

Clinical characteristics, attendance outcomes and deaths of homeless persons in the emergency department

Paudyal, V.; Ghani, A.; Shafi, T.; Punj, E.; Saunders, K.; Vohra, N.; Hughes, H.e.; Elliot, A.j.; Lowrie, R.; Pucci, M.

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1 **Clinical characteristics, attendance outcomes and deaths of homeless**
2 **persons in the emergency department: implications for primary healthcare**
3 **and community prevention programmes**

4
5 **Abstract**

6
7 **Objective**

8 Persons experiencing homelessness (PEH) are known to be often excluded from
9 primary healthcare and community prevention programmes leading to high use of
10 hospital Emergency Departments (EDs). This study aimed to identify demographic
11 features, clinical characteristics, and attendance outcomes of PEH presenting to ED.

12
13 **Study design**

14 Analysis of routinely collected dataset

15
16 **Method**

17 Clinical presentations and drug prescription data of PEH who presented a major ED in
18 the West Midlands region of England from 2014-2019 were extracted and analysed
19 using descriptive and inferential statistics.

20
21 **Results**

22 During the study period 3,271 out of 596,198 presentations were made by PEH; 74%
23 PEH attendees were male. Drug and alcohol-related conditions, as well as pain and
24 injury constituted the most frequent reasons for presentation, contributing to over
25 half of all presentations. A significantly higher proportion of males (n=481, 20.3%)
26 presented with drug and alcohol problems compared to females (n=93, 11.2%)
27 (p=<0.001). However, pain was the primary reason for presentation for twice as
28 many female patients (n=189, 22.8%) compared to males (n=305, 12.9%)
29 (p<0.001). Nearly one in five left ED before being assessed and a total of 39 patients
30 (1.2%) died in the ED and 785 (24.0%) required in-patient admissions to the same
31 hospital.

32
33 **Conclusions**

34 Drug, alcohol and pain including the need of opioid analgesics constituted the majority
35 of presentations made by PEH in ED. The observed rate of death of PEH in ED is 12
36 times higher than the general population. A very high proportion of PEH also leave ED
37 before being treated. Future research should focus on strengthening community
38 interventions, particularly to improve access to those at risk of dual diagnoses of
39 substance misuse and mental health problems. Interventions involving multi-sector

40 collaborations are needed to improve seamless discharge from ED and minimise
41 repeat attendance. Gender differences in the nature of presentations and ED
42 outcomes needs to be investigated further.

43
44 **Keywords:** Drug abuse, emergency department, emergency department utilisation,
45 mental health, homelessness

46
47

48 **Clinical characteristics, attendance outcomes and deaths of homeless**
49 **persons in the emergency department: implications for primary healthcare**
50 **and community prevention programmes**

51

52 **Background**

53 Homelessness can be defined as a situation where an individual does not have a
54 secure or safe place of residence. This may include residents of homeless shelters,
55 temporary accommodations such as bed and breakfasts, hostels, squats; rough
56 sleepers or those sofa surfing between family and friends' houses.¹ It also includes a
57 persons who are in accommodation but not able to 'reasonably occupy' it such as due
58 to the threat of violence.² Homelessness is a widespread issue in the United Kingdom
59 (UK).³ In recent years, there has been a sharp rise in the number of people sleeping
60 rough.^{3,4} Persons experiencing homelessness (PEH) face severe and multiple
61 disadvantages. They are 12 times more likely to die prematurely than the general
62 population⁵ with cardiovascular health conditions, drug overdose and accidents
63 contributing to their higher mortality. Health status worsens with the length of time
64 spent as homeless.⁶ The negative health consequences of social exclusion are noted to
65 be greater in female than male PEH with average age of death of PEH in England
66 reported to be 43.4 (female) and 45.9 (male) years.⁷

67

68 Engaging PEH in research and identifying healthcare needs including the need for
69 emergency healthcare is often challenging. Surveys provide limited information due to
70 missing data from the non-respondents, small sample size of the survey population
71 and lack of reliability of the self-reported data. In addition, homeless populations are
72 also known to have very limited coverage in routine health surveys. Healthcare
73 utilisation data can hence be a useful source of information to explore healthcare
74 needs of this population .

75

76 Homelessness is independently associated with high emergency care utilisation;
77 higher rates of presentations to the emergency department (ED) are often linked to
78 their multiple complex needs and the barriers in accessing primary healthcare and
79 substance misuse services.^{8,9} Findings from recent studies^{10,11} show that PEH face
80 system-related barriers such as difficulty in registering with a general practice; lack of
81 integration of services including suboptimal communications and transition of care
82 across services; and patient-related barriers such as lack of knowledge and awareness
83 of primary healthcare services, inadequate skills and health literacy. They are also
84 known to face negative experiences when accessing primary healthcare services such
85 as perceived stigma, thereby preferring to use ED. Many patients are often denied

86 access to primary care due to their no-fixed abode status, contrary to existing
87 guidelines.¹⁰

88
89 There is a lack of research, particularly in the UK that investigate clinical reasons for
90 which PEH present to ED. Available literature have focused on risk factors that lead to
91 higher ED utilisation amongst ED.^{8,9} One previous study conducted within the UK
92 sought to determine how seasonal weather variations affect the rate of attendance of
93 homeless persons in the ED.¹² International literature often shows wide variations in
94 relation to the reasons why PEH present to ED. Such variations may be attributable to
95 diverse study aims. Published studies often tend to focus on presentations in specific
96 clinical areas such as substance and alcohol misuse, mental health,^{13,14} and injuries.¹⁵
97

98 Investigating clinical reasons for ED presentations is important to inform appropriate
99 preventive and public health services in the community and primary care, thereby
100 enabling health services providers and commissioners to minimise ED presentations in
101 PEH. This study aimed to identify demographic features, clinical characteristics, and
102 outcomes in relation to ED attendance made by PEH.

103 104 **Methods**

105 The study was conducted at a Type 1 ED, i.e. a consultant-led 24 hour service with
106 full resuscitation facilities and designated accommodation for the reception of ED in
107 the West Midlands region of England. The study setting is also a designated trauma
108 centre. The ED is located in an urban area and receives approximately 120,000
109 attendances per year. Data from all patients who presented to the ED between
110 01/05/2014 and 30/04/2019, and who were assigned a specific demographic code for
111 'no-fixed-abode', i.e. homelessness were included. In addition to those presenting
112 with no fixed abode, the codes can also be assigned by ED staff when patients refer
113 their domicile as temporary homeless shelters, homelessness health service, sofa
114 surfing or any other forms of homelessness. Data on demographic characteristics,
115 presenting conditions, attendance outcomes and medicines administered during ED
116 stay and to-take-out (TTO) were extracted and anonymised by clinical staff with
117 routine access to clinical records before handing over to the research team.

118 Attendance outcomes enables the identification of how an ED attendance concluded
119 such as further admission to a hospital bed, discharge from ED to patient home or
120 death.

121
122 Presenting conditions were clinically re-coded into a smaller number of categories
123 (electronic supplemental material 1). For example, all pain-related conditions were

124 coded into a single 'pain' category. Ethnicity data were similarly re-coded. All
125 prescription items including ED administered and to-take-out medicines (TTOs) were
126 coded as per British National Formulary (BNF)¹⁶ chapters. BNF is a joint publication of
127 the British Medical Association and the Royal Pharmaceutical Society and is intended
128 to be a rapid reference source of drugs used in the NHS for all healthcare
129 professionals.¹⁶ Drugs are listed as per body systems such as the respiratory and
130 central nervous systems. Data were independently checked for accuracy by two
131 researchers (AG and TS). Both descriptive and inferential statistics were calculated
132 using Microsoft Excel and SPSS v21. Comparison of data across arrival mode, referral
133 source and presenting conditions across gender categories were conducted using Chi-
134 square statistics.. P values ≤ 0.05 were considered significant.

135
136 A national multi-disciplinary stakeholder event was conducted in West Midlands, UK in
137 2018 by the study researchers prior to undertaking this study.¹⁷ Determining unmet
138 healthcare needs amongst PEH using routinely collected data such as those in the ED
139 was identified as one of the priority research areas by the stakeholders who
140 participated in the workshop.

141
142 This study was reviewed and approved by the Ethics Review Panel, University of XXX
143 (2019-35). XXX NHS Foundations Trust classified and approved this study as an audit
144 (CARMS-15434) and further NHS Ethical approval was not required.

