STABILITY OF MEROPENEM AND PIPERACILLIN/TAZOBACTAM IN CONTINUOUS INFUSION FOR HOME ADMINISTRATION

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Background and importance

The treatment of many infections requires lengthy hospitalizations, associated with a greater likelihood of complications for patients, and entails a substantial increase of costs for the healthcare system. For antibiotics, such as Meropenem and Piperacillin/Tazobactam, for which the authorized Summary of Product Characteristics does not provide for continuous infusion, the literature data are conflicting and there are no harmonized and consensus guidelines on this type of administration.

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DIFFUSION OF RESISTANT MICRO-ORGANISMS

II LINE ANTIBIOTIC THERAPY

HOSPITALIZATION FOR INFUSIONAL THERAPY

HEALTH RESOURCES COSTS

THERAPEUTIC FAILURE LACK OF CARRIER ISOLATION

I LINE ANTIBIOTIC THERAPY

Aim and objectives

The aim of this work is to investigate Piperacillin/Tazobactam and Meropenem stability in different media that can be used for continuous infusion administration via an elastomeric pump at home for patients diagnosed with severe bacterial infection.
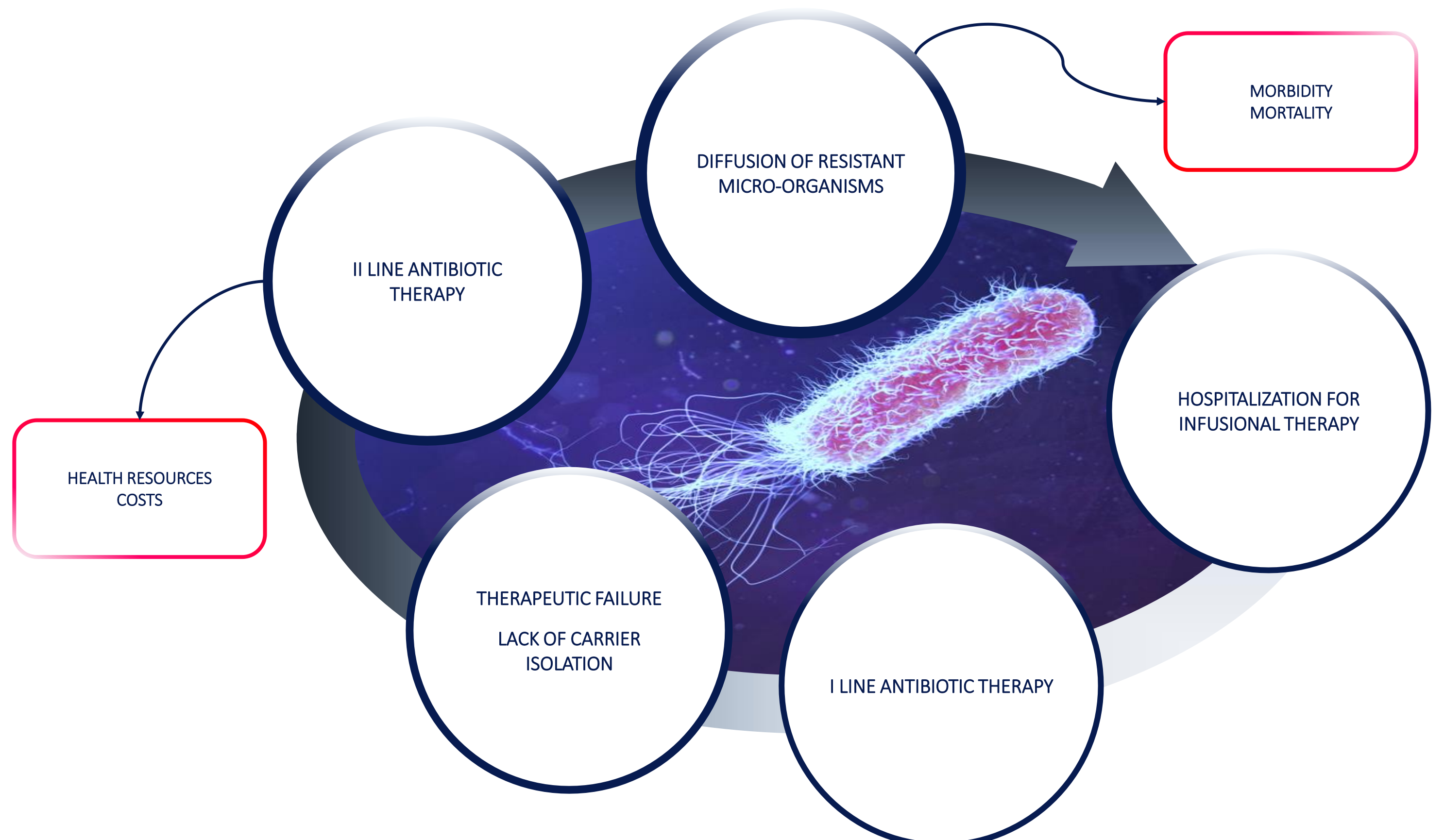
Material and methods

