Original Article

Thai Geriatric Emergency Patients' Registry in Tertiary Care Hospitals

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Background: Emergency department (ED) is one of the most crucial department to take care of the elderly patients. However, there is limited data about the characteristics of emergency elderly patients in Asia as well as the factors that have impact on the need of life-saving intervention (LSI) and hospital admission.

Objective: To study characteristics and factors that affect the need of LSI and hospital admission of the elderly patients who visit the ED.

Materials and Methods: This retrospective descriptive study conducted at 2 hospitals, 1) Srinagarind hospital, Faculty of medicine, Khon Kaen University, Thailand, and 2) Khon Kaen Hospital, a tertiary-care center of Northeast region of Thailand. All patients aged ≥65 years old who visited the ED from any causes between 1st January and to 31st December 2015 were enrolled. Demographic data and clinical characteristics were collected.

Results: A total of 657 elderly patients was enrolled, average age was 73.5 years old, 57.7% were women. Ten percent of the patients were in the resuscitation level. Nearly one-fourth (23.9%) received the life-saving intervention. The admission rate was 24.7%. The significant factors that related with receiving the LSI were: 1) using emergency medical service (EMS) (OR 11.87, 95% CI 7.47 to 18.87), 2) having comorbidities (OR 1.27, 95% CI 1.04 to 1.58), and 3) respiratory infection (OR 5.98, 95% CI 3.28 to 10.92). And, significant factors that related with hospital admission were: 1) age >65 years old (OR 0.91, 95% CI 0.87 to 0.91), and 2) using EMS (OR 55.90, 95% CI 31.30 to 99.85).

Conclusion: The elderly patients with respiratory infection should have a thorough clinical observation as well as patients aged >65 years old, patients with comorbidities and patients who used EMS to reach the ED because these patients tended to have poorer prognoses.

Keywords: Geriatric, Elderly, Thai, Emergency room

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The world has been moved to an aging society. In 2015, the overall world population reached 7,439 millions. Within this number, 12% of them were those aged 60 years old or more (901 millions people)[1]. It is estimated that in year 2050, the number of elderly people will be 22% of the world population[1]. Europe has the highest proportion of aging people, while Africa has the least. Asia has about one-third of the world population and has around 508 millions aging people, which is 56% of aging people around the world[1].

In Thailand, there is a continuous rising of the aging population. In 1994, Thai elderly was 6.4% of all population; the number rose to 9.4%, 10.7%, 12.2% in 2002, 2007, and 2011, consecutively[2]. Thai aging act which was launched in 2003 defines aged society as having people whose aged ≥60 years of more than 10% of the whole population, therefore, Thailand is officially in the aged society. There is the estimation that Thailand will be a complete aged society in 2021 and super-aged society in 2031[2].

Most countries use the age 65 years old as the cut-off point to define the word "the elderly". Thailand has more than 4% growth rate of the elderly population per year. In 2015, Thailand had the second most aging population in ASEAN after Singapore[2]. This affects many aspects, for instance, economics, social welfare, and especially health care.

Above 20% of the Emergency Department (ED) patients are the elderlies[3], which tend to have atypical presentation and worse prognosis. The research from Aminzadeh et al revealed that the elderly who came to the ED had a higher rate of using emergency medical service (EMS), a greater rate of urgent severity, have a longer stay at the ED, more likely to be admitted or to revisit, and also had

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a higher rate of adverse outcomes after discharge[4].

The study from Lau GK et al, which studied about the characteristics of the elderly patients who came to the ED revealed that the patients aged 60 years old or more had diseases with more severity compared with other age groups, used more of the EMS transportation, had longer ED length of stay, and had higher admission rate[5-8]. In Thailand, there was a study that showed atypical presentations of older adults at the ED and found that the most common atypical presentation in the emergency elderly patients was sepsis without fever[9]. From the current data, we knew that elderly patients are vulnerable and need specific care. However, to our knowledge, there is limited study about the characteristics of Thai emergency elderly patients and the factors that have impact on the need of life-saving intervention (LSI) and hospital admission.

Objective

To study characteristics and factors in need of LSI and hospital admission of the geriatric patients who come to visit the emergency department in tertiary care hospitals.

Materials and Methods

Study design and subjects

This retrospective cohort study conducted at 2 hospitals, 1) Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, Thailand, and 2) Khon Kaen Hospital, a tertiary-care center of the Northeast region. All patients whose aged ≥65 years old who visited the ED from any causes between 1st January and 31st December 2015 were consecutively registered. The patients whose medical records were incomplete were excluded from the study. The present study was approved by the ethical committee in human research, Khon Kaen University (HE591254).

