Factors Determining the Appropriateness of Ceftriaxone Usage at the Emergency Room of a University Hospital in Thailand

Angsana Phuphuakrat MD, PhD*,
Sasisopin Kiertiburanakul MD, MHS*, Kumthorn Malathum MD*

** Department of Medicine, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand*

Background: *Ceftriaxone is one of the most common empirical antibiotics prescribed at emergency rooms in Thailand. Inappropriate prescriptions of antibiotics have been frequently reported. The authors aimed to study factors that determine the appropriateness of ceftriaxone usage at an emergency room of a university hospital in Thailand.*
Material and Method: *A cross-sectional study was conducted among patients with age of >15 years old who received ceftriaxone as empirical treatment at the emergency room between April 1 and May 31, 2010. Appropriateness of ceftriaxone usage was considered according to local recommendations and current published guidelines.*
Results: *During the 2-months period, 278 patients for whom ceftriaxone was prescribed were included in the analysis. Of these, 109 (39.2%) were men and a median (interquartile range; IQR) age of 62.2 (45.2-75.7) years. Ceftriaxone usage was considered appropriate in 162 (58.3%) cases. By multiple logistic regression, female gender [odds ratio (OR) 1.96, 95% confidence interval (CI) 1.03-3.70], fever (OR 3.12, 95% CI 1.3-6.11), had signs and symptoms of infections (OR 2.92, 95% CI 1.37-6.28), and suspicion of sepsis (OR 7.90, 95% CI 3.67-17.07), were associated with appropriateness of ceftriaxone usage, while diagnosis of gastrointestinal tract infection was associated with inappropriate ceftriaxone usage (OR 0.20, 95% CI 0.05-0.77).*
Conclusion: *Proportion of appropriate use of ceftriaxone is fair. As assessed by established criteria, clinical suspicion of infection was associated with appropriateness of ceftriaxone usage for empirical treatment in an emergency room setting. Interventions to improve appropriateness of ceftriaxone prescription should focus on these factors.*

Keywords: *Antibiotic, Appropriateness, Ceftriaxone, Emergency room*

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Ceftriaxone is one of the most common intravenous antibiotics prescribed empirically in Thailand. This is due to its broad spectrum and bactericidal activity against many gram-positive and gram-negative aerobic bacteria. In addition, widely available generic product makes the price affordable in resource-limited countries.

Though the above reasons make ceftriaxone an appealing choice as an empirical antibiotic, a liberal use of cephalosporin antibiotics has been known to be associated with the emergence of resistant organisms including gram-negative bacilli that produce extended spectrum beta-lactamases (ESBLs), penicillin-resistant *Streptococcus pneumoniae* (PRSP), and methicillin-resistant *Staphylococcus aureus* (MRSA)[1]. Data from the National Antimicrobial Resistance Surveillance Center, Thailand, indicated that, overall proportion of *Escherichia coli* and *Klebsiella pneumoniae* that are susceptible to ceftriaxone has gradually decreased from 90% and 72% in 1999 to 67% and 61% in 2009, respectively[2]. Furthermore, some patients might be exposed to unnecessary risk of adverse effects associated with cephalosporins such as various forms of hypersensitivity reactions or antibiotic-associated diarrhea[3]. Recently, Miyawaki et al showed that the appropriate use of antibiotics led to a great amount of antimicrobials cost reduction[4]. Emergence of resistant organisms, toxic effects of the antibiotic as well as costs of unnecessary use of the agent can be avoided by appropriate justification[5].

Many studies reported inappropriate use of antibiotics[5-10], most of which were among in-patient settings. In Turkey, it was estimated that the rate of appropriate antibiotic use was 45.2% and the incidence

Correspondence to:
Malathum K, Division of Infectious Diseases, Department of Medicine, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand.
Phone: 0-2201-1581, Fax: 0-2201-2232
E-mail: kmalathum@hotmail.com

of rational use was different between medical and surgical wards[9]. Comparably, 49% of appropriate antibiotic use was observed at the University of Virginia Hospital in the US[5]. In developing countries, the picture was similar[7,8]. In Thailand, however, only 9% of entirely appropriate antibiotic usage was reported among 307 patients in medical wards in which the main reason of inappropriate use of antibiotic was the use of antibiotics without any evidence of bacterial infection[6]. Another study in Thailand showed 48% appropriate use of antibiotics among in-patient wards and the reasons of inappropriateness were no indication for empirical treatment, surgical prophylaxis and wrong choice of drugs to treat documented infection[10].

