Perceptions of Relatives about Symptoms and Signs in Older Adults with Sepsis: A Cross-Sectional Study

Nattanicha Singjan, Nuchanad Sutti, Supreeda Monkong*

Abstract: Sepsis is a common health condition in older adults that may present with typical or atypical symptoms and signs. The perception of warning symptoms and signs by relatives is important in their decision to seek hospital medical treatment. This cross-sectional study was conducted to explore the symptoms and signs of sepsis in older adults as perceived by their relatives, the awareness of symptoms and signs of sepsis, and the duration from the symptom onset to hospital arrival at a tertiary care hospital in Bangkok, Thailand. Seventy-seven dyads of older adults with sepsis and their relatives were recruited. Data were collected using the Personal Information of Older Adults and Relatives Questionnaire and the Symptoms and Signs of Sepsis Questionnaire. Descriptive statistics and Fisher's exact test were used to analyze the data.

Results revealed that both typical and atypical symptoms and signs occurred in older adults with sepsis. The top five typical presentations were drowsiness/deep sleep, rapid breathing, fever, chilling, and difficulty breathing. The top five atypical presentations were malaise or fatigue, loss of appetite, signs of dehydration, comorbidity exacerbations, and decreased activities of daily living. Atypical presentations were the most common presentations that relatives were unsure of and did not recognize as sepsis. The majority of older adults with sepsis (72.7%) arrived at the emergency department within 24 hours of the onset of symptoms or signs. There was no significant difference between the number of participants arriving at the emergency department within ≥24 hours, classified by typical and atypical presentations. These findings point to the important role of relatives to be proactive in the management of sepsis in older adults, starting at home. Nurses should teach relatives about early detection and timely seeking of medical care in hospitals. A system of telehealth consultations through phone or video calls should be established to facilitate healthcare-seeking decisions prior to clinical deterioration.

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Introduction

Sepsis is a significant public health problem, especially among the aging population.[1] Many factors contribute to the higher prevalence of sepsis in older adults, such as aging itself due to changes in the immune system, preexisting co-morbidities with multiple drugs, use of invasive medical devices, poor functional status, malnutrition, and recurrent hospitalization.[2] As the

most vulnerable group, sepsis in older adults frequently carries an adverse outcome and increases the mortality rate.[3] Sepsis in older adults may present with both typical and atypical symptoms and signs, found to be highly prevalent in the emergency department (ED).[4,5] Generally, the most common typical presentations that lead to hospitalization from sepsis include rapid heart rate, low blood pressure, chilling, shortness of breath, and extreme pain or discomfort.[1] However, older adults are frequently admitted to the hospital with other symptoms such as confusion or delirium, lethargy, falls, decreased walking or immobility, loss of appetite, and dysphagia.[5,6] These symptoms, called atypical presentation, are unrelated to or even opposite what is expected as symptoms or unusual symptoms in patients with sepsis.[7]

Timing is greatly important in recognizing and treating sepsis.[8] There is often a delay in receiving treatment by the patients and diagnosis of sepsis by physicians.[9] Despite advances in technology and sepsis management strategies, sepsis is still associated with substantial morbidity and mortality.[8,10] Delayed diagnosis and treatment of sepsis, particularly in older adults, could cause the condition to worsen quickly, increasing the risk of septic shock by 13.1 times and the mortality rate by 1.56 times compared to adult patients.[6] Nevertheless, it has been reported that many older adults respond positively to evidence-based diagnostic and management strategies when implemented promptly.[10]

Older adults with sepsis often have altered consciousness, which may have a perception problem. Relatives are mostly expected to be a person who is aware of changes in symptoms and signs of sepsis and decide to refer older adults to the hospital. In a literature review, lay people's awareness and perception of sepsis symptoms and signs is relatively low compared to other diseases because sepsis often has atypical presentations.[11] If the family does not perceive symptoms of sepsis, it may worsen the condition and lead to organ failure and pre-hospital delay. It is challenging for healthcare personnel to diagnose and provide treatment within 72 hours to prevent clinical deterioration and maintain life effectively.[12]

Most older adults with sepsis are more inclined to delay seeking treatment for sepsis symptoms and signs. Low perceptions about the symptoms and signs of sepsis are the main cause of delayed arrival time at the hospital.[11,13] Knowing the symptoms and signs of older adults with sepsis and perceptions of relatives that contribute to the duration from the symptom onset to ED arrival is necessary to reduce poor outcomes. However, limited studies have been conducted in this area. This study aimed to explore the symptoms and signs of sepsis in both typical and atypical presentations, including the awareness of such symptoms and signs of sepsis and the duration from the symptom onset to ED arrival by collecting recognition from relatives who are key persons in evaluating patients' conditions and making decisions about whether to take the patient to seek medical treatment. The findings may be useful in promoting accurate perceptions of sepsis for patients, relatives, or general people to monitor symptoms and signs, and seek medical advice in order to make appropriate decisions for hospital visits.

