

Emergency Care for Homeless Patients: A French Multicenter Cohort Study

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Objectives. To determine whether homeless patients experience suboptimal care in the emergency department (ED) by the provision of fewer health care resources.

Methods. We conducted a prospective multicenter cohort study in 30 EDs in France. During 72 hours in March 2015, all homeless patients that visited the participating EDs were included in the study. The primary health care service measure was the order by the physician of a diagnostic investigation or provision of a treatment in the ED. Secondary measures of health care services included ED waiting time, number and type of investigations per patient, treatment in the ED, and discharge disposition.

Results. A total of 254 homeless patients and 254 nonhomeless patients were included. After excluding homeless patients that attended the ED for the sole purpose of housing, we analyzed 214 homeless and 214 nonhomeless. We found no significant difference between the 2 groups in terms of health care resource consumption, and for our secondary endpoints.

Conclusions. We did not find significant differences in the level of medical care delivered in French EDs to homeless patients compared with matched nonhomeless patients. (*Am J Public Health.* 2016;106:893–898. doi:10.2105/AJPH.2015.303038)

 See also Bharel, p. 784.

On any given night in the European Union, 400 000 people are homeless.^{1,2} In France, the total number of homeless people increased by 44% between 2001 and 2012.² These patients experience a high disease burden: it has been reported that there is a higher prevalence in the homeless population of various diseases such as mental illness, substance abuse, injuries, infectious diseases, and cardiovascular diseases than in the general population.^{1,3–7} Homeless patients seem to be admitted to hospital 10 to 15 years earlier than nonhomeless inpatients for the same diseases, and functional impairment occurs 20 years earlier than in nonhomeless patients.^{8–10} The all-cause mortality rate among homeless patients at any age is higher than in the general population, which in part is attributable to suicide and unintentional injuries.^{1,6,11,12}

Homeless patients often delay seeking medical care. Because they have difficulties in accessing health care, they have a lower rate of access to primary care than the general

population.^{13,14} Their delayed health care can be attributed to a lack of medical insurance coverage, transportation barriers, or competing priorities (such as looking for food or shelter).¹⁵ However, homelessness is reported to be an independent risk factor for emergency department (ED) attendance and those patients are more likely to return to the ED after hospitalization.^{14,16–20} These ED frequent users are seen as prone to difficult behavior and little

compliance to treatment.^{15,21} Some studies have shown that care providers may feel that homeless patients do not receive standard ED care.^{22–24}

Even though homeless patients are often frequent ED users, there is scarce literature on health care resource consumption from homeless people in the ED, especially in Europe. As it has been described in other frail populations (such as older patients^{25,26}), we tested the hypothesis that homeless patients experience suboptimal care, by the provision of fewer health care resources.

METHODS

This was a prospective multicenter cohort study in 30 EDs in France. Our sample of EDs comprises both urban and rural centers, with an annual ED census ranging from 30 000 to 100 000 visits in 2014. We prospectively included homeless patients for a 72-hour period in March 2015, and recruited a matched nonhomeless patient for each included homeless. As this study was observational, our institutional review board approved the study and waived the need for written informed consent. We followed the STROBE recommendations for reporting observational cohort studies.²⁷

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Selection of Participants

During the inclusion period, a local investigator in each participating ED screened the ED to recruit any homeless patient that was present during these consecutive 72 hours. We defined a homeless patient as a person that currently lives on the street or in a shelter. For each included homeless patient, we recruited a nonhomeless patient matched on their gender, severity level at triage, and age. Selection was done by the local investigator who selected the subsequent patient that visited the ED with the same triage severity scale (on a 1 to 4 scale), same gender, and similar age (± 10 years).

