

Association between Living Conditions and Admission to an Inappropriate Ward in Elderly Patients

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35 **ABSTRACT**

36 **INTRODUCTION.** Half of elderly patient hospitalizations are preceded by an emergency
37 department (ED) visit, and a higher proportion is observed among those living in institutions.
38 These patients are more often exposed to problems related to hospital occupancy and
39 overcrowding, which may lead to hospitalization in inappropriate wards (IWs) and increased
40 morbidity and health care costs. At the same time, elderly individuals living in institutions, due to
41 their high vulnerability, are the most exposed to these negative health care outcomes and might
42 have priority in geriatric beds. The aim of this study was to explore whether living conditions
43 were associated with admission to an IW after visiting an ED.

44 **METHOD.** The French Emergency Survey was a one-day, nationwide, cross-sectional survey in
45 2013 in all EDs in France. We focused on patients ≥ 75 years old who had been hospitalized.
46 Descriptive analysis and multilevel logistic regression were used.

47 **RESULTS.** Among the 3,285 patients, 16.5% were admitted to an IW: 15.7% among those
48 living in institutions and 16.6% among those living at home. ED visits during peak periods and
49 reaching the ED by her/his own means were the only factors associated with an increased
50 likelihood of admission to an IW. There was no association with living conditions.

51 **CONCLUSION.** Living conditions were not observed to be associated with the likelihood of
52 being hospitalized in an IW after an ED visit. Given the limited bed resources and the greater
53 vulnerability of elderly individuals living in institutions (compared with those living at home),
54 progress can be made in the coordination of acute geriatric care.

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58 **INTRODUCTION**

59 In many industrialized countries, a high proportion of emergency department (ED) visits are for
60 non-urgent conditions (1–3), largely contributing to the well-known phenomenon of access block
61 and overcrowding (4,5), a source of additional morbidity (6,7) and medical errors (8). Elderly
62 individuals represent an increasing proportion of ED users (9). It has been shown that they suffer
63 from suboptimal care in EDs (10–13). They wait longer (10,11) and are at higher risk of poor
64 pain management (12) and adverse health outcomes after discharge (e.g., functional decline, ED
65 return, hospitalization, and death) (13). Elderly patients are also twice as likely to experience
66 delirium related to an ED length of stay (LOS) that exceeds 10 hours (14) and suffer from a 3%
67 increase in the risk of adverse events per hour in an ED (such as procedure-related and/or
68 medication-related adverse events) (15). It is well-established that these prolonged ED LOSs are
69 largely due to the inability to access inpatient beds for these elderly people (16,17), often
70 considered bed blockers (18,19). In this context, several reports have stressed the need to
71 implement clinical pathways for direct admission (DA) to the hospital for these elderly patients to
72 improve the process and outcome (20,21).

73 Advanced age actually brings a higher likelihood of presenting with multiple chronic
74 conditions and is accentuated by frequent socioeconomic issues (22) leading to frailty. Frailty is
75 the most problematic expression of population ageing (22,23). Such a condition of extreme
76 vulnerability exposes individuals to an increased risk of negative health-related outcomes leading
77 to disability, hospitalization, institutionalization, and death (22). In 2015, in France, 5.7% of
78 people older than 65 years were living in institutions, 49% of whom suffered from
79 neurodegenerative disease (24). Similar proportions are found in other countries (25). Older
80 people living in nursing homes have increased levels of comorbidity, frailty and physical health
81 needs (26). For this particular population, the implementation of clinical pathways from DA to

82 hospitals seems slow to take place. In a recent study, 60% of hospitalizations of elderly
83 individuals living in institutions were preceded by an ED visit, compared with 45% of those
84 living at home (21).

85 Faced with this reality, the issue of appropriateness to the patient's needs in the hospital
86 ward to which the elderly are admitted for this unscheduled hospitalization (27,28) seemed
87 important to consider. Several studies have shown that admission to wards dedicated to elderly
88 individuals (acute geriatric units) is associated with less delirium (29), better functional status
89 (28,30), higher likelihood of returning home (28,30), and a shorter hospital stay (30). This
90 finding might be particularly true for those living in institutions, as they are more vulnerable than
91 others. To our knowledge, it has been minimally investigated. One can think, if not hope, that
92 special vigilance is being exercised with regard to these fragile patients and that they will be less
93 hospitalized in a ward that is not appropriate to their needs.

94 We took advantage of a nationwide cross-sectional survey that aimed to portray hospital-
95 based emergency care in France to explore whether living conditions were associated with the
96 likelihood of being hospitalized in an inappropriate ward after a visit to an emergency department
97 in elderly patients over 75 years.

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105 **METHOD**

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107 **French Emergency Survey**

108 The French Emergency Survey (FES) is a nationwide cross-sectional survey with a two-level
109 design that aims to portray hospital-based emergency care in France by describing ED
110 organizations and patients. It was developed by the French Society of Emergency Medicine
111 (SFMU) and the French Directorate of Research, Studies, Evaluation and Statistics at the
112 Ministry of Social Affairs and Health (DREES) and has already been described (31,32).

113 Briefly, data were collected from 734 of the 736 adult and paediatric EDs listed in French
114 territory and described 48,711 patients who came to one of these EDs during a 24-hour period on
115 June 11, 2013. Collected data concerned the organization of the participating EDs, individual
116 characteristics, and care delivered in EDs. The first part of the survey was the ED-centred
117 questionnaire completed by each ED administrator. The second part of the survey was the patient
118 questionnaire, completed by the patient or the accompanying person under the supervision of the
119 emergency physician (EP) during the ED visit.

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121 **Ethics**

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123 This study was carried out in accordance with relevant guidelines and regulations. It was declared
124 to be of public interest by the National Council for Statistical Information (CNIS) and was
125 integrated into the public statistical program (Visa no. 2013X080SA and publication in the
126 official Journal of French Republic, September 17, 2013). It was also approved by the French
127 Data Protection Authority (CNIL) (identification no. 1663413). According to French law, written
128 informed consent was not required for this type of study.

129 **Study participants**

130 We selected all patients older than 75 years included in the FES (excluding those from overseas
131 territories) who were hospitalized. They could be admitted to the same hospital where the ED
132 was located or transferred to another hospital. Since information on the appropriateness of the
133 ward was not available in the event of inter-hospital transfer, the patients concerned were not
134 included in our main analysis and were described separately.

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136 **Outcome of interest**

137 For every patient hospitalized in the same hospital where the ED was located (excluding inter-
138 hospital transfers), EPs were asked if the hospitalization took place in a ward they considered
139 inappropriate for the patient's needs (binary variable yes/no) (IW). An appropriate ward was
140 defined as the ward that would have been chosen by the EP if all the beds were available.