Review of Literature

The Theory of Symptom Management (TSM)[14,15] and relevant literature guided this study. The TSM comprises of three essential concepts: symptom experience, symptom management strategies, and symptom outcomes. Symptom experience is defined as "subjective experience reflecting changes in a person's bio-psychosocial function, sensation, or cognition."[15,p.669] Symptom experience is a simultaneous perception, evaluation, and response to a change in one's usual feelings.[14] In this study, we used TSM[14,15] but adapted it to relatives' perception of symptoms and signs of older adults with sepsis. When relatives perceive any alterations in typical feelings or function of older adults with sepsis, they may evaluate the severity of that symptoms and signs,

and act whether to seek medical treatment or relieving symptoms and signs on their own such as giving medication, tepid sponging to reduce fever, bed rest, or adopt a wait and see strategy.[13]

The symptoms and signs of sepsis in older adults can be divided into typical and atypical presentations. The nine most common typical presentations are fever, drowsiness/deep sleep, rapid heart rate/palpitations, chilling, rapid breathing/gasping, difficulty breathing/shortness of breath/dyspnea, response to the local infected site, cold body/pale or cold skin, and oliguria/anuria.[1] Previous studies have also identified atypical presentations of symptoms and signs in older adults with sepsis.[2,4,6,7] Atypical presentations are defined as no signs and symptoms or unusual signs and symptoms that are unrelated to sepsis or even the reverse of what is expected.[7] There are 11 atypical presentations found in older adults, including malaise/fatigue, restless/agitation, skin rash, dizziness/fainting/unconsciousness, signs of dehydration, comorbidity exacerbations, loss of appetite/reduced food intake, urine or feces incontinence, decreased walking, decreased activities of daily living, and falls.[5,6,7,16]

To prevent clinical deterioration, sepsis must be properly managed.[17] Unawareness of sepsis warning symptoms and signs can lead to a more serious condition requiring emergency hospitalization.[11] Acute sepsis-related organ dysfunction, caused by a general decrease in organ function, diminished cardiopulmonary reserve, and an often-enhanced innate immune response with increased cytokine production, can be increased by as much as twice.[18] Therefore, when a relative observes the onset of symptoms and signs suspected as sepsis, they need to take the older adults to the ED as soon as possible.

Furthermore, when patients arrive at the ED, they should be carefully assessed using a sepsis screening tool. For example, the Search Out Severity (SOS) instrument gives the patients a severity score for their presenting condition. It is used in Thailand for the identification of sepsis in the ED.[19] The tool grades the patient's signs of temperature, systolic blood pressure, pulse, respiration rate, urine output, and level of consciousness. The sensitivity, specificity, and accuracy of the SOS score are 57.7%, 87.5%, and 74.1%, respectively.[20] When patients have an SOS score of <4, this indicates they are not entering a crisis but must be followed up. A score of ≥4 indicates a diagnosis of sepsis and entering a crisis. The patient then starts receiving immediate treatment by administering intravenous fluids, antimicrobials, and laboratory tests.[21] The total SOS score was utilized in this study to illustrate a critical condition when the older adult participants arrived at the ED.

At present, atypical presentations are a concern because they are associated with poor outcomes in older adults.[22] Healthcare personnel have developed guidelines for early recognition and care of older adults with sepsis in the ED. However, concern and recognition of sepsis at home are low, and as a result, older adults arrive at the hospital later than warranted.[11] For the assessment of sepsis at home, knowledge is important. Well-informed patients and relatives will make an early, appropriate, and effective decision to visit the hospital.[13]

Study Aims

This study aimed to explore the symptoms and signs of sepsis in older Thai adults as perceived by their relatives, the awareness of such symptoms and signs of sepsis, and the duration from symptom onset to ED arrival.

