Audit of elderly deaths within 72 hours after admission through the emergency department: Descriptive study

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Master of Family Medicine
Masterproef Huisartsgeneeskunde
Academiejaar: 2017 – 2018

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Audit van ouderen overlijdens binnen de 72 uur na opname via de spoedgevallen

Context: Door de toenemende vergrijzing is er meer multimorbiditeit. Deze oefent steeds grotere druk uit op de gezondheidsdiensten waaronder de rusthuizen, sociale en ziekenhuisdiensten. In België is er een vrije toegang tot de tweedelijns gezondheidszorg en hebben de huisartsen formeel geen gatekeeping rol. In deze land wordt er meer dan 10 procent van het bruto binnenlandse product aan de gezondheidszorg besteedt en volgens recente cijfers sterft ongeveer de helft van de bevolking in een ziekenhuis. Dit is zorgwekkend, want tijdens de laatste weken van het leven nemen de kosten van de gezondheidszorg sterk toe, terwijl de kwaliteit van sterven niet lijkt toe te nemen.
Onderzoeksvraag: Het doel van deze studie is om de demografische gegevens, gezondheidsvariabelen inclusief de aanwezigheid van vroegtijdige zorgplanning te beschrijven van oudere patiënten die binnen 72 uur na de opname zijn overleden.
Methode: In dit retrospectieve studie werden anoniem de demografische en medische gegevens van patiënten ≥80 jaar oud die via de spoedgevallen van Universitaire Ziekenhuis Antwerpen waren opgenomen en die binnen de 72 na de opname zijn overleden geanalyseerd.
Resultaten: Gegevens van 47 patiënten die via de spoedgevallen waren opgenomen in de periode januari 2015-Juni 2016 werden geanalyseerd. Meer dan twee-derde van patiënten woonden nog thuis. De meerderheid van de patiënten had een multimorbiditeit. Het meest voorkomende waren, in volgorde van prevalentie, een cardiovasculaire aandoening, arteriële hypertensie, respiratoire aandoening en maligniteit. Meer dan de helft van de patiënten gebruikte polyfarmacie, waarvan in meer dan twee-derde van de gevallen een orale antithrombotica. Bijna twee-derde van de patiënten werden binnengebracht door een ambulance en of Mobiele Urgentiegroep. De meest voorkomende reden van aanmelding waren, in volgorde van prevalentie; een cardiovasculaire collaps, bewustzijnsverlies, pijn op de borst en algemene achteruitgang, samen verantwoordelijk voor meer dan de helft van de aanmeldingen. Bijgevolg was in ongeveer twee-derde van de gevallen een vasculaire aandoening de onderliggende problematiek. Bijna een-derde van de patiënten die antithrombotica gebruikte, stierf uiteindelijk aan een fatale intracraniële bloeding. Meer dan twee-derde van de patiënten onderging uitgebreide reanimatie en/of intubatie voor of net na aankomst op de spoedgevallen. De prevalentie van vroegtijdige zorgplanning was laag en vooral beperkt tot de kankerpatiënten. Ondanks uitgebreide inspanning overleed een-derde van de patiënten op de spoedgevallen, terwijl de meerderheid werd opgenomen, in het bijzonder op de intensieve zorgen of op een chirurgische afdeling voor een complexe en later een fatale chirurgie om na een gemiddeld 9 uur alsnog te komen overlijden.
Conclusie: Deze studie biedt gedetailleerde informatie over de demografische en gezondheidsvariabelen inclusief de prevalentie van de vroegtijdige zorgplanning bij ouderen patiënten die binnen de 72 uur na de opname via de spoedgevallen zijn overleden. Ouderen die acuut en ernstig ziek zijn krijgen een uitgebreide en invasieve behandelingsaanpak bij aanmelding op de spoedgevallen. Slechts een kleine minderheid van de opgenomen patiënten beschikte over een vroegtijdige zorgplanning. We raden aan om vroegtijdige zorgplanning te promoten onder de huisartsen bij hun oudere patiënten die zowel thuis wonen als in een rusthuis verblijven en dit nog toegankelijker te maken gebruikmakend van de reeds beschikbare faciliteiten zoals de Summarised Electronic Health Records. Verder stellen we voor dat er financiering komt voor de introductie van het concept "Geriatric Emergency Department Intervention systems" om de zorg rond het levenseinde te verbeteren, de druk op de gezondheidszorg en de sociale diensten te verminderen, kosten te besparen en mogelijks de kwaliteit van het leven voor deze kwetsbare mensen te verhogen rond hun laatste levensdagen.

Abstract

Background: There is a rise in frailty and multimorbidity due to the increasingly aging population. As a result, this aging population puts strain on health care systems, including social and hospital services. In Belgium, there is free access to secondary care facilities and primary care physicians have no formal gatekeeping role. In this country, around half of the population dies in a hospital and over 10 percent of the gross domestic product is spent on health care. This is of concern as during the last weeks of life, health care costs steeply increase while the quality of dying does not seem to increase. To get more insight into these figures, the purpose of this study is to describe the demographics and health care related variables, including the presence of advanced care planning in the elderly population who have deceased within 72 hours after admission through the emergency department

Methods: In this retrospective descriptive observational cohort study, medical records of patients ≥80 years old who have deceased within 72 hours after admission to the University Hospital of Antwerp through the emergency department were anonymously reviewed.

Results: Data of forty-seven patients, who were admitted through the emergency department over a 15-month period starting January 2015, were analysed. Surprisingly, more than two thirds of the patients still lived at home. The vast majority of the patients had three comorbidities prior to admission. The most common comorbidities were, in order of prevalence: cardiovascular diseases, arterial hypertension, respiratory disease and malignancy. Unsurprisingly, more than half of the study population used polypharmacy, with more than two thirds being on oral antithrombotics. Almost half of the patients were brought in to the emergency department by an ambulance accompanied by a critical care intervention group. The most common reasons for referral to the emergency department were, in order of prevalence: cardiovascular collapse; loss of consciousness; chest pain and general deterioration. All together these were responsible for more than half of the emergency department presentations. Accordingly, two thirds of the emergency department diagnosis were of a vascular origin. More than two-thirds of the patients underwent extensive reanimation and/or intubation upon arrival at the emergency department. Almost one third of the study population who used antithrombotics eventually deceased from a fatal intracranial haemorrhage. Despite an extensive and costly resuscitation approach, the outcome was very limited. One third of patients died at the emergency department shortly after arrival and the remaining patients were admitted to various wards, in particular to the intensive care unit and surgical wards for complex and eventually fatal surgeries, only to prolong their lives with an average of 9 hours.

