ACRONYM: **EMerGE-NeT**

Title: **Effectiveness of infection control strategies against intra- and inter-hospital transmission of MultidruG-resistant Enterobacteriaceae – insights from a multi-level mathematical NeTwork model**

Keywords: **Network modelling, multidrug-resistant Enterobacteriaceae, transmission dynamics, infection control, healthcare network**

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Abstract:

Multidrug-resistant Enterobacteriaceae (MDR-E) have become a major public health threat in many European countries. While traditional infection control strategies primarily target the containment of intra-hospital transmission, there is growing evidence highlighting the importance of inter-hospital patient traffic for the spread of MDR-E within healthcare systems.

Going substantially beyond previous research, the EMerGE-NeT consortium will unite expertise in theoretical modelling, numerical simulation studies, epidemiology, clinical medicine, and microbiology in order to develop a generic network modelling platform, which combines inter- and intra-hospital transmission of MDR-E in a single framework. This multi-level network model will reflect patient traffic in various European healthcare systems and will thus provide the framework to study systematically transmission dynamics of MDR-E and the effectiveness of infection control strategies to contain their spread within and across healthcare systems.

Corresponding to the requirements of this modelling approach, we will conduct specific molecular studies assessing the transmissibility of different MDR-E species and strains. In these studies, we will apply a novel cutting-edge methodology of targeted sequencing, which makes the large studies planned in this project economically feasible.

Based on a systematic literature review and a formal Delphi process for collating evidence, we will identify promising infection control strategies for containing MDR-E and assess their effectiveness in

simulation studies in the multi-level network model using species and strain specific transmission parameters.

The multidisciplinary character of this project will create a unique opportunity to evaluate results of computer simulations against practical knowledge and experience, thus allowing researchers to determine whether targeted, unified infection control strategies could stop or reduce the spread of MDR-E, and whether they are practically feasible.