Limited studies are available for appropriateness of antibiotic usage in an emergency room (ER) setting where most empirical antibiotics were started. The authors aimed to determine the characteristics of ceftriaxone usage at the ER, and to identify factors associated with appropriate use of ceftriaxone in order to construct a policy to improve an appropriate use of ceftriaxone.

Material and Method

Population

A cross-sectional study was conducted at Ramathibodi Hospital (a 1,200-bed university hospital), Mahidol University, Bangkok, Thailand. Inclusion criteria were as the following; (1) age ≥15 years, and (2) ceftriaxone was initiated at the ER between April 1 and June 31, 2010. Patients who were hospitalized for more than two days in the preceding 90 days, received ceftriaxone as pre-operative antibiotic, and received other intravenous antibiotics at the ER prior to ceftriaxone in that visit were excluded. If patients had more than one episode of receiving ceftriaxone, only the first episode was included in the present study. The present study was reviewed and approved by the ethical committee for human research of the Faculty of Medicine, Ramathibodi Hospital.

Data collection

Medical records of the patients who suited the criteria were reviewed. Patients' characteristics and laboratory investigations including age, sex, underlying disease, site of infection, bacterial identification, primary diagnosis, final diagnosis, complete blood count, blood chemistries, and microbiological culture results were reviewed during the study period. Department and status of the first prescriber were also collected.

Criteria for diagnosis of infection were two of four of the following: fever ≥37.8°C, signs and symptoms of specific infection (see below), white blood cell (WBC) >12,000 cells/mm^3, and polymorphonuclear cells (PMN) >75%. Site of infection and criteria for diagnosis organ of infection were determined by the operational definitions and are shown in Table 1. Appropriateness of ceftriaxone usage was determined by the author (AP). Most evaluation was based on existing guidelines, i.e. Infectious Diseases Society of America (IDSA), Sanford Guide to Antimicrobial Therapy[11-15] with some modification according to the prevalence of organisms in Thailand (Table 1). Appropriateness of ceftriaxone prescription other than the operational definitions was concluded by an infectious disease specialist (KM). Intraabdominal infection included acute cholecystitis, acute cholangitis, and bacterial peritonitis. Gastrointestinal tract infection combined gastroenteritis and diarrhea. Clinical information written in the medical records since arrival at ER until the time point when ceftriaxone was prescribed was used for the evaluation of usage to simulate the real situation.

Statistical analysis

Mean (standard deviation, SD), median (interquartile range, IQR) and frequencies (%) were used to describe patients' characteristics. Chi-square test or Fisher's exact test and Mann-Whitney U-test were used to compare categorical variables and continuous variables between the two groups, respectively. Univariate logistic regression was used to determine the factors associated with appropriate use of ceftriaxone. Variables that presented $p<0.10$, were considered in a multivariate logistic regression model after assessment of multicollinearity of variance inflation factors. Variables were selected into a multiple logistic regression model with backward selection and ones that attained a level of significance were retained in the model. Odds ratio (OR) and its 95% confidence interval (CI) were estimated. A p-value of <0.05 was considered statistically significance. All statistical analyses were performed using Stata statistical software version 10.0 (Stata Statistical Software: Release 10.0, Stata Corporation, College Station, TX, 2007).

Results

During a 2-month-period, 408 patients received ceftriaxone at the ER. Two hundred seventy eight (68.0%) patients were included in the analysis. The others were excluded because of previous

Table 1. Operational definitions for criteria for diagnosis specific organ infection and appropriateness of ceftriaxone usage