Conclusion: This study provides detailed information about the demographics, health care related variables and the prevalence of advanced care planning in elderly patients who deceased within 72 hours after admission through the emergency department. Elderly patients who are acutely and seriously ill receive a major invasive and extensive resuscitation approach at the emergency department. Only a small minority of the admitted patients had an advanced care planning at their disposal. We suggest advanced care plannings to be actively promoted by primary care physicians in the health system. Furthermore, we propose that there should funding towards the introduction of Geriatric Emergency Department Intervention systems in order to improve end-of-life care, reduce strain on healthcare services, save costs and possibly increase quality of life for these vulnerable people in their final days of life.

1.Introduction

Life expectancy is increasing worldwide in high and middle-income countries [1, 2]. This is mainly due to medical advances, better living, socio-economic and political conditions and more importantly better health care delivery systems [1, 3, 4]. As a result, this elderly population will show more frailty and multimorbidity [5] and an increasingly higher proportion of this population may decease in residential aged care facilities (RACF) and hospitals after admission for an acute episode on a chronic illness.
The aging population will therefore put strain on health care systems, including social and hospital services [6].

The socio-psychological, physiological, multimorbidity, polypharmacy, age-associated diseases, functional disability, biochemical variations and clinical differences of signs and symptoms presentation make health care for the elderly complicated and demand a different approach of management which not every physician may be able to cope with [3, 6-8].
The elderly population, both from the RACF's and the community have a higher rate of emergency department (ED) presentation [9-11]. Frailty and multimorbidity, the disruption of the primary care, understaffing in RACF's, sudden loss of family support/social network and the absence of advanced care planning (ACP) have been reported to be associated with higher transfers to ED in their last years of their life [12]. However, such admissions has been reported to be associated with a negative outcome, for example, on the mortality [13] and functional outcome [14].

Furthermore, hospital beds are occupied by elderly patients more frequently, and for a relatively longer period compared to the younger patients [15]. Those over the age of 65 have been reported to be admitted to the hospital thrice as often as opposed to younger persons and roughly 35% are discharged with decreased functional capacity after admission [16]. In addition to that, it has been reported that roughly 5% of admitted patients decease during hospitalisation and up to 30% die within 1 year after they were discharged from hospitals [16].

In Belgium, there is free access to secondary care facilities and primary care physicians have no formal gatekeeping role [17]. In this country as a typical country with a liberal health care system spending over 10 percent of the gross domestic product on health care, recent figures show about 45 percent of the population dies in a hospital [18]. This is of concern as during the last weeks of life, health care costs steeply increase while the quality of dying does not seem to increase [19].

To get more insight into these figures, the purpose of this study is to describe the demographics and health care related variables including the presence of ACP in elderly population who have deceased within 72 hours after admission through the ED.

2.Methods

In this retrospective descriptive observational cohort study, records of patients who have deceased within 72 hours after admission to the University Hospital of Antwerp (UHA) through the ED during a fifteen-month period starting January 2015 were reviewed. This study included patients ≥80 years old who deceased within 72 hours after admission. For this study, we obtained, anonymised and analysed the following medical data from the patient's records:

- *Demographics:* age, gender, marital status and place of living
- *Patient variables:* presence of family upon/prior to death, cognitive and functional state prior to admission, comorbidities, polypharmacy/medications, number of ED presentations/admissions 12 months prior to current admission, presence of ACP/DNR (Do Not Resuscitate) codes
- *ED variables:* referring person, arrival mode, admission time, triage category, reanimation and intubation upon arrival, main presenting symptoms, technical investigations, diagnosis, major initial treatment reason for referral, ACP/DNR code prior to discharge from ED,
- *Inpatient variables:* specialty of admission, length of admission, time of death

The scope of this study is not to investigate a possible association between certain patient's variables, number of admissions and/or mortality, but to describe without any statistical analysis.

The Ethics Committee of UHA and University of Antwerp (UA) approved the study protocol (#17/09/094).

3.Results

3.1 Study case identification

Figure 1 shows how cases from the hospital database were identified. During the fifteen-month period starting January 2015, 6069 patients aged ≥80 years attended the ED. One hundred and sixty-five patients deceased in the hospital, of which fifty-six patients were within 72 hours after admission through the ED. A final number of forty-seven patients were included in this study after exclusions of any direct transfers to other wards from peripheral hospitals through the ED, and incomplete or missing record of the current admission.

The demographics, Emergency department (ED) variables, the patient and inpatient variables of the study population are summarised in Table 1. Only important or relevant findings will be described in detail in the result and in the discussion section.

3.2 Demographics

A total number of 47 patients were included in this study, of which 40% (*n=19*) were male and 60% (*n=28*) were female with an average age of 85 years. The vast majority of the patients were residing at their own residence, namely 74% (*n=35*) whereas 21% (*n=10*) where residing at RAFC ((nursing homes, *n=9*) and service flat (*n=1*). In 4% (*n=2*) of the cases the type of facility where the patient was residing was unknown.

3.3 Comorbidities

Figure 2 shows patient's comorbidities prior to admission. The average number of comorbidities was 3 and the most common comorbidities observed were cardiovascular diseases (56%, *n=32*) followed by arterial hypertension (19%, *n=11*), respiratory diseases (19%, *n=11*) and malignancy (16%, *n=9*). In 11% (*n=6*) of cases notes about the patient's morbidities were not present.

3.4 Polypharmacy

More than half of the study population (51%, *n=24*) used polypharmacy, whereas 28% (*n=13*) did not, and in 21% (*n=10*) of the cases this was unknown. The most commonly used classes are shown in Figure 3 and were antithrombotics (68%, *n=32*), followed by diuretics (49%, *n=23*), beta-blockers (34%, *n=16*), proton pump inhibitors (32%, *n=15*), statins (28%, *n=13*) and antiarrhythmics (17%, *n=8*, excluding Beta-blockers).