We excluded patients younger than 18 years, pregnant, or incarcerated. We retrieved all demographic data and medical history of recruited patients, physiological parameters measured at triage, and their past visits to the ED. To evaluate resource consumption, we collected the following data related to their ED stay: presence of clinical examination by a physician, radiological examination, laboratory test, electrocardiogram, specialist consultation, and treatment in the ED. We also collected their waiting time to see a physician and ED length of stay (LOS). We followed them until hospital discharge and collected data on their hospital stay and discharge disposition.

Outcome and Endpoints

Our primary objective was to study the level of care provided to homeless patients compared with that provided to nonhomeless patients. Our primary endpoint was the order by the emergency physician of any diagnostic test or provision of any treatment in the ED. Diagnostic tests included laboratory tests, radiographs, ultrasonography, computerized tomography, magnetic resonance imaging, and specialist consultation (surgical, medical, psychiatric). Treatment in the ED was categorized as pharmacological (oral, intramuscular, or intravenous, including fluids) or other nonpharmacological (namely splint, cast, or suture). We did not include electrocardiogram as a diagnostic test, as it is often ordered and performed by the triage nurse.

Our secondary endpoints included number and types of diagnostic tests in the ED, treatment, waiting time in the ED, LOS in the ED, LOS in the hospital, and discharge

disposition. As we studied resource consumption in homeless patients seeking care in the ED, we removed from the analysis all patients that attended the ED for housing only and did not have any medical complaints. Such patients are often registered in the ED system, and in our organization are sometimes allowed to spend the night in the ED to rest.

Statistical Analysis

Continuous data are expressed as mean (SD) if normally distributed or median (25–75 interquartile range [IQR]). Categorical data are reported as number and percentage. We tested normality with the Kolmogorov–Smirnov test. We performed comparisons between homeless and nonhomeless by using paired student *t* test or paired rank Wilcoxon test for continuous data, with determination of the mean difference and its 95% confidence interval (CI). For categorical variables, we calculated odds ratios (ORs) between homeless and nonhomeless with their 95% CIs. All comparisons were 2-tailed, and a *P* value less than .05 was required to reject the null hypothesis. We performed statistical analyses with NCSS version 7.0 (Statistical Solution Ltd, Cork, Ireland).

To be clinically significant, we estimated that the difference in proportion of patients with one of the primary endpoints (treatment or investigation in the ED) should be no less than 15%. With a β of 80% and an α of 5%, 171 patients in each group were required. We estimated from preliminary analysis in 2 centers (Pitié-Salpêtrière and Hôpital Européen Georges-Pompidou) that a target of 10 homeless (and 10 nonhomeless) patients per center for 72 hours was realistic. As we were unaware of the primary endpoint rates and the final number of patients that would be included in the analysis, we planned a retrospective power analysis. We performed sample size and power calculation with PASS version 15 (Statistical Solution Ltd, Cork, Ireland).

RESULTS

A total of 30 EDs participated in the study and included 254 homeless patients and 254 nonhomeless patients. Recruitment in each center varied from 0 to 34 homeless patients in

the 72-hour period of the study, with a median of 6 homeless patients included per center. After exclusion of homeless patients that attended the ED for the sole purpose of night housing, we included 428 patients: 214 homeless and 214 matched nonhomeless patients.

The mean age of the sample was 43 years (SD = 13), and 89% of them were male. Roughly a third of the included homeless people had been living on the street for less than 2 months, another third for longer than 2 months, and the remainder lived in a shelter as reported in Table 1. Less than half of them were French; however, 77% spoke and understood the French language. Of those, 44% had basic health insurance coverage, and less than 10% of them had supplemental coverage.

