# Transformation of Antimicrobial Stewardship Programs Through Technology and Informatics

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**KEYWORDS**

• Antimicrobial stewardship • Technology • Informatics • Electronic health records
• Medical applications

**KEY POINTS**

- Antimicrobial stewardship programs (ASPs) are established to improve patient outcomes and simultaneously reduce overall costs and decrease antimicrobial resistance.
- Informatics and technology have made significant contributions in health care, which can enhance ASPs.
- Using electronic health records and clinical decision support systems to their potential as well as embracing medical applications (apps) and social media enable clinicians to improve antibiotic use.
- There is a need for a review of technology and informatics currently available to assist in ASPs.

## INTRODUCTION

The Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA) recommend that health care organizations invest in data systems capable of measuring quality improvement from antimicrobial stewardship implementation.[1] Successful antimicrobial stewardship programs (ASPs) have been shown to improve patient outcomes and decrease antimicrobial usage by up to 35%, with an annual savings to institutions of up to $900,000.[2–5]

Health care providers and the government are looking to informatics and technology to play an important role in managing costs, as well as improving health care

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quality and patient outcomes. The Centers for Medicare and Medicaid Services (CMS) are embracing informatics by providing financial incentives to qualified institutions as they adopt, implement, upgrade, or show "meaningful use" of certified electronic health record (EHR) technology to improve patient care by meeting several predefined objectives established by the CMS.[6] By 2014, the federal government wants more than half of all health care institutions to use EHRs. Facilities that have not implemented EHRs by 2015 will be penalized. EHRs represent 1 role that technology plays in health care. Applications (apps) geared toward mobile computing devices (eg smartphones and tablets) have also made an increasing impact in health care.

The Secretary of Health and Human Services published a press release on May 22, 2013 entitled "Doctors and hospitals' use of health information technology more than doubles since 2012."[7] This press release highlights a survey by the Centers for Disease Control and Prevention (CDC), indicating that in 2008 only 17% of physicians were using an advanced EHR system versus more than 50% by the end of April, 2013.[8] Likewise, in 2008, 9% of hospitals adopted an EHR versus more than 80% receiving Medicare or Medicaid incentive payments for implementing, upgrading, or meaningfully using EHRs by the end of April 2013. The highest rates of meaningfully using EHRs have been among large (>400 beds) hospitals (77%), followed by small (100 beds) rural hospitals (76%) and medium (100–399 beds) (72%) hospitals. Although EHR adoption rates seem to have increased this past year, much of that came from practices that upgraded basic systems (which includes capabilities for ordering prescriptions, recording patient history and demographic information, recording a list of the patient's medications and allergies, recording patient problem lists, recording clinical notes, viewing laboratory results, and viewing imaging results) for meaningful use. The CDC data show that of the 72% of doctors using an EHR, about 40% were using a basic system that would not qualify for meaningful use incentives.[8] As these technologies become more widespread, they are increasingly being applied to efforts to improve antibiotic use. Therefore, the objective of this article is to describe the impact of informatics and technology, focusing on EHRs and clinical decision support systems (CDSSs), apps, electronic resources, and social media, on antimicrobial stewardship.

## EHRS AND CDSSS

### *EHR Terminology*

The Healthcare Information and Management Systems Society defines an EHR as "a longitudinal electronic record of patient health information generated by 1 or more encounters in any care delivery setting."[9] Various components are included in this information, such as patient demographics, progress notes, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports. An EHR has the capability to generate a complete record of a clinical patient encounter, as well as any other care-related activity directly or indirectly via interface, including evidence-based decision support, quality management, and outcomes reporting.

Several individuals in the health care system use the terms electronic medical record (EMR) and EHR interchangeably; however, these terms describe 2 different systems. EHRs rely on EMRs to be in place, and EMRs are less comprehensive than EHRs. Data in the EMR are a legal record of what happened to a patient during the course of their treatment at a care facility, allowing the health care practitioner to document, monitor, and manage a patient's treatment course at a facility.[9] In its simplest form, an EMR is a digital version of the traditional paper charts for an individual, which is limited to the health organization and cannot be shared. Unlike EMRs,