3.5 Advanced care planning

Eighty-seven percent of the patients had no available ACP at admission. The remaining thirteen percent had set up an ACP (DNR II, *n=2*, DNR0, *n=4*). Both patients with DNR II and two of the DNR0 were cancer patients, whilst the remaining two patients with DNR0 were from RACF making the prevalence of ACP among the RACF residents 22% and that of cancer patients 44%.

3.6 Mode of arrival

The most common mode of arrival, namely 45% (*n=21*), was by an ambulance accompanied by a critical care intervention group, followed by an ambulance only, 13% (*n=6*). The remaining patients arrived by a private transport (6%, *n=3*), or their mode of arrival was unknown (11%, *n=5*).

3.7 Source of referral

The source of referral to the ED was in almost half of the patients (45%, *n=21*) by a healthcare professional (primary care physician and nurse), whereas in 30% (*n=14*) of the cases this was either a family member or a bystander. Only one patient arrived at the ED on his/her own initiative, whilst the source of referral of the remaining 23% (*n=11*) of the patients was unknown.

3.8 Main presenting symptoms

Figure 4 shows the main presenting symptoms at the ED, which were in 17% (*n=8*) a collapse (witnessed cardiac arrest, collapse because of other reasons) and also in 17% (*n=8*) of the cases due to loss of consciousness (patient found unconscious). The next common reasons of admission were in 13% (*n=6*) chest pain and also in 13% (*n=6*) of the cases due to general deterioration, followed by dyspnoea (9%, *n=4*) and pain (9%, *n=4*). The remaining patients (23%, *n=11*) presented with various other reasons such as a fall, nausea and/or vomiting, road traffic accident, paralysis or due to an unknown reason.

3.9 Diagnosis

Figure 5 shows the diagnosis at ED. More than a third (34%, *n=16*) of the patients were diagnosed with cardiac diseases (arrest, infarct, arrhythmia, shock), whereas almost a fifth (19%, *n=9*) of the patients were diagnosed with haemorrhage (*n=8* for intracranial and *n=1* for intraperitoneal haemorrhage) whilst taking antithrombotics. Thus, the prevalence of haemorrhage in those using antithrombotics (*n=32*) was 28%. Three of these patients were taking a vitamin K antagonist and in only one patient the INR was known (5.0) whilst the lab tests of the other two patients were not performed. The remaining patients used NOACS (*n=2*) and antiplatelets

(*n=3*) and their INR was either normal or lab tests were not performed. The next common diagnoses were respiratory disease ((9%, *n=4*), COPD/Asthma exacerbations, infections) and septic shock (9%, *n=4*). An equal number of patients presented with malignancy related problems (6%, *n=3*), aortic rupture or dissection (6%, *n=3*) and CVA (6%, *n=3*). In only one patient (2%, *n=1*) a diagnosis of acute abdomen was made, whereas in the remaining patients (9%, *n=4*) the ED diagnosis was either not clear or belonged to other categories.

3.10 Admitting specialty

Most of the patients (36%, *n=17*) were admitted to the intensive care unit (ICU) whereas approximately one third (28%, *n=13*) deceased at the ED (of which 6 patients who had received a DNR IV/Comfort therapy). An equal number of patients were admitted to the Neurology ward (6%, *n=3*), Vascular surgery ward ((6%, *n=3*) and Cardiology ward (6%, *n=3*). The remaining 17% (*n=8*) patients were admitted to various other wards.

4. Discussion

To the best of our knowledge, this is the first study in Belgium studying the demographics and health related variables including the presence of ACP of elderly patients who have deceased within 72 hours after admittance through the ED.

To our surprise, more than two thirds of the study population were residing at their own residency prior to admission. Apparently, most of them were in good cognitive and functional state prior to admission.

The vast majority of our study population had on average three comorbidities or chronic (age-associated) diseases prior to admission. The most common comorbidities were, in order of prevalence: cardiovascular diseases, arterial hypertension, respiratory disease and malignancy. This finding (not necessarily the order of prevalence) is consistent with many other studies investigating the chronic disease in the elderly population, for example Schneider et al [20] and Salive [21]. A number of studies of the elderly population, for example Longman et al [22], Ahluwalia et al [23] and Ayaz et al [24] of the elderly population have shown a strong positive correlation between the presence of comorbidity and frequent admissions to hospital.

Polypharmacy in this study was defined as taking ≥5 medications excluding over the counter (OTC's). Unsurprisingly, more than half of the study population used polypharmacy, with more than two thirds being on oral antithrombotics. It was difficult to estimate and/or identify how many admissions were polypharmacy/medications related, but almost one third of the study population who used antithrombotics eventually deceased from a fatal haemorrhage, concerning a non-traumatic intracranial haemorrhage in most of the cases. Of course, these findings need to be interpreted with caution due to the small sample size.

The most common reasons for referral to the ED were, in order of prevalence: cardiovascular collapse; loss of consciousness; chest pain and general deterioration. All together these were responsible for more than half of the ED presentations. Accordingly, two thirds of the ED diagnosis were of a vascular origin (cardiovascular and neurovascular together). Despite the fact that most of the patients in our study were not from RACF, were in apparent good cognitive and functional state (and assuming that patients in this study deceased from the diagnosis made at ED), these figures are still consistent with the diagnoses of deceased peers in RACF's in this country [25]. However, these findings are mostly inconsistent with many previous research studies

in the elderly population outside Belgium. For example, Elsayem [26] reported pain, respiratory diseases and malignancy related presentations, Samaras et al [27] reported falls, McCuster et al [28] reported injuries and Arendts et al [29] reported respiratory diseases followed by cardiovascular diseases as the most presenting symptom/diagnosis.

Our findings show that only a small minority (*n=6*) of the patients had a known ACP, of which 4 were cancer patients and 2 were RACF residents. This makes the prevalence of ACP in the RACF residents 22%, a finding inconsistent with that reported by De Gendt et al [25], who reported a much higher figure, namely 51.8% of ACP's in the RACF residents in Flanders. However, the prevalence of ACP among the cancer patients was much higher, namely 44%, a finding that is well consistent with De Gendt et al [25] and Meeussen et al [30]. This is likely due to the fact that cancer patients are much more proactively engaged in the ACP process compared to non-cancer patients because of the dying course that is relatively more predictable with usually a "short period of evident decline" towards the end of their lives [31].

