

Recommendations for the Management of Geriatric Patients Visiting Emergency Department and Risk of Death: An Observational Cohort Study

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Abstract

Objective: To examine the effects of geriatric and gerontological recommendations for the management of geriatric patients visiting an emergency department (ED) on risk of death in the first year following the ED visit.

Methods: A total of 131 geriatric patients who visited Angers University hospital ED were prospectively included in this observational cohort study. They were separated in three groups matched on age and gender: two intervention groups (11 patients with geriatric recommendations and 23 patients with gerontological recommendations) and one control group (97 patients without any recommendations). Intervention was provided upon the participant's ED admission. Incident mortality was collected via the administrative registry of Hospital before patients' discharge and via a systematic phone call 12 month after the ED visit. Age, gender, place of living, number of daily drugs taken, cognitive decline, and reason for ED admission were used as covariates.

Results: Multiple Cox regression model showed that gerontological recommendations were associated with a lower rate of mortality (adjusted Hazard Ratio [HR]=0.12, P=0.038) but not geriatric recommendations (adjusted HR=9.94, P=0.905). Living at home was associated with a greater risk of death (adjusted HR=2.55 with P=0.020). Kaplan-Meier distributions of mortality confirmed that patients who received gerontological recommendations had a lower mortality rate compared to those who did not receive recommendations (P=0.005) and those who received geriatric recommendations (P=0.015).

Discussion and Conclusion: Our findings show that gerontological, but not geriatric recommendations were associated with a lower risk of mortality after an ED visit in geriatric patients.

Keywords: Emergency department; Risk of mortality; Geriatric intervention

Introduction

The number of older adults (i.e., aged 65 and over) who visit emergency department (ED) has increased. In fact, elderly adults account for around 20% of all ED visitors in Europe [1,2]. Compared to their younger counterparts, elderly individuals are more frequently discharged from the ED to acute care wards because they have a higher burden of acute and chronic diseases that contribute to disability [1-4]. They also have a higher risk of mortality during and after their hospitalization [3-5]. Thus, addressing the specific needs of the growing number of geriatric ED visitors is imperative to limit adverse outcomes such as death [2,5].

Early intervention is a key component of efficient management of geriatric patients [1,2]. Mobile Geriatric Teams (MGT) provide a care model based on a comprehensive geriatric assessment and support recommendations to improve medical and/or social care of older patients visiting ED [1,2,6]. It has been previously reported that an early MGT intervention that combines a brief geriatric assessment (BGA) and subsequent recommendations has significantly reduced the length of hospital stay (LHS) of older adults after an ED visit [7,8]. More precisely, two different levels of recommendations were distinguished; the geriatric recommendations that are defined as medical recommendations only (i.e., recommendations for the diagnosis and treatment of polymorbid older adults with disabilities) and the gerontological recommendations that combine medical and social recommendations (i.e., in addition to

medical recommendations, there was also the establishment of formal and appropriate home-help services). The first one was significantly associated with an early discharge (i.e., <24 h) from ED [7], and the second one was associated with a shorter hospital stay when geriatric patients were discharged to acute care wards [8].

Poor health status and a high mortality have both been associated with prolonged LHS. However, the effects of MGT recommendations on mortality risk remain to be determined [9]. Because of the significant impact that geriatric and gerontological recommendations have had on decreasing the LHS that has been previously reported by Launay, Annweiler, De Decker, Kabeshova, Beauchet, et al. [7-10], we hypothesized that these recommendations could also decrease mortality risk in geriatric patients visiting the ED. The aim of this study was to describe the effects of geriatric and gerontological recommendations visiting an ED on risk of death in the first year following the ED visit.