Methods

Design: A cross-sectional study design was employed and is reported here using the observational studies in epidemiology-STROBE guideline checklists.[23]

Sample and Setting: One super-tertiary hospital located in Bangkok was conveniently selected as the study hospital. The sample consisted of dyads of older adults and a relative as a caregiver. The following inclusion criteria were used to recruit participants: 1) older adults aged 60 years and over who were diagnosed and had recorded codes (ICD-10) as Sepsis (A65.2) or Septic shock (A65.21)[24] in their electronic medical records (EMR), and received treatment at

the ED of a tertiary care hospital, Bangkok, Thailand; and 2) relatives who had taken care of the older patient at least 14 days prior to the admission and spoke and understood Thai. The relatives who were unable to provide information via telephone during data collection were excluded from the study.

The sample size was calculated using Yamane's formula.[25] After substituting the values in the formula with 229 cases of older adults with sepsis diagnosed at the ED of this research setting each year, an alpha of 0.05 was calculated; thus, the sample should be 70 participants. To accommodate missing data or participant withdrawal, an additional 10% of the sample was added, and with rounding up, 77 participants were then required per group.

Ethical Considerations: This study was approved by the Institutional Review Board (IRB) of the Faculty of Medicine Ramathibodi Hospital, Mahidol University (No. 2021/609) and the studied hospital (No. 1374/2021). The primary investigator (PI) coordinated with a registered nurse (RN) at the ED to help select a sample of older patients who met the specified criteria and to introduce the PI to their relatives. The PI met the eligible relatives to ask permission for the patient to participate in the study and provided information about the protection of human rights, the study purpose and benefits, their right to withdraw from the study at any time without consequence, confidentiality, and then asked them to sign the consent form if they were willing to participate. To minimize the mental strain on the relatives about the illness of their older adults, data collection by telephone interviews was conducted 24 hours after the older adults were admitted to the hospital.

Instruments: Two instruments were used for data collection as follows.

The Personal Information of Older Adults and Relatives Questionnaire was developed by the PI based on the literature review. This semi-structured questionnaire consisted of 1) the demographic data, health conditions, and clinical data of older adults, including gender, age, comorbid disease, medications and invasive medical devices used at home, activities of daily living prior to this illness, previous sepsis in the past year, the duration from the symptom onset to ED arrival (in hours), a total score of the Search Out Severity (SOS), sources of sepsis, and status after receiving treatment in the ED; and 2) the demographic data of relatives, such as gender, age, education, and relationship with the older adult. The data were gathered from the EMR, the SOS score alert sepsis record sheet, and through interviews with relatives.

The Symptoms and Signs of Sepsis Questionnaire, designed to obtain presentation and awareness of sepsis, was developed by the PI based on the literature review. The questionnaire consisted of 20 items, including 9 items for typical sepsis presentations and 11 items for atypical sepsis presentations. To obtain the presentation of symptom and sign of sepsis, the questionnaire asked 3 choices; yes, no, or did not notice/not sure. The same as the awareness, the questionnaire asked whether they were aware, unaware, or unsure of them as sepsis. Only one answer that matched the perception of relatives was recorded. There was also an open-ended question to record additional symptoms and signs that relatives perceived as unusual conditions.

The content validity of the two instruments was investigated by three experts: a physician in infectious diseases, a nurse instructor in gerontological nursing specializing in infectious diseases in older adults, and a registered nurse in an aged care ward. The content validity index (CVI) for scales (S-CVI) and for items (I-CVI) was 1 and 0.91, respectively.

Data Collection: Data collection was conducted from November 2021 to January 2022, after the eligible relatives reported their willingness to join the study. The PI asked for the phone numbers of relatives, requested permission to access medical records, and distributed one set of questionnaires to relatives. The PI collected the data from the EMR, the SOS alert sepsis record sheet, and phone interviews with relatives 24 hours after older patients arrived at the ED to avoid strain on relatives post-admission. If interviewing with the eligible relatives was inconvenient, the PI requested permission to contact them at a time and date convenient for them to complete the questionnaires.

The questionnaire-based interview took around 15-20 minutes.

Data Analysis: Data were analyzed using descriptive statistics, including frequency, percentage, mean and standard deviation (SD), or median and interquartile range (IQR). Also, Fisher's exact test was performed to compare the differences in the duration from symptom onset to ED arrival between older adults with typical and atypical presentations.