Sites of infection	Operational definitions	Evaluation of appropriateness
Sepsis	2 of 4 evidences of T >38.5°C or <35°C, HR >90/min, RR >20/min or $PaCO_2$ <32 mmHg, WBC >12,000 cells/mm^3 or <4,000 cells/mm^3, or >10% band form with evidence of infection[22]	Ceftriaxone usage in patients with septicemia who was not immunocompromised was considered appropriate
Community-acquired pneumonia	Fever, cough or dyspnea with new infiltrates on chest film[23]	Outpatient with comorbidities; ceftriaxone combined with a FQ (levofloxacin [750 mg], moxifloxacin) or ceftriaxone plus a macrolide, inpatient admitted to medical ward or ICU; ceftriaxone combined with a FQ or a macrolide[11]
Osteomyelitis	Presence of fever/malaise/night sweats, bone pain, surrounding soft tissue compromise/ fistula to superficial skin with supporting image[24]	Empiric ceftriaxone in immunocompetent host was considered inappropriate
Acute meningitis	Fever, headache/photophobia, alteration of consciousness/seizure and stiff neck with cerebrospinal fluid showing WBC >5 cells/mm^3 with TP >50 mg/dL[25]	Empiric ceftriaxone was considered appropriate in bacterial meningitis
Brain abscess	Fever, headache, alter mental status/focal neurological deficit, seizure with supporting image study[26]	Ceftriaxone was considered appropriate when given in combination with metronidazole in immunocompetent host
Cholecystitis	Fever along with at least one of either right upper quadrant abdominal pain or positive Murphy's sign with laboratory showed leukocytosis or left shift from CBC and characteristic imaging[27]	Ceftriaxone alone was considered appropriate in community-acquired acute cholecystitis of mild-to-moderate severity[12]
Cholangitis	Fever, abdominal pain, jaundice and cholestatic pattern of LFT[28]	Ceftriaxone alone was considered appropriate in community-acquired acute cholangitis in an absent of a biliary-enteric anastomosis[12]
Bacterial peritonitis	Fever and/or abdominal pain with ascites showed PMN >250 cells/mm^3 without evidence of polymicrobial on Gram stain[29]	Ceftriaxone was appropriate in SBP and CNNA
Skin and soft tissue infection	Signs and symptoms of erythema, edema, warmth and pain[30]	Empiric ceftriaxone in diabetic foot infections with moderate severity[13] and SSTI in cirrhotic patient was considered appropriate. Empiric ceftriaxone in immunocompetent host was considered inappropriate
Urinary tract infection	Upper tract or acute pyelonephritis was defined by fever with signs and symptoms of frank pain, lower UTI symptoms, nausea/vomiting and evidence of WBC in urine >5/HPF or leukocyte cast[31]	Ceftriaxone usage in upper tract infection was considered appropriate, but not for the lower tract infection
Acute diarrhea	Stool frequency ≥3 times/day[17]	Ceftriaxone given in febrile diarrhea with moderate to severe invasive disease was considered appropriate[17]

CBC = complete blood count; CNNA = culture-negative neutrocytic ascites; FQ = fluoroquinolone; HPF = high power field; HR = heart rate; LFT = liver function test; RR = respiratory rate; SBP = spontaneous bacterial peritonitis; T = temperature; TP = total protein; UTI = urinary tract infection; WBC = white blood cell

admission in the 3-month-period, 49 (12.0%) cases, received ceftriaxone as preoperative antibiotic, 23 (5.6%) cases, received another antibiotic prior to ceftriaxone, five (1.2%) cases, and medical records could not be retrieved, 53 (13.0%) cases. Of all, ceftriaxone was prescribed by emergency medicine faculty in nine (3.2%) cases, while 96.8% were prescribed by residents. The prescribing physicians were mostly from the department of emergency medicine (69.4%) and the others were from departments of medicine (22.7%), surgery (5.4%), and family medicine (2.5%).

Among 278 patients included in the analysis, 109 (39.2%) were men with a median (IQR) age of 62.2 (45.2-75.7) years. Clues suggested infection including fever (64.7%), organ-specific signs and symptoms (77.0%), leukocytosis (55.4%), and predominated PMN (73.4%) were observed in majority of the patients (Table 2). Ceftriaxone usage was considered appropriate in 162 cases (58.3%).