145

146 **Results**

147 Total attendance

148 A total of 596,198 ED presentations were recorded at the study site during the five
149 year study period. Of these, 3271 (0.55%) were identified to have been made by
150 PEH. Anonymised data relating to PEH attendances were then extracted and subjected
151 to further analyses.

152

153 Demography characteristics

154 The majority of PEH were male, representing 74% (n=2372) of all PEH attendances.
155 The mean age of patients was 39 (standard deviation: 13.5) years (table 1). Ethnicity
156 was not recorded in a third of the cases (32.9%). Excluding the cases with no records
157 of ethnicity, 79.5% (1685 out of 2119) of attendances were made by patients of
158 'White' ethnicity. Median time spent within the ED was 184 minutes (interquartile
159 range 121-236 minutes). A total of 2,647 (80.9%) attendees were seen within four
160 hours (240 minutes) or less.

161

162 Referral sources and arrival modes

163 Approximately four in five attendees (n=2557, 79.9%) referred themselves to the ED.
164 Referral through primary care/ general practitioner (GP) was low (n=28, 0.008%)
165 (figure 1).

166
167 The majority of the patients (n=2109, 65.9%) arrived at the ED via emergency
168 services, e.g. ambulance. Significantly more male patients (n=1672, 70.5%) used
169 emergency services compared to females (n=437 52.7%), (p<0.001) (table 2).
170 Significantly more males were brought in by law enforcement agencies, i.e. police
171 officers, compared to females (4.1% vs 1.9%, p<0.001).

172

173

174 Clinical reasons for presentation

175 The most common presenting conditions were related to drug, alcohol or overdose
176 (18.3%, n= 598), followed by pain (n=497, 15.2%), injury (n=431, n=13.2%) and
177 trauma (n= 362, 11.1%). These presentations constituted over half (57.7%, n=1526)
178 of all attendances (table 3).

179

180 The presenting conditions differed significantly across the gender categories. For
181 example, a significantly higher proportion of males (n=481, 20.3%) attended with
182 drug and alcohol-related problems compared to females (n=93, 11.2%) (p=<0.001).
183 However, pain was the primary reason for presentation for twice as many female
184 attendances (n=189, 22.8%) compared to male (n=305, 12.9%) (p<0.001).
185 Presentations such as injury and trauma were more prevalent in male patients
186 compared to the females (table 3). Presentation for psychiatric and behavioural
187 problems as well as for infection, wound/abscesses and respiratory problems each
188 constituted less than 3% of all attendances (table 3).

189

190 Drugs prescribed

191 A total of 636 (19.4%) attendances required drugs to be administered during their
192 stay in the ED (2239 items) and 356 (10.8%) consultations resulted in TTO
193 prescriptions (1866 items). In total, 172 patients required administration of five or
194 more items in the ED. Similarly, 167 patients were discharged with five or more
195 different TTO prescriptions.

196

197 Commonly prescribed drugs for both ED administration and TTO included analgesics
198 such as paracetamol and opioids such as codeine, morphine and methadone (table 4).
199 The BNF chapter 'central nervous system' (CNS) constituted the highest number of

200 drugs administered in ED and TTOs (figure 2). These included analgesics, anti-emetics
201 and drugs to treat epilepsy and anxiety. This was followed by BNF chapters 'blood and
202 nutrition' and 'infection' respectively. For prescription drugs administered during ED
203 stay, a total of 5 items out of the top 15 (33.0%) related to analgesia. For the TTO
204 prescriptions, 3 out of the 15 items (20%) related to analgesia.

205

206 Outcomes of ED attendance

207 A total of 18.4% patients left the ED before being assessed (figure 3). The majority of
208 the patients (n=1791, 54.8%) were discharged to healthcare beyond ED such as
209 through inpatient admissions and transfer to another hospital. A total of 39 patients
210 (1.2%) died in the ED including 26 males and 9 females. The majority of patients who
211 died in the ED primarily presented with trauma (n=21, 53.8%) followed by other
212 conditions noted as 'medical alert' (n=15, n=38.5%), cardiovascular disorders (n=2,
213 5.1%) and pain (n=1, 2.6%). All were brought by emergency services to the ED.

