Meropenem Use Pattern at Srinagarind Hospital

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Abstract

Introduction: Meropenem is an antimicrobial in the National List of Essential Medicines of Thailand which has been substantially used and needs drug use evaluation program to optimize rational drug utilization in Srinagarind Hospital. **Objectives:** To study meropenem use pattern in fields of indication and dosage regimen**. Methods:** The medical records of hospitalized patients who received meropenem during July 2014 to September 2014 were reviewed retrospectively. The relevant data including patient demographic background, type of infection, type of therapy, dosage regimen and duration of therapy, was collected. **Results:** A total of 106 patients met the inclusion criteria and were recruited to the study. Meropenem was used as empiric therapy (65.1%) and documented therapy (34.9%). Respiratory tract infection was the major organ of infection (38.7%) followed by sepsis (36.8%).The usual dosage regimenwas 1 g every 8 h (58.5%) and the dosage regimen were adjusted according to renal function. Duration of therapy was usually up to 14 d (85.9%) **Conclusion:** The use of meropenem at Srinagarind Hospital was considerable rationale in either indication or dosage regimen which compliedwith the hospital guideline for antimicrobials use.

Keywords: Pattern of use, Meropenem, Antimicrobials, Srinagarind Hospital

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Introduction

Meropenemis a broad spectrum antibiotic with activity against gram-positiveand gram-negative pathogens including extended-spectrum ß-lactamase (ESBL) and AmpC-producing Enterobacteriaceae (Mohr, 2008).It is indicated for a broad range of serious infections caused by various pathogens in both adults and children.The indications approved by the United States Food and Drug Administration (US FDA) include complicated intra-abdominal infection (cIAI), complicated skin and skin structure infection (cSSSI) and bacterial meningitis (in patient aged over 3 months). However, in other countries, the drug is also indicated for nosocomial pneumonia, septicaemia, febrile neutropenia, complicated urinary tract infection, obstetric and gynecological infections, cystic fibrosis with pulmonary exacerbations, and severe community-acquired pneumonia. Meropenem has been included inthe category D of the National Lists of Essential Medicinesof Thailand since 2004 and the drug

use evaluation (DUE) or drug use review (DUR) is required to ensure the rationale drug use (Food and Drug Administration, 2004). Since then, the drug use evaluation (DUE) or drug use review (DUR) has been implemented to ensure the rationale meropenemuse (Chelkeba, 2013). The drug use is considered rationale if it is for the treatment of nosocomial infections caused by multi-drug resistant (MDR) gram negative bacilli. Many strategies have been developed to promote the rationale drug use in hospitals across the country including the checklist to remind the approved indications and/or dosage regimen. To prescribe meropenem at the Srinagarind Hospital, doctors are encouraged to fill the relevant information into the drug use control form for all cases. The approved indications and dosage regimen of the drug are provided on that form**.** However, this process is not mandatory and little is known about the pattern of meropenem use at this tertiary hospital. This study was thus conducted to review the meropenem use pattern in fields of indication and dosage regimen at Srinagarind Hospital. The obtained data will be used to develop the criteria of meropenem use in this hospital and, if possible, other hospitals in Thailand.

Methods

The study protocol was approved by the institutional research ethic committee at KhonKaen University (HE571463). The population were hospitalized patients who received meropenem at Srinagarind Hospital, KhonKaen during July-September 2014. The inclusion criteria was the patients who were 18 years or older. Patients with incomplete medical data or receiving meropenem less than three days were excluded.All the relevant data was obtained from the hospital computer database. These include the patients' demographic data, site of infection, type of therapy (empirical or documented therapy), dosage regimen and duration of therapy. The data was analyzed using descriptive statistics and presented as number and percentage.

Results

There were106patients recruited to the study. Most of patients were male (62.3%) with average age 58.8± 16.3 years (Table 1). Respiratory tract infection was the major indication of treatment (40.6%). Twenty-nine patients in that group were diagnosed with hospital acquired pneumonia (HAP) whereas 9 and 3 patients were diagnosed with community acquired pneumonia (CAP) and health care-associated pneumonia (HCAP), respectively. Most of the orders were for empirical therapy (65.1%). The standard dosage regimen of meropenem (1 g every 8 h) was given to most of the patients in this study (58.5%). Dosing interval wasextended to 12 or 24 h in patient with renal impairment. Duration of therapy were less than 7, 7-14 and over 14 days in 42.5, 43.5 and 14.2% of patients, respectively (Table 2). Microbiological culture and sensitivity test obtained after meropenem was started indicate no growth, mixed organism, gram negative bacteria, gram positive bacteria and normal flora in 35, 11, 9, 8 and 6, respectively.