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Materials and Methods

Population

Between February and June 2011, among the 136 older (i.e., aged 75-years and over) patients who visited ED of Angers University Hospital, France, 131 (96.3%, mean age 85.1 ± 4.9 years; 61.1% female) were prospectively and consecutively included in this observational cohort study. The inclusion criteria for the present analysis were: hospitalization on acute care wards after an ED visit, aged 75 years and over, willingness to participate in research, and amenable to follow up contact by phone one year after the ED visit. Patients may receive different type of care: geriatric intervention (intervention group) or non-geriatric intervention (control group). Following care provided on acute wards, participants were statistically separated in three groups matched on age and gender. The intervention groups were divided in two subgroups: patients with geriatric recommendations ($n=11$) and patients with gerontological recommendations ($n=23$). The control group ($n=97$) was composed by patients who received care from non-geriatricians and no specific geriatric recommendation.

Intervention

The first step of the intervention aimed at identifying patients at risk of prolonged length of hospital stay through the stratification provided by the 6-item brief geriatric assessment (BGA) tool [6-8]. The second step consisted of an intervention performed by the MGT based on a comprehensive geriatric assessment with a diagnostic and therapeutic purpose. With this intervention, patients could receive 2 types of recommendations; either geriatric recommendations that involved diagnostic or therapeutic modifications among polymorbid patients or gerontological recommendations that combined geriatric and social advices. The assignment in both groups was not randomized. The assignment in intervention was not controlled as the design was an observational study. It depended on two combined factors which were the number of patients visiting ER and the number of health professionals available in MGT. As it was not possible to see all older ER users during the period of recruitment, the selection of patients was based on the hour of entrance in Emergency room. In order to have a control group comparable with intervention group, we selected patients admitted the same day in the same medical unit after an ER visit and who had the same risk of prolonged length of hospital stay. To improve comparability, identified patients were also matched on age, gender.

Assessment and follow-up of participants

All participants were assessed by an ED physician upon their ED visit. Age, gender, living arrangement (i.e., home versus institution), the number of drugs taken daily, cognitive decline defined as the inability to give the month and/or year, and acute organ failure and reason for admission was coded as a binary variable (yes versus no) were recorded. Compared to the control group, participants in the intervention group were evaluated by MGT, which proposed to ED physician geriatric or gerontological recommendations based on the results of the geriatric assessment. All participants were followed for one year after their ED admission.

Definition of endpoint

During the follow-up period, incident mortality was collected via the administrative registry of Angers University Hospital before the hospital discharge and via a systematic phone call 12 month after ED visit.

Standard protocol approvals, registrations, and participant consents

The study was conducted in accordance with the ethical standards set forth in the Helsinki Declaration (1983). All participants recruited in this study provided a verbal informed consent as the study did not change the usual clinical practice. The verbal informed consent was obtained from the patients themselves in the presence of a reliable caregiver who was usually a family member assisting in decision-making for medical issues. The consent to participate was recorded in patients' digital files. The study and the consent procedure were approved by the Ethical Committee of Angers, France.

Statistical analysis

The participants' baseline characteristics were summarized using means and standard deviations or frequencies and percentages, as appropriate. Participants were separated into 3 groups: control group, intervention group with geriatric recommendations and intervention group with gerontological recommendations. First, between-group comparisons were performed using Kruskal-Wallis, Mann-Whitney, or Chi-square test, as appropriate. Second, a multiple Cox regression model was used to identify whether geriatric and/or gerontological recommendations (independent variables) influenced mortality (dependent variable) while adjusting participants' baseline characteristics. Third, the time elapsing to death among participants separated in three groups (control group, intervention group with geriatric or gerontological recommendations) was studied by survival curves computed according to the Kaplan-Meier method and compared by the log-rank test. Participants were censored one year after their ED visit. P-values less than 0.05 were considered statistically significant. All statistics were performed using SPSS (version 19.0; SPSS, Inc., Chicago, IL).

Results

As shown in Table 1, participants in intervention group who received gerontological recommendations were more likely to live at home, were less frequently admitted for acute organ failure and had a lower mortality during the one-year follow-up period compared to those in control group ($P=0.021$, $P=0.003$ and $P=0.002$) and those who received geriatric recommendations ($P=0.049$, $P=0.003$ and $P=0.006$). Multiple Cox regression model confirmed that gerontological recommendations were associated with a lower mortality rate (Hazard Ratio [HR]=0.12 with $P=0.038$; (Table 2). In addition, it was shown that living at home was associated with a greater risk of death (HR=2.55 with $P=0.020$). There was no significant association for the other variables. Kaplan-Meier distributions of mortality confirmed that intervention group with gerontological recommendations had less deaths than their counterparts ($P=0.015$); (Figure 1). Significant differences were reported when comparing this group with the control group ($P=0.005$) and the geriatric recommendations ($P=0.015$) but no significant difference was showed when comparing with geriatric recommendation ($P=0.799$).

