

# Innovating the Control and Prevention of Antibiotic Resistant Infections – a surveillance and decision-support system for antibiotic use and antibiotic resistant infections

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## BACKGROUND

**Healthcare-associated infections (HAIs)** are a major cause of morbidity and mortality (37,000 deaths/year in Europe) with an **important economic impact** (28.4 to 33.8 billion dollars/year in the USA) (ECDC, Annual Epidemiological Report 2012, 2013; Scott, R. D., CDC, 2009).

**Antibiotics** are important in HAIs control, however, **inappropriate prescription** leads to **antimicrobial resistance, increasing even more morbidity, mortality and costs** (Huttner, A., Antimicrob Resist Infect Control, 2013).

**Strategies based on surveillance and monitoring systems well-matched with social, educational and cultural background** are the best ones to prevent and control antibiotic resistant HAIs (Borg, M. A. J Hosp Infect, 2013).

**AIM**  
 To co-design, and develop a surveillance and decision-support system, aimed to improve HAIs management and to reduce emergence and transmission of antimicrobial resistant pathogens.

## METHODOLOGY

To co-design and develop the monitoring and decision-support system, the strategy represented in Fig. 1, is used:

- **Multidisciplinary research team** (Clinicians, Microbiologists, Hospital Management, Pharmacists and Information System);
- **Healthcare workers** (of the Portuguese participant hospitals);
- **Design Science Research Methodology** (Peffer, K., Journal of management information systems, 2007);
- **Surveillance and decision-support system** (that extract, processed and aggregated patient, microbiology and pharmacy data).

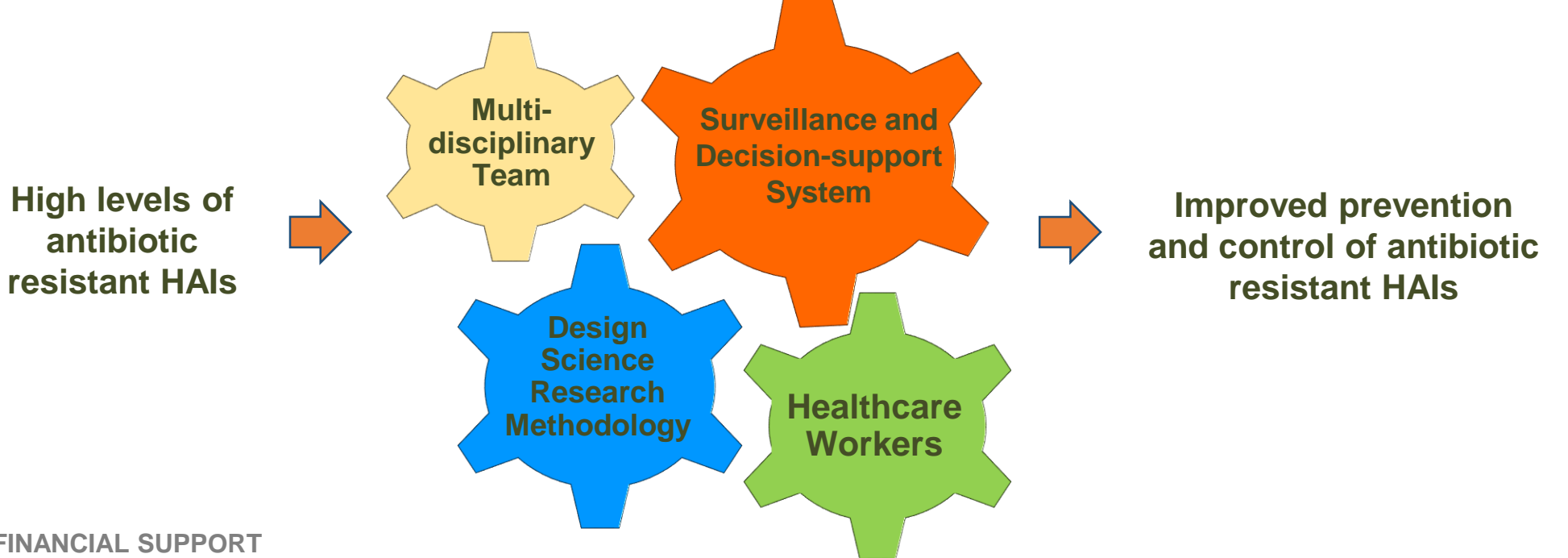


Fig. 1. Strategy schematics representation

## RESULTS

We co-design and developed **HAITool**, a **surveillance and decision-support system to help clinicians and infection control team dealing with HAIs**