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142 **Explanatory and adjustment variables**

143 Living conditions and other explanatory variables at the patient level as well as adjustment
144 variables are summarized in Table 1.

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PATIENT LEVEL		
Individual characteristics	Age	75-84y/≥ 85y
	Gender	Female/Male
	Living conditions	Living at home/Living in an institution
	Having a referent GP	Yes/No
	Supplementary health insurance coverage	Having universal health coverage (CMU-C) or not <i>Note: A large proportion of the population has private supplementary health insurance to cover re-insurable co-payments not covered by the public insurance scheme. Below a certain income threshold, individuals can benefit from a free supplementary health insurance called CMU-C, which can be considered here as a proxy</i>

		for poor socioeconomic status.
ED visit-related variables	Presenting complaint	Cardiopulmonary/Neurological/Traumatic injury/Other
	Time of ED arrival	8:00 a.m.–12:00 p.m./12:00 p.m.–8:00 p.m./after 8 p.m.
	How the questionnaire was filled out	With the patient/With a proxy/No response available from both patient and proxy
	How the patient reached the ED	By his/her own means or by ambulance/With firefighters or emergency medical services (SAMU)
	The distance from the patient's home to the ED	<10 km/>10 km
	If the patient was managed in a resuscitation room	Yes/No <i>Note:</i> It was considered here as a proxy for a life-threatening condition
	If the ED used was that of the usual place of residence	Yes/No
	Type of hospitalization ward	Medical ward/Surgery/Intensive care unit (ICU)/Long term care/Psychiatry
ED LEVEL		
<p><i>Note:</i> To analyse the factors associated with the admission to an inappropriate ward (IW), we performed analyses adjusted on characteristics of health care supply and demand at the ED level. The survey included variables about the ED and the county in which the ED was located.</p>		
Characteristics of healthcare demand	ED attendance	Number of annual visits to the ED (<15,000, 15,000-30,000, 30,000-45,000, >45,000)
	Elderly rate	Proportion of elderly patients among those coming to the ED (above and below the median)
	Proportion of dependent persons among patients older than 75 years in the county	Above and below the national average of 20.6% <i>Note:</i> Dependent persons were identified as those receiving the personalized autonomy allowance (APA) awarded to those with issues with activities of daily living.
	Number of access blocks to patients	The number of patients on a stretcher waiting to be admitted to a ward at 8:00 a.m. on the day of the survey) (0 patient \geq 1 patient). <i>Note:</i> It was considered an indicator of ED overcrowding (which is known to be linked to access block (4,5,16)) and is a negative outcome for health care system efficiency when it is greater than 0.
	Type of hospital	Public academic/public non-academic and/or not-for-profit private hospitals/for-profit private hospitals
	Number of hospitalization beds in the acute medical unit in the hospital	Number of hospitalization beds in the acute medical unit (in the same hospital where the ED was located) per 10,000 ED annual visits
	Percent of geriatric unit beds in the hospital	Percent of geriatric unit beds among all acute medical beds. It was equal to 0 in case of no geriatric unit in the same hospital where the ED was located

Characteristics of health care supply	Number of long-term care and nursing home beds per 100,000 patients older than 75 years in the county	Above/Below the national average of 123.4 beds,
	Proportion of available places in nursing homes for patients older than 75 years in the county	Above/Below the national average rate of 19.6%,
	Number of acute care beds per 100,000 inhabitants in the county	Above/Below the national average of 395 beds
	Nurse density per 100,000 inhabitants in the county	Above/Below the national average density of 146 (33)
	Medical density (all specialties combined) per 100,000 inhabitants in the county	It was classified into 3 levels: Low/Medium/High) (34). In 2013, low, medium, and high levels corresponded to < 302, 302 to 393 and > 393 doctors, respectively.

Table 1. List of explanatory and adjustment variables

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148 **Statistical analysis**

149 *Missing data management.* We performed a fully conditional specification imputation
150 (35) to handle missing data for individual characteristics (except the outcome of interest) under
151 the assumption of missing at random (MAR). Ten imputed datasets were created for analysis, and
152 the regression coefficients were acquired by combining the results from the imputed datasets and
153 applying Rubin's rules (36).

154 *Descriptive analysis.* The characteristics of the study population (individual
155 characteristics and ED visit-related variables) before and after imputation were described, as well
156 as characteristics at the ED level (characteristics of health care demand and supply). Categorical
157 variables were reported as numbers (%).

158 ***Multilevel model (3).*** To analyse the determinants of admission to an IW, a multilevel
159 logistic regression model was built for those who were hospitalized in the same hospital where
160 the ED was located. We also performed sensitivity analysis, including inter-hospital transfers,
161 considering them admissions to appropriate wards.

162 A multilevel logistic regression model allowed us to consider the hierarchical structure of
163 the data and explain admission to an IW according to the study population's characteristics after
164 adjustment for variables at the ED level. First, we tested the non-adjusted model (the empty
165 model), considering only the cluster effect but no explanatory variable. The aim of this first step
166 was to confirm possible inter-group (inter-ED) heterogeneity and justify the multilevel approach.
167 The intraclass correlation coefficient obtained in the empty model indicated that approximately
168 25% of the total variance of admission to an IW was explained by the ED level. We also tested
169 the county level but did not find intergroup heterogeneity. Variables that were statistically
170 significant in univariate analysis at $p < 0.20$ were introduced in our models. Age, living conditions,
171 number of long-term care and nursing home beds in the county, and number of acute care beds in
172 the county were also included in the model even if the p-value was > 0.20 .

173 All statistical analyses were performed using SAS software (SAS/STAT Package 2002–2003 by
174 SAS Institute Inc., Cary, NC, USA).

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184 **RESULTS**

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186 **Characteristics of study participants**

187 Among the 3,285 patients 75 years or older included in the FES, 3,005 (91.5%) were admitted to
188 the same hospital where the ED was located, and 280 (8.5%) were transferred (Figure 1).

189 The descriptive results are summarized in Table 2. Among the 3,005 patients older than 75 years
190 who were admitted to the same hospital where the ED was located, admission occurred to an
191 intensive care unit (ICU) for 8.0% of the patients (n=280), to surgery for 22.0% (n=716) and to a
192 medical ward for 68.8% (n=2235). In all, 59.1% (n=1941) were women, 47.1% (n=1515) were 85
193 years or older and 15.1% (n=482) were living in an institution. Approximately 80% of these ED
194 visits (n=2622) occurred between 8 a.m. and 8 p.m. Among those who were not transferred,
195 16.5% (n=495) were admitted to a ward considered inappropriate: 15.7% (n=69) of those living
196 in institutions versus 16.6% (n=426) of those living at home. The characteristics of the study
197 participants by living conditions are summarized in Table 3.