Results

There were 77 dyads of older adults and their relatives in this study. Most older adults were females with an average age of 78.02 years (range 60-100 years), and almost half were 80 or older (42.8%). Most relatives were female, aged from 18 to 80 years, with a mean of 51 years. Participants' characteristics are shown in Table 1. For the presentation of the symptoms and signs, see Table 2. Relatives reported a total of 27 symptoms and signs, with 12 typical and 15 atypical presentations. There were seven additional symptoms and signs that the relatives mentioned but were not covered by the questionnaire: diarrhea, low oxygen saturation (self-measured with an oximeter), low blood pressure/hypotension (self-measured with an automated blood pressure monitor), muscle weakness, muscle relaxation, muscle spasm, and nausea.

Table 1. Characteristics of older adults with sepsis and their relatives (N = 77 per group)

Characteristics	Number	Percentage
Older adult characteristics		
Gender		
Female	41	53.2
Male	36	46.8
Age (years) (Mean = 78.02, SD = 10.37, Range = 60-100)		
60-69	17	22.1
70-79	27	35.1
≥ 80	33	42.8
Comorbid disease		
No	2	2.6
Yes* (Top 3)	75	97.4
Hypertension	46	19.2
Diabetes mellitus	30	12.6
Cancer	26	10.9
Medications used at home (Min-Max = 0-22)		
No	2	2.6
Yes (Mean = 7.24, SD = 4.52)	75	97.4
1-4 medications used	20	28.6
≥ 5 medications used	55	71.4
Invasive medical devices used at home		
No	48	62.3
Yes*	29	37.7
Nasogastric tube	16	55.2
Gastrostomy	6	15.0
Hemodialysis catheter / Peritoneal dialysis catheter	6	15.0
Urinary catheter	5	12.5
Tracheostomy tube	5	12.5
Percutaneous nephrostomy (PCN)	1	2.5
Percutaneous transhepatic biliary drainage (PTBD)	1	2.5

Table 1. Characteristics of older adults with sepsis and their relatives (N = 77 per group) (Cont.)

Characteristics	Number	Percentage
Activities of daily living prior this illness		
Independence	12	15.6
Partial dependence	34	44.1
Total dependence	31	40.3
Previous sepsis in the past year		
No	49	63.6
Yes	28	36.4
Search Out Severity score		
≥ 4 (sepsis with a score indicating a critical condition)	52	67.5
< 4 (sepsis but a score indicating no a critical condition)	25	32.5
Source of sepsis*		
Urinary system	40	43.0
Respiratory system	26	28.0
Gastrointestinal system	12	12.9
Not identified	7	7.5
Skin and Connective Tissue system	3	3.2
Nervous system	3	3.2
Catheter-related bloodstream infection (CRBSI)	2	2.2
Status after receiving treatment in the ED		
Admitted to the medicine ward	43	55.8
Admitted to the observation unit at ED	11	14.3
Died at the ED	11	14.3
Admitted to the ICU	8	10.4
Referral back to the hospital of origin	4	5.2
Relatives' characteristics		
Gender		
Female	58	75.3
Male	19	24.6
Age (Mean = 51.24, SD = 13.10, Range = 18-80)		
Education level		
Illiterate	1	1.3
Elementary school	4	5.2
Junior high school	2	2.6
High school	8	10.4
Vocational	7	9.1
Bachelor's degree	40	51.9
Post-graduate	15	19.48
Relationship with an older adult		
Adult children	60	77.9
Spouse	9	11.7
Grandchildren	3	3.9
Sibling	3	3.9
Daughter-in-law	2	2.6

* One participant might have more than one answer.

Table 2. Symptoms and signs presentation of older adults with sepsis as reported by relatives (N = 77)

Symptoms and signs presentation*	Number	Percentage
Typical presentations		
1. Drowsiness/deep sleep	61	79.2
2. Rapid breathing/gasping	59	76.6
3. Fever	55	71.4
4. Chilling	47	61.0
5. Difficulty breathing/shortness of breath/dyspnea	45	58.4
6. Oliguria	42	54.5
7. Specific symptoms of infectious	33	42.9
8. Rapid heartbeat/palpitations	29	37.7
9. Cold body/pale or cold skin	29	37.7
10. Diarrhea	10	13.0
11. Low oxygen saturation	1	1.3
12. Low blood pressure/hypotension	1	1.3
Atypical presentations		
1. Malaise or fatigue	74	96.1
2. Loss of appetite/reduced food intake	54	70.1
3. Signs of dehydration	53	68.8
4. Comorbidity exacerbations	51	66.2
5. Decreased activities of daily living	43	55.8
6. Decreased walking	37	48.1
7. Dizziness/fainting/unconscious	26	33.8
8. Urine or feces incontinence	19	24.7
9. Restless/agitation	16	20.8
10. Fall	10	13.0
11. Skin rash	3	3.9
12. Muscle weakness	1	1.3
13. Muscle relaxation	1	1.3
14. Muscle spasm	1	1.3
15. Nausea	1	1.3