**HAITool includes** integrated views of patient, microbiology and pharmacy data, displayed in an innovative graphics presentation:

- **Patient Timeline (Fig. 2)** - an integrated visualization of patient clinical evolution;
- **Antimicrobial consumption** - visualization of antibiotic consumption trends;
- **Antibiotic resistant infections** – visualization of antibiotic resistant infections distribution;
- **Antimicrobial susceptibility patterns (Fig. 3)** - local antimicrobial susceptibility patterns visualization;
- **Decision support tool for antimicrobial prescription**
  - Alerts for antimicrobial therapy duration (an algorithm matches antimicrobial prescriptions and CDC rules/guidelines);
  - Alerts for antimicrobial therapy not in accordance with microbiology lab results;
- **Alerts for ESKAPE + C and multi-drug resistant microorganisms** – when these microorganisms are isolated in the lab.

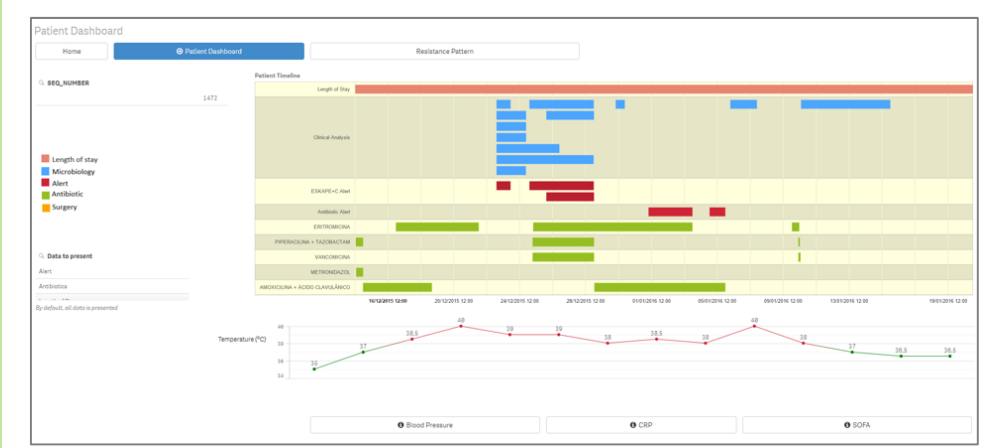


Fig. 2. Patient Timeline visualization

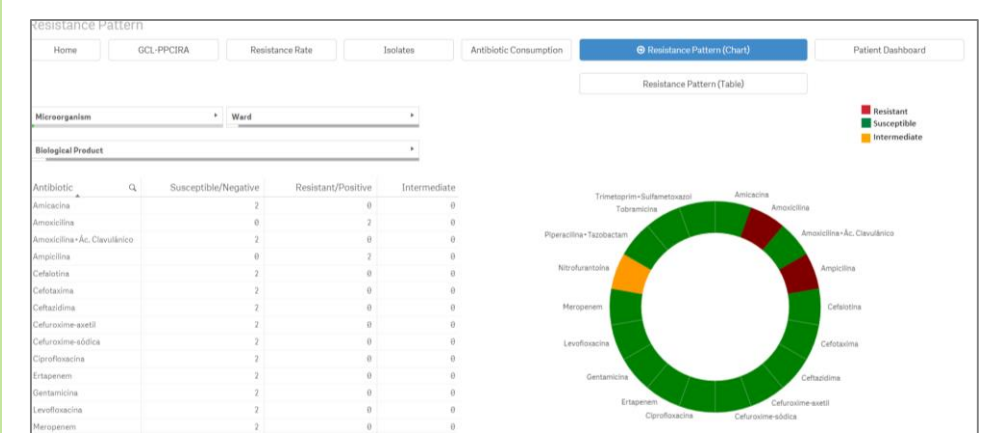


Fig. 3. Antimicrobial susceptibility patterns visualization

## CONCLUSIONS

We co-design and developed HAITool, a surveillance and decision-support system, that aggregate patient, microbiology and pharmacy data.

HAITool makes easier the management, prevention and control of antibiotic resistant HAIs.

HAITool is helpful in monitoring antibiotic use, antibiotic prescription, early identification of outbreaks, and infection control interventions.

HAITool is an important step forward for reduction of antibiotic misuse and for control and prevention of antibiotic resistant HAIs.