For suspected source of infection, the majority of the study patients had sepsis (130 cases, 46.8%). Urinary tract infection (UTI) was the most common source of infection (74 cases, 26.6%). Cultures were

Table 2. Characteristics of 278 patients who received ceftriaxone at ER

Factors	Appropriate use (n = 162)	Inappropriate use (n = 116)	p-value
Gender			0.061
Men	56 (34.6)	53 (45.7)	
Women	106 (65.4)	63 (54.3)	
Median (IQR) age, years	64.7 (46.4-75.8)	56.4 (44.8-75.3)	0.280
Ordering physician			0.739
Staff	6 (3.7)	3 (2.6)	
Resident	156 (96.3)	113 (97.4)	
Physician department			0.439
Emergency medicine	117 (72.2)	76 (65.5)	
Medicine	35 (21.6)	28 (24.1)	
Surgery	6 (3.7)	9 (7.8)	
Others	4 (2.5)	3 (2.6)	
Underlying disease			
Diabetes mellitus	48 (29.6)	25 (21.6)	0.131
HIV infection	5 (3.1)	4 (3.5)	1.000
Autoimmune	4 (2.5)	7 (6.0)	0.210
Malignancy	20 (12.4)	11 (9.5)	0.455
Immunocompromised	5 (3.1)	3 (2.6)	1.000
Non-immunosuppression	106 (65.4)	76 (65.5)	0.988
Criteria for diagnosis infection			
Fever ≥37.8°C	127 (78.4)	53 (45.7)	<0.001
Signs and symptoms of specific organ infection	78 (67.2)	136 (84.0)	0.001
WBC >12,000 cells/mm^3	97 (59.9)	57 (49.1)	0.076
PMN >75%	125 (77.2)	79 (68.1)	0.092
Culture taken prior to antibiotic	158 (97.3)	103 (88.8)	0.004
Organ of suspected infection			
Sepsis	113 (69.8)	17 (14.7)	<0.001
Central nervous system	0 (0.0)	1 (0.9)	0.417
Respiratory tract	12 (7.4)	19 (16.4)	0.019
Intra-abdomen	7 (4.3)	9 (7.8)	0.297
GI tract	3 (1.9)	21 (18.1)	<0.001
Urinary tract	24 (14.8)	16 (13.8)	0.811
Skin and soft tissue	2 (1.2)	8 (6.9)	0.019
Bone and joint	0 (0.0)	2 (1.7)	0.173
Others	1 (0.6)	4 (3.5)	0.164

GI = gastrointestinal tract; HIV = human immunodeficiency virus; IQR = interquartile range; PMN = polymorpho nuclear cell; WBC = white blood cell

performed in 93.9% of all study patients, most of which were blood specimens (81.1% of all cultures) (Table 2). Final diagnosis of infection was concluded in 172 cases (61.9%) of patients receiving ceftriaxone, in which only 108 cases (38.9%) were proved to have bacterial infections by microbiological methods. Non-infectious causes including malignancy (5.8%) and autoimmune disease (2.2%) were documented in patients receiving ceftriaxone at ER (Table 3). Outcome after receiving ceftriaxone was clinically improved in 200 cases (71.9%).

Ceftriaxone was changed to other antibiotics in 98 cases (35.3%). Reasons for antibiotic switching were as follows: suggestions from the attending staff, 34 (12.2%) cases; no clinical improvement, 16 (5.8%) cases; according to microbiological results, 15 (5.4%) cases; and others reasons, 23 (8.3%) cases. Ninety-eight (35.3%) cases were switched to oral antibiotics because of clinical improvement.

The review of the medical records was extended to look for evidence of infection for 3-months duration after receiving ceftriaxone. Of 278 cases, 17 cases (6.1%) were found to have new evidence of bacterial infection within three months after receiving ceftriaxone at ER. Of these 17 cases, eight cases were caused by multidrug resistant organism (MDR), six cases were caused by ESBL-producers, and one case by MRSA. Seven infections were caused by susceptible organisms. Five of them were infected with more than one organism. No significant association between appropriateness of antibiotic usage and infection within 3 months after receiving ceftriaxone (OR 0.78, 95% CI 0.31-1.99, p<0.606).