We suspect high, and to some extent avoidable, transfers and health costs associated with admissions of these elderly patients. As you would expect from the average ED physician when no rapidly accessible information of the critically ill elderly is at hand, most of our elderly patients appeared to have received an extensive but futile resuscitation approach during their last moments of life. For example, almost half of the patients were brought in to the ED by an ambulance accompanied by a critical care intervention group, more than two-thirds underwent extensive reanimation and/or intubation and had on average 3 different technical investigations at the ED. Despite these huge and costly efforts, the outcome was very limited. One third of patients died at the ED shortly after arrival and the remaining patients were admitted to various wards, in particular to the ICU and surgical wards for complex and eventually fatal surgeries, only to prolong their lives with an average of 9 hours. These findings are fairly similar to a study in Singapore [32] and an Australian study [33] who also demonstrated that elderly patients received a maximum but usually futile resuscitation approach at the ED due to miscommunication and lack of documentation of intervention limits or any ACP's. One could wonder if such an expensive, intensive resuscitation was appropriate in these cases and whether they were in the patients' best interests. We should develop a system or tools to be able to quickly decide whether we should aggressively continue our efforts of resuscitation in this population. Furthermore, we should also consider the costs for the healthcare system. Most of the elderly patients are often seen in

a crowded ED with limited resources, limited time to perform thorough assessment and a system with a fast throughput. However, promising results have been obtained by some health service interventions systems at ED's for the purpose of providing appropriate care for the elderly patients. For example, the "Geriatric Emergency Department Intervention (GEDI) delivered in the ED by a multidisciplinary team consisting of a dedicated ED physician and advanced practice nurses who have additional experience and education in gerontology and care of frail, older people" [12].

A question worth asking is whether general practitioners who care for the elderly in their homes and follow up chronic disease patients could have avoided transfers to ED or certain types of treatment at the ED? This is difficult to say for the patients included in this study, but they certainly could avoid prolonged resuscitation by setting up and making ACP's easily available for their elderly population with progressive diseases as is shown by Brinkman-Stoppelenburg et al [34]. Martin et al. also demonstrated, in a systematic review, that ACP has beneficial effects on the RACF resident [35]. They reported a decrease in hospitalisation without an increase in the mortality, a significant number of residents dying in the RACF and a reduction in the overall health associated costs. We therefore suggest that primary care physicians actively promote ACP's and also ensure to make these rapidly accessible to intervening teams and colleagues at the ED.

5. Limitations

This study has some limitation and our findings must be interpreted cautiously. The major limitations were the small sample and the fact that we only looked at the patients who deceased within 72 hours without a control group. Data were collected from one University Hospital of medium size. We had no access to the medical records in other hospitals nor from the primary care physicians. Furthermore, because of the limited coding of diagnoses and processes at the ED, some subjectively written information was coded by the researcher such as cognitive and functional state.

6. Conclusion

This study provides detailed information about the demographics and health related variables including the presence of ACP of elderly patients who have deceased within 72 hours after admittance through the ED in one University Hospital in Belgium. We conclude that elderly patients who are acutely and seriously ill receive a major invasive, expensive and extensive resuscitation approach at the ED and only a small minority of the admitted patients had an APC at their disposal. We suggest ACP's to be actively promoted by primary care physicians in the health system and made easily available when urgent

medical care is needed. In Belgium, this is perfectly possible as e-health facilities are already capable of documenting medication profiles and a Summarised Electronic Health Records (SUMEHR) [36] online for all citizens and consultable for all physicians who treat the patient. Furthermore, in Belgium we propose to introduce the concept of Geriatric Emergency Department Intervention (GEDI) systems to improve end-of-life care, reduce strain on healthcare services, save costs and possibly increase quality of life for these vulnerable people in their final days of their life.

7. Abbreviations

- **VZP:** Vroegtijdige Zorgplanning=Advanced care planning (**ACP**)
- **MUG:** Mobiele Urgentiegroep=critical care intervention group
- **SUMEHR:** Summarised Electronic Health Records
- **GEDI:** Geriatric Emergency Department Intervention
- **RACF:** Residential Aged Care Facilities
- **UHA:** University Hospital of Antwerp
- **UA:** University of Antwerp
- **ED:** Emergency Department
- **DNR:** Do Not Resuscitate
- **INR:** International Normalised Ratio
- **NOACS:** Novel Oral Anticoagulants
- **COPD:** Chronic Obstructive Pulmonary Disease
- **CVA:** Cerebrovascular accident
- **OTC:** Over-The-Counter

8. Acknowledgements

Writing this thesis was a lengthy and intensive process. Fortunately, I wasn't alone. Firstly, I would like to thank my promotor, Professor doctor Roy Remmen and co-promotor, Doctor Sabine Lemoyne, from the bottom of my heart for their continuous guidance, constructive criticism and emotional support. Of course, completion of this assignment wouldn't be possible without the necessary love and support in every possible way from the most important person in my life, my wife Aisha. Lastly, I would like to thank all my friends and families for their support and understanding.