Data collection

The authors searched for patients aged 65 years old and over and reviewed the medical records from the hospitals' computerized databases. Demographic data and clinical characteristics were collected. Demographic data included age, gender, height, weight, occupation, religion, medical payment, underlying disease, comorbidity, current medication, the activity of daily living, caregiver, residence, mode of ED arrival, and triage level. Clinical characteristics included LSI, disposal status, re-attendance within 72 hours with the same problem or sequelae, diagnosis, and organ-based diagnosis. A residence was categorized into institutions and homes. The activity of daily living was categorized into independent, partially dependent, dependent, and unknown. The triage level was categorized into 5 categories: 1) Critical, 2) Emergency, 3) Urgent, 4) Semi-urgent, and 5) Non-urgent. The lists of LSI[10] were collected from medical records included airway and breathing support, circulatory support, emergency procedures, and emergency medications.

Operating definition

LSI was defined as one or more treatment among the list below:

1) Airway and breathing support ranged from oxygen therapy to ventilator support.

2) Circulatory support including intravenous fluid supplements, blood component replacement, inotropic drug administration, and cardiopulmonary resuscitation.

3) Emergency procedures e.g. emergency surgery, intercostal drainage, incision and drainage, and nerve block.

4) Emergency medications e.g. inotropic drugs, anti-arrhythmic drugs, and intravenous antibiotics.

Sampling and sample size

To acquire a sample of the geriatric patient who comes to the ED with a confidence level of 0.05 and use ±3% as a margin of error, the minimum sample size was 657. We used Microsoft Excel on a random 657 patients from overall 23,793 elderly patients who visited the ED from both hospitals.

Statistical analysis

The authors used means and standard deviations (SD) to describe continuous variables. Counts and percentages were used for categorical variables. Multivariate logistic regression was used to evaluate the predictors of the need for LSI and hospital admission. The authors reported adjusted odds ratios (ORs), 95% confidence interval (95% CI), and *p*-values. A *p*-value of less than 0.05 was described as statistically significant. All data were analyzed using STATA version 11.

Results

There were 23,793 patients aged 65 years old or more who attended the ED in both hospitals during the study period, which is calculated as 6.6% of overall patients who attended the ED. In accordance with the calculated sample size, we randomly collected data of 657 patients (443 from Srinagarind Hospital and 214 from Khon Kaen Hospital), which was calculated as 2.8% of all elderly patients who visited the ED in both hospitals.

From our study, the average age of elderly patients who visit the ED is 73.5 years old. There were 379 females, which was 57.7% of overall patients. Ten percent of the patients (n = 71) were at the resuscitation triage level. Nearly one-fourth (23.9%, n = 157) received the LSI (Table 1). The most intervention given to the patient was emergency medication administration (57.1%). The admission rate was 24.7% (n = 162). Others demographic data and baseline characteristics are presented in Table 1.

There were 120 trauma patients (18.3%) and 537 (81.7%) non-trauma patients. Non-trauma patients were categorized as infectious patients (29.6%, n = 159), and non-infectious patients (70.4%, n = 378). The most common injured organs in trauma patients were soft tissue injury (35%, n = 42), and head injury (28.3%, n = 34) (Figure 1). The most common organ-based infectious diseases were respiratory tract infection (46.6%, n = 74), gastrointestinal tract infection (23.9%, n = 38), and genitourinary tract

infection (16.4%, n = 26) (Table 2). Most patients had one or more comorbidities (70%, n = 453) (Figure 2). The most common organ-based diagnoses in the ED were the disease of respiratory system (15.8%, n = 113), disease of the digestive system (15.4%, n = 110), and injury, poisoning and certain other consequences of external causes (14.7%, n = 105) (Table 3). The most common causes of admission in the ED were the disease of respiratory system (30%), trauma (16%), and disease of circulatory system (11%) (data not shown).

By using Logistic regression model, we found that significant factors related to receiving the LSI were: 1) arriving the ED by EMS (OR 11.87, 95% CI 7.47 to 18.87), 2) one or more comorbidities (OR 1.27, 95% CI 1.04 to 1.58), and 3) patient who was diagnosed with a respiratory tract infection (OR 5.98, 95% CI 3.28 to 10.92) (Table 4).

Significant factors related to hospital admissions were: 1) increasing age every 1 year after 65 years old (OR 0.91, 95% CI 0.87 to 0.91), and 2) arriving the ED by EMS (OR 55.90, 95% CI 31.30 to 99.85) (Table 5).