Baseline characteristics, demographics, physiological parameters, and health history are summarized in Table 2. Vitals on admission were similar between the 2 groups with the exception of core temperature, which was statistically but not clinically significantly lower in homeless patients compared with others (36.3°C vs 36.6°C; median difference -0.3 ; 95% CI = $-0.43, -0.08$). Chief complaints were similar in each group except for alcohol intoxication, which was more frequent in homeless patients than in others (20.6% vs 3.8%; OR = 6.57; 95% CI = 3.01, 14.30), and pain, which was less frequent in homeless patients (6.6% vs 16.6%; OR = 0.35; 95% CI = 0.18, 0.68). Past medical history differed between the 2 groups as reported in Table 1. Of note, homeless patients were more likely to have suffered from chronic alcohol intake, drug abuse, and neuropsychiatric comorbidities. Homeless patients were more likely to have a return visit to the ED: 30% versus 9.3% were admitted in the same ED in the past 28 days (OR = 4.18; 95% CI = 2.39, 7.31).

After exclusion of missing data for the primary endpoint, we analyzed 211 homeless patients and 211 nonhomeless patients and reported their level of care and resource consumption in Table 2. We report no significant difference in our primary endpoint between homeless and nonhomeless patients: diagnostic investigations and treatment in the ED were ordered for 62.1% and 53.5% of homeless patients, versus 66.8% and 46.9%, respectively, for others (with a respective OR of 0.81; 95% CI = 0.55, 1.21 and 1.14; 95%

TABLE 1—Demographic Data and Attendance to the Emergency Department in France: 2015

Variable	No.	Nonhomeless (n = 214), No. (%) or Mean \pm SD	Homeless (n = 214), No. (%) or Mean \pm SD
Age, y	426	43 \pm 14	43 \pm 13
Male gender	428	191 (89)	191 (89)
Citizenship	395		
French		154 (80)	92 (46)
European non-French		8 (4)	47 (23)
Non-European		32 (17)	61 (30)
Speaks French	410	199 (98)	160 (77)
Lives on the street	212		137 (65)
For > 2 mo			74 (35)
Lives in shelter			70 (34)
Admission to ED	418		
Via ambulance		132 (64)	90 (43)
Via medicalized EMS		4 (2)	4 (2)
Severity triage			
1 (more severe)		3 (1)	4 (2)
2		27 (13)	24 (11)
3		91 (43)	86 (41)
4 (less severe)		92 (43)	97 (46)

Note. ED = emergency department; EMS = emergency medical service.

CI = 0.94, 1.38). Overall, all types of treatment and studies were ordered at a similar frequency, as shown in Table 3. Waiting time was similar, with a median of 57 minutes in both groups, and a mean difference of 5 minutes (95% CI = -12, 20). The retrospective analysis showed that our study has a power of 87% and 84% to detect a 15% difference in the rate of diagnostic testing and the rate of treatment in the ED.

We report no significant difference in discharge disposition, with respectively 75.6% and 81.2% of homeless and nonhomeless patients that were discharged from the ED, and 1% admitted into an intensive care unit in both groups. Length of stay in the hospital among admitted patients was similar: 3 days (IQR = 1–5) for homeless patients versus 2 days (IQR = 1–8) for others. The only clinically and statistically significant difference we noted is a greater LOS in the ED for homeless patients (5.1 hours [IQR = 1.9–8.3] vs 3.3 hours [IQR = 1.7–5.1]).

DISCUSSION

In this prospective, multicenter, cohort study, we recruited 254 homeless patients

and 254 matched nonhomeless patients. Our results suggest that homeless patients visiting the ED do not experience suboptimal care compared with their nonhomeless counterparts.

Our primary endpoint was the level of care provided while visiting the ED, illustrated by the number of diagnostic studies and treatments ordered.²⁸ Homeless patients did not undergo fewer investigations, did not receive fewer treatments, and did not undergo fewer specialized consultations compared with other patients. Our results showed that homeless patients did not wait longer before being clinically assessed, and had similar discharge dispositions. The only significant difference we observed in care provision was the LOS in the ED, which was more than 50% longer in homeless patients.