Table 3. Final diagnosis and outcome of 278 patients received ceftriaxone

Final diagnosis and outcome	n (%)
Final diagnosis	
Infection	172 (61.9)
Bacteria	108 (38.9)
Virus	2 (0.7)
Mycobacteria	7 (2.5)
Fungus	1 (0.4)
Parasite	1 (0.4)
Malignancy	16 (5.8)
Autoimmune disease	6 (2.2)
Others	27 (9.7)
Not define	52 (18.7)
Outcome	
Improve	200 (71.9)
Not improve	12 (4.3)
Dead	19 (6.8)
Not known	47 (16.9)

By univariate analysis logistic regression (Table 4), fever (OR 4.31, 95% CI 2.56-7.28, p<0.001), signs and symptoms of specific organ infections (OR 2.54, 95% CI 1.44-4.51, p = 0.001), prior culture before administration of antibiotic (OR 4.99, 95% CI 1.58-15.71, p = 0.006) were associated with appropriateness of ceftriaxone usage. With respect to provisional diagnosis, sepsis was associated with appropriateness of ceftriaxone usage (OR 13.44, 95% CI 7.27-24.82, p<0.001). In contrast, gastrointestinal tract, respiratory tract, and skin infections were associated with inappropriate usage. Association between appropriate use of ceftriaxone and specialty of prescribers was not found. In multivariate analysis, female gender (OR1.96, 95% CI 1.03-3.70, p = 0.040), fever (OR3.12, 95% CI 1.60-6.11, p = 0.001), signs and symptoms of specific organ infection (OR 2.93, 95% CI 1.37-6.28, p = 0.006), and impression of sepsis (OR 7.90, 95% CI 3.67-17.07, p<0.001) were statistically associated with appropriate use of ceftriaxone (Table 5). In contrast, suspicious of gastrointestinal tract infection was associated with inappropriateness of ceftriaxone usage (OR 0.20, 95% CI 0.05-0.77, p = 0.019).

No association between appropriateness of ceftriaxone usage and the outcome of the patients (p = 0.095) was observed. Median time (IQR) from ER arrival to the first dose of ceftriaxone was 3.2 (0.2-6.1) hours. Outcome considered clinical improvement was associated with time to antibiotic of less than six hours after arriving ER (OR 2.55, 95% CI 1.08-5.81, p = 0.03).

Discussion

The present study focused on appropriate use of ceftriaxone in an ER, where most of an empirical antibiotic is started. In the present study, the prescriptions were considered appropriate in about 60%, which is comparable to other studies[8,10,16]. The authors found appropriateness of empirical ceftriaxone usage depends on criteria to diagnose infection and organs of suspected infection.

Appropriate empirical ceftriaxone usage is associated with prescription in a patient who had fever and organ-specific signs and symptoms of infection. The authors' finding showed that final proved diagnosis of infection was associated with fever and signs and symptoms of infection but not leukocytosis or predominantly PMN in CBC. This suggested that

Table 4. Univariate analysis of factors associated with appropriate use of ceftriaxone at ER

Factors	OR	95% CI	p-value
Male	0.63	0.39-1.02	0.062
Ordering by staff	0.69	0.17-2.82	0.606
Department of physician	0.95	0.64-1.41	0.811
Underlying disease			
Diabetes mellitus	1.53	0.88-2.67	0.133
HIV infection	0.89	0.23-3.40	0.867
Autoimmune	0.39	0.11-1.38	0.145
Malignancy	1.34	0.62-2.93	0.456
Immunocompromised	1.20	0.28-5.12	0.806
Others	1.00	0.60-1.64	0.988
Criteria for diagnosis			
Fever	4.31	2.56-7.28	<0.001
Signs and symptoms of specific organ infection	2.54	1.44-4.51	0.001
WBC ≥12,000/mm^3	1.54	0.96-2.50	0.076
PMN ≥75%	1.58	0.93-2.70	0.093
Culture taken prior to antibiotic	4.99	1.58-15.71	0.006
Provision diagnosis or sites of infection			
Sepsis	13.43	7.27-24.82	<0.001
Respiratory tract	0.41	0.19-0.88	0.022
Intra-abdomen	0.54	0.19-1.49	0.231
GI tract	0.09	0.02-0.29	<0.001
Urinary tract	1.09	0.55-2.15	0.811
Skin and soft tissue	0.17	0.04-0.81	0.026
Others	0.17	0.02-1.58	0.120