Characteristics	Control group* (n=97)	Intervention groups with recommendations		P-value§			
		Geriatric† (n=11)	Gerontological‡ (n=23)	Overall	Control versus geriatric	Control versus gerontological	Geriatric versus gerontological
Baseline characteristics							
Age (years), mean ± SD	84.9 ± 5.1	84.7 ± 3.4	86.0 ± 4.4	0.608	--	--	--
Female gender, n (%)	55(56.7)	6(54.5)	19(82.6)	0.065	--	--	--
Living at home, n (%)	78(80.4)	8(72.7)	23(100.0)	0.049	0.549	0.021	0.049
Number of drugs daily taken, mean ± SD	6.8 ± 3.0	8.0 ± 4.2	6.4 ± 2.9	0.728	--	--	--
Cognitive decline#, n (%)	33(34.0)	3(27.3)	5(21.7)	0.498	--	--	--
Acute organ failure reason for admission to emergency department, n (%)	46(47.4)	2(18.2)	3(13.0)	0.003	0.064	0.003	0.003
Mortality¶, n (%)	36(37.1)	5(45.5)	1(4.3)	0.006	0.589	0.002	0.006

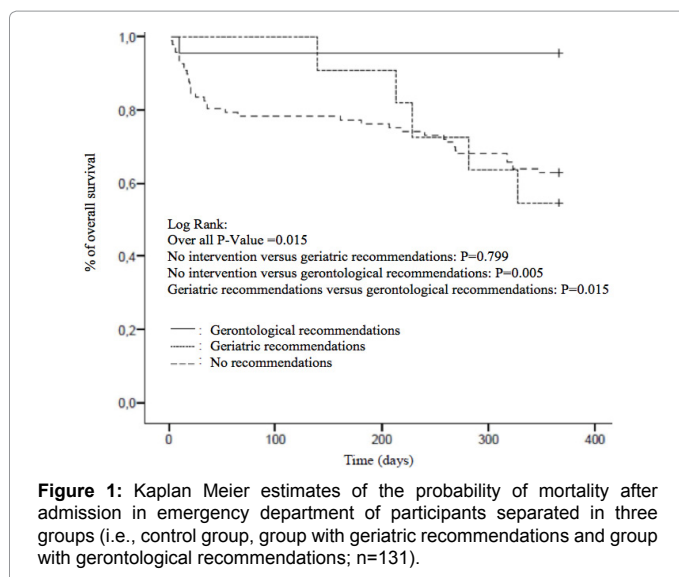
*: Geriatric inpatient admitted in emergency department during the same period of recruitment of participants in intervention group and who did not received recommendation.
†: Recommendations for the diagnosis and treatment of polymorbid older adults with disabilities.
‡: Combination of medical and social recommendations (i.e., geriatric recommendation plus the establishment of formal and adapted home-help services).
§: Comparison based on Kruskal-Wallis, Mann-Whitney, or Chi-square test, as appropriate.
#: Inability to give the month and/or year.
¶: Death occurred during the one-year follow-up period after admission in emergency department.
P-value significant (i.e., P<0.05) indicated in bold.

Table 1: Comparison of geriatric inpatients' characteristics separated in three groups (i.e., control group, group with geriatric recommendations and group with gerontological recommendations; n=131).