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199 **Characteristics of health care demand and supply at the ED level**

200 Among the 593 EDs involved in the study, only 18.7% (n=111) were for-profit private hospitals,
201 33.5% (n=199) had more than 30,000 annual visits and 36.1% (n=214) had at least one access
202 block patient on the day of the study (Table 4).

203

204 **Multilevel regression models**

205 After adjustment for characteristics of health care supply and demand at the ED level, ED visits
206 during peak periods (in the afternoon or at night vs. in the morning) and reaching the ED by
207 her/his own means or by ambulance were the only factors associated with an increased likelihood

208 of admission to an IW (Table 5). Living conditions were not associated with the likelihood of
209 admission to an IW.

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211 **Sensitivity analysis.**

212 When considering inter-hospital transfers as admissions to an appropriate ward, the results from
213 the multilevel regression model were similar (Appendix 2).

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249 **DISCUSSION**

250 Our study shows that 16.5% of the elderly individuals over 75 years of age referred to the ED and
251 hospitalized are in a service that is inappropriate to their needs and that being institutionalized
252 does not reduce this percentage. Thus, our hypothesis that special vigilance is being exercised
253 with regard to these fragile patients is not confirmed. As ED visits would already be considered a
254 negative health care outcome, it appears that older people living in institutions are subject to a
255 double penalty, that of being admitted less often directly to a hospital service (21) and that of not
256 being cared for with more attention than other elderly patients when the decision to hospitalize is
257 made.

258 ***Being admitted to an inappropriate ward.***

259 Since 2000, the number of beds per capita has decreased in nearly all OECD countries, from an
260 average of 5.6 per 1000 of the population to 4.7 in 2017, which can be attributed, in part, to cost
261 and financial constraints (37). This reduction in bed capacity can increase hospital occupancy,
262 which might impact the proper functioning of hospitals and can be detrimental to patient
263 outcomes (38). Higher inpatient volumes and demand for beds results in a reduced ability to
264 manage fluctuating incoming patient flow with available resources (39). A potential consequence
265 of high occupancy is that patients may be admitted to any available bed regardless of the reason
266 for the visit. The magnitude of this phenomenon, 16.5% in this study, is poorly documented in
267 the literature (40,41). One could criticize the subjectivity of this criterion being assessed by the
268 emergency physician. However, who can judge the situation better than the doctor? In any case,
269 to our knowledge, there is no objective criterion for measurement.

270 ***Failure in upstream and post-ED organization.***

271 Elderly individuals living in institutions are not only the most vulnerable, but when upstream
272 coordination fails (i.e., the patients are referred to EDs), they will also not be cared for with more

273 attention than other elderly patients. Even if they would probably benefit the most from the
274 expertise of geriatricians and would suffer the most from the lack of hospitalization beds adapted
275 to their needs. It suggests that hospital occupancy is so high that priority for institutionalized
276 people is no longer possible due to adaptation capacities already being exceeded (39). Some
277 studies have shown that better management of inpatient beds (such as early morning admissions)
278 is associated with increased systemic capacity and reduces the number of ED access blocks (5,42).
279 Other solutions proposed would be to improve the balance between the demand and supply of
280 hospital beds by reducing the demand (improving upstream services and identifying
281 vulnerability) and increasing the supply. For example, several studies have shown that acute
282 geriatric unit LOS increased when the patient was waiting for long-term care facilities and/or a
283 nursing home (43–45). Holstein J et al proposed dividing acute geriatric unit LOS into “medical
284 stay” (with a high concentration of medical explorations and costs) and “social stay” (including
285 waiting time for long-term care) (44). The duration of the “social stay”, which could reach up to
286 18% of LOS, depends on the availability of beds in long-term care units and/or nursing homes
287 (44). Increasing the number of beds in the entire geriatric pathway as well as social service
288 resources would allow all vulnerable elderly patients to be identified early and receive suitable
289 geriatric and social expertise to improve geriatric service (18,45,46). Few studies have
290 investigated the link between primary care interventions on coordination of care and
291 appropriateness of ward admission for elderly patients (47,48). An integrated primary care model
292 for very frail elderly individuals decreases the risk of unplanned hospital admission and increases
293 the rate of planned admissions (47). Additionally, DA to geriatric intermediate care units might
294 represent a potential alternative to acute hospitalization for selected older patients (48).

295 ***The double penalty: a major consideration for those living in institutions***

296 It is already well-known that elderly individuals living in institutions are more likely to be
297 referred to the ED before hospitalization than those living at home (21). We also know that
298 prolonged ED LOS, often related to difficulties in managing cognitive disorders and physical
299 impairment in this population, is associated with discharge delays and longer hospital stays (49–
300 51). Strategies to reduce ED LOS may also save both ED costs and costs associated with
301 inpatient care (49), which is why such strategies of avoiding ED visits by DA should be preferred
302 for those living in institutions.

303 *Poor feasibility of DA*

304 Possible barriers to the diffusion of DA are the difficulty of organizing it in routine practice
305 within a reasonable time (52,53) and a common belief that access to certain tests, particularly
306 radiological tests, would be easier from the ED than from hospitalization wards. From experts'
307 views, strategies of reserving beds dedicated to DA could enhance their availability, and thus,
308 encourage physicians to organize geriatric care pathways, especially for fragile patients living in
309 institutions.

310 *Poor health care coordination in institutions*

311 Excess ED referrals could also be related to dysfunction in health care management in institutions
312 themselves. Indeed, 80% of ED visits occurred in daytime. During the daytime, urgent medical
313 advice should be possible within the institution, and care could be initiated until DA becomes
314 possible. In 2015, in France, there were on average 22.8 caregivers (nurses and nursing
315 assistants) per 100 elderly individuals in private institutions and 36.7 in public institutions (54).
316 Among all institutions, 44% reported recruitment difficulties, more frequently in private
317 institutions (54). Understaffing was reported in 63% of institutions, especially among
318 coordinating physicians (10%) and nursing assistants (9%) (54). Understaffing and inadequate
319 training of nursing staff are known to be associated with poor quality of care (55).

320 Each country, depending on its health system and the political choices that are made, tries to
321 address these problems in a different way.