9. Figures and tables

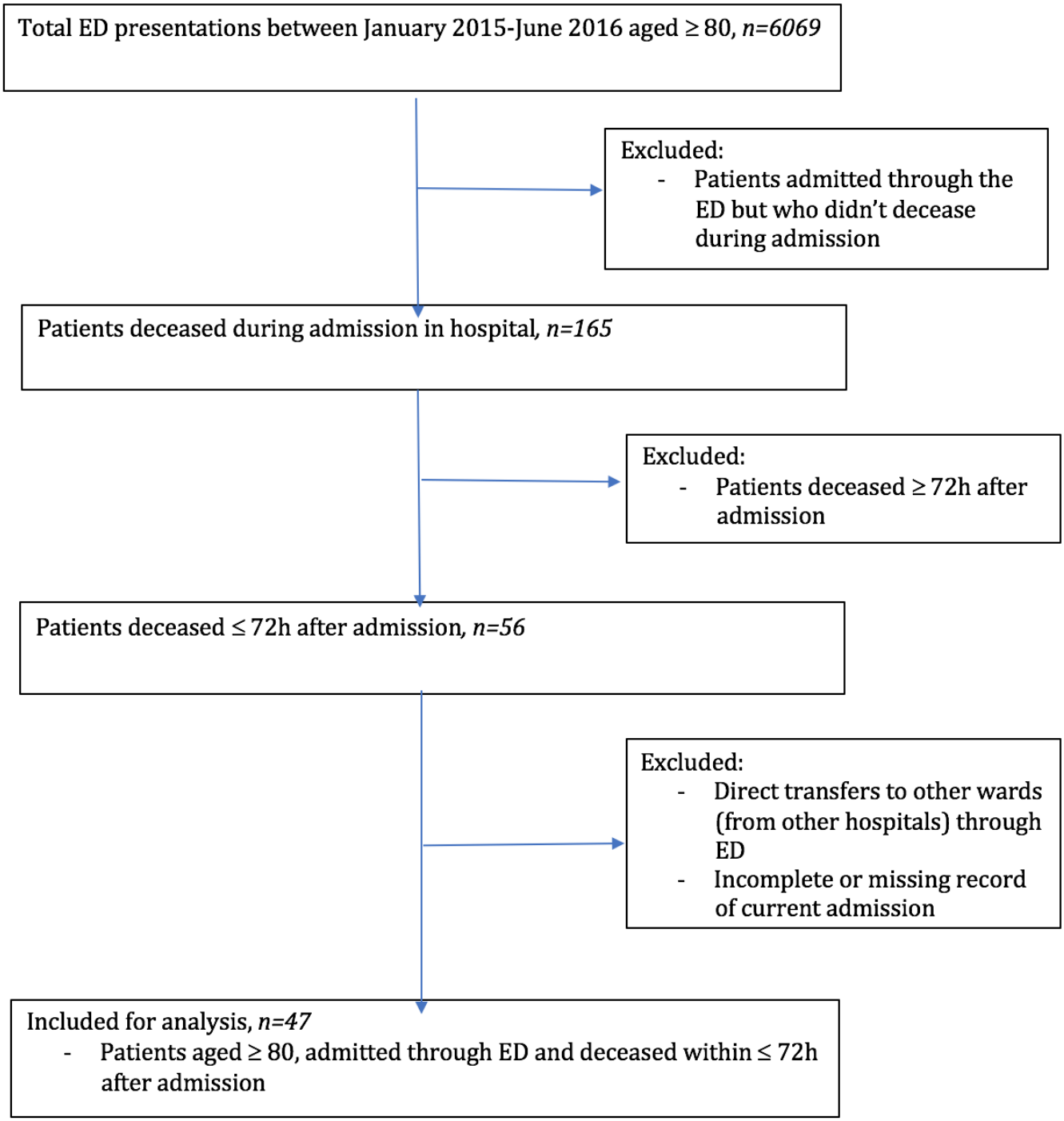


***Figure 1**. Flow chart of the case identification.* From the 6069 presentations to the ED between the period 01-2015-06-2016, a final number of 47 patients were included in this study after exclusion of patients who weren't admitted, patients who didn't decease in hospital, any direct transfers to other wards from peripheral hospitals through the ED and incomplete or missing record of the current admission. ED=Emergency department.

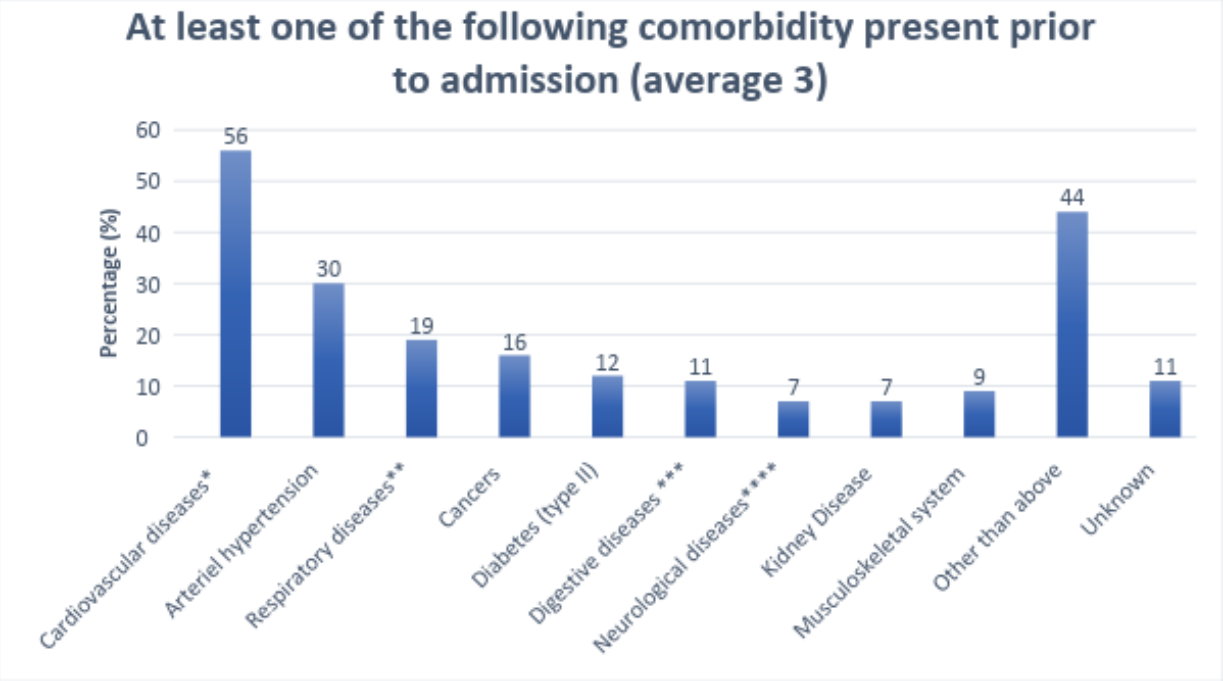


Figure 2. *Comorbidities present prior to admission.* The average number of comorbidities was 3. The most common comorbidities were cardiovascular diseases, followed by arterial hypertension respiratory diseases, malignancy (past or present) etc. In 11% (n=6) of cases notes about patient's morbidities were not present. *AMI, VKF, CABG, heart failure, valve pathology PTCA, claudication intermittence etc. **COPD, Asthma, OSAS etc. *** major gut surgeries, chronic peptic ulcers/gastritis, colitis, Crohn disease. ****CVA/TIA, Dementia, Parkinson, epilepsy etc.