CI = confidence interval; GI = gastrointestinal tract; HIV = human immunodeficiency virus; OR = odds ratio; PMN = polymorphonuclear cell; WBC = white blood cell

Table 5. Multivariate analysis of factors associated with appropriate use of ceftriaxone at ER

Factors	OR	95% CI	p-value
Female	1.96	1.03-3.70	0.040
Fever	3.12	1.60-6.11	0.001
Signs and symptoms	2.93	1.37-6.28	0.006
Sepsis	7.90	3.67-17.07	<0.001
GI infection	0.20	0.05-0.77	0.019

CI = confidence interval; GI = gastrointestinal tract; OR = odds ratio

empirical antibiotic prescription should be based on clinical presentation in suspicious cases rather than laboratory results.

Inappropriate use of ceftriaxone as empirical therapy for presumed bacterial infections in patients who presented with fever was previously reported[7,16]. Only 38% of patients in the present study were microbiologically proved to have bacterial infection, while the remaining had either non-bacterial infections or non-infectious process, which included malignancy, autoimmune diseases, or some other unclear diagnosis. However, empirical use of ceftriaxone was considered appropriate in 60%, which might be due to overlapping symptoms and signs of infectious and non-infectious causes of systemic inflammatory response syndrome. Thus, thorough assessment before starting an antibiotic followed by close clinical evaluation to determine whether antibiotic is still in need is also important in such a process. Further analysis in patients who had the final diagnosis of malignancy found that ceftriaxone was prescribed empirically if they had a fever without other infectious disease diagnostic criteria (comparing to patients who did not have a fever, p = 0.001). Thus, antibiotic should not be prescribed, or if needed, it must be done cautiously in patients who had a fever without signs and symptoms of infection when malignancy, autoimmune disease or other disease entities were suspected.

Certain diagnoses were associated with appropriateness of ceftriaxone use, i.e. sepsis, while gastrointestinal tract infection was not. In acute diarrhea, empirical antibiotic is recommended only in

febrile diarrhea with moderate to severe invasive disease[17]. The association of appropriateness of antibiotic usage and presumptive diagnosis reflects the knowledge and perception of physicians for proper empirical treatment for the disease. Gastrointestinal tract infection should be treated mainly with quinolone antibiotics[15]. The reason of using of ceftriaxone for gastrointestinal tract infection in this setting might be due to the convenience for administration; dosing is daily for ceftriaxone, but twice daily for ciprofloxacin. Combined approach of surveillance, education and feedback should be provided for suitable antibiotic use[18].

The authors found association of appropriate ceftriaxone usage with female gender. Association of appropriate use of ceftriaxone with gender was previously reported[19]. Some studies reported association of appropriate use of antibiotic with service of prescribers[7,8,20]. The authors did not observe this association. It may be related to our method of evaluation that we used the same information as the prescribers to determine the appropriateness of use through clinical diagnosis, and the clinical records were clear enough for us to decide whether these patients could have bacterial infections. This emphasizes the importance of clinical skill of physicians and completeness of medical records.

One risk factor for mortality in patients with sepsis and septic shock was receiving antibiotics after six hours of onset of sepsis[21]. The present results revealed association of favorable outcome with time to antibiotic less than six hours as well. Thus, decision of providing antibiotic should be made within this period of time.

The strength of the present study was that the population of interest was patients who came to ER. These patients usually had multiple medical illnesses that rendered them at risk of having a poor outcome. Physicians in ER then would be very likely to prescribe broad-spectrum antibiotics, of which ceftriaxone is the prototype. Prescription in this setting was constrained by limited time, space, and personnel to manage the patient. Evaluation of the prescription at the very beginning of hospital visit is therefore meaningful for intervention to improve appropriateness of antimicrobial agents. Some limitations of our study were noteworthy. First, the results were performed by only one evaluator based on the preset criteria with the infectious disease specialist's decision for cases that did not fit the criteria. Second, the data were collected in only a two-month period. This might not represent the annual picture of appropriateness. Since the collection time was the last two months of the academic year and most of the prescriptions were ordered by residents, the rate of appropriateness of ceftriaxone usage could be higher than collection at the beginning of the academic year. Third, the present study was based on the patient's medical record, which might be incomplete.

