent of intoxication; this may suggest that both are the effects of an injured brain. This association with loss of consciousness was not found in the studies reviewed.[20,31–33] Emergency department resources may not be sufficient to meet the needs of many patients with severe intoxication or other injuries compounded by severe psychosocial problems and their resultant difficult behaviours.[34] Table 6 gives qualitative evidence suggestive of the how challenging and possibly inappropriate the current approach to care for these vulnerable populations can be for both the care providers and the patients. Difficult behaviours range from “refusing BP” to “setting bedsheets on fire” to being “put in 4 point restraint for staff safety”.

This study has several limitations. Difficult behaviours were likely undercounted to varying degrees due to recording bias. [20] Fernandes’ study of a comparable inner city hospital

Table 5. (Continued)

| Difficult behaviour or incident | Intoxication during visit | Record of head injury | Major reduced level unconscious | Problem drinker | Age | Housed | Mood disorder at study follow up |
|--------------------------------|--------------------------|-----------------------|-------------------------------|----------------|-----|--------|-------------------------------|
| Security escort out of department | 1.84 (0.99, 3.42) | 1.24 (0.50, 3.07) | 0.48 (0.11, 2.07) | 2.43 (0.47, 12.52) | 0.94 (0.90, 0.99) | 0.56 (0.06, 5.02) | 0.14 (0.03, 0.67)* |
| Security observation | 3.91 (2.04, 7.48)* | 0.39 (0.12, 1.30) | 1.40 (0.52, 3.79) | 1.28 (0.32, 5.16) | 0.98 (0.94, 1.01) | 0.50 (0.09, 2.74) | 1.42 (0.59, 3.43) |
| Security involved due to uncooperativeness | Did not converge | | |

doi:10.1371/journal.pone.0124528.t005
| Sample Behaviour Descriptions | More Severe Behaviour Descriptions |
|-------------------------------|-----------------------------------|
| Violent behaviour             |                                   |
| “slightly combative”          | “restrained for own protection”   |
| “aggressive, violent”         | “pt. attempting to punch crew!”  |
| “showed his ‘fists of steel’” | “verbally/physically abusive +++” |
| “aggressive behaviour”        | “patient put in 4 point restraints for being aggressive—security called to observe” |
| “threatening behavior”        | “patient very combative”          |
| Verbal abuse                  |                                   |
| “verbally abusive to all staff encountered” | “threatened nurses, removed by security w/o being seen” |
| “patient told he will not be given any Valium, became abusive and left” | “patient yelling at secretary” |
| “patient stated: ’t—k off’”   | “discharged from hospital bc. he was harassing other patients” |
| “singing obscene jingles”     | “death threats to staff”          |
| Uncooperative                 |                                   |
| “patient uncooperative”       | “emptied bladder on floor”        |
| “patient pulled out IV”        | “flopping around on ER floor security not there, escorted out by doctor” |
| “removed own condom catheter and then voided in bed” | “threatening staff, peed on floor, locked self in room—escorted out by security” |
| “refused treatment”           | “patient ripped off all stabilization equip collar and straps screaming wants to be seen” |
| Uncooperative with care or encounter |                                   |
| “drinking cooking wine in ER” | “very uncooperative”              |
| “refusing BP”                 | “patient escorted out by security b/c he refused to leave ER” |
| “advised to return meds since obviously non-compliant” | “restrained because patient ‘uncooperative’” |
| “pt. is not actually suicidal but is seeking bed in ER” | “patient won’t sit down, won’t hand over glue, wants to leave, escorted out eventually by security” |
| Security observation          |                                   |
| “security called to observe”  | “patient left then bought back by security” |
| “escorted to waiting room by security” |                                   |
| Security involved due to uncooperativeness |                                   |
| “was caught drinking in the ER and escorted out by security” | “asked by security to give up bottle of liquor” |
| “antagonistic w/ security staff” |                                   |
| Security escort out of department |                                   |
| “escorted out by security”    | “removed by security w/o being seen” |
| “patient abusive removed by security” |                                   |
| “set bedsheets on fire, escorted out by police” |                                   |
| Physical assault involving security |                                   |
| “patient very violent, restrained + masked because patient spitting; screaming, belligerent” |                                   |
| “patient extremely violent, spat in nurse face, removed by security” |                                   |
| “became abusive w/staff, hit nurse” |                                   |
| Use of restraints             |                                   |
| “very combative, 4pt restrain, threatening to kill everyone” |                                   |
| “hospital asks to have him sent back by police, put in 4–pt restraint for staff safety” |                                   |
| “put in 4–pt restraint for staff safety” |                                   |
| “placed in 2–point restraint” |                                   |
| “patient had to be put into 2patient restraint to be assessed” |                                   |
| “patient brought in for chemical and physical restraint for attacking transit driver” |                                   |
| Restraints when unconscious   |                                   |
| “intubated, sent to ICU, 2 point restraint because tried d/c ET tube” | “patient collapsed”, “held patient down manually while IV established” |
| “GCS = 9, placed in 4 point restraints” |                                   |
| Drug seeking                  |                                   |
| “frequent flier—drug seeker, wants Valium—as family doctor can’t prescribe” |                                   |
| “patient drug seeking”        |                                   |
| Difficult historian           |                                   |
| “patient seeking prescription for Valium” |                                   |
| “difficult to obtain history” |                                   |
| “difficult historian”         |                                   |
| “information unreliable and difficult to obtain” |                                   |

(Continued)
suggests a rate of 330 assaults in a year based on staff recall.\[19\] This study suggests 98. Over-recall in Fernandes’s study and under-recording in the current study may provide upper and lower bounds to the actual number. Other potential sources of undercount include exclusion of individuals from participation due to severe mental illness, severe intoxication, or not appearing as scheduled as well as including individuals in a shelter based harm reduction program that aimed to improve behaviours. The results of the current study may not be generalizable to other jurisdictions, subgroups, such as women and youth not included in this study, and present circumstances due to the age of the data. Older and more recent studies of difficult behaviours during this time suggest that there has not been a change.\[7–10\] Some authors have suggested that difficult behaviours may increase as resources become more stretched.\[34\]

Intervention studies aimed at assisting those who are homeless especially those who are chronically homeless and heavy alcohol users should be a high priority. Approaches that reduce inappropriate and difficult emergency department visits, especially for those who are likely to present intoxicated, are needed. They are beginning to appear.\[12,35,36\] These studies however do not address or describe the impact of interventions on difficult behaviors. This study raises important topics for further research and program development, especially for vulnerable subgroups such as chronically homeless, alcohol-dependent men. These include the further evaluation and development of promising community and hospital-based interventions for those with severe problems related to heavy alcohol use, such as housing first, staff sensitivity and de-escalation skills training, compassionate care, harm reduction, and abstinence-based programs. These interventions may both reduce visits to the emergency department and rates of difficult behaviours.\[22,30,35–37\] Better understanding of staff, client, environmental, and care approach differences among emergency departments and within the community could also provide promising results.

Acknowledgments

This work was supported by grants from the Central East Health Information Partnership; the former City of Toronto Shelter, Housing and Support Division; Physician Services Incorporated; and St. Michael’s Hospital Research Department, as well as a post-doctoral fellowship from the Canadian Institutes for Health Research to Dr. Svoboda.

Author Contributions

Conceived and designed the experiments: TS. Analyzed the data: TS. Contributed reagents/materials/analysis tools: TS. Wrote the paper: TS.