Table 1. Demographic data and baseline characteristics of elderly patients who visited the emergency department

Parameters	
Age (years), mean ± SD	73.5±7.1
Female, n (%)	379 (57.7)
Underlying disease, n (%)	
Diabetes mellitus	314 (47.8)
Hypertension	188 (28.6)
Myocardial infarction and/or arrhythmias	100 (15.2)
Cerebrovascular disease	48 (7.3)
Others	41 (6.2)
Activity of daily living, n (%)	
Independent	548 (83.4)
Partial dependent	41 (6.2)
Dependent	11 (1.7)
Unknown	57 (8.7)
Mode of emergency department (ED) arrival, n (%)	
By self	497 (75.6)
By EMS	143 (21.8)
Others	17 (2.6)
Triage category, n (%)	
Level 1: critical	71 (10.8)
Level 2: emergency	134 (20.4)
Level 3: urgent	195 (29.7)
Level 4: semi-urgent	214 (32.6)
Level 5: non-urgent	43 (6.5)
Life-saving intervention, n (%)	157 (23.9)
Airway and breathing support	66 (28.6)
Circulatory support	11 (4.8)
Emergency procedures	22 (9.5)
Emergency medications	132 (57.1)
Disposal status, n (%)	
Home	473 (71.9)
Admission	162 (24.7)
Death in the ED	7 (1.1)
Disappeared against advice	1 (0.2)
Refer to other hospitals	14 (2.1)
Unplanned re-attendance within 72 hours	19 (2.9)

Discussion

The present study reveals characteristics and factors that affect the need of LSI and hospital admission of

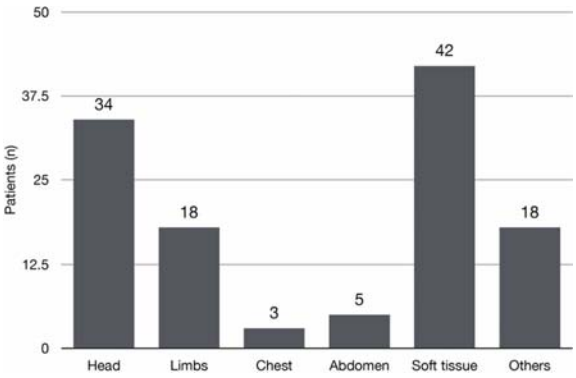

Figure 1. Organ-based injury in elderly trauma patients (n = 120).

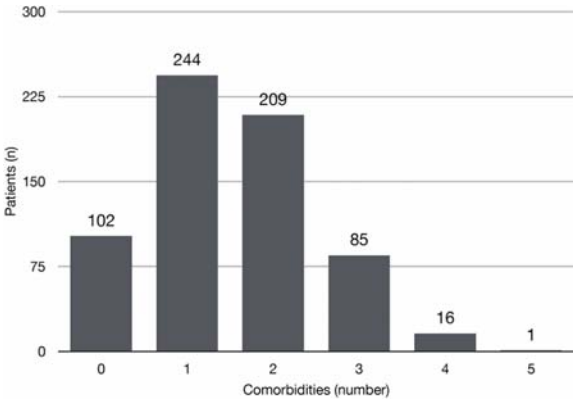

Figure 2. Numbers of comorbidities in elderly patients who visited the emergency department.

Table 2. Organ-based infectious disease in elderly patients who visited the emergency department (n = 159)

Organ system	n (%)
Respiratory	74 (46.5)
Gastrointestinal	38 (23.9)
Genitourinary	26 (16.4)
Skin	13 (8.2)
Others	7 (4.4)
Central nervous system	1 (0.6)

Table 3. Common diagnosis in elderly patients who visited the emergency department

Rank	Disease	n	%
1	Disease of the respiratory system	113	15.8
2	Disease of the digestive system	110	15.4
3	Injury, poisoning and certain other consequences of external causes	105	14.7
4	Disease of the nervous system	75	10.5
5	Disease of the musculoskeletal system and connective tissue	74	10.4
6	Disease of the genitourinary system	47	6.6
7	Disease of the circulatory system	37	5.2

Some patients had more than one diagnosis

Table 4. Factors that predicted life-saving intervention in elderly patients who visited the emergency department (ED) by logistic regression analysis

Parameters	Adjusted Odds ratio* (95% confidence interval)	*p*-value
Age (adding every 1 year after 65)	0.98 (0.94 to 1.01)	0.15
Arrived the ED by EMS	11.87 (7.47 to 18.87)	0.04
One or more comorbidities	1.28 (1.04 to 1.58)	0.02
Diagnosed with respiratory tract infection	5.98 (3.27 to 10.92)	0.04