Table 1 Patients' characteristics

Characteristics	Parameter
Gender	
Male	66 (62.3%)
Female	40 (37.7%)
Age	
Mean ± SD	58.8 ± 16.3 years
Range	20 – 92 years
Previledge	
Self-payment	4 (3.8%)
CSMBS*	44 (41.5%)
Social insurance	36 (34.0%)
Non-identify	22 (20.7%)
Underlying disease	
Absent	64 (60.4%)
Present (n = 107 diseases or disorder)	42 (39.6%)
Endocrine disorder	32 (29.9%)
Cardiovascular disorder	22 (20.6%)
Renal disorder	16 (15.0%)
Gastrointestinal	8 (7.5%)
Dyslipidemia	6 (5.6%)
Neurology	4 (3.7%)
Gout	4 (3.7%)
Anemia	4 (3.7%)
Lung	4 (3.7%)
SLE	3 (2.8%)
Cancer	3 (2.8%)
Psychiatry	1 (0.9%)
Renal function (creatinine clearance)	
>50 mL/min	55 (51.9%)
25-50 mL/min	17 (16.0%)
10-25 mL/min	13 (12.3%)
<10 mL/min	9 (8.5%)
No data	12 (11.3%)
Length of stay	
Mean ± SD	31.9 ± 36 days
Range	3-266 days

*CSMBS = Civil servant medical benefit scheme

Table 2 Meropenem use pattern

Indication	Numbers
Type of therapy	
Empiric therapy	69 (65.1%)
Document therapy	37 (34.9%)
Organ system of infection	
Non-identified	10 (9.4%)
Identified (n = 112 infections)	96 (90.6%)
Respiratory tract infection	41 (38.7%)
Sepsis or severe sepsis or septic shock	39 (36.8%)
Intra-abdominal infection	12 (11.3%)
Urinary tract infection	12 (11.3%)
Others	8 (7.5%)
Dosage regimen	
Total daily dose	
0.5 g	8 (7.6%)
1 g (0.5 g every 12 h)	3 (2.8%)
1.5 g (0.5 g every 8 h)	1 (0.9%)
2 g (1 g every 12 h)	26 (24.5%)
3 g (1 g every 8 h)	62 (58.5%)
4 g (2 g every 12 h)	2 (1.9%)
6 g (2 g every 8 h)	4 (3.8%)
Dosing interval	
24 h	9 (8.5%)
12 h	30 (28.3%)
8 h	67 (63.2%)
Total administration day	
<7 days	45 (42.5%)
7-14 days	46 (43.4%)
>14 days	15 (14.1%)

Discussion and conclusion

Meropenem was mostly used as empirical therapy (65.1%)which is similar to what was reported by other studies (Ayuthya and Matangkasombat et al., 2003; Raveh and Muallem-zilcha et al., 2006). Respiratory tract infection was themost common infection (38.7%) followed by sepsis, severe sepsis or septic shock (36.8%). These infectionsare severe and life-threatening especially in patients with underlying disease or critical condition.Therefore, it was reasonable to give meropenem as an empirical therapy. In the aspect of dosage regimen, it must be adjusted according to an individual renal function.There were 64.2% of patients receiving standard dose of meropenem for severe infections

(1 g every 8 h) but only 51.9% of patients had normal renal function (CrCl>50 mL/min). Markedly, more than half of the dosage regimen in this study was ordered according to renal function. For example, 9 patients (8.5%) had the creatinine clearance less than 10 mL/min and they should have received 0.5 g meropenem every 24 h as a treatment but only 8 patients (7.6%) received the drug with the adjusted dose. The appropriate dosage regimen in this study is comparable to that in the other studies (Ayuthaya and Matangkasombat et al., 2003; Ouwuttipong, 2008). For total administration days, 85.9% ofpatients received meropenemup to14 days which is in accordance with the recommended duration of therapy for most of infections (Mohr, 2008). However, the microbiological test is not performed in routine practice if clinical manifestation is improved. Thus, negative microbiological culture was not used to assess efficacy of meropenem in this study. Thus we can conclude that the use of meropenem at Srinagarind Hospital was considerable rationale in either indication or dosage regimen and complied with the antimicrobials use guideline determined by this hospital.

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