Antibiotic Stewardship Decision-Supporting System: Innovating the Control and Prevention of Antibiotic Resistant Infections - A Participative Approach

Luís Velez Lapão[a], Alexandra Simões[a], Pedro Pinto[a], Miguel Gil[a], Isabel Couto[a], Miguel Mira da Silva[b], Pedro Póvoa[c, d], Miguel Viveiros[a]

a Global Health and Tropical Medicine, Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa

b Instituto Superior Técnico, Universidade de Lisboa

c NOVA School of Medicine, Universidade Nova de Lisboa

d Intensive Care Unit, Hospital São Francisco Xavier, Centro Hospitalar de Lisboa Ocidental

Healthcare-associated infections (HAI) caused by antibiotic-resistant pathogens are linked with high-levels of morbidity and mortality. To prevent and control antibiotic-resistant HAI, strategies based on surveillance/monitoring systems are imperative, especially if they are well-matched with the local social-cultural background. To decrease antimicrobial-resistant HAI in hospitals a decision-supporting-system was designed to reduce antibiotic use/misuse and antibiotic-resistant HAI. Three Portuguese Hospitals participate in the research, following the Design Science Research Methodology: (i) problem identification; (ii) solution definition by using an Antibiotic Stewardship decision-support information system; (iii) design, in collaboration with healthcare workers, a toolkit that help/assist physicians and infection control team to monitor/control antibiotic use and antibiotic-resistant HAI; (iv) implementation of the toolkit in the hospitals; and (v) evaluate the toolkit in the control and prevention of antibiotic-resistant HAI. To feed the toolkit, patient, microbiology and pharmacy data are extracted, from the current hospitals information systems by web services, in real-time. The information is then processed and aggregated in a unique database. A display module allows visualization through innovative graphics presentation: Inform about the accuracy of antibiotic prescription, providing timely and appropriate information related with antibiotics use; monitoring the data about antibiotic use and resistant bacteria.

The evaluation of the toolkit, based on a focus group questioner about the toolkit functionalities, revealed that it was considered helpful in monitoring antibiotic use, helping antibiotic prescription, and can be used to improve infection control interventions. This toolkit is an important step forward for the reduction of antibiotic misuse and in the control/prevention of antibiotic-resistant HAI.