214

215 Discussion

216 This study aimed to identify the demographic characteristics and clinical reasons for
217 all visits made by PEH over a 5-year period at a major ED in the West Midlands. This
218 study shows that drug and alcohol-related conditions, as well as pain including the
219 need for opioid analgesics and injury constituted the most frequent reasons for
220 presentation of PEH to the ED. Triangulation of prescription data for both ED
221 administered and TTO prescriptions also confirmed these findings. Our findings are in
222 line with the systematic reviews of international literature⁵ and the data from the
223 Office of National Statistics⁷ which show that drug and alcohol-related deaths most
224 commonly contribute to the mortality in PEH.

225

226 There is substantial literature on the linkage between homelessness and substance
227 and/or alcohol dependence; these issues are cited as both cause and consequences of
228 homelessness.^{5,7,31} This study demonstrates that these problems contribute to
229 homeless persons' most frequent reasons for utilisation of emergency healthcare.
230 Although the presentations due to other health conditions, such as respiratory and
231 cardiovascular health conditions, were lower compared to substance/alcohol
232 dependence, it is important to note that the homeless and socioeconomically
233 disadvantaged populations experience higher mortality rates attributed to respiratory
234 and cardiovascular health conditions, compared to the general population.¹⁸

235

236 The proportion of PEH who died in the ED was approximately 12 times higher than in
237 the general population (1.2% vs 0.1%¹⁹ respectively). A recent systematic review has

238 suggested that homeless persons have 12 times higher early mortality rate compared
239 to the general population.⁵ Our study demonstrates similar extent of inequality in the
240 mortality data in healthcare setting. Comparison of the study dataset with the
241 national datasets of general populations ED attendance in England also suggests that
242 were more likely to be admitted to the same hospital provider following presentation
243 in the ED (24.0% vs 19.1%¹⁹ respectively).

244

245 Strengths and limitations

246 A large sample size was used enhancing the transferability of the findings to other
247 settings. The proportion of people who were identified and coded as 'homeless'
248 accounted for 0.55% of all ED attendances during the study period. This is in line with
249 the best available estimate of the number of homeless persons in England relative to
250 the population size as per 2019 estimates (280,000 homeless persons in 55.98 million
251 (0.5%).²⁰ However, it is important to note that homeless persons who reside in
252 temporary shelters such as emergency accommodation, hostels or charity services
253 may use corresponding addresses and postcodes when presenting to the ED.

254 Therefore practices to record homelessness in EDs may vary across hospitals. It is
255 likely that rough sleepers are more commonly identified as PEH in the medical records
256 compared to patients experiencing other forms of homelessness. Many patients may
257 also be using the postcode of their last permanent domicile when presenting to health
258 services. It is therefore highly likely that the numbers presented here are an
259 underestimation of the actual number of attendances made by homeless persons.

260 Previous literature suggests that refusal of GP/dentist registration is often associated
261 with repeat ED attendance.²¹ We were not able to investigate repeat attendance by
262 PEH given the anonymization of the data and hence the dataset may represent repeat
263 attendance by same PEH. The study setting was a specialist trauma centre. Therefore
264 the observed adverse outcomes, especially the higher incidence of deaths amongst
265 PEH is likely to have been influenced by the nature of the study setting.

266

267 Implications for practice

268 This study has emphasised the continued need to diversify the provision of mental
269 health and substance misuse related support in the community. Prevention measures
270 needs to be further strengthened to address the health inequalities faced by this
271 population. In particular, under-treatment of substance misuse in the community,
272 unsuitable opening hours for PEH, fragmentation of service are key issues that PEH
273 experience when presenting to the services.¹⁰ Previous research demonstrates
274 effectiveness of integrated models of care around reduction in substance misuse,
275 quality of life and mental health improvement, greater motivation to uptake treatment

276 in relation to integrated models of management.²²⁻²⁴ In addition, clinical guidelines for
277 substance misuse and mental health need to be further inclusive to dual diagnosis as
278 well as social and community cause and consequences such as homelessness.²⁵

279
280 Homeless people are known to be less likely to be registered with a mainstream
281 general practice compared to the general population.²⁶ Documented cases of access
282 being denied in primary care, contravening NHS England guidance, have come to
283 light.^{10,27} In an attempt to address such disparities, specialist primary healthcare
284 centres for homeless persons have been established. Whilst such services are often
285 highly regarded by patients,¹¹ mainstream services need to be adapted to be inclusive
286 of homeless patients. Training and education of frontline staff at mainstream general
287 practices can help to reinforce the registration guidelines. Additionally, distribution of
288 'My right to access healthcare' cards²⁸ would provide guidance to homeless individuals
289 about registering at mainstream providers and facilitate self-advocacy.