* One participant might have more than one answer

The top five typical symptoms and signs from the highest to lowest were drowsiness or deep sleep, rapid breathing/gasping, fever, chills, and difficulty breathing/shortness of breath/dyspnea, whereas, for atypical presentations included malaise/fatigue, loss of appetite/reduced food intake, signs of dehydration, comorbidity exacerbations, and decreased activities of daily living. In this study, the most common comorbidity exacerbations were hyperglycemia in diabetes (37.25%), extreme tiredness in patients with lung or heart disease (21.57%), oliguria in those with kidney disease (21.57%), and congestive heart failure in patients with heart disease (19.61%)

Regarding awareness of sepsis, a very high percentage (almost 100%) of relatives reported they were unsure or unaware of both typical and atypical presentations (See Table 3). Skin rashes, comorbidity exacerbations, urinary or fecal incontinence, dizziness/fainting/unconscious, and decreased activities of daily living were the most common presentations that relatives were unsure of and did not recognize as sepsis. However, some were aware of the following sepsis symptoms and signs: fever, chills, drowsiness/deep sleep, rapid breathing or gasping, and difficulty breathing/shortness of breath, respectively.

Table 3. Relatives' awareness of the symptoms and signs presentation of sepsis (N = 77)

Symptoms and signs presentation	Number	Percentage
Unsure/Unaware of symptoms and signs of sepsis (Top 5)		
1. Skin rash (e.g., spotty rash or a small red patch)	77	100
2. Comorbidity exacerbations	77	100
3. Urine or feces incontinence	77	100
4. Dizziness/fainting/unconscious	76	98.7
5. Decreased activities of daily living	76	98.7
Aware of symptoms and signs of sepsis (Top 5)		
1. Fever	34	44.2
2. Chilling	15	19.5
3. Drowsiness or deep sleep	9	11.7
4. Rapid breathing/gasping	8	10.4
5. Difficulty breathing/shortness of breath/dyspnea	8	10.4

The average duration from the symptoms or signs onset to ED arrival among older adults with sepsis was 31.92 hours (SD = 36.80). Most older adults (72.7%) arrived at the ED within 24 hours after the onset of symptoms. The number who presented with typical and atypical complaints took the duration of ≤ 24 hours and >24 hours from the symptom onset to the ED arrival, with no statistically significant differences between groups (see Table 4).

Table 4. Duration from the symptom onset to emergency department (ED) arrival among older adults with sepsis

Older adults with sepsis	Chief Complaint		Total (n = 77)	p-value
	Typical Presentation (n = 68)	Atypical Presentation (n = 9)		
Duration from the symptom onset to ED arrival				.430[F]
≤ 24 hours	48 (70.6%)	8 (88.9%)	56 (72.7%)	
> 24 hours	20 (29.4%)	1 (11.1%)	21 (27.3%)	

[F] = Fisher's Exact Test

Discussion

Symptoms and signs of sepsis presentation

Results demonstrated that relatives reported both typical and atypical presentations of all 20 sepsis symptoms and signs listed in the questionnaire. An open-ended question revealed seven additional symptoms and signs of sepsis as unusual in older adults, including diarrhea, low oxygen saturation, low blood pressure/hypotension, muscle weakness, muscle relaxation, muscle spasms, and nausea. These additional symptoms and signs are both typical and atypical presentations of sepsis, as verified in the criteria of Centers for Disease Control and Prevention (CDC)[1] and previous studies.[2,5,6,7,16,26] These findings supported the existing knowledge that sepsis frequently manifests as a variety of presenting symptoms and signs.[2,26]

In terms of the top five typical presentations in our study, these were drowsiness/deep sleep, rapid breathing/gasping, fever, chilling, and difficulty breathing/shortness of breath/dyspnea, which were consistent with the typical presentations from the previous studies[2,6,27,28]

and CDC information, which indicate that a patient with sepsis may present one or more of the following symptoms or signs, rapid heart rate or low blood pressure, fever, shivering or feeling very cold, confusion or disorientation, shortness of breath, extreme pain or discomfort, and clammy or sweaty skin.[1]

Regarding the atypical presentations found in our study, malaise/fatigue, loss of appetite/reduced food intake, signs of dehydration, comorbidity exacerbations, and decreased activities of daily living were the top five most common atypical presentations. The explanations of how each symptom developed during sepsis are as follows.

