# Informatics in Infection Control

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**KEYWORDS**

• Infection control • Informatics • Surveillance • Prevention • Public health

**KEY POINTS**

- In the age of digitized medical data, informatics tools are integral to routine infection control activities.
- Computer software can partially or fully automate infection surveillance, improving efficiency and reliability.
- Informatics are used for infection prevention, primarily through clinical decision support.
- Informatics link clinical and public health activities through electronic laboratory reporting, syndromic surveillance, and enhanced interfacility communication, which improves the timeliness of disease reporting, and outbreak detection and intervention.

The term "informatics" describes the use of computer information systems to answer questions, solve problems, and make decisions[1]; for the purpose of this paper, it refers to the use of computer information systems to control and prevent infection. As medical information becomes digitized, computer applications are an important part of everyday infection control practice. Informatics has the potential to improve infection control outcomes in three major domains: (1) surveillance, (2) prevention, and (3) connections with public health (**Box 1**). Furthermore, informatics can connect individual facility infection control programs with each other in a way that is similar to what the Internet did for stand-alone desktop computers; such connectedness improves regional control of antibiotic resistance by enhancing interfacility communication and facilitating outbreak detection across multiple facilities. This article reviews the current and emerging use of informatics for infection control.

## BACKGROUND

The adoption of electronic medical record systems in the United States has skyrocketed; the percentage of hospitals with at least a basic electronic medical record

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**Box 1**
**Uses of informatics in infection control**

*Surveillance*

- Fully or semiautomated surveillance of infections
- Fully automated device counting (denominator)
- Outbreak detection, single institution or ward

*Prevention*

- Awareness of multidrug-resistant organism carriage on admission
- Enhanced interfacility communication
- Identifying inappropriate infection precautions
- Reducing device use
- Antimicrobial stewardship

*Public health*

- Electronic communicable disease reporting
- Syndromic surveillance
- Regional outbreak detection

increased from approximately 10% in 2008 to 75% in 2014.[2] Patient information relevant to the infection control department (including microbiology and laboratory test results, patient location, presence of invasive devices, and infection precautions status) is stored electronically, enabling computers to automate processes that were previously performed by hand.

The automation of infection control has improved efficiency, allowing a single infection preventionist to perform more surveillance than previously possible. Historically, surveillance of hospital-acquired bloodstream infections focused on the intensive care unit in part because of feasibility; now, with the use of automated surveillance, bloodstream infection surveillance is performed across the entire hospital. Whether the adoption of informatics results in a net savings of time is unclear; the trade-off of surveillance efficiency is the generation of more data to review, which competes with time spent on the hospital floor interacting with hospital staff. Ultimately, the critical question is whether the implementation of informatics improves patient safety.

## INFECTION SURVEILLANCE

Surveillance is a cornerstone of infection prevention. Hospitals use surveillance data to identify trends within wards (eg, is infection increasing in the particular intensive care unit); public health officials, payors, and consumers use surveillance data to compare performance among hospitals (eg, does Hospital A have a higher infection rate than Hospital B). The objectives of surveillance definitions are clearly different from that of clinical diagnostic criteria, which are used to help providers treat patients. Thus, although clinical diagnostic criteria relies heavily on human judgement to determine whether or not a patient has a disease, surveillance definitions work best when the definitions are as objective as possible, to reduce subjectivity and increase reliability between infection preventionists.[3]

An example of subjective versus objective surveillance definition is *Clostridium difficile* surveillance. The National Healthcare Safety Network (NHSN) endorses two