

## From social patterns to prevention of nosocomial infections: how RFID devices can help us reducing the risks

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Nosocomial infections represent one of the most important risks for patients admitted into the hospital and their burden and severity account for significant morbidity and mortality. Several of these infections are transmitted from person to person through the respiratory route or by direct contact. The implementation of current guidelines for prevention of nosocomial infections is based on universal principles derived from epidemiologic studies which cannot take into account specific logistics of hospital wards. Contact patterns observed in a given hospital ward may allow to identify critical behaviours among health care personnel, patients, and visitors, that are crucial for prediction of infection spread and for prevention strategies. Inspired by experiments in social sciences that investigated social patterns by using RFID devices, we decided to apply the same technology for the study of social contacts within a pediatric hospital ward. RFID tags were worn by health personnel, patients, caregivers, and visitors for a one week period during the highest peak of pandemic influenza in 2009 in Italy. RFID receivers were located in the hospital ward and collected signals that were transmitted and stored on a central server. The study included a total of 119 individuals, including: 10 ward assistants, 20 physicians, 21 nurses, 37 patients, and 31 caregivers. A total of nearly 16,000 contacts were recorded during the measurements, with a median of approximately 20 contacts per participants per day. The analysis of contacts showed different patterns across different roles. Patients and caregivers had stable long contacts whereas nurses had frequent contacts throughout the day with patients. Physicians and visitors had less frequent contacts with patients. Of note, during the period under study, no nosocomial infection due to pandemic influenza virus was observed. Our experiment shows the feasibility of monitoring social contacts in a hospital with technologies that allow precise, timely, and contextual measures of social contacts. In this lecture we will discuss how this technology may be deployed for implementing more efficacious guidelines for preventing nosocomial infections that are adapted to local settings. We will also discuss how the availability of this technology together with other biosensors may allow to achieve other crucial tasks such as handwashing monitoring and direct detection of contaminated sites, and to transfer geolocalized information through the Internet or mobile phones.