First, malaise or fatigue was mostly (96.1%) reported in our study, which was probably caused by circulatory pathogens and cytokines that trigger pathways in the skeletal muscle that restrict protein synthesis and speed up protein breakdown.[29] This effect on decreased muscle mass and loss of force production could contribute to fatigue during sepsis. Malaise or fatigue is the most common atypical presentation of sepsis due to these symptoms being unusual symptom that is easy to notice and has experienced sepsis. In addition, most of the relatives graduated with a bachelor's degree (52%), which may be due to the high level of education that afforded the relatives a better understanding of the cause of an illness.[13]

Additionally, fatigue can cause patients with sepsis to be at risk of falls[29] because it can impact lower limb function.[30] In our study, the incidence of a fall was not a major symptom experienced nor the primary cause for older adults with sepsis to visit the ED. However, previous studies found that falls were the most frequent cause of ED admission.[5] Possibly, it might be because of cultural differences between Asian and Western countries. Older adults in Asian cultures continue to live with their extended family and rely on them for physical and supervisory support.[16] In many of Western cultures, older adults typically live alone, and falls tend to occur more often.

Second, loss of appetite or reduced food intake during sepsis might be caused by the movement of bacteria or the invasion of native gut bacteria to sterile tissues and internal organs through complex mesenteric lymph nodes. These defense actions bring about loss of appetite/reduced food intake and other gastrointestinal symptoms, such as abdominal pain, bowel ileus, bloating, and abdominal discomfort.[19]

Third, signs of dehydration occurring in older adults with sepsis may be explained by a TNF-α induced increase in endothelial cell permeability or loss of endothelial function. This manifestation leads to the redistribution of fluid from the intravascular to the extravascular compartment, causing hypovolemia, hemoconcentration, and stasis of blood flow, which can induce signs of dehydration (e.g., thirst, dry skin, dry lips, and darker urine).[19,31]

Fourth, when sepsis develops, comorbidity can be worsened. Our study found that patients with diabetes mellitus experienced hyperglycemia (random blood glucose >300 mg/dL), lung or heart disease patients experienced extreme tiredness, kidney disease patients experienced oliguria, and heart disease patients experienced congestive heart failure. Although each comorbidity's mechanisms and effects are not completely understood, some knowledge is available for an explanation as follows.

Hyperglycemia, frequently found in sepsis, is a consequence of an adaptive response mediated by inflammation and neuroendocrine mechanisms. Activation of the hypothalamic-pituitary-adrenal axis during times of stress results in the production of cortisol, but the stress response also increases the secretion of other anti-insulin hormones, such as catecholamines, glucagon, and growth hormone[19], which causes an increase in blood glucose levels during sepsis. Furthermore, people with diabetes have a variety of immune defects, including diminished cell-mediated immunity and phagocytosis.[27] The disease predisposes individuals to serious bloodstream infections and the risk of sepsis-related organ dysfunction.

For older adults with lung problems, their symptoms become worse with sepsis. It might be a result of bacterial products and inflammatory cytokines in the blood.[31] Proteases and inflammatory mediators cause harm to the alveolar epithelium and deplete the alveolar basement membrane,[19] leading to induce extreme tiredness in older adults with sepsis.

Kidney function is also reduced when sepsis occurs. The chronic inflammatory and immunodeficient state response cause decreased innate and adaptive immune responses. These changes cause the downregulation of kidney function.[27] Besides, sepsis can worsen myocardial dysfunction by impairing contractility, diastolic dysfunction, decreasing cardiac index, and decreasing ejection fraction.[19] These ultimately result in systolic and left ventricular failure.

Fifth, decreased daily living activities were experienced more than half of the participants in our study, which can be explained by the fact that sepsis stimulates skeletal muscle breakdown and inhibits skeletal muscle synthesis by altering many metabolic pathways. These defense actions result in muscle weakness and dysregulation,[29] causing older adults to decline in activities of daily living.

