

Diagnostic Safety Research at the Agency for Healthcare Research and Quality



History and Impact of AHRQ's Diagnostic Safety and Quality Program

Diagnostic error is a significant and underrecognized threat to patient safety

Diagnostic error is pervasive, costly, and in many cases, preventable.

- Diagnostic errors occur in 1 of 20 outpatients annually, affecting 12M patients each year.¹
- Diagnostic errors harm 1 in every 14 hospitalized patients; 85% are likely preventable.²
- One in five patients with cancer experiences a delayed or missed diagnosis, impacting how likely they are to survive.³
- The human toll of diagnostic error is high; estimates suggest as many as 795,000 people in the United States become permanently disabled or die each year from misdiagnosis.⁴
- Diagnostic errors are costly—a 25-year sum of diagnosis-related malpractice payments was \$38.8 billion.⁵

Foundational work

In 2015, AHRQ collaborated with CDC and private funders to sponsor the National Academies' expert consensus report on [*Improving Diagnosis in Healthcare*](#).⁶ That report summarized evidence of the extent of diagnostic error, generated foundational definitions for the field, and produced a framework that has guided subsequent research.

Impact of investigator-initiated research

AHRQ's role in the U.S. health enterprise is threefold: making 21st century care a reality for all, focusing on healthcare improvement, and disseminating and implementing actionable knowledge.

Examples of significant advancements achieved by our grantees include the following:

- **Improved diagnostic accuracy and reduced missed diagnosis.** A quality collaborative of 15 pediatric primary care settings at the Albert Einstein School of Medicine demonstrated improvement in the diagnosis of hypertension in children (from 54% to 74%) and depression (from 6.2% to 10.5%).⁷ This work was subsequently expanded to more than 59 pediatric care settings.



PATIENT
SAFETY

- **Reduced delays in the diagnosis of cancer.** Nearly three-quarters of patients fail to complete recommended testing and referrals, which can lead to delays in diagnosis and prevent patients from receiving timely and essential care. An AHRQ grantee developed ambulatory safety nets using registries, patient navigators, and workflow redesign that successfully achieved followup in more than half of those originally lost to followup for colon and lung cancer testing.⁸ Their ambulatory safety net model has been replicated in a large malpractice insurer-sponsored collaborative⁹ and implemented successfully in a large integrated healthcare system (Kaiser Permanente) that serves 12 million patients.¹⁰
- **Reduced low-value care and improved diagnostic yield.** Between 2018 and 2019, Medicare spending on low-value care totaled approximately \$3.6 billion, most of it driven by inappropriate diagnostic services (Grade D by U.S. Preventive Services Task Force recommendations).¹¹ An AHRQ grantee showed that four activities—including an IT solution made available for public use that provided evidence-based guidance—reduced recommendations for low-value exams by nearly half, improved the clarity and actionability of radiology recommendations nearly eightfold, and improved the completion rate and timeliness of followup (from 59.6% to 84.7%).¹² These activities can make sure that patients get the timely diagnostic care they need but avoid unnecessary and burdensome tests.
- **Avoided diagnostic harm from overdiagnosis.** Failure to detect life-threatening sepsis can have devastating consequences. An AHRQ grantee team developed and implemented a novel and valid metric for clinical surveillance of sepsis in a 12-hospital group that reduced harm from overdiagnosis.^{13,14} Results include improved survival for one of the leading causes of death in hospitals (reduced mortality from 2.4% to 2.1%) and a decrease in hospital length of stay from 4 days to 3 days. Using the novel metric could save more than 5,000 deaths each year, along with the other improvements in reducing time in hospital, and total days of antibiotic use.
- **Improved diagnosis for a leading cause of death and inpatient hospitalization.** Pneumonia is a challenging diagnosis, largely because there is no gold standard or single defining test for diagnosis, and thus there is a great deal of variation in practice patterns. An AHRQ grantee developed an electronic decision support tool that automatically extracts historical data and adds real-time clinical data to stratify risk and provide guidelines for diagnosis.^{15,16} The tool was implemented across 16 community hospitals and increased the proportion of patients with pneumonia who were discharged home, reduced utilization of intensive care units, decreased time to antibiotics for those warranting them, improved the use of optimal antibiotics, and at the same time, lowered 30-day mortality by 38 percent. In addition, they developed a SMART on FHIR (Substitutable Medical Applications and Reusable Technologies on Fast Healthcare Interoperability Resources) version of their toolkit that is interoperable across different electronic health record systems and available for wide dissemination.

Practice improvement

AHRQ is working with 150 healthcare sites nationally to implement one or more of the following three diagnostic safety resources: [Toolkit for Engaging Patients to Improve Diagnostic Safety](#), [Measure Dx](#), and [Calibrate Dx](#).¹⁷ These resources are designed to promote improved communication with patients for complete and accurate information, encourage clinicians to reflect and learn from their experiences, and help quality leaders assess events with diagnostic errors. The implementation project includes a learning collaborative to mentor sites and tackle barriers to success. A separate project trained more than 80 healthcare sites on [TeamSTEPPS for Diagnosis Improvement](#).

AHRQ embeds diagnostic safety across our entire patient safety portfolio

AHRQ integrates diagnostic safety in our general patient safety program. Specific examples include:

- **Common Formats for Event Reporting—Diagnostic Safety.** [Patient Safety Organizations](#) (PSOs) [have protected privileges](#) to collect information about safety events to promote shared learning and quality improvement. Event reporting systems are central to the function of PSOs, and AHRQ developed a standard taxonomy (the Common Formats) to facilitate and standardize the capture of diagnostic safety adverse event reports in Event Reporting Systems. This allows the PSOs to learn from and create solutions to optimize diagnostic outcomes.
- **Diagnostic Excellence Performance Measures.** Healthcare improvement has been stymied by lack of methods to measure diagnostic quality. AHRQ has a portfolio of quality measures that are publicly available. Our latest work includes the development and testing of several new quality measures targeting the timely and accurate diagnosis of cancer and stroke.
- **Surveys on Patient Safety Culture (SOPS®).** A strong patient safety culture is foundational to improving patient safety. Since 2001, the SOPS program has supported AHRQ's mission by advancing the scientific understanding of patient safety culture in healthcare settings. In 2020 AHRQ developed the [Diagnostic Safety Supplemental Items for Medical Office SOPS](#) to help medical offices assess the extent to which their organization's culture supports the diagnostic process, accurate diagnoses, and communication around diagnoses.

AHRQ works with other federal partners to share learnings and coordinate diagnostic safety work

AHRQ leads the [Federal Interagency Workgroup on Improving Diagnostic Safety and Quality in Healthcare that](#) coordinates diagnostic excellence efforts across the Department of Health and Human Services and with other agencies such as the Veteran's Administration and the Defense Health Agency and identifies opportunities for collaboration. One collaborative project produced an issue brief on [Diagnostic Stewardship](#) that summarizes interventions that promote optimal use of diagnostic tests, improve accuracy and speed of diagnosis, and reduce misdiagnosis due to errors in test performance, interpretation and/or communication.

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