322 **Limitations**

323 Our study has several limitations. The first limitation is the lack of data on comorbidities
324 (including the presence of cognitive disorders) and the degree of patient autonomy, which would
325 have allowed us to perform a more detailed analysis of patient characteristics. Unfortunately,
326 these variables were not collected in the survey. However, we assume that these variables might
327 be strongly linked to older age and living conditions and that a lack of information might have
328 limited consequences.

329 The second limitation concerns the exclusion of inter-hospital transfers (because of missing data
330 on the outcome of interest). However, sensitivity analysis (assuming that all patients were
331 transferred to an appropriate ward) did not show differences in the results of the multilevel
332 models.

333 The last limitation is that this survey reflects the situation in EDs in 2013 and that it might have
334 changed since 2013. However, this study takes part in a ministerial study plan on EDs, taking
335 place every 10 years where 2013 was the first nationwide survey. In 2003, the study involved a
336 sample of EDs only. It is, thus, the most recent national data source available on EDs at this time.

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342 **CONCLUSION**

343 Living conditions were not statistically associated with the likelihood of being hospitalized in an
344 inappropriate ward after a visit to an emergency department. This finding suggests that elderly
345 people living in institutions, who should be considered as more vulnerable than those living at
346 home, are not prioritized in access to hospital beds. These results argue for the development of
347 geriatric care pathways, especially for the most fragile elderly.

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366 **REFERENCES**

- 367 1. Cour des comptes. Les urgences hospitalières : une fréquentation croissante, une
368 articulation avec la médecine de ville à repenser [Internet]. 2014 [cited 2019 Jun 19] p.
369 351–77. (Rapport sur l’application des lois de financement de la sécurité sociale pour 2014).
370 Available from:
371 https://www.ccomptes.fr/sites/default/files/EzPublish/rapport_securite_sociale_2014_urgences_hospitalieres.pdf
372
- 373 2. Uscher-Pines L, Pines J, Kellermann A, Gillen E, Mehrotra A. Emergency department
374 visits for nonurgent conditions: systematic literature review. *Am J Manag Care*. 2013
375 Jan;19(1):47–59.
- 376 3. Naouri D, Ranchon G, Vuagnat A, Schmidt J, El Khoury C, Yordanov Y, et al. Factors
377 associated with inappropriate use of emergency departments: findings from a cross-
378 sectional national study in France. *BMJ Qual Saf*. 2019 Oct 30;
- 379 4. Shetty AL, Teh C, Vukasovic M, Joyce S, Vaghasiya MR, Forero R. Impact of emergency
380 department discharge stream short stay unit performance and hospital bed occupancy rates
381 on access and patient flow measures: A single site study. *Emerg Med Australas EMA*. 2017
382 Aug;29(4):407–14.
- 383 5. Luo W, Cao J, Gallagher M, Wiles J. Estimating the intensity of ward admission and its
384 effect on emergency department access block. *Stat Med*. 2013 Jul 10;32(15):2681–94.
- 385 6. Jo S, Jin YH, Lee JB, Jeong T, Yoon J, Park B. Emergency department occupancy ratio is
386 associated with increased early mortality. *J Emerg Med*. 2014 Feb;46(2):241–9.
- 387 7. Richardson DB. Increase in patient mortality at 10 days associated with emergency
388 department overcrowding. *Med J Aust*. 2006 Mar 6;184(5):213–6.
- 389 8. Kulstad EB, Sikka R, Sweis RT, Kelley KM, Rzechula KH. ED overcrowding is
390 associated with an increased frequency of medication errors. *Am J Emerg Med*. 2010
391 Mar;28(3):304–9.
- 392 9. Samaras N, Chevalley T, Samaras D, Gold G. Older Patients in the Emergency
393 Department: A Review. *Ann Emerg Med*. 2010 Sep;56(3):261–9.
- 394 10. Horwitz LI, Bradley EH. Percentage of US emergency department patients seen
395 within the recommended triage time: 1997 to 2006. *Arch Intern Med*. 2009 Nov
396 9;169(20):1857–65.
- 397 11. Freund Y, Vincent-Cassy C, Bloom B, Riou B, Ray P, APHP Emergency Database Study
398 Group. Association between age older than 75 years and exceeded target waiting times in
399 the emergency department: a multicenter cross-sectional survey in the Paris metropolitan
400 area, France. *Ann Emerg Med*. 2013 Nov;62(5):449–56.
- 401 12. Platts-Mills TF, Esserman DA, Brown DL, Bortsov AV, Sloane PD, McLean SA. Older
402 US emergency department patients are less likely to receive pain medication than younger
403 patients: results from a national survey. *Ann Emerg Med*. 2012 Aug;60(2):199–206.
- 404 13. Aminzadeh F, Dalziel WB. Older adults in the emergency department: A systematic
405 review of patterns of use, adverse outcomes, and effectiveness of interventions. *Ann Emerg
406 Med*. 2002 Mar;39(3):238–47.
- 407 14. Bo M, Bonetto M, Bottignole G, Porrino P, Coppo E, Tibaldi M, et al. Length of Stay in
408 the Emergency Department and Occurrence of Delirium in Older Medical Patients. *J Am
409 Geriatr Soc*. 2016 May 1;64(5):1114–9.
- 410 15. Ackroyd-Stolarz S, Guernsey JR, MacKinnon NJ, Kovacs G. The association between a