* The odds ratio were adjusted for age, carried in by ambulance, comorbidities and respiratory tract infection

Table 5. Factors that predicted hospital admission in elderly patients who visited the emergency department by logistic regression analysis

Parameters	Adjusted odds ratio* (95% confidence interval)	*p*-value
Age (adding every 1 year after 65)	0.91 (0.87 to 0.95)	0.03
Arrived the ED by EMS	55.90 (31.30 to 99.85)	0.04
One or more comorbidities	1.02 (0.79 to 1.31)	0.90
Diagnosed with respiratory tract infection	1.80 (0.85 to 3.79)	0.13

* The odds ratio were adjusted for age, arrival by EMS, comorbidities and respiratory tract infection

the elderly patients who came to visit the tertiary care hospital's ED. The most common diagnosis was the disease of the respiratory system. And the factors that significantly related to LSI and hospital admission were ED arrival by EMS, multiple comorbidities, and the respiratory tract infection.

The average age of the patients in the present study was 76 years old and there were predominant of women, which was similar to a prior study[3]. Based on the epidemiology data of Thai elderlies from the National Statistical Office of Thailand in 2014, which showed that women tend to have longer life expectancy than men which might explain the result of the present study[11].

The authors found that the percentage of the elderly patients who attended to the ED was 15.1% of overall emergency patients. This was comparable to studies from Samaras N. et al[12] and Yip WL. et al[7], which reported the percentage of 12 to 14% and 14%, respectively. The authors found that more than half of the patients in this study were categorized as semi-urgency and urgency, which were also similar to Yip WL et al's study[7]. Nevertheless, the present study found a relatively lower admission rate (24.7%) compared with prior studies which reported that emergency elderly patients had beyond 50% admission rate[7,13]. However, each hospital had different criteria for the decision of admission. This may lead to the difference in the admission rate among studies.

The most common comorbidities in the elderly in our study were diabetes mellitus, hypertension, and cardiac diseases. The interesting finding was that patients with one or more comorbidities were at 1.3 times higher risk of receiving LSI compared with those who did not have any comorbidity. Therefore, the medical personnel should be aware of the worse prognosis in this group of patients and may follow-up on vital signs more frequently than in normal patients.

The studies from Canada[4] and Hong Kong[7] showed that majority of elderly patients arrived the ED by ambulance, on the other hand, in Thailand most patients came to the ED by themselves[14]. This differential issue may occur from the difference in healthcare systems, beliefs,

cultures, and healthcare education among countries. The study from Soontorn T et al showed that there were many reasons that affect caregivers' decision on the choice of transportation for the elderly patient to the hospital. Some people still have beliefs that EMS system was slower than personal household car[14]. The authors found that most patients in this study were non-trauma patients and the most common disease was the disease of the respiratory system. Older people are prone to have respiratory disease because of the physiologic changes of immunity and the respiratory system, for instance, the structure of the lung and chest wall, lung volume, capacity, mechanic of the lung, and the changes of immune response (immune senescence)[15,16]. Upper respiratory infection and influenza are common among elderly patients and may later associate with pneumonia. The reported annual incidence of influenza was around 5 to 20%, within this number, infants and elderly people had higher mortality rate[17,18]. The disease of the respiratory system is crucial and has a severe prognosis especially in elderly patients; therefore, influenza vaccination is recommended for preventing of complications and mortality[19]. From logistic regression analysis, we found that factors which were associated with receiving LSI and hospital admission were ED arrival by EMS, one or more comorbidities, and respiratory tract infection. These factors related to more severe condition and prognosis, for example, patients who arrived in the ED by EMS tended to be critical (triaged as resuscitation, emergent, or urgent level), which almost always in the need of LSI and hospital admission.

The present study had some potential limitations. First of all, due to the nature of the retrospective study, some data were missing or incomplete. Second, the authors did not collect the laboratory results, which may be another predictor of receiving the LSI and hospital admission. Third, the present study was a multi-center study, which may differ in the patient registration and some management. The last limitation was the setting of the present study was in tertiary care hospitals which may have a different pattern of the patients from primary or secondary care hospitals. These limitations are research opportunities for researchers to fill these research gaps in further studies.