The qualitative analysis of the samples was carried out by applying the high-pressure liquid chromatography (HPLC). Conditions tested: 1) stress test (24 hours at -40 °C in ppi water) on samples of known drug concentration (400 µg/ml); 2) stability test in elastomer (meropenem 8 g/100 ml; piperacillin/tazobactam 18 g/100 ml), using physiological solution as a diluent, for 5 days at 25 °C to investigate any influence of the device on the sample stability; 3) stability test on drug solution (diluent: physiological and glucose solutions) at different temperatures (*i.e.*, 2-8 °C, 25 °C, 37 °C) for 48 hours.
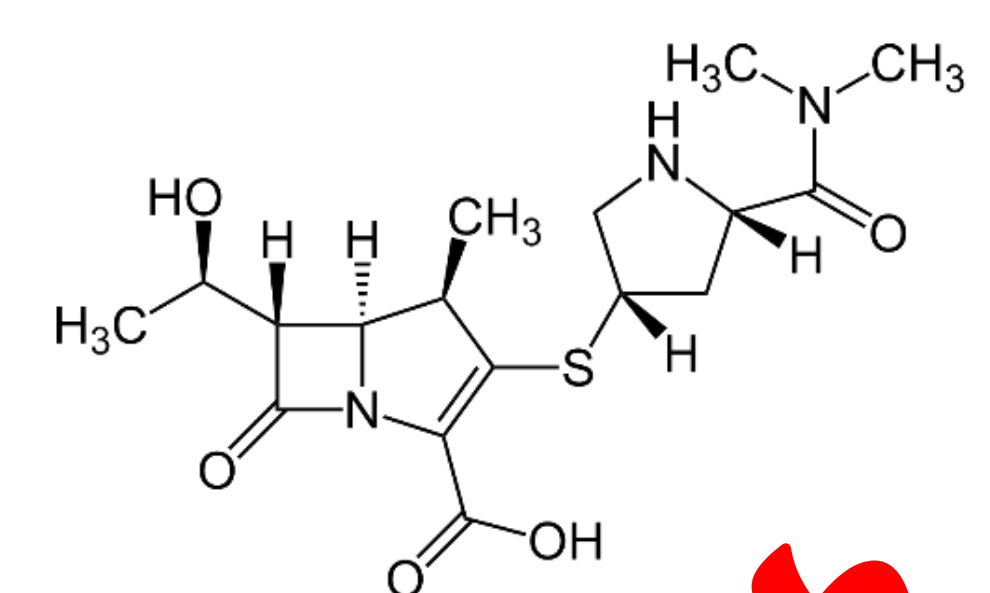
Results

Stress tests showed that meropenem degraded much more significantly than Piperacillin/Tazobactam when subjected to high temperatures, whereas the device seemed not to influence the degradation pattern of drug substances.

In physiological solution, Meropenem appeared stable at 2-8 °C, since the degradation pattern changes in a negligible matter within 24 hours. At temperature above 8 °C, it was unstable: loss of more than 5% of the active after only 4 hours and significant increase of impurities after 2 hours. On the contrary, Piperacillin/Tazobactam was stable for at least 24 hours in all the storage conditions tested.
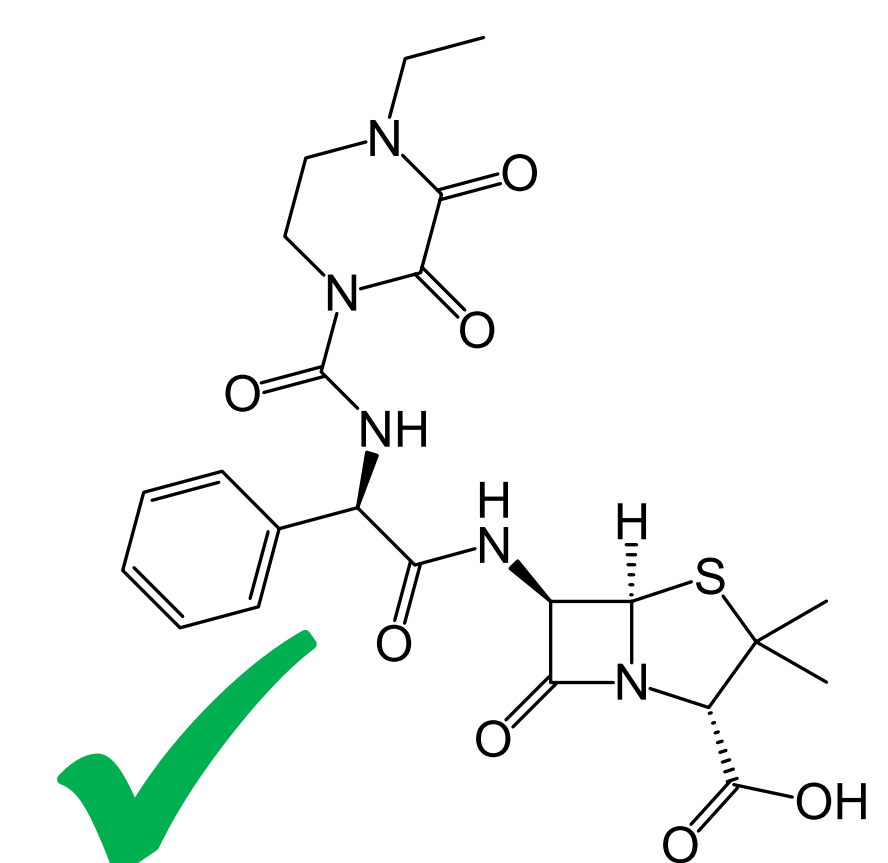
In glucose, Meropenem showed a significant reduction in the titer already after 2 hours and a significant increase in the impurity profile after 6 hours; those of Piperacillin/Tazobactam were stable for at least 24 hours.

Meropenem

Piperacillin Tazobactam

Conclusion and relevance

Continuous infusion at home of time-dependent antibiotics, such as Piperacillin/Tazobactam, is a feasible possibility, from a chemical stability point of view, that could increase the chances of therapeutic success, avoiding discontinuations or shifts to alternative therapies that could lead to the onset of new resistance phenomena, with a reduction in hospitalization costs and complications related to long hospitalization.