- 411 prolonged stay in the emergency department and adverse events in older patients admitted
412 to hospital: a retrospective cohort study. *BMJ Qual Saf.* 2011 Jul 1;20(7):564–9.
- 413 16. Cooke MW, Wilson S, Halsall J, Roalfe A. Total time in English accident and
414 emergency departments is related to bed occupancy. *Emerg Med J EMJ.* 2004
415 Sep;21(5):575–6.
- 416 17. Forero R, McCarthy S, Hillman K. Access block and emergency department
417 overcrowding. *Crit Care.* 2011;15(2):216.
- 418 18. Manzano-Santaella A. From bed-blocking to delayed discharges: precursors and
419 interpretations of a contested concept. *Health Serv Manage Res.* 2010 Aug 1;23(3):121–7.
- 420 19. Vetter N. Inappropriately delayed discharge from hospital: What do we know? *BMJ.*
421 2003 Apr 26;326(7395):927–8.
- 422 20. Cours des comptes. Les urgences hospitalières : une fréquentation croissante, une
423 articulation avec la médecine de ville à repenser [Internet]. 2014 Sep. Available from:
424 https://www.ccomptes.fr/sites/default/files/EzPublish/rapport_securite_sociale_2014_urgences_hospitalieres.pdf
425
- 426 21. Mesnier T. Assurer le premier accès aux soins Organiser les soins non programmés
427 dans les territoires [Internet]. 2018 May. Available from: [https://solidarites-](https://solidarites-sante.gouv.fr/IMG/pdf/rapport_snp_vf.pdf)
428 [sante.gouv.fr/IMG/pdf/rapport_snp_vf.pdf](https://solidarites-sante.gouv.fr/IMG/pdf/rapport_snp_vf.pdf)
- 429 22. Cesari M, Calvani R, Marzetti E. Frailty in Older Persons. *Clin Geriatr Med.*
430 2017;33(3):293–303.
- 431 23. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. *The*
432 *Lancet.* 2013 Mar 2;381(9868):752–62.
- 433 24. Direction de la recherche des études de l'évaluation et des statistiques. Infographie :
434 L'hébergement des personnes âgées en établissement - Les chiffres clés [Internet]. [cited
435 2021 Jan 14]. Available from: [https://drees.solidarites-sante.gouv.fr/etudes-et-](https://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/publications/infographies/article/infographie-l-hebergement-des-personnes-agees-en-etablissement-les-chiffres)
436 [statistiques/publications/infographies/article/infographie-l-hebergement-des-personnes-](https://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/publications/infographies/article/infographie-l-hebergement-des-personnes-agees-en-etablissement-les-chiffres)
437 [agees-en-etablissement-les-chiffres](https://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/publications/infographies/article/infographie-l-hebergement-des-personnes-agees-en-etablissement-les-chiffres)
- 438 25. British Geriatrics Society. Joint Working Party Inquiry into the Quality of Healthcare
439 Support for Older People in Care Homes: A Call for Leadership, Partnership and Quality
440 Improvement [Internet]. 2011 Jun. Available from:
441 [https://www.bgs.org.uk/sites/default/files/content/attachment/2019-08-](https://www.bgs.org.uk/sites/default/files/content/attachment/2019-08-27/quest_quality_care_homes.pdf)
442 [27/quest_quality_care_homes.pdf](https://www.bgs.org.uk/sites/default/files/content/attachment/2019-08-27/quest_quality_care_homes.pdf)
- 443 26. Sampson EL, Feast A, Blighe A, Froggatt K, Hunter R, Marston L, et al. Evidence-based
444 intervention to reduce avoidable hospital admissions in care home residents (the Better
445 Health in Residents in Care Homes (BHiRCH) study): protocol for a pilot cluster randomised
446 trial. *BMJ Open.* 2019 May 1;9(5):e026510.
- 447 27. Moulias R, Moulias S, Franco A, Meaume S. Le syndrome du soin inapproprié. Une
448 situation gériatrique courante sévère, mais curable. *Rev Gériatrie.* 2012;37(5):1.
- 449 28. Baztán JJ, Suárez-García FM, López-Arrieta J, Rodríguez-Mañas L, Rodríguez-Artalejo
450 F. Effectiveness of acute geriatric units on functional decline, living at home, and case
451 fatality among older patients admitted to hospital for acute medical disorders: meta-
452 analysis. *BMJ.* 2009 Jan 22;338:b50.
- 453 29. Bo M, Martini B, Ruatta C, Massaia M, Ricauda NA, Varetto A, et al. Geriatric ward
454 hospitalization reduced incidence delirium among older medical inpatients. *Am J Geriatr*
455 *Psychiatry Off J Am Assoc Geriatr Psychiatry.* 2009 Sep;17(9):760–8.
- 456 30. Asplund K, Gustafson Y, Jacobsson C, Bucht G, Wahlin A, Peterson J, et al. Geriatric-

- 457 Based Versus General Wards for Older Acute Medical Patients: A Randomized Comparison
458 of Outcomes and Use of Resources. *J Am Geriatr Soc.* 2000;48(11):1381–8.
- 459 31. Naouri D, El Khoury C, Vincent-Cassy C, Vuagnat A, Schmidt J, Yordanov Y, et al. The
460 French Emergency National Survey: A description of emergency departments and patients
461 in France. *PloS One.* 2018;13(6):e0198474.
- 462 32. Naouri D, Ranchon G, Vuagnat A, Schmidt J, Khoury CE, Yordanov Y. Factors
463 associated with inappropriate use of emergency departments: findings from a cross-
464 sectional national study in France. *BMJ Qual Saf.* 2019 Oct 29;bmjqs-2019-009396.
- 465 33. Professionnels de santé au 1^{er} janvier 2017 | Insee [Internet]. [cited 2019 Sep 25].
466 Available from: [https://www.insee.fr/fr/statistiques/2012677#tableau-](https://www.insee.fr/fr/statistiques/2012677#tableau-TCRD_068_tab1_departements)
467 [TCRD_068_tab1_departements](https://www.insee.fr/fr/statistiques/2012677#tableau-TCRD_068_tab1_departements)
- 468 34. Cartographie Interactive de la Démographie Médicale [Internet]. [cited 2019 Sep 25].
469 Available from:
470 https://demographie.medecin.fr/#s=2016;v=map2;i=demo_med.dens_tte_act;l=fr
- 471 35. Schafer JL, Olsen MK. Multiple Imputation for Multivariate Missing-Data Problems: A
472 Data Analyst's Perspective. *Multivar Behav Res.* 1998 Oct 1;33(4):545–71.
- 473 36. Lee KJ, Carlin JB. Multiple imputation for missing data: fully conditional specification
474 versus multivariate normal imputation. *Am J Epidemiol.* 2010 Mar 1;171(5):624–32.
- 475 37. OCDE. Health at a Glance 2019: OECD Indicators [Internet]. 2019 [cited 2021 Feb 12].
476 (Éditions OCDE). Available from: [https://www.oecd-ilibrary.org/social-issues-migration-](https://www.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-2019_4dd50c09-en)
477 [health/health-at-a-glance-2019_4dd50c09-en](https://www.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-2019_4dd50c09-en)
- 478 38. Eriksson CO, Stoner RC, Eden KB, Newgard CD, Guise J-M. The Association Between
479 Hospital Capacity Strain and Inpatient Outcomes in Highly Developed Countries: A
480 Systematic Review. *J Gen Intern Med.* 2017 Jun;32(6):686–96.
- 481 39. Soremekun OA, Zane RD, Walls A, Allen MB, Seefeld KJ, Pallin DJ. Cancellation of
482 scheduled procedures as a mechanism to generate hospital bed surge capacity-a pilot study.
483 *Prehospital Disaster Med.* 2011 Jun;26(3):224–9.
- 484 40. Boaden R, Proudlove N, Wilson M. An exploratory study of bed management. *J Manag*
485 *Med.* 1999 Jan 1;13(4):234–50.
- 486 41. Proudlove NC, Gordon K, Boaden R. Can good bed management solve the
487 overcrowding in accident and emergency departments? *Emerg Med J.* 2003 Mar
488 1;20(2):149–55.
- 489 42. Khanna S, Sier D, Boyle J, Zeitz K. Discharge timeliness and its impact on hospital
490 crowding and emergency department flow performance. *Emerg Med Australas EMA.* 2016
491 Apr;28(2):164–70.
- 492 43. Champlon S, Cattenoz C, Mordellet B, Roussel-Laudrin S, Jouanny P. Déterminants de
493 la durée de séjour des personnes âgées hospitalisées.
494 [/data/revues/02488663/002900S1/08003007/](https://www.em-consulte.com/en/article/167730) [Internet]. 2008 Jun 4 [cited 2019 Jul 27];
495 Available from: <https://www.em-consulte.com/en/article/167730>
- 496 44. Holstein J, Saint-Jean O, Verny M, Bérigaud S, Bouchon J-P. Facteurs explicatifs du
497 devenir et de la durée de séjour dans une unité de court séjour gériatrique. *Sci Soc Santé.*
498 1995;13(4):45–79.
- 499 45. Costa AP, Poss JW, Peirce T, Hirdes JP. Acute care inpatients with long-term delayed-
500 discharge: evidence from a Canadian health region. *BMC Health Serv Res.* 2012 Jun
501 22;12(1):172.
- 502 46. Victor CR, Healy J, Thomas A, Seargeant J. Older patients and delayed discharge from