Characteristics	Relative risk over time of in-hospital mortality*		
	Adjusted HR	[95%CI]	P-value
Age (years)	0.97	[0.90;1.04]	0.334
Female gender	1.07	[0.55;2.05]	0.850
Living at home	2.55	[1.16;5.62]	0.020
Number of drugs daily taken	0.93	[0.83;1.03]	0.169
Cognitive decline†	1.03	[0.52;2.06]	0.926
Acute organ failure reason for admission to Emergency Department	0.87	[0.45;1.69]	0.926
Intervention			
None‡		1.00 (Ref#)	
Geriatric recommendations§	9.94	[0.35;2.54]	0.905
Gerontological recommendations#	0.12	[0.02;0.89]	0.038

HR: Hazard ratio
CI: Confidence interval.
*: Death occurred during the one-year follow-up period before admission in emergency department.
†: Inability to give the month and/or year.
‡: Geriatric inpatient admitted in emergency department during the same period of recruitment of participants in intervention group and who did not received recommendation.
§: Recommendations for the diagnosis and treatment of polymorbid older adults with disabilities.
#: Combination of medical and social recommendations (i.e., geriatric recommendation plus the establishment of formal and adapted home-help services).

Table 2: Risk estimates over one-year follow-up period of mortality after admission in emergency department based on multiple cox regression models (n=131).



Discussion

Our findings show that gerontological, but not geriatric recommendations were associated with a lower risk of mortality. This finding is consistent with previous published studies. Recently, a systematic review which examined the effects of interventions performed in geriatric patients visiting ED reported that more intensive interventions led to a significant reduction of adverse outcomes compared to simple interventions [2]. In the current study, we can assume that gerontological recommendations are more intensive than geriatric because these recommendations involve a combination of medical and social recommendations. Furthermore, our result is similar to that of a previous one which suggested that there was a positive association between gerontological recommendations and decreased LHS [8]. LHS is usually considered as a surrogate measure of both health and functional status, with a short LHS being thus a marker of better health status than a long LHS [7-10].

Our findings also show that living at home was associated with a greater risk of mortality compared to living in an institution. Some argued that older adults who live at home have a less medical follow-

up compared to those living in institution, which exposes them to a greater acute and/or decompensation of their chronic diseases [11-13]. On the other hand, it is well-recognized that institutionalized residents, whatever their type, are frailer than individuals living at home which should expose them to a greater risk of death [11,12]. Thus, the explanation of this result remains difficult to understand.

Our study has limitations. First, participants were included from a single center in France and were selected based on their age (i.e., 75-years and over) and thus the results are not generalizable to the larger population of the elderly visiting ED. Second, the size of sample of participants was small. Third, the observational design with no randomization of the assignment of participants into intervention and control groups may also limit the interpretation of our results. However, this observational study intends to describe recommendations provided by MGT and represents the first step to conduct future randomized interventional trial. Fourth, although we were able to control for participants' baseline characteristics which were likely to modify the association between the death and the double treatment arm, residual confounders might still be present.

Conclusion

The Gerontological recommendations for the management of geriatric patients visiting ED reduced the risk of death during the year following the hospital discharge. Further research is required to confirm the result of this pilot study and should be based on multicenter randomized controlled trial.

Declarations

Standard protocol approvals, registrations, and participant consents

The study was conducted in accordance with the ethical standards set forth in the Helsinki Declaration (1983). All participants recruited in this study provided a verbal informed consent as the study did not change the usual clinical practice. The verbal informed consent was obtained from the patients themselves in the presence of a reliable caregiver who was usually a family member assisting in decision-making for medical issues. The consent to participate was recorded in patients' digital files. The study and the consent procedure were approved by the Ethical Committee of Angers, France.

Availability of Data and Material

Please contact author for data requests.

Authors' Contributions

- Launay has full access to the data in the study.
- Study concept and design: Launay and Beauchet.
- Acquisition of data: Launay, Rivière, Scholastique.
- Analysis and interpretation of data: Launay, Jaunin, Chabot and Beauchet.

- Drafting of the manuscript: Launay.
- Critical revision of the manuscript for important intellectual content: Scholastique, Jaunin, Chabot, Rivière and Beauchet.
- Obtained funding: Not applicable.
- Statistical expertise: Launay.
- Administrative, technical, or material support: Beauchet.
- Study supervision: Beauchet.

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