Table 6. (Continued)

| Sample Behaviour Descriptions | More Severe Behaviour Descriptions |
|------------------------------|-----------------------------------|
| **Left against medical advice** | “patient left ‘AMA’” |
| “refused further assessment and walked out AMA” |
| “nurse started IV, patient pulled out IV and left AMA” |
| “left AMA, signed form” |
| **Left without being seen** | “LWBS” |
| “was not seen by doctor” |
| **Left before discharge** | “patient left before physical exam” |
| “Removed by security w/o being seen” |
| “no diagnosis, patient was uncooperative, threatening, etc. left early” |

doi:10.1371/journal.pone.0124528.t006
References

1. Hwang SW. Homelessness and health. Canadian Medical Association Journal. 2001; 164: 229–233. PMID: 11332321
2. Mandelberg JH, Kuhn RE, Kohn MA. Epidemiologic analysis of an urban, public emergency department’s frequent users. Academic Emergency Medicine. 2000; 7: 697–646. PMID: 10905642
3. Kushel MB, Vittinghoff E, Haas JS. Factors associated with the health care utilization of homeless persons. JAMA. 2001; 285: 200–206. PMID: 11176814
4. Lissauer T, Richman S, Tempia M, Jenkins S, Taylor B. Influence of homelessness on acute admissions to hospital 763. Archives of Disease in Childhood. 1993; 69: 423–429. PMID: 8259871
5. Padgett DK, Struening EL, Andrews H, Pittman J. Predictors of emergency room use by homeless adults in New York City: the influence of predisposing, enabling and need factors. Social Science & Medicine. 1995; 41: 547–56.
6. Pilossof-Gelb S, Mower WR, Ajaelo I, Yang SC. Psychosocial difficulties and emergency department use 451. Academic Emergency Medicine. 1997; 4: 589–92. PMID: 9189192
7. Mason K, Khandor E. The Street Health Report 2007 [Internet]. Toronto: Street Health; 2007 Sep. Available: c:\references\Street Health Report 2007.pdf
8. Ambrosio E, Crowe C, Hardill K. The Street Health Report [Internet]. 1992. Available: c:\References \The Street Health Report.pdf
9. Mayer D. Refusal of care and discharging “difficult” patients from the emergency department. Ann Emerg Med. 1990; 19: 1436–1446. PMID: 2240758
10. McNiel DE, Binder RL. Psychiatric emergency service use and homelessness, mental disorder, and violence. Psychiatr Serv. 2005; 56: 699–704. doi: 10.1176/appi.ps.56.6.699 PMID: 15939946
11. Giesbrecht NA, Giffen PJ, Lambert S, Oki G. Changes in the social control of skid row inebriates in Toronto: assessments by skid row informants. CanJPublic Health. 1981;Revue Canadienne de Sante Publique. 72: 101–104. PMID: 6165452
12. Thomquist L, Biros M, Olander R, Sterner S. Health care utilization of chronic inebriates. Academic Emergency Medicine. 2002; 9: 300–308. PMID: 11927454
13. Leonard EC. The treatment of Philadelphia inebriates. From temperance reform to “secret cure” 60. American Journal on Addictions. 1997; 6: 1–10. PMID: 9097866
14. Cox GB, Walker RD, Freng SA, Short BA, Meijer L, Gilchrist L. Outcome of a controlled trial of the effectiveness of intensive case management for chronic public inebriates. Journal of Studies on Alcohol. 1998; 59: 523–532. PMID: 9718154
15. Greene J. Serial Inebriate Programs: What to do About Homeless Alcoholics in the Emergency Department. Annals of Emergency Medicine. 2007; 49: 792–793.
16. Fulde GWO. The Homeless and the Emergency Department: a Special Relationship. The Medical Journal of Australia. 2003; 179: 651–652. PMID: 14636146
17. CLEGG and ASSOCIATES. Recommended Array of Services of Chronic Public Inebriates. Seattle, WA: Seattle-King County Department of Public Health; 1993.
18. Mahoney BS. The extent, nature, and response to victimization of emergency nurses in Pennsylvania. J Emerg Nurs. 1991; 17: 282–291; discussion 292–294. PMID: 1921065
19. Fernandes CMB, Bouthillette F, Raboud JM, Bullock L, Moore CF, Christenson JM, et al. Violence in the emergency department: a survey of health care workers. CMAJ. 1999; 161: 1245–1248. PMID: 10584084
20. Vardy J, Mansbridge C, Ireland A. Are emergency department staffs’ perceptions about the inappropriate use of ambulances, alcohol intoxication, verbal abuse and violence accurate? Emerg Med J. 2009; 26: 164–168. doi: 10.1136/emj.2007.056259 PMID: 19234002
21. James A, Madeley R, Dove A. Violence and aggression in the emergency department. Emerg Med J. 2006; 23: 431–434. doi: 10.1136/emj.2005.028621 PMID: 16714500
22. Svoboda Tj. Measuring the “Reduction” in a Harm Reduction Program for Homeless Men with Problems Related to Alcohol and Severe Mental Illness. University of Toronto. 2005.
23. Young D, Hooker D, Freeberg F. Informed consent documents: Increasing comprehension by reducing reading level. IRB. 1990; 12: 1–5. PMID: 11651265
24. Taub H, Baker M, Kline G, Sturr J. Comprehension of informed consent information by young-old through old-old volunteers. Exp Aging Res. 1987; 13: 173–178. PMID: 3505870
25. Taub HA, Baker MT, Kline G, Sturr J. Effect of repeated testing upon comprehension of informed consent materials by elderly volunteers. Exp Aging Res. 1983; 9: 135–138. PMID: 6641771
26. Tankanow R, Sweet B, Weiskopf J. Patients’ perceived understanding of informed consent in investigational drug studies. Am J Hosp Pharm. 1992; 49: 633–635. PMID: 1598945