- 503 hospital. Health Soc Care Community. 2000;8(6):443–52.
- 504 47. de Stampa M, Vedel I, Buyck J-F, Lapointe L, Bergman H, Beland F, et al. Impact on
505 hospital admissions of an integrated primary care model for very frail elderly patients. Arch
506 Gerontol Geriatr. 2014 May 1;58(3):350–5.
- 507 48. Colprim D, Martin R, Parer M, Prieto J, Espinosa L, Inzitari M. Direct Admission to
508 Intermediate Care for Older Adults With Reactivated Chronic Diseases as an Alternative to
509 Conventional Hospitalization. J Am Med Dir Assoc. 2013 Apr 1;14(4):300–2.
- 510 49. Ingold BB, Yersin B, Wietlisbach V, Burckhardt P, Bumand B, Büla CJ. Characteristics
511 associated with inappropriate hospital use in elderly patients admitted to a general internal
512 medicine service. Aging Milan Italy. 2000 Dec;12(6):430–8.
- 513 50. Bo M, Fonte G, Pivaro F, Bonetto M, Comi C, Giorgis V, et al. Prevalence of and factors
514 associated with prolonged length of stay in older hospitalized medical patients. Geriatr
515 Gerontol Int. 2016;16(3):314–21.
- 516 51. Liew D, Liew D, Kennedy MP. Emergency department length of stay independently
517 predicts excess inpatient length of stay. Med J Aust. 2003;179(10):524–6.
- 518 52. Canac B. Admission directe en court séjour gériatrique: difficultés rencontrées par
519 les médecins généralistes des Alpes-Maritimes. [cited 2021 Mar 3]; Available from:
520 <https://core.ac.uk/reader/52775590>
- 521 53. Maréchal F, Kim B-A, Castel-Kremer E, Comte B. Évaluation de la ligne unique et
522 directe d’appel téléphonique en gériatrie (ELUDAT G) : une étude qualitative. NPG Neurol -
523 Psychiatr - Gériatrie. 2015 Dec 1;15(90):316–22.
- 524 54. Bazin M, Muller M. Le personnel et les difficultés de recrutement dans les Ehpad |
525 Direction de la recherche, des études, de l’évaluation et des statistiques. Etudes Résultats-
526 DREES [Internet]. 2018 Jun [cited 2021 Feb 12]; Available from: [https://drees.solidarites-
527 sante.gouv.fr/publications/etudes-et-resultats/le-personnel-et-les-difficultes-de-
528 recrutement-dans-les-ehpad](https://drees.solidarites-sante.gouv.fr/publications/etudes-et-resultats/le-personnel-et-les-difficultes-de-recrutement-dans-les-ehpad)
- 529 55. Maas ML, Specht JP, Buckwalter KC, Gittler J, Bechen K. Nursing Home Staffing and
530 Training Recommendations for Promoting Older Adults’ Quality of Care and Life: Part 1.
531 Deficits in the Quality of Care Due to Understaffing and Undertraining. Res Gerontol Nurs.
532 2008 Apr 1;1(2):123–33.

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541 **DECLARATIONS**

542 **Ethics approval and consent to participate.** This study was carried out in accordance with
543 relevant guidelines and regulations. It was declared to be of public interest by the National
544 Council for Statistical Information (CNIS) and was integrated into the public statistical program
545 (Visa no. 2013X080SA and publication in the official Journal of French Republic, September 17,
546 2013). It was also approved by the French Data Protection Authority (CNIL) (identification no.
547 1663413). According to French law, written informed consent was not required for this type of
548 study.

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550 **Consent for publication.** According to French law, written informed consent was not required
551 for this type of study. Patients were informed by staff and a short handout and posters were in the
552 waiting area; 0.3% refused to participate.

553
554 **Availability of data and materials.** The data that support the findings of this study are available
555 from the French Directorate of Research, Studies, Evaluation and Statistics at the Ministry of
556 Social Affairs and Health (DREES) but restrictions apply to the availability of these data, which
557 were used under license for the current study, and so are not publicly available. Data are however
558 available from the authors upon reasonable request and with permission of the French Directorate
559 of Research, Studies, Evaluation and Statistics at the Ministry of Social Affairs and Health
560 (DREES).

561 Data information and questionnaires are available at the following address

562 http://www.data.drees.sante.gouv.fr/ReportFolders/reportFolders.aspx?IF_ActivePath=P,432,507
563 [32,507](#)

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565 **Competing interests.** The authors declare no conflicts of interest.

566

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568 Statistics of the French Health and Social Affairs Ministry (DREES).

569

570 **Authors' contributions.** DN, YY and NPF were involved in the study data analysis,
571 interpretation of results and drafting of the manuscript. HP was involved in statistical analysis.
572 CEK, PS and JS were involved in study conception. LM was involved in interpretation of the
573 results. All authors critically revised the manuscript.

574

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579 sfmu/drees2013/](https://www.sfmu.org/fr/vie-professionnelle/outils-professionnels/referentiels-sfm/drees2013/)).