Despite a certain literature regarding homeless global health, their high morbidity, and overall mortality rate, details concerning care provision to homeless patients visiting the ED received only limited research attention. Several epidemiological studies have investigated the homeless population consulting in the ED but, to our knowledge, no study has ever assessed the detailed care

provided to homeless patients during their ED visit. One retrospective cohort study of 300 homeless patients in an American urban safety-net hospital estimated the benefit of emergency treatment, discharge disposition, and LOS.⁴ The authors found that the level of benefit from ED treatment was comparable but they reported a lower hospitalization rate for homeless patients. Consistent with our results, the authors reported a longer LOS in the ED compared with nonhomeless patients (4.4 vs 3.8 hours). Another large analysis of the ED subset of the National Hospital Ambulatory Medical Care Survey in the US homeless population reported a longer LOS for homeless patients than for those from the general population.^{29,30} Similar results have previously been reported outside the ED, with a longer LOS for homeless patients when admitted to acute-care medical and surgical wards or intensive care units.^{1,31,32}

The consistently reported longer LOS in the ED may be associated with their housing problems. Indeed, a proportion of homeless patients are living in the streets or in shelters that close their doors during the nights, and these patients may feel the need to stay overnight to rest and avoid risk of assault or other injury outside. Aside from their medical needs, homeless patients are motivated by nonmedical needs such as finding food, shelter, or safety, all of which are reasons that could delay their discharge once the acute medical problem has already been answered.¹⁵ It is not uncommon in our system that homeless patients are allowed to spend the night in the ED, even though they present with no medical issue.

In our study, the homeless patients were mainly young men and half of them were from foreign countries. They rarely attended the ED for urgent or emergent reasons. Their chief complaints were similar to those of nonhomeless patients except that they expressed less pain and were more often intoxicated with alcohol. These results are consistent with results reported through other studies.^{1,3,4,9,13,14,29} In our study, roughly 50% of our homeless population is uninsured. The uninsured rate among homeless patients that has been reported in European or American studies varies from 25% to 50%.^{3,4,9,13,16} Details concerning our homeless population are similar to those

TABLE 2—Baseline Characteristics of Homeless and Nonhomeless Emergency Department Patients in France: 2015

Characteristics	Nonhomeless (n = 214), No. (%), Mean \pm SD, or Median (Range)	Homeless (n = 214), No. (%), Mean \pm SD, or Median (Range)	OR or Mean Difference (95% CI)
Vitals on admission (n = 418)			
Temperature, °C	36.6 \pm 0.7	36.3 \pm 1	-0.3 (-0.43, -0.08)
Systolic BP, mm Hg	134 \pm 22	131 \pm 22	-3.9 (-8.40, 0.51)
Diastolic BP, mm Hg	82 \pm 14	81 \pm 14	-1.6 (-4.25, 1.86)
Heart rate	85 \pm 17	89 \pm 16	3.7 (0.03, 7.35)
Oxygen saturation	98 (97-99)	98 (96-99)	-0.3 (-0.71, 0.10)
GCS	15 (15-15)	15 (15-15)	-0.06 (-1.5, 0.03)
GCS < 15	6 (2.8)	13 (6.1)	2.43 (0.91, 6.43)
Chief complaint (n = 425)			
Alcohol intoxication	8 (3.8)	44 (20.6)	6.57 (3.01, 14.30)
Fatigue, difficulty coping	2 (1.0)	9 (4.2)	4.59 (0.98, 21.50)
Wound, trauma	58 (27.5)	45 (21.0)	0.70 (0.45, 1.10)
Fever	6 (2.8)	4 (1.9)	0.65 (0.18, 2.34)
Neurological	17 (8.1)	21 (9.8)	1.24 (0.64, 2.43)
Cardiac or respiratory	27 (12.8)	21 (9.8)	0.74 (0.40, 1.36)
Abdominal	24 (11.4)	16 (7.5)	0.63 (0.32, 1.22)
Dermatological	3 (1.4)	9 (4.2)	3.04 (0.81, 11.40)
Pain	35 (16.6)	14 (6.6)	0.35 (0.18, 0.68)
Psychiatric	7 (3.3)	7 (3.3)	0.99 (0.34, 2.86)
Other	27 (12.8)	30 (14.0)	1.11 (0.64, 1.94)
Past medical history (n = 414)			
None	85 (41.4)	47 (22.5)	0.41 (0.27, 0.63)
Chronic alcohol intake	13 (6.3)	99 (47.4)	13.29 (7.12, 24.81)
IV drug user	3 (1.5)	19 (9.1)	6.73 (1.96, 23.12)
Neurological	12 (5.8)	37 (17.8)	3.46 (1.75, 6.85)
Hepatological	2 (1.0)	10 (4.8)	5.10 (1.10, 23.57)
Infectious disease	13 (6.3)	24 (11.5)	1.92 (0.95, 3.88)
Cardiovascular	37 (18.0)	26 (12.4)	0.65 (0.37, 1.11)
Respiratory	11 (5.4)	16 (7.7)	1.46 (0.66, 3.23)
Diabetes mellitus	32 (15.6)	22 (10.5)	0.64 (0.36, 1.14)
Psychiatric	24 (11.9)	47 (22.5)	2.19 (1.28, 3.74)
Other	26 (12.7)	16 (7.7)	0.57 (0.30, 1.10)
No. ED visits past 28 d (n = 404)			
Number	0 (0-0)	0 (0-1)	0.8 (0.48, 1.12)
≥ 1 visit	19 (9.3)	61 (30.0)	4.18 (2.39, 7.31)