290
291 Further research is required to understand the entry criteria to primary care, mental
292 health and substance misuse services for homeless persons in order to increase
293 accessibility. Our previous study showed that homeless persons will benefit from a
294 lower entry threshold for the criteria to access mental health services.¹⁰ Providers of
295 alcohol and drug, mental health and other services need to have an open door policy
296 for individuals with co-occurring conditions, and to make every contact count²⁹ and
297 promote self-care.^{30,31} Treatment for any of the co-occurring conditions should be
298 available through every contact point. Prevention focused services such as needle
299 exchange, naloxone, opioid optimisation and substitution services needs to be readily
300 available in the community, including through community pharmacies.^{32,33}

301 Implementation barriers such as adequate remuneration, privacy, confidentiality,
302 interdisciplinary working and adequate training of staff needs to be addressed to
303 facilitate service provision through pharmacy.³⁴⁻³⁷ Pharmacist-led outreach based
304 model have the potential to address many of the barriers to access of healthcare by
305 PEH. A recent evaluation in Glasgow, Scotland showed that intervention involving
306 pharmacist independent prescriber working alongside a social worker conducting
307 outreach engagement at low threshold venues such as streets, city day centres and
308 soup kitchens showed signals of improvement in patient engagement with the
309 healthcare team and minimise repeat ED visits.³⁸

310
311 There is also a need for compliance with the Homelessness Reduction Act 2017³⁹ to
312 ensure healthcare settings proactively identify vulnerable people and work
313 collaboratively with social services to offer support. This will aid in the continuity of

314 care of patients in primary care when being discharged from the ED. There is a duty
315 on these services to refer service users they believe are homeless or threatened with
316 homelessness to a local public housing authority.³⁹ The duty to refer came into force
317 from October, 2018.

318
319 Future studies should consider accessing individual medical notes and health related
320 data from multiple sources to triangulate the findings. There is a need for research
321 investigating repeat attendance and associated reasons. 'Homelessness' appears as
322 one of the disease diagnostic criteria as per the International Classification of Diseases
323 (ICD).⁴⁰ However such codes are not often available for ED personnel and where
324 available such coding often seems to be under-utilised, such as in the hospital in-
325 patient setting.

326

327 **Conclusions**

328 The study shows that drug and alcohol-related conditions, pain and injury constitute
329 the most frequent reasons for utilisation of emergency healthcare by homeless
330 persons. There appears to be significant gender differences in the nature of
331 presentations. PEH mortality rate in the ED is 12 times higher compared to general
332 population. There is a continued need for prevention measures, enhanced service
333 provision at the community level, and multi sector collaborations to maximise
334 opportunities for early interventions and minimise the need for ED utilisation by PEH.

335

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338 searching, extraction and anonymization of the data.

339

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342 Authority.

343

344 **Conflict of interests**

345 There are no conflicts of interests to declare.

346

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466 **Table 1: Demographic characteristics of persons experiencing homelessness who**
 467 **presented to the Emergency Department**
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		Male	Female	Total
Age (valid n*=2606)	Mean age** (\pm SD)	39 (\pm 13.3)	39 (\pm 14.0)	39 (\pm 13.5)
	Age Range	18-84	18-85	18-85
	18-25	324 (17.1)	143 (20.1)	467 (17.9)
	26-35	494 (26.1)	177 (24.9)	671 (25.7)
	36-45	509 (26.9)	131 (18.4)	640 (24.6)
	46-55	351 (18.5)	191 (26.8)	542 (20.8)
	56-65	138 (7.3)	34 (4.8)	172 (6.6)
	66-75	55 (2.9)	27 (3.8)	82 (3.1)
	76-85	23 (1.2)	9 (1.3)	32 (1.2)
Ethnicity (valid n*=3157)	Asian/Asian British	136 (5.8)	42 (5.2)	178 (5.6)
	Black/African/Caribbean/ Black British	81 (3.5)	12 (1.5)	93 (2.9)
	Mixed/multiple ethnic groups	40 (1.7)	12 (1.5)	52 (1.6)
	White	1181 (50.4)	504 (62.0)	1685 (53.4)
	Other ethnic group	90 (3.8)	21 (2.6)	111 (3.5)
	Ethnicity not coded	816 (34.8)	222 (27.3)	1038 (32.9)