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589 **Table 2. Description of study participants after multiple imputations**
 590 *Note: ED = Emergency department; ICU = Intensive Care Unit; SAMU = emergency medical service*
 591 *CMUc: A large proportion of the population has private supplemental health insurance to cover reinsurable*
 592 *copayments not covered by public insurance schemes. Below a certain income threshold, individuals can benefit*
 593 *from free supplementary health insurance called Couverture Maladie Universelle Complementary (CMU-C), which*
 594 *can be considered here as a proxy for poor socioeconomic status.*

595 *Note: due to multiple imputations, counts have been rounded to the nearest integer*
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	Hospitalization				Total	
	Inter-hospital transfer		In the same hospital as the ED			
	N	% col	N	% col	N	% col
	280		3005		3285	
INDIVIDUAL CHARACTERISTICS						
Age						
75-84 years	143	51.1	1591	52.9	1734	52.8
More than 85 years or equal	137	48.9	1414	47.1	1551	47.2
Gender						
Male	113	40.4	1231	40.9	1344	40.9
Female	167	59.6	1774	59.1	1941	59.1
Living conditions						
Home	235	83.4	2568	85.5	2803	85.3
Institution	45	16.6	437	14.5	482	14.7
Having a GP						
No	3	1.5	46	1.7	49	1.7
Yes	277	98.5	2959	98.3	3236	98.3
Supplementary health insurance coverage						
Private	243	87.0	2698	89.8	2942	89.6
Universal complementary health coverage or none	37	13.0	307	10.2	343	10.4
ED VISIT RELATED CHARACTERISTICS						
Presenting complaint						
Cardio-pulmonary	78	27.9	910	30.3	988	30.1
Neurologic	28	10.0	265	8.8	293	8.9
Traumatic injury	41	14.6	386	12.8	427	13.0
Other	133	47.5	1444	48.1	1577	48.0
Times of ED arrival						
8 h-12 h	88	31.4	789	26.3	877	26.7
12 h-20 h	136	48.6	1609	53.5	1745	53.1
20 h-8 h	56	20.0	607	20.2	663	20.2
How the questionnaire was filled out						

	Hospitalization				Total	
	Inter-hospital transfer		In the same hospital as the ED			
	N 280	% col	N 3005	% col	N 3285	% col
Self reported	194	69.3	2243	74.6	2437	74.2
With a proxy	51	18.2	462	15.4	513	15.6
No response possible	35	12.5	300	10.0	335	10.2
How the patient reached the ED						
By his own means or ambulance	193	69.1	2272	75.6	2466	75.0
Firefighters or SAMU	87	30.9	733	24.4	819	25.0
The distance from the patient's home to the ED						
Less than 10 km or equal	176	62.8	1657	55.0	1833	55.6
More than 10 km	104	37.2	1348	45.0	1452	44.4
If the patient was managed in a resuscitation room						
No	217	77.4	2479	82.5	2696	82.1
Yes	63	22.6	526	17.5	589	17.9
If the ED used was that of the usual place of residence						
From the usual living place	259	92.5	2812	93.9	3071	93.8
Outside the usual living place	21	7.5	193	6.1	214	6.2
Type of hospitalization ward						
Medical ward	167	59.4	2069	68.8	2235	68.0
Surgery	56	19.9	660	22.0	716	21.8
ICU	40	14.5	241	8.0	280	8.6
Long term care	11	4.0	22	0.7	33	1.0
Psychiatry	6	2.2	14	0.5	20	0.6

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Table 3. Description of study participants by living conditions

Note: due to multiple imputations, counts have been rounded to the nearest integer

	Living conditions			
	Home		Institution	
	N	% col	N	% col
INDIVIDUAL CHARACTERISTICS				
Age				
75-84 years	1602	57.2	132	27.5
More than 85 years or equal	1201	42.8	350	72.5
Gender				
Male	1193	42.6	151	31.0
Female	1610	57.4	331	69.0
Having a GP				
No	43	1.7	6	1.7
Yes	2760	98.3	476	98.3
Supplementary health insurance coverage				
Private	2508	89.5	434	89.9
Universal complementary health coverage or none	295	10.5	49	10.1
ED VISIT RELATED CHARACTERISTICS				
Presenting complaint				
Cardio-pulmonary	848	30.2	140	29.2
Neurologic	257	9.2	36	7.5
Traumatic injury	356	12.7	71	14.7
Other	1342	47.9	235	48.6
Times of ED arrival				
8 h-12 h	766	27.3	111	23.2
12 h-20 h	1474	52.6	271	55.9
20 h-8 h	562	20.0	101	21.0
How the questionnaire was filled out				
Self reported	2095	74.8	342	70.8
With a proxy	428	15.3	85	17.7
No response possible	280	10.0	55	11.5
How the patient reached the ED				
By his own means or ambulance	2086	74.4	380	78.3
Firefighters or SAMU	717	25.6	102	21.7
The distance from the patient's home to the ED				
Less than 10 km or equal	1570	55.9	263	54.2
More than 10 km	1233	44.1	219	45.8

	Living conditions			
	Home		Institution	
	N	% col	N	% col
If the patient was managed in a resuscitation room				
No	2304	82.2	392	81.1
Yes	499	17.8	90	18.9
If the ED used was that of the usual place of residence				
From the usual living place	2615	93.7	456	94.7
Outside the usual living place	187	6.3	26	5.3
Type of hospitalization ward				
Medical ward	1909	68.1	327	67.6
Surgery	603	21.5	113	23.4
ICU	242	8.6	38	8.2
Long term care	29	1.0	4	0.7
Psychiatry	20	0.7	0	0.0

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Table 4. Description of EDs and counties

Note: County medical density (all specialties combined) was classified into 3 levels according to the National Council of Medical Doctors. In 2013, low, medium, and high levels corresponded to < 302, 302 to 393 and > 393 doctors per 100,000 inhabitants, respectively.