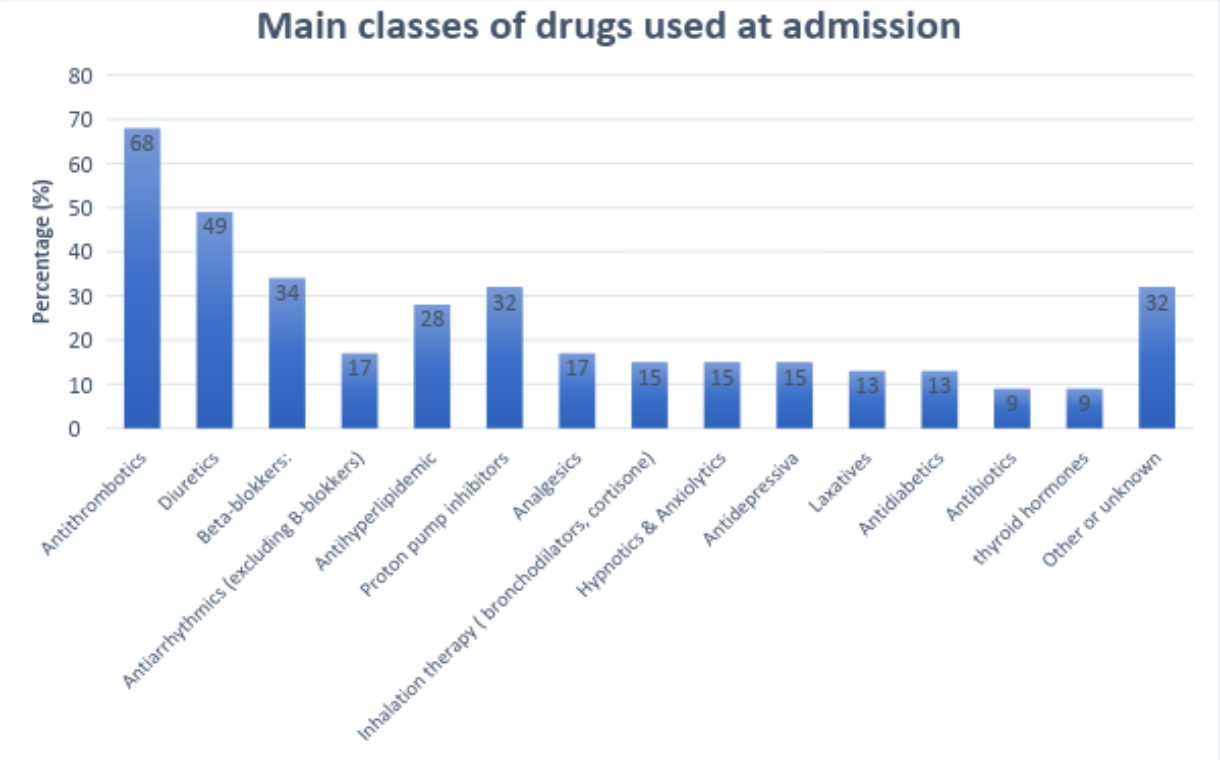


Figure 3. *Main classes of drugs*. The most common drug classes used were antithrombotics, followed by diuretics, beta-blockers, proton pump inhibitors, statins and antiarrhythmics etc.

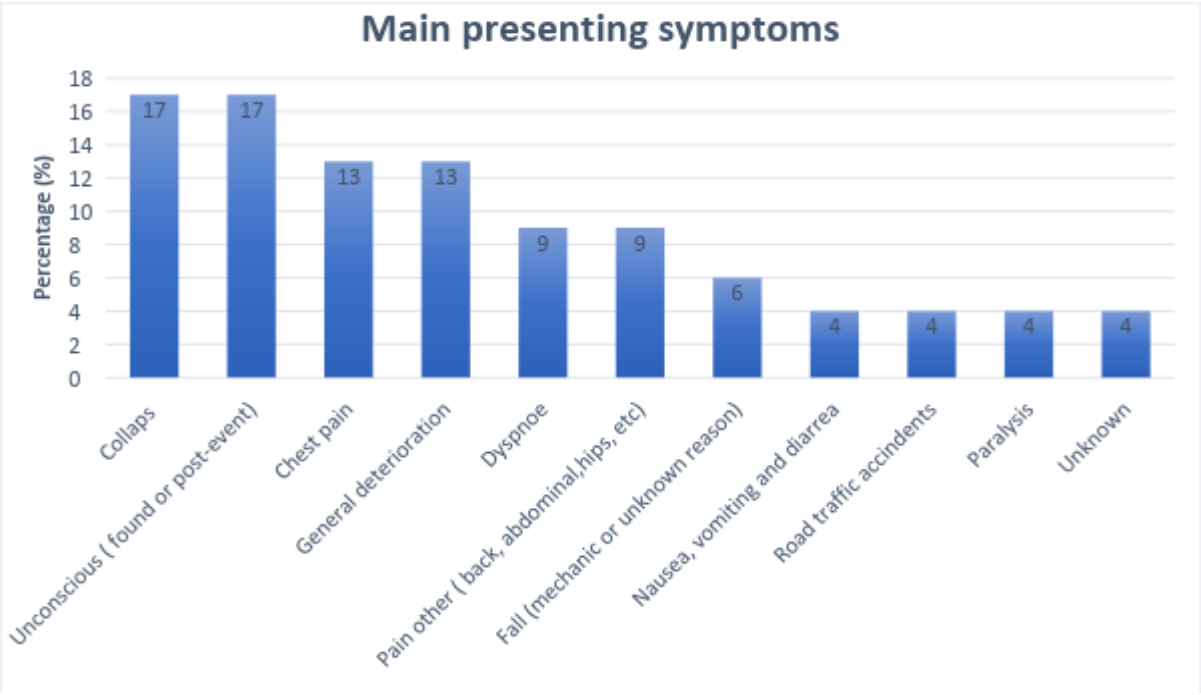


Figure 4*. Main presenting symptoms.* The main presenting symptom were in 17% collapse (witnessed cardiac/non-cardiac collapse) and also in 17% of the cases due to loss of consciousness (patient found unconscious). The next common reasons of admission were in 13% chest pain and also in 13% of the cases due general deterioration followed by dyspnoea and pain. The remaining of the patients presented with various other reasons such as a fall, nausea and vomiting road traffic accident, paralysis or due to an unknown reason.