470 SD: standard deviation; valid n excludes unknown or erroneous entries
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474 **Table 2: Arrival mode of persons experiencing homelessness who presented to the**
 475 **Emergency Department from 01/05/2014 to 30/04/2019**
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Arrival mode	Male (n=2372)	Female (n=830)	Total (n=3271)
Emergency services (e.g. 999, police, helicopter)	1672 (70.5)	437 (52.7)	2109 (65.9)
Ambulance (Transfer)	13 (0.5)	2 (0.2)	15 (0.5)
Foot	214 (9.0)	136 (16.4)	350 (10.9)
Private transport	298 (12.6)	178 (21.4)	476 (14.9)
Public transport	102 (4.3)	46 (5.5)	148 (4.6)
Other	73 (3.1)	31 (3.7)	104 (3.2)

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Table 3: Clinical reasons for presentation to the Emergency Department

Presenting conditions	Male n (%) *	Female n(%) *	Total male and female n(%)	Total including gender unknown cases
Drug/Alcohol-related/Overdose	481 (20.3)	93 (11.2)	574 (17.9)	598
Pain	305 (12.9)	189 (22.8)	494 (15.4)	497
Injury	347 (14.6)	80 (9.6)	427 (13.3)	431
Trauma	269 (11.3)	67 (8.1)	336 (10.5)	362
Unwell/Weakness	167 (7.0)	74 (8.9)	241 (7.5)	243
Strange in Manner (SIM)	158 (6.7)	55 (6.6)	213 (6.7)	213
Consciousness impairment	95 (4.0)	27 (3.3)	122 (3.8)	124
Seizure	68 (2.9)	11 (1.3)	79 (2.5)	80
Infection	47 (2.0)	29 (3.5)	76 (2.4)	76
Abscess/Swelling	56 (2.4)	19(2.3)	75(2.3)	75
Wound/Cut/Burn	55 (2.3)	16 (1.9)	71 (2.2)	71
Any psychiatric complaint/disorder	35 (1.5)	18 (2.2)	53 (1.7)	53
Behavioural problems	35 (1.5)	17 (2.0)	52 (1.6)	53
Respiratory complaint	28 (1.2)	17 (2.0)	45 (1.4)	45
Endocrine disorders	27 (1.1)	8 (1.0)	35 (1.1)	36
Bleeding	11 (0.5)	22 (2.7)	33 (1.0)	35
Gastro-intestinal issues	16 (0.7)	10 (1.2)	26 (0.8)	26
Cardiovascular disorders	10 (0.4)	3 (0.4)	13 (0.4)	13
Genito-urinary disorders	3 (0.1)	8 (1.0)	11 (0.3)	11
Other	159 (6.7)	67 (8.1)	226 (7.1)	229
Total	2372 (100.0)	830 (100.0)	3202 (100.0)	3271

483 * % represent proportion within gender categories
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487 **Table 4: Top 15 items prescribed during Emergency Department stay and for patients 'to-**
 488 **take-out'**
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Medicines administered at the ED	n	Medicines prescribed for patients to take out	n
Sodium chloride (saline) flush	199	Paracetamol	181
Paracetamol	183	Codeine Phosphate	99
Sodium chloride	178	Thiamine Hydrochloride	63
Codeine phosphate	77	Vitamin B Compound Strong	57
Morphine sulphate solution 10mg/5ml	77	Co-amoxiclav	54
Hartmann's solution	75	Senna	47
Vitamins B & C	65	Docusate Sodium	44
Co-amoxiclav	64	Lansoprazole	42
Morphine sulphate injection	62	Ferrous Sulfate	37
Ondansetron	60	Flucloxacillin	34
Adsorbed Diphtheria vaccine	58	Pregabalin	31
Tetanus Inactivated Poliomyelitis vaccine	58	Ibuprofen	28
Co-codamol	56	Methadone	25
Flucloxacillin	46	Salbutamol	24
Chlordiazepoxide	37	Quetiapine	23

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 491 ED: Emergency department
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