In conclusion, our results show that appropriateness of ceftriaxone usage is associated with infection fitting with diagnostic criteria and suspicion of specific organs infection. Interventions to improve appropriateness of ceftriaxone prescription should focus on increasing the ability of ER physicians to make correct diagnosis and selecting suitable antibiotic for specific organ infection.

Potential conflicts of interest

None.

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ปัจจัยที่เกี่ยวข้องกับการใช้ยาปฏิชีวนะ ceftriaxone อย่างเหมาะสมในโรงพยาบาลมหาวิทยาลัย

อังสนา ภู่เผือกรัตน์, ศศิโสภิณ เกียรติบูรณกุล, กำธร มาลาธรรม

วัตถุประสงค์: เนื่องจากในประเทศไทย มีการใช้ ceftriaxone อย่างแพร่หลายสำหรับการรักษาโดยที่ยังไม่ทราบผลการเพาะเชื้อโดยเฉพาะที่ห้องฉุกเฉิน แต่ยังไม่เคยมีการศึกษาถึงความเหมาะสมในการใช้ ceftriaxone ในห้องฉุกเฉิน การวิจัยนี้จึงศึกษาปัจจัยที่เกี่ยวข้องกับการใช้ ceftriaxone อย่างเหมาะสมที่ห้องฉุกเฉินในโรงพยาบาลมหาวิทยาลัย

วัสดุและวิธีการ: เก็บรวบรวมข้อมูลแบบย้อนหลังในผู้ป่วยอายุมากกว่า 15 ปี ที่ได้รับการรักษาการติดเชื้อแบบ empiric ด้วย ceftriaxone ที่ห้องฉุกเฉิน โรงพยาบาลรามาธิบดี ระหว่างวันที่ 1 เมษายน ถึง 31 พฤษภาคม พ.ศ. 2553 โดยประเมินความเหมาะสมของการให้ยา ceftriaxone ตามข้อแนะนำจากแนวทางการรักษาในปัจจุบัน

ผลการศึกษา: ในระยะเวลาที่ทำการศึกษา 2 เดือน มีผู้ป่วยที่อยู่ในเกณฑ์และได้รับการประเมิน 278 ราย มีค่ากลางของอายุ 62.2 ปี (interquartile range; IQR 45.2-75.7 ปี) โดยผู้ป่วย 109 ราย (ร้อยละ 39.2) เป็นผู้ชาย จากการประเมินความเหมาะสมของการใช้ ceftriaxone พบว่ามีการใช้อย่างเหมาะสม 162 ราย (ร้อยละ 58.3) การวิเคราะห์โดย multiple logistic regression พบว่าปัจจัยที่มีผลต่อการใช้ ceftriaxone อย่างเหมาะสม คือ เพศหญิง [odds ratio (OR) 1.96, 95% confidence interval (CI) 1.03-3.70], ไข้ (OR 3.12, 95% CI 1.3-6.11), การมีอาการและอาการแสดงที่บ่งชี้ว่าจะมีการติดเชื้อ (OR 2.92, 95% CI 1.37-6.28), และสงสัยว่ามีภาวะ sepsis (OR 7.90, 95% CI 3.67-17.07) อย่างไรก็ตามพบว่า การให้การวินิจฉัยว่ามีการติดเชื้อในทางเดินอาหารนั้น สัมพันธ์กับการใช้ ceftriaxone ที่ไม่เหมาะสม (OR 0.20, 95% CI 0.05-0.77)

สรุป: การใช้ ceftriaxone แบบ empiric ที่เหมาะสมที่ห้องฉุกเฉินในโรงพยาบาลมหาวิทยาลัยอยู่ในระดับปานกลาง โดยการใช้ ceftriaxone อย่างเหมาะสมนั้น สัมพันธ์กับการมีอาการและอาการแสดงที่บ่งชี้ว่าจะมีการติดเชื้อ รวมถึงภาวะติดเชื้อในกระแสเลือด (sepsis) ดังนั้นการปรับปรุงเพื่อให้มีการสั่งยา ceftriaxone อย่างเหมาะสม ควรจะเน้นในประเด็นดังกล่าวและทำการศึกษาในโอกาสต่อไป