Awareness of symptoms and signs of sepsis

In our study, typical presentations of sepsis, such as fever, chilling, drowsiness/deep sleep, rapid breathing/gasping, and difficulty breathing/shortness of breath/dyspnea, were symptoms and signs that relatives were aware of. This could be explained by the characteristics of typical presentations and the symptoms of a systemic inflammatory reaction that were evident on initial examination or assessment.[8,11] As a result, relatives are aware that the aforementioned symptoms can be due to sepsis. However, our study found that most relatives were unsure/unaware of symptoms and signs of sepsis, which include skin rash, comorbidity exacerbations, urinary or fecal incontinence, dizziness, fainting or unconscious, and decreased activities of daily living because of these unusual, vague, and gradually occurring symptoms and signs. On the other hand, if patients have severe symptoms, such as unconsciousness, dyspnea, and confusion, the relatives decide to take them to the hospital. This also made patients prone to organ failure, requiring admission to the ICU (10.39%) and death in the ED (14.28%). Additionally, these older adults have characteristics aged ≥80 years, multiple comorbidities, and almost total dependence on activities of daily living. These findings are similar to a previous study conducted in the ED in the very older adult group (≥80 years), which can explain older adults' higher risk for developing sepsis and its adverse outcomes due to declining physical and functional status.[3]

Duration from the symptom onset to ED arrival

The average time from the symptom onset to hospital arrival of our patients was around 31.92 hours, a considerable delay period because most of them (67.5%) were in a critical condition when they arrived at the ED, and some had multiple organ dysfunction, as evidenced by the SOS score ≥ 4.

For the chief complaints of patients at the ED, there were no significant differences in time spent at the ED between typical and atypical presentations. This lack of difference may be because the relatives did not perceive the typical symptoms as severe, so they continued to observe at home. This can be further explained by the Theory of Symptom Management. When symptoms of an acute illness appear, people mostly attempt to avert, delay or minimize the symptoms that they are experiencing based on their knowledge, awareness, and perception of symptom severity.[14,15] For example, they usually deal with problems that arise first by taking medicine, tepid water sponging to reduce fever, bed rest, or observing the symptoms. Consequently, some of our participants who had a prolonged pre-hospital time would have developed severe symptoms and signs when they arrived at the ED, which is consistent with a previous study.[13]

Even though sepsis was treated promptly as standard treatment, 11 older adults (14.28%) died while receiving medical care at the ED in our study.

This occurred in patients with comorbidities and almost total dependence on activities of daily living. Their relatives brought them to the hospital because they perceived severe symptoms that they did not recognize as sepsis. After ED admission, most of them had clinical signs of deterioration, such as alteration of consciousness, low oxygen saturation, hypotension, or cardiac arrest; their comorbidities also developed exacerbations. Unfortunately, sepsis-related mortalities did occur. This finding raised concerns that pre-hospital delay can cause higher sepsis acuity, leading to clinical deterioration affecting mortality, similar to previous studies.[16,32]

This study was undertaken during the COVID-19 pandemic, and this could have been an important reason for the delay in seeking medical care because relatives hesitated to take older adults to the hospital for fear of getting COVID-19. A previous study explained that the COVID-19 pandemic affects perceived symptoms and signs, awareness of changes in health status to bring patients to the hospital, and also obtaining emergency treatment delays.[33] In such the COVID-19 situation, the preparation of the health service system to deal with abnormal situations is important. The findings raised concerns that a telephone consultation guideline for relatives during COVID-19 situations would promote faster decision-making in hospitals, increasing the opportunity for medical treatment.

Limitations

This study used the Symptoms and Signs of Sepsis Questionnaire to obtain data at a category level without test-retest reliability; thus, to amend this issue, future studies should be performed a test-retest reliability. Another limitation was found during the process of data collection via telephone interviews. Some relatives were unavailable to provide information when the phone contact was made 24 hours after the older adult arrived at the ED. The phone interview had to be rescheduled. This situation causes the recall ability to be longer, making them more likely to exhibit recall bias. To avoid recall bias, participants should be excluded from the study if they were used for more than 48 hours after older adults received treatment at the ED.

Conclusions and Implications for Nursing Practice and Research

Sepsis in older adults is frequently presented to the ED and challenges early recognition at home due to a lack of knowledge about the symptoms and signs of sepsis among relatives. This study provides evidence that older adults with sepsis do not only present with typical presentations but also atypical ones. Relatives were unsure or unaware of almost all the atypical presentations of sepsis, which might be the cause of the delay in seeking medical treatment. The implications for nursing practice are that nurses should provide knowledge and skills related to the symptoms and signs of sepsis found in this study to ensure that relatives are able to monitor for early detection of this sepsis condition and seek medical treatment promptly. Additionally, sepsis is often misdiagnosed in hospitals in many countries, so it is important for nurses to be aware of the possible symptoms and signs of sepsis and then be involved with other health professionals in public health campaigns to educate the public about these. Further study is needed to focus on factors related to delay in seeking medical treatment and on testing the effectiveness of an intervention program or system for relatives caring for older adults with conditions at risk of sepsis at home.