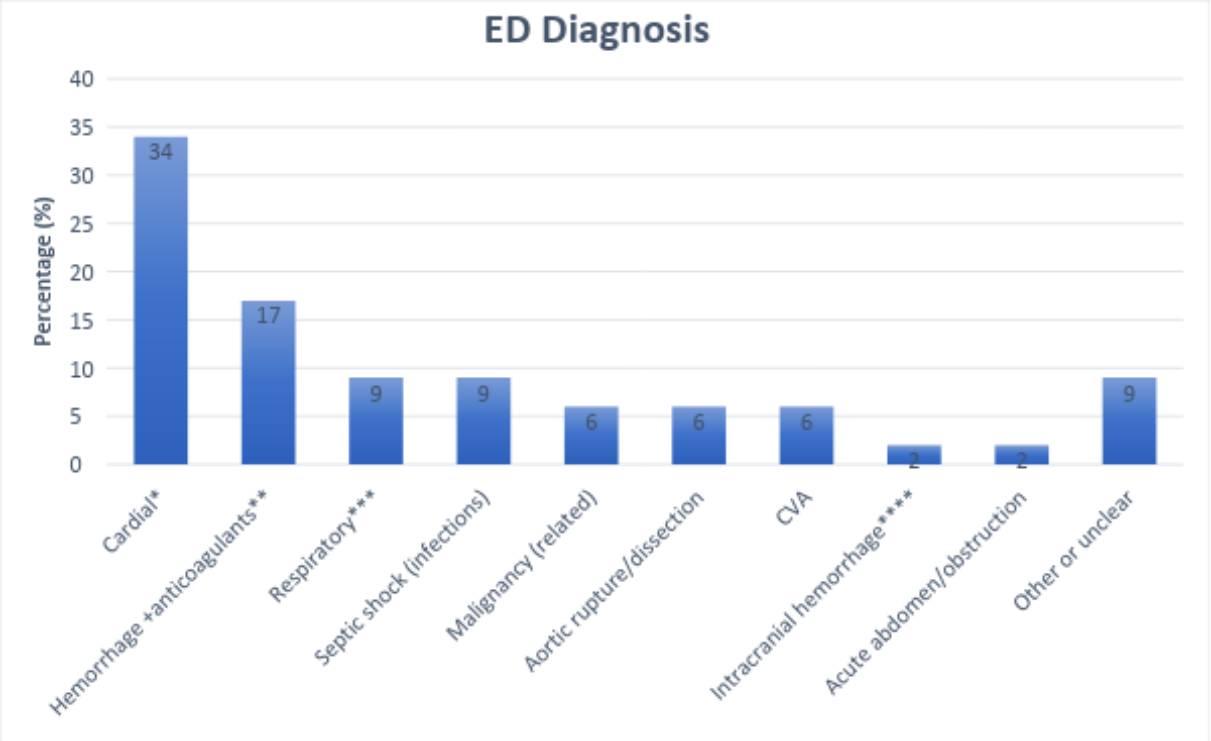


Figure 5. *Diagnosis at ED.* The most common diagnosis was a cardiac disease (*arrest, infarct, arrhythmia, shock), followed by haemorrhage (patients with antithrombotics, **almost all intracranial), respiratory disease (***COPD/Asthma exacerbations, infections) and septic shock. An equal number of patients presented with malignancy related problems, aortic rupture or dissection and CVA. In only one patient a diagnosis of acute abdomen was made, whereas the remaining patients the ED diagnosis was either not clear or belonged to other categories.

Table 1. Demographics and health related variables of the study population, *n=47*

Patient variables	***n***	**%**
Age (mean 85 years)		
80-84	25	53%
85-89	13	28%
90-95	9	19%
Gender		
Male	19	40%
Female	28	60%
Marital status		
Married	7	15%
Cohabiting	1	2%
Widowed	1	2%
Not registered/disclosed	38	81%
Type of residential facility where patient resides		
Own residence	35	74%
Aged care facility (nursing home (*n=9*), service flat (*n=1*)	10	21%
Other/unknown	2	4%
Family presence upon/during admission or death		
Yes	41	87%
No	1	2%
Unknown	5	11%
Cognitive state prior to illness		
Normal	2	4%
Known Dementia	2	4%
Unknown but seems ok	28	60%
Unknown	15	32%
Functional state prior to illness		
Normal	2	4%
Unknown but seems normal	27	57%
Unknown	17	36%
Immobile	1	2%
Number of comorbidities present prior to current admission (average 3)		
1-2	20	43%
3-4	13	28%
≥5	6	13%
Unknown	6	13%
At least one of the following comorbidity present prior to current admission		
Cardiovascular disease*	32	56%
Arterial hypertension	17	30%
Respiratory diseases**	11	19%
Cancers	9	16%

Diabetes (type II)	7	12%
Digestive diseases ***	6	11%
Nervous system ****	4	7%
Kidney Disease	4	7%
Musculoskeletal system	5	9%
Other than above	25	44%
Unknown	6	11%
Polypharmacy (≥5)?		
Yes	24	51%
No	13	28%
Unknown	10	21%
Main classes of drugs used prior to current admission		
Antithrombotics	32	68%
Diuretics	23	49%
Beta-blockers	16	34%
Antiarrhythmics (excluding B-blockers)	8	17%
Antihyperlipidemics	13	28%
Proton pump inhibitors	15	32%
Analgesics	8	17%
Inhalation therapy (bronchodilators, cortisone)	7	15%
Hypnotics & Anxiolytics	7	15%
Antidepressiva	6	13%
Laxatives	6	13%
Antidiabetics	5	11%
Antibiotics	4	9%
thyroid hormones	4	9%
Other or unknown	15	32%
Type of antithrombotic used, *n=32*		
Antiplatelet	9	28%
Direct oral anticoagulants	9	28%
Vitamin K-antagonist	8	25%
Low molecular weight heparins	1	3%
Combination (different antiplatelets)	5	16%
Number of ED presentations/admissions 12 month prior to current illness		
0	12	26%
1-2	9	19%
3-4	0	0%
5-6	2	4%
Unknown	24	51%
Advanced care planning prior to current admission		
Unknown/Missing	41	87%
Yes (including DNR 0)	6	13%
DNR code prior to current admission		
0	4	67%
I	0	0%
II	2	33%