Conclusion

The number of elderly populations and the emergency elderly patients in Thailand is rising. Understanding the characteristics of the patients leads to improving of health care systems for the elderlies. Disease of the respiratory system was the most common disease among the elderlies and should have a thorough clinical evaluation; furthermore, the patients with multiple comorbidities and patients who used EMS to reach the ED should also be close monitored due to their poorer prognosis.

What is already known for this topic?

The ED is one of the most crucial departments to take care of the elderly patients that have continuously increased in number year by year throughout the world.

What this study adds?

Elderly patients who presented to the ED by EMS, or those who had respiratory tract infection, or multiple comorbidities had poorer prognosis. A close monitoring for vital signs and the early warning signs should be implemented in this group of patients.

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Potential conflicts of interest

The authors declare no conflict of interest.

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ผู้ป่วยสูงอายุไทยที่เข้ารับบริการในแผนกอุบัติเหตุและฉุกเฉินของโรงพยาบาลระดับตติยภูมิ

วรรณประภา มณีกัญญ์, แพรวา ธาตุเพชร, แพรว โคตรุฉิน, พรทิพา ตันติบัณฑิต

ภูมิหลัง: แผนกฉุกเฉินเป็นหนึ่งในแผนกที่สำคัญในการดูแลผู้ป่วยสูงอายุ อย่างไรก็ตามมีข้อมูลจำกัดในเรื่องลักษณะผู้ป่วยฉุกเฉินสูงอายุในเอเชีย และปัจจัยที่มีผลต่อการทำหัตถการช่วยชีวิตและการนอนโรงพยาบาล

วัตถุประสงค์: เพื่อศึกษาลักษณะทั่วไปของผู้ป่วยสูงอายุไทยที่เข้ารับบริการในแผนกอุบัติเหตุและฉุกเฉินของโรงพยาบาลระดับตติยภูมิ และเพื่อศึกษาปัจจัยพยากรณ์การได้รับหัตถการช่วยชีวิตและการนอนโรงพยาบาล

วัสดุและวิธีการ: เป็นการศึกษาแบบย้อนหลังเชิงพรรณนา ในผู้ป่วยที่เข้ารับบริการในแผนกอุบัติเหตุและฉุกเฉินโรงพยาบาลศรีนครินทร์ มหาวิทยาลัยขอนแก่น และโรงพยาบาลศูนย์ขอนแก่น ประเทศไทย โดยสืบค้นข้อมูลประวัติจากเวชระเบียนผู้ป่วยสูงอายุตั้งแต่ 65 ปีขึ้นไป ตั้งแต่เดือนมกราคม ถึง เดือนธันวาคม พ.ศ. 2558 โดยเก็บข้อมูลพื้นฐานผู้ป่วยและลักษณะอาการทางคลินิก

ผลการศึกษา: จำนวนผู้ป่วยสูงอายุ 657 ราย ผู้ป่วยมีอายุเฉลี่ย 73.5 ปี เป็นเพศหญิงร้อยละ 57.7 เป็นผู้ป่วยผู้ป่วยวิกฤตร้อยละ 10 ผู้ป่วยเกือบหนึ่งในสี่ (ร้อยละ 23.9) ได้ทำหัตถการช่วยชีวิต ผู้ป่วยนอนโรงพยาบาลร้อยละ 24.7% ปัจจัยที่มีผลต่อการได้รับหัตถการช่วยชีวิต คือ 1) การมาโรงพยาบาลด้วยรถพยาบาล (OR 11.87, 95% CI 7.47 ถึง 18.87) 2) การมีโรคร่วมหลายโรค (OR 1.27, 95% CI 1.04 ถึง 1.58) และ 3) การวินิจฉัยเป็นโรคติดเชื้อระบบทางเดินหายใจ (OR 5.98, 95% CI 3.28 ถึง 10.92) และปัจจัยที่มีผลต่อการนอนโรงพยาบาลได้แก่ 1) อายุมากกว่า 65 ปี (OR 0.91, 95% CI 0.87 ถึง 0.91) และ 2) การมาโรงพยาบาลด้วยรถพยาบาล (OR 55.90, 95% CI 31.30 ถึง 99.85)

สรุป: ผู้ป่วยสูงอายุที่มีอาการทางระบบหายใจควรมีการสังเกตอาการอย่างใกล้ชิด เช่นเดียวกับผู้ป่วยที่มีอายุมากกว่า 65 ปี ผู้ป่วยที่โรคประจำตัวหลายระบบและผู้ป่วยที่มาโรงพยาบาลด้วยรถพยาบาล เพราะผู้ป่วยกลุ่มนี้มีแนวโน้มการพยากรณ์โรคที่ไม่ดี