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การรับรู้ของญาติต่ออาการและอาการแสดงในผู้สูงอายุที่มีภาวะเซพซิส: การศึกษาภาคตัดขวาง

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บทคัดย่อ: ภาวะเซพซิสเป็นปัญหาสุขภาพที่พบได้บ่อยในผู้สูงอายุ ซึ่งอาจมีทั้งอาการและอาการแสดงแบบทั่วไปหรือไม่เฉพาะเจาะจง การรับรู้ของญาติเกี่ยวกับอาการและอาการแสดงที่เป็นอาการเตือนของภาวะเซพซิสจึงสำคัญต่อการตัดสินใจมาขอรับการรักษาจากโรงพยาบาล ดังนั้นการศึกษาแบบภาคตัดขวางจึงถูกออกแบบขึ้น เพื่อศึกษาอาการและอาการแสดงที่เกิดขึ้นกับผู้สูงอายุที่มีภาวะเซพซิสจากการรับรู้ของญาติ ความตระหนักรู้ของญาติว่าอาการและอาการแสดงที่เกิดขึ้นนั้นเป็นสัญญาณของภาวะเซพซิส และระยะเวลาตั้งแต่เริ่มมีอาการจนมาถึงที่แผนกฉุกเฉิน การศึกษานี้คัดเลือกผู้สูงอายุที่มีภาวะเซพซิสและญาติ จำนวน 77 คู่ ที่มารับการรักษาที่แผนกฉุกเฉินของโรงพยาบาลระดับตติยภูมิแห่งหนึ่งในกรุงเทพมหานคร ประเทศไทย เก็บข้อมูลโดยแบบสอบถามข้อมูลส่วนบุคคล และแบบสอบถามอาการและอาการแสดงของภาวะเซพซิส วิเคราะห์ข้อมูลโดยใช้สถิติพรรณนาและการทดสอบสถิติฟิชเชอร์

ผลการวิจัยพบว่า ผู้สูงอายุที่มีภาวะเซพซิสจะแสดงอาการทั้งอาการทั่วไปและอาการไม่เฉพาะเจาะจง อาการทั่วไปที่พบมาก 5 อันดับแรก ได้แก่ ซึมลงหรือหลับลึกมากขึ้น หายใจเร็ว ไข้ หนาวสั่น และหายใจลำบาก ในขณะที่อาการไม่เฉพาะเจาะจงที่พบมาก 5 อันดับแรก ได้แก่ อ่อนเพลียหรืออ่อนล้า เบื่ออาหาร มีอาการแสดงของภาวะขาดน้ำ โรคประจำตัวเดิมกำเริบ และทำกิจวัตรประจำวันได้ด้วยตนเองลดลง อาการไม่เฉพาะเจาะจงเป็นอาการและอาการแสดงส่วนใหญ่ที่ญาติไม่แน่ใจและไม่รับรู้ว่าเป็นภาวะเซพซิส ผู้สูงอายุส่วนใหญ่ที่มีภาวะเซพซิส (ร้อยละ 72.7) มาถึงแผนกฉุกเฉินภายใน 24 ชั่วโมงหลังจากเริ่มมีอาการหรืออาการแสดง โดยไม่พบความแตกต่างอย่างมีนัยสำคัญทางสถิติในระยะเวลาที่ใช้มาถึงห้องฉุกเฉินระหว่างกลุ่มที่มีอาการนำแบบทั่วไปและไม่เฉพาะเจาะจง ผลการวิจัยชี้ให้เห็นถึงบทบาทที่สำคัญของญาติในการจัดการเชิงรุกกับผู้สูงอายุที่มีภาวะเซพซิสตั้งแต่ที่บ้าน พยาบาลควรสอนญาติให้รู้จักการตรวจพบอาการตั้งแต่แรกเริ่มและการมาโรงพยาบาลให้ทันท่วงที รวมทั้งควรจัดให้มีการให้คำปรึกษาทางไกลผ่านทางโทรศัพท์หรือวิดีโอคอล เพื่อช่วยเหลือด้านการตัดสินใจมาโรงพยาบาล ก่อนที่อาการทางคลินิกจะแย่ลง

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