Note. BP = blood pressure; CI = confidence interval; ED = emergency department; GCS = Glasgow coma scale; IQR = interquartile range; IV = intravenous; OR = odds ratio. The total sample size was n = 428.

found in other studies concerning homeless populations visiting the ED. Homeless patients attend the ED more than once in a short period of time. They present with a history of mental illness, drug or alcohol intoxication, and neurological impairment. Their chief complaints are often alcohol intoxication or traumatic injuries.^{1,4,13,16,29,30,32} Not all of our homeless patients live on the streets (34% live in a shelter). These results are consistent

with those found by other studies held in EDs.^{1,33,34} Conversely, a French study concerning a homeless population nationwide asserted that 2 out of 5 homeless persons are women.² This ratio is not consistent with the gender proportion we report (89% men) or in literature concerning homeless patients in the ED. Thus, it would be interesting to understand the health care use of this feminine proportion of homeless as they

do not seem to use the ED like their male counterparts.³⁵

Finally, we noticed that in our study homeless patients presented less frequently with a chief complaint of pain than nonhomeless patients. There has not been any study assessing pain evaluation in the ED in homeless patients. The reasons that can explain this discrepancy may be related to the higher rate of alcohol intoxication among homeless patients, described in our study and elsewhere,³⁶ or differences in subjective sensitivity to pain.³⁵ We can also suggest that health care providers (triage nurse, physicians) are less likely to assess the level of pain of this population, as it has been demonstrated in other frail populations.^{25,35,37}

This study involved several limitations. First, our sample size calculation was based on 2 primary measures, from which we had no a priori estimation. We aimed to recruit 300 per group, but achieved only 211 per group in the final analysis. Although the retrospective calculated power was around 85%, our sample may be too small to detect differences and our results may suffer from a β error. However, our report suggests that if such statistically significant differences do exist, they would be of limited clinical significance.

Second, most ED physicians were aware of the study. They may have changed their habits and standard of care for this studied population. Thus, we cannot rule out the hypothesis that a Hawthorne effect may have biased our results, although emergency physicians were not aware of our primary endpoint.

Third, even though we matched our homeless to other patients on their age, gender, and severity level, their clinical presentation to the ED was slightly different. Homeless patients presented with more comorbidities, and with different chief complaints. The absence of difference of health care consumption may be a difference in the type or quality of care provided, especially if our included homeless patients were in fact more ill than their matched nonhomeless patients. Moreover, homeless patients could have been undertriaged, biasing their matching.