Description of EDs and counties	% col	N
CHARACTERISTICS OF HEALTHCARE DEMAND		
ED attendance		
Less than 15,000 or equal	24.1	143
15,001-30,000	42.3	251
30,001-45,000	19.7	117
More than 45,001	13.8	82
Elderly rate		
< 15%	54.1	321
≥ 15%	45.4	269
County rate of dependent elderly persons		
< 20.6%	54.5	323
≥ 20.6%	45.5	270
Number of access block patients		
< 1 patient/per 100 ED visits	63.9	379
≥ 1 patient/per 100 ED visits	36.1	214
CHARACTERISTICS OF HEALTHCARE SUPPLY		
Type of hospital		
Public academic	9.8	58
Public non-academic or Not-for-profit-private hospitals	71.5	424
For-profit private hospitals	18.7	111
Number of hospitalization beds in acute medical unit in the hospital		
< 30	24.6	146
30 - 49	26.6	158
50 - 69	21.2	126
More than 70	22.3	132
Missing data	5.2	31
Rate of geriatric unit beds in the hospital		
0	34.1	202
0 - 10%	18.7	111
More than 10%	30.0	178
Missing data	17.2	102
Number of long-term care and nursing home beds per 100,000 patients		

older than 75 years in the county		
< 123.4	46.4	275
≥ 123.4	53.6	318
Proportion of available places in nursing homes for patients older than 75 years in the county		
< 19.6%	63.1	374
≥ 19.6%	36.9	219
Number of acute care beds per 100,000 inhabitants in the county		
< 395	47.6	282
≥ 395	52.4	311
County nurse density for 100,000 persons		
< 146	57.7	342
≥ 146	42.3	251
County medical density		
Low	42.7	253
Intermediate to high	57.3	340

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663 **Table 5. Multilevel regression model**

664 *Note: Adjustment variables (ED level) included in the model were: percentage of elderly, proportion of dependent*
 665 *persons among patients older than 75 years in the county, type of hospital, number of hospitalization beds in the*
 666 *acute medical unit in the hospital, percentage of geriatric unit beds in the hospital, number of long-term care and*
 667 *nursing home beds per 100,000 patients older than 75 years in the county and number of acute care beds per*
 668 *100,000 inhabitants in the county*

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Variables	aOR	95%CI	p
Age			
75-84 years	Ref	.	
More than 85 years or equal	1.17	0.93 - 1.46	0.1740
Gender			
Male	Ref		
Female	1.00	0.80 – 1.25	0.9959
Living conditions			
Home	Ref	.	
Institution	0.81	0.58 - 1.14	0.2299
Presenting complaint			
Cardio-pulmonary	Ref	.	
Neurologic	1.40	0.95 – 2.08	0.0919
Traumatic injury	0.77	0.52 – 1.14	0.1962
Other	1.13	0.87 – 1.47	0.3344
How the patient reached the ED			
By his own means or ambulance	Ref	.	
Firefighters or SAMU	0.65	0.47 – 0.89	0.0094
Times of ED arrival			
8 h-12 h	Ref	.	
12 h-20 h	1.80	1.36 – 2.38	<.0001
20 h-8 h	1.64	1.16 – 2.31	0.0046

Figures

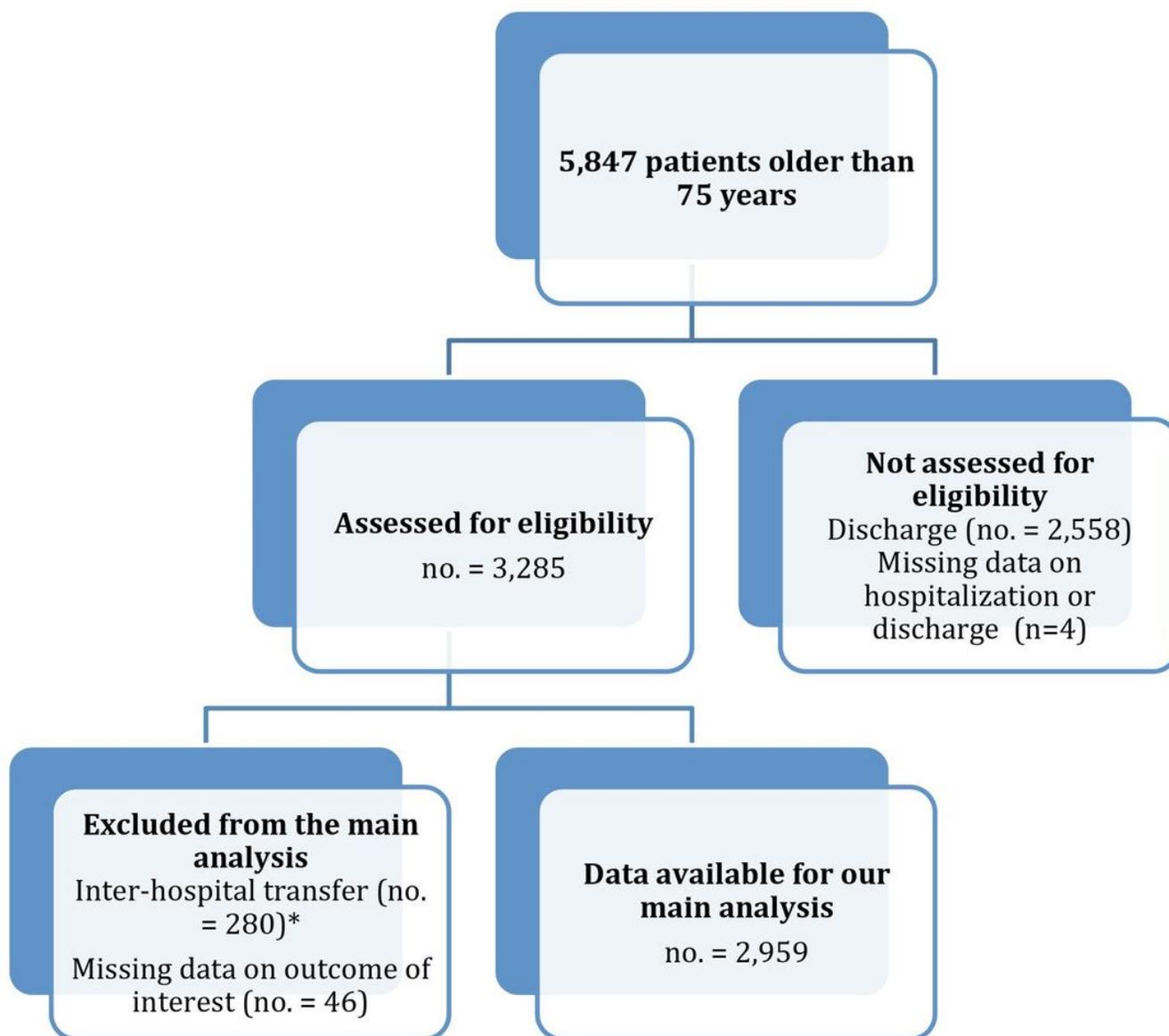


Figure 1

Study flow chart *Interhospital transfers were excluded from the main analysis. However, these patients were included in the sensitivity analysis and were considered admission to an appropriate ward.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [AppendicesFiles.pdf](#)