27. Agresti A, Coull BA. Approximate Is Better than “Exact” for Interval Estimation of Binomial Proportions. The American Statistician. 1998; 52: 119–126. doi: 10.2307/2685469

28. Pane GA, Winiarski AM, Salness KA. Aggression directed toward emergency department staff at a university teaching hospital. Ann Emerg Med. 1991; 20: 283–286. PMID: 1996823

29. Crilly J, Chaboyer W, Creedy D. Violence towards emergency department nurses by patients. Accid Emerg Nurs. 2004; 12: 67–73. doi: 10.1016/j.aeen.2003.11.003 PMID: 15041007

30. Parker D. Housing as an Intervention on Hospital Use: Access among Chronically Homeless Persons with Disabilities. J Urban Health. 2010; 87: 912–919. doi: 10.1007/s11524-010-9504-y PMID: 21125341

31. Henson VL, Vickery DS. Patient self discharge from the emergency department: who is at risk? Emerg Med J. 2005; 22: 499–501. doi: 10.1136/emj.2003.005447 PMID: 15983086

32. Mohsin M, Forero R, Ieraci S, Bauman AE, Young L, Santiano N. A population follow-up study of patients who left an emergency department without being seen by a medical officer. Emerg Med J. 2007; 24: 175–179. doi: 10.1136/emj.2006.038679 PMID: 17351221

33. Goodacre S, Webster A. Who waits longest in the emergency department and who leaves without being seen? Emerg Med J. 2005; 22: 93–96. doi: 10.1136/emj.2003.007690 PMID: 15662055

34. Morrison LJ. Abuse of emergency department workers: an inherent career risk or a barometer of the evolving health care system? CMAJ. 1999; 161: 1262–1263. PMID: 10584087

35. Larimer ME, Malone DK, Garner MD, Atkins DC, Burlingham B, Lonczak HS, et al. Health care and public service use and costs before and after provision of housing for chronically homeless persons with severe alcohol problems. JAMA. 2009; 301: 1349–1357. doi: 10.1001/jama.2009.414 PMID: 19336710

36. Podymow T, Turnbull J, Coyle D, Yetisir E, Wells G, Podymow T, et al. Shelter-based managed alcohol administration to chronically homeless people addicted to alcohol.[see comment]. CMAJ Canadian Medical Association Journal. 2006; 174: 45–49. PMID: 16399236

37. Redelmeier DA, Molin JP, Tibshirani RJ. A randomised trial of compassionate care for the homeless in an emergency department [see comments] 568. Lancet. 1131; 345: 1131–4. PMID: 7723543