Finally, we assessed quality of care only through the provision of health care resources (diagnostic test and treatment). Homeless patients may have suffered from suboptimal

TABLE 3—Types of Treatment and Studies Among Homeless and Nonhomeless Emergency Department Patients in France: 2015

Variable	Nonhomeless (n = 211), No. (%) or Median (IQR)	Homeless (n = 211), No. (%) or Median (IQR)	OR or Mean Difference (95% CI)
Clinical examination	199 (94.4)	194 (92.0)	0.69 (0.32, 1.48)
Any diagnostic investigation	141 (66.8)	131 (62.1)	0.81 (0.55, 1.21)
Radiological examination			
Any	89 (42.2)	70 (33.2)	0.68 (0.46, 1.01)
X-ray or ultrasonography	73 (34.6)	55 (26.1)	
CT scan or MRI	29 (13.8)	22 (10.5)	
Biology	86 (40.8)	80 (37.5)	0.87 (0.59, 1.29)
ECG	53 (25.1)	54 (25.6)	1.03 (0.66, 1.59)
Specialty consultation			
Any	61 (29.4)	51 (24.2)	0.77 (0.50, 1.19)
Medical	29 (13.7)	22 (10.4)	
Surgical	23 (11.1)	7 (3.3)	
Psychiatric	11 (5.2)	11 (5.2)	
Treatment in ED			
Any	99 (46.9)	113 (53.5)	1.14 (0.94, 1.38)
Oral	53 (25.1)	55 (26.1)	
IM or IV	48 (22.7)	67 (31.7)	
Waiting time in ED, min (n = 408)	57 (27–104)	57 (29–115)	−4.9 (−11.9, 20.1)
Length of stay in ED, h	3.3 (1.7–5.1)	5.1 (1.9–8.3)	1.9 (0.77, 3.10)
Discharged from ED (n = 422)	173 (81.2)	161 (75.6)	0.72 (0.45, 1.14)
ICU admission	2 (0.9)	2 (0.9)	1 (0.14, 7.17)
Length of stay in hospital, days <i>in admitted patients</i>	2 (1–8)	3 (1–5)	

Note. CI = confidence interval; CT = computerized tomography; ECG = electrocardiogram; ED = emergency department; IM = intramuscular; IQR = interquartile range; IV = intravenous; MRI = magnetic resonance imaging; OR = odds ratio. The total sample size was n = 422.

care from different paths, such as time to treatment, level of analgesia, or other recommended treatment of specific pathologies.

In summary, we did not find significant differences in the level of medical care delivered in French EDs to homeless patients compared with nonhomeless patients. Resource consumption was similar for both groups, as were the waiting time and admission rate. We report that homeless patients visit the ED more often for an alcohol-related complaint, are often uninsured, and have higher rates of return visit. *AJPH*

CONTRIBUTORS

A.-L. Feral-Piessens, A. Aubry, and Y. Freund originated the study. P. Juvin, B. Riou, and L.-M. Joly provided methodology expertise. A. Aubry, J. Truchot, P.-A. Raynal, M. Boiffier, A. Hutin, and A. Leleu included patients. G. Debruyne and Y. Freund provided statistical analysis. Y. Freund and A.-L. Feral-Piessens interpreted the results and drafted the article. B. Riou, L. M. Joly, and

P. Juvin provided substantial revisions. All authors approved the final article. Y. Freund and A.-L. Feral-Piessens are responsible for the article as a whole.

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HUMAN PARTICIPANT PROTECTION

This study has been approved by our institutional review board—Comite de protection des personnes, Paris Ile de France 6 (December 18, 2014), and by Comite consultatif sur le traitement de l'information en matière de recherche dans le domaine de la santé, Dossier 15.132.

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