III/Palliative/Comfort therapies	0	0%
Emergency department (ED) variables		
Source of referral to ED		
Healthcare professionals (GP, Nurse)	21	45%
Own initiative	1	2%
Family/bystanders	14	30%
Unknown	11	23%
Mode of arrival		
Ambulance & Mobile Medical Team (MMT)	33	70%
Ambulance	6	13%
Private (own/family)	3	6%
Unknown	5	11%
Time of admission to the ED		
Office hours (08:00-16:59)	24	51%
Out of office hours (17:00-07:59)	23	49%
Triage category		
Red	31	66%
Orange	6	13%
Yellow	6	13%
Green	4	9%
Blue	0	0%
Reanimation upon arrival		
Yes	15	32%
No	32	68%
Intubation upon arrival		
Yes	19	40%
No	24	51%
Other or unknown	4	9%
Main presenting symptom		
Collapse	8	17%
Unconscious (found or post-event)	8	17%
Chest pain	6	13%
General deterioration	6	13%
Dyspnoea	4	9%
Pain other (back, abdominal, hips, etc.)	4	9%
Fall (mechanic or unknown reason)	3	6%
Nausea, vomiting and diarrhoea	2	4%
Road traffic accidents	2	4%
Paralysis	2	4%
Unknown	2	4%
Major investigations upon or during admission (average 3)		
Lab	37	79%
X-ray (Chest, abdomen, other)	21	45%
ECG	17	36%
CT (brain)	12	26%
Coronarography (+stent)	8	17%

Cardiac ultrasound (TEE and TTE)	5	11%
Ultrasound	4	9%
CT other	4	9%
None or unknown	6	13%
Diagnosis ED		
Cardiac (Arrest, Infarct/arrhythmias/Shock)	16	34%
Haemorrhage +anticoagulants (Intracranial (n=7) and intraperitoneal (n=1))	8	17%
Respiratory (infection, chronic disease)	4	9%
Septic shock (infections)	4	9%
Malignancy (related)	3	6%
Aortic rupture/dissection	3	6%
CVA	3	6%
Intracranial haemorrhage (road traffic accident)	1	2%
Acute abdomen/obstruction	1	2%
Other or unclear	4	9%
Major treatment ED		
Symptomatic and supportive therapy*	16	34%
Palliative/Comfort therapy	3	6%
Reanimation and or intubation	13	28%
Other or unknown	15	32%
DNR code upon current admission at ED		
0	5	11%
I	7	15%
II	11	23%
III	1	2%
IV/Palliative care/Comfort therapy	7	15%
Deceased at ED	7	15%
Unknown	9	19%
Inpatient variables		
Admitting specialty		
ICU	17	36%
Deceased at ED	13	28%
Neurology ward	3	6%
Vascular surgery	3	6%
Cardiology	3	6%
Other	8	17%
Length of admission	Total time (hours)	Average time (hours)
Office hours (08:00-16:59)	232	10
Out of office hours (17:00-07:59)	182	8
Time of death		
Office hours (08:00-16:59)	18	38%
Out of office hours (17:00-07:59)	29	62%

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Attachments: Ethics Committee study protocol approval.

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Elderly deaths within 72 hours after admission through an emergency department: causes of death, factors influencing the mortality rates and reasons for admission (Manama huisartsgeneeskunde Mohammad Ayaz Tokhi)

datum	ons kenmerk	contactpersoon
13/03/2017	17/09/094	Annelies Van Looy Anniek Leeraert Marleen Bolens ethisch.comite@uza.be

DEFINITIEF GUNSTIG ADVIES

Geachte Collega,

Het Ethisch Comité van het Universitair Ziekenhuis Antwerpen en de Universiteit Antwerpen heeft bovenvermelde studie besproken en geeft een gunstig advies dd. 13/03/2017.

De volgende bijlagen werden volgens de ICH-GCP richtlijnen door het Ethisch Comité goedgekeurd:

- CV Onderzoeker UZA
  Ayaz Tokhi
- Protocol dd. 26/02/2017
  Versie 2

De volgende opmerkingen werden nog gemaakt:

1) In het protocol is er sprake van 'anonieme' gegevens. Bij anonieme gegevens is terugkoppelen naar de deelnemer niet mogelijk. Indien terugkoppelen wel mogelijk is door middel van een code, wordt er gesproken over 'gecodeerde' gegevens.

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Vervolg blz. 2 van het adviesformulier betreffende project EC UZA 17/09/094

datum	ons kenmerk	contactpersoon
13/03/2017	17/09/094	Annelies Van Looy Anniek Leeraert Marleen Bolens ethisch.comite@uza.be

Tenslotte verzoeken wij u ons volgende data te melden:
-Startdatum inclusie patiënten
-Datum waarop de studie wordt afgesloten en de reden hiervoor:
- o Nooit opgestart
- o Vroegtijdig stopgezet
- o Einde studie

Met vriendelijke groeten,

Prof. dr. P. Cras
Voorzitter Ethisch Comité

cc: Dr. M. Tokhi, NVT, Nachtegaallaan 12 b8 - 2660 Hoboken
Dr. S. Lemoyne, UZA - Spoedgevallen - 2650 Edegem

- BLOEDAFNAME, RX,...

8. GEEF EEN KORTE SAMENVATTING VAN HET PROTOCOL (MINIMUM 30 ZINNEN/ EEN HALVE PAGINA EN MAXIMUM ÉÉN PAGINA), VERSTAANBAAR VOOR MENSEN NIET GESPECIALISEERD IN DE MATERIE, VERWIJS NIET ALLEEN NAAR EEN BIJGEVOEGD PROTOCOL.

...

In this retrospective observational cohort study, records of patients who have died within 72 hours after admission to the University Hospital of Antwerp through the emergency department between January 2015 and March 2016 will be retrospectively reviewed. This study will only include patients ≥80 years old who have died within 3 days after admission. For this study, we will anonymously obtain the following data from the patient's records: demographic data, comorbidities, medications, reason for admission, length of admission, diagnosis upon admission, CPR prior to/during admission, treatment upon admission, ward of admission, vital parameters, DNR-codes and investigations (hematology, biochemistry, imaging). Finally, financial data records for these admissions will be analyzed to characterize patterns of costs these admissions were associated with and based on these patterns to examine the role of setting up advanced care planning and palliative care consultations for the elderly patients who are fragile and have chronic and serious illness.