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# Adoption of Electronic Health Record Systems among U.S. Non-federal Acute Care Hospitals: 2008-2013

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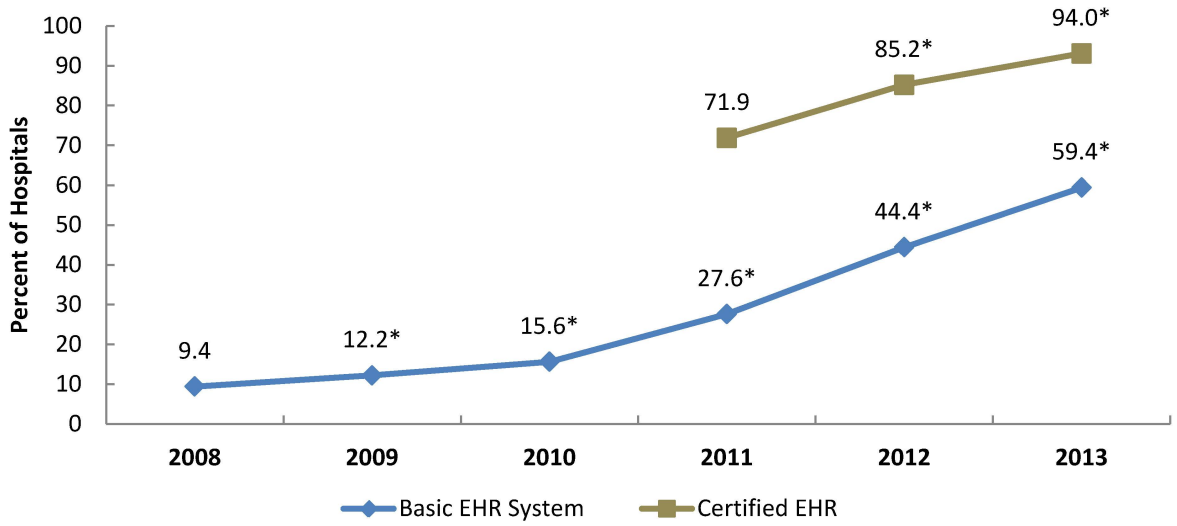
The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 directed the Office of the National Coordinator for Health Information Technology (ONC) to promote the adoption and meaningful use of electronic health records (EHRs). This brief describes trends in adoption of EHR systems among non-federal acute care hospitals from 2008 to 2013.

## Hospital adoption of EHR systems has increased more than five-fold since 2008.

Figure 1: Percent of non-federal acute care hospitals with adoption of at least a Basic EHR system and possession of a certified EHR: 2008-2013




NOTES: Basic EHR adoption requires the EHR system to have a set of EHR functions defined in Table 2. A certified EHR is EHR technology that has been certified as meeting federal requirements for some or all of the hospital objectives of the CMS EHR Incentive Program. Possession means that the hospital has a legal agreement with the EHR vendor, but is not equivalent to adoption.
*Significantly different from previous year ($p < 0.05$).
SOURCE: ONC/American Hospital Association (AHA), AHA Annual Survey Information Technology Supplement

- ★ In 2013, nearly six in ten (59%) hospitals have adopted at least a Basic EHR system. This represents an increase of 34% from 2012 to 2013 and a five-fold increase since 2008 (Figure 1).
- ★ Over nine in ten (93%) hospitals possessed a certified EHR technology in 2013, increasing by 29% since 2011.

## Hospital adoption of EHR systems varied significantly by state.

Table 1: Percent of non-federal acute care hospitals with adoption of at least a Basic EHR system by U.S. state: 2013

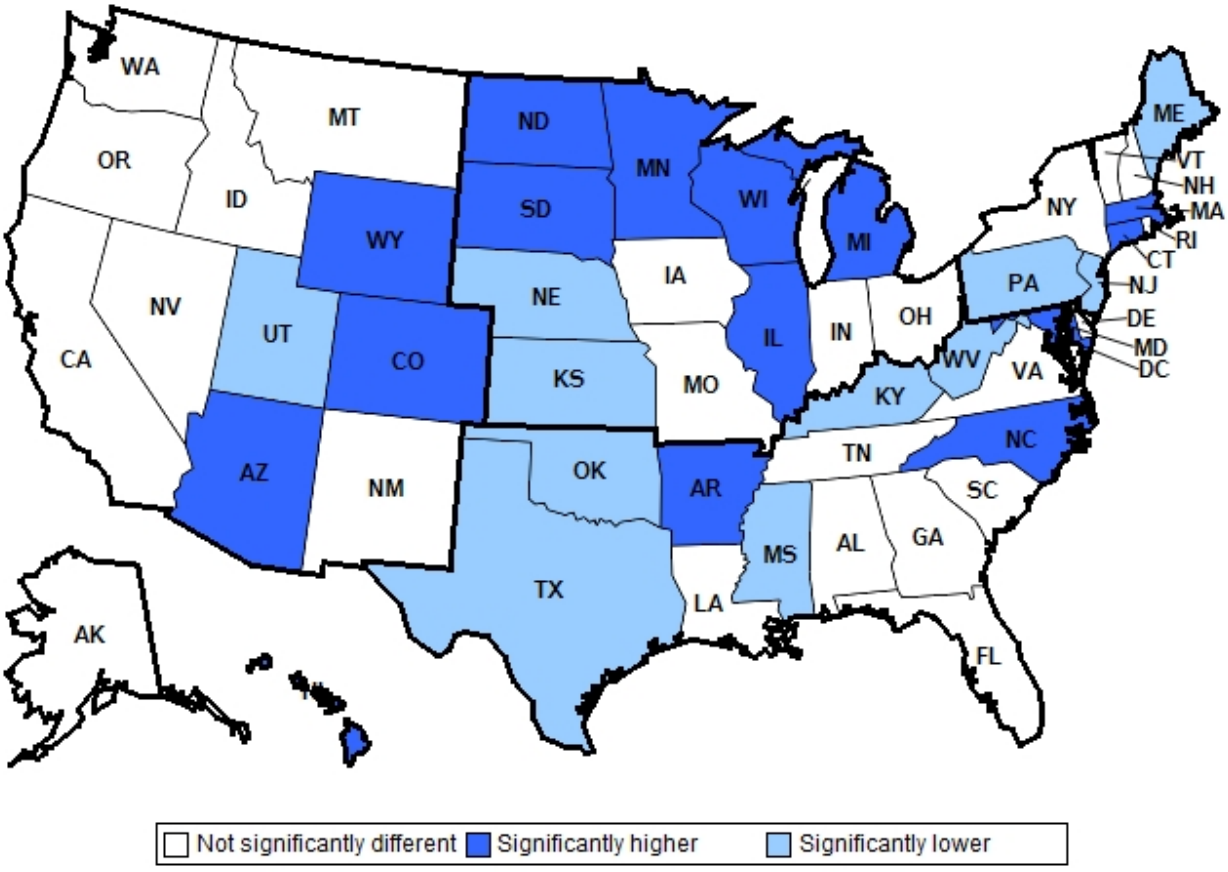
| State | Basic EHR, % | n (N) | State | Basic EHR, % | n (N) |
|---|---|---|---|---|---|
| **United States** | **59.4** | **2655 (4472)** | Missouri | 53.1 | 111 (112) |
| Alabama | 45.4 | 31 (90) | Montana | 67.5 | 28 (54) |
| Alaska | 55.3 | 6 (19) | Nebraska | 41.0§ | 49 (84) |
| Arizona | 71.6† | 39 (60) | Nevada | 68.0 | 11 (29) |
| Arkansas | 78.2† | 38 (71) | New Hampshire | 58.7 | 12 (26) |
| California | 55.3 | 170 (328) | New Jersey | 43.9§ | 45 (64) |
| Colorado | 76.3† | 48 (71) | New Mexico | 47.8 | 17 (31) |
| Connecticut | 75.7† | 17 (29) | New York | 63.4 | 115 (171) |
| Delaware | 50.1 | 4 (6) | North Carolina | 74.7† | 55 (108) |
| District of Columbia | 67.9 | 6 (8) | North Dakota | 78.7† | 14 (42) |
| Florida | 65.7 | 96 (184) | Ohio | 57.9 | 106 (158) |
| Georgia | 60.9 | 58 (134) | Oklahoma | 47.3§ | 57 (107) |
| Hawaii | 83.4† | 12 (20) | Oregon | 51.6 | 27 (59) |
| Idaho | 52.4 | 20 (38) | Pennsylvania | 53.2§ | 114 (154) |
| Illinois | 66.8† | 141 (178) | Rhode Island | 61.3 | 8 (10) |
| Indiana | 63.6 | 63 (107) | South Carolina | 63.0 | 19 (58) |
| Iowa | 61.4 | 75 (117) | South Dakota | 82.2† | 23 (50) |
| Kansas | 36.1§ | 97 (125) | Tennessee | 52.9 | 48 (115) |
| Kentucky | 50.8§ | 63 (97) | Texas | 53.7§ | 199 (343) |
| Louisiana | 49.2 | 44 (100) | Utah | 26.2§ | 22 (44) |
| Maine | 45.2§ | 22 (36) | Vermont | 66.1 | 6 (14) |
| Maryland | 73.0† | 31 (45) | Virginia | 65.2 | 42 (81) |
| Massachusetts | 63.6 | 40 (62) | Washington | 70.3 | 36 (88) |
| Michigan | 67.5† | 74 (128) | West Virginia | 47.3§ | 28 (49) |
| Minnesota | 71.6† | 127 (129) | Wisconsin | 78.1† | 93 (125) |
| Mississippi | 56.1§ | 33 (90) | Wyoming | 80.9† | 15 (24) |

NOTES: Basic EHR adoption requires the EHR system to have a set of EHR functions defined in Table 2.
n = survey respondents; N = hospitals surveyed. All estimates met standards for reliability.
†Significantly higher than national average
§Significantly lower than national average ($p < 0.05$)
SOURCE: ONC/AHA, AHA Annual Survey Information Technology Supplement

- ★ State rates of hospital adoption of at least a Basic EHR system ranged from 26% to 83% (Table 1).
- ★ Hawaii (83%), South Dakota (82%), and North Dakota (79%) had the highest percent of hospitals with adoption of at least a Basic EHR system.
- ★ Utah (26%), Kansas (36%), and Nebraska (41%) had the lowest percent of hospitals with adoption of at least a Basic EHR system.

**EHR adoption rates were significantly higher than the national average in fifteen states.**

Figure 2: State percent of non-federal acute care hospitals with adoption of at least a Basic EHR system compared with the national average (59.4%): 2013




NOTES: Basic EHR adoption requires the EHR system to have at least a basic set of EHR functions, including clinician notes, as defined in Table 2.
SOURCE: ONC/AHA, AHA Annual Survey Information Technology Supplement

