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Clinical and microbiological efficacy of continuous versus intermittent application of meropenem in critically ill patients

Submission date
02/01/2012

Registration date
20/01/2012

Last Edited
20/01/2012

Recruitment status
No longer recruiting

Overall study status
Completed

Condition category
Infections and Infestations

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[_] Results
[_] Individual participant data
[_] Record updated in last year

Plain English summary of protocol

Background and study aims
How well the antibiotic meropenem works depends on the dose used. The aim of this study was to compare the benefits of continuous infusion of meropenem against bolus administration (large dose given by injection in bloodstream to achieve the desired level rapidly), in critically ill patients, with severe infection.

Who can participate?
Patients aged 18 years or older (both men and women), admitted to the intensive care unit (ICU) of the university hospital, who suffered from severe infection .

What does the study involve?
Comparing continuous infusion of meropenem versus intermittent administration of meropenem given in higher daily dose. Patients were were randomly allocated to the Infusion group or the Bolus group.

What are the possible benefits and risks of participating?
We presumed that continuous infusion of meropenem could provide the same or better clinical and microbiological efficacy than intermittent administration of meropenem given in higher daily dose.
There were no additional risks in both groups.

Where is the study run from?
Department of Anesthesiology and Intensive Care Medicine at Charles University teaching hospital in Plzen, Czech Republic.

When is study starting and how long is it expected to run for?
The study started on 01/10/2007 and ended on 30/04/2010.

Who is funding the study?
Czech Ministry of Education (project ref: MSM0021620819).

Who is the main contact?
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Contact information

Type(s)
Scientific

Contact name
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Additional identifiers

Protocol serial number
N/A

Study information

Scientific Title
Clinical and microbiological efficacy of continuous versus intermittent application of meropenem in critically ill patients: a randomized prospective single center study

Study objectives
Meropenem bactericidal activity depends on the time when the free drug concentrations remain above the minimum inhibitory concentration (MIC) of pathogens. In conventional bolus dosing regimens serum concentrations of meropenem between doses can fall to lower concentrations than MIC of less susceptible pathogens. We presume that continuous infusion of meropenem can provide the same or better clinical and microbiological efficacy than intermittent administration of meropenem given in higher daily dose.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Local Research Ethics Committee of University Hospital in Plzen, 17 May 2007

Study design
Single-center prospective randomized open-label comparative study

Primary study design

Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Critically ill patients with severe infection

Interventions
Patients admitted to the intensive care (ICU) of university hospital who suffered from severe infection and received meropenem were randomized either in the Infusion group or in the Bolus group.

Patients in the Infusion group received loading dose of 2g of meropenem followed by continuous infusion of 4g of meropenem over 24 hours.

Patients in the Bolus group were given 2g of meropenem over 30 minutes every 8 hours.

Clinical and microbiological outcome, meropenem-related length of ICU and hospital stay, meropenem-related length of mechanical ventilation, duration of meropenem treatment, total dose of meropenem, ICU and in-hospital mortality, safety and cost effectiveness were assessed.

Patients were followed up to hospital discharge.

Intervention Type
Other

Phase
Not Applicable

Primary outcome(s)
1. Clinical and microbiological efficacy of meropenem therapy were evaluated at the end of meropenem therapy
Clinical response was evaluated at the end of therapy as treatment success or failure. Clinical success was defined as complete or partial resolution of leukocytosis, temperature, and clinical signs and symptoms of infection. Cure was defined as complete resolution of all acute signs and symptoms of infection, with no new signs or symptoms associated with the original infection. Patients who retained evidence of infection but demonstrated a reduction of the majority of the clinical signs and symptoms of infection and no new or worsened signs associated with the original infection were classified as improved. For the purpose of statistical analysis, patients meeting the definitions of cured and improved were combined and defined as clinical successes. Failure consisted of any of the following:
1.1. Persistence or progression of signs and symptoms of infection
1.2. Development of new clinical findings consistent with active infection
1.3. Death from infection

2. Microbiological outcome was assigned one of the following categories: eradication, presumed eradication, persistence, presumed persistence, resistance or unevaluable. Eradication was defined as elimination of the pathogen from the site of isolation. Presumed eradication consisted of absence of appropriate material for culture or absence of results of control microbiological tests coupled with clinical improvement after a pathogen was initially isolated.

Three possible outcomes were defined collectively as persistence: verified persistence (failure to eradicate the original pathogen from the site of isolation after completion of therapy), presumed persistence (absence of appropriate material for culture or absence of results of control microbiological tests coupled with lack of clinical improvement after a pathogen was initially isolated) and development of resistance during therapy. Patients without cultures or evident pathogens from the presumed site of infection were deemed unevaluable.The categories of eradication and presumed eradication were combined and defined as microbiologic success. Persistence was designated as microbiologic failure.

Key secondary outcome(s))

1. Meropenem-related length of mechanical ventilation
2. Meropenem-related length of ICU and hospital stay (LOS)
3. ICU and in-hospital mortality
4. Duration of meropenem treatment
5. The total dose of meropenem
6. Safety and cost effectiveness of both dosing regimens

Completion date

30/04/2010

Eligibility

Key inclusion criteria

1. Patients aged 18 years and over
2. Admitted to the interdisciplinary Intensive Care Unit (ICU) between September 2007 and May 2010
3. Had suffered from severe infection and received meropenem with predicted duration of treatment for at least 4 days at the admission or during the ICU stay
4. Types of infections include:
4.1. Abdominal
4.2. Respiratory
4.3. Skin
4.4. Soft tissue
4.5. Bloodstream
4.6. Central nervous system
4.7. Urinary tract
4.8. Other sources of infections

Participant type(s)

Patient

Healthy volunteers allowed

No

Age group

Adult

Lower age limit

18 years

Sex

All

Key exclusion criteria
1. Age younger than 18 years
2. Pregnancy
3. Acute or chronic renal failure with glomerular filtration rate lower than 0.5 ml/s
4. Immunodeficiency or immunosuppressant medication
5. Neutropenia
6. Hypersensitivity or allergy to meropenem

Date of first enrolment
01/10/2007

Date of final enrolment
30/04/2010

Locations

Countries of recruitment
Czech Republic

Study participating centre
Department of Anesthesia and Intensive Care
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Sponsor information

Organisation
Charles University Teaching Hospital Plzen (Czech Republic)

ROR
https://ror.org/024d6js02

Funder(s)

Funder type
Government

Funder Name
Czech Ministry of Education (Czech Republic) ref: MSM0021620819

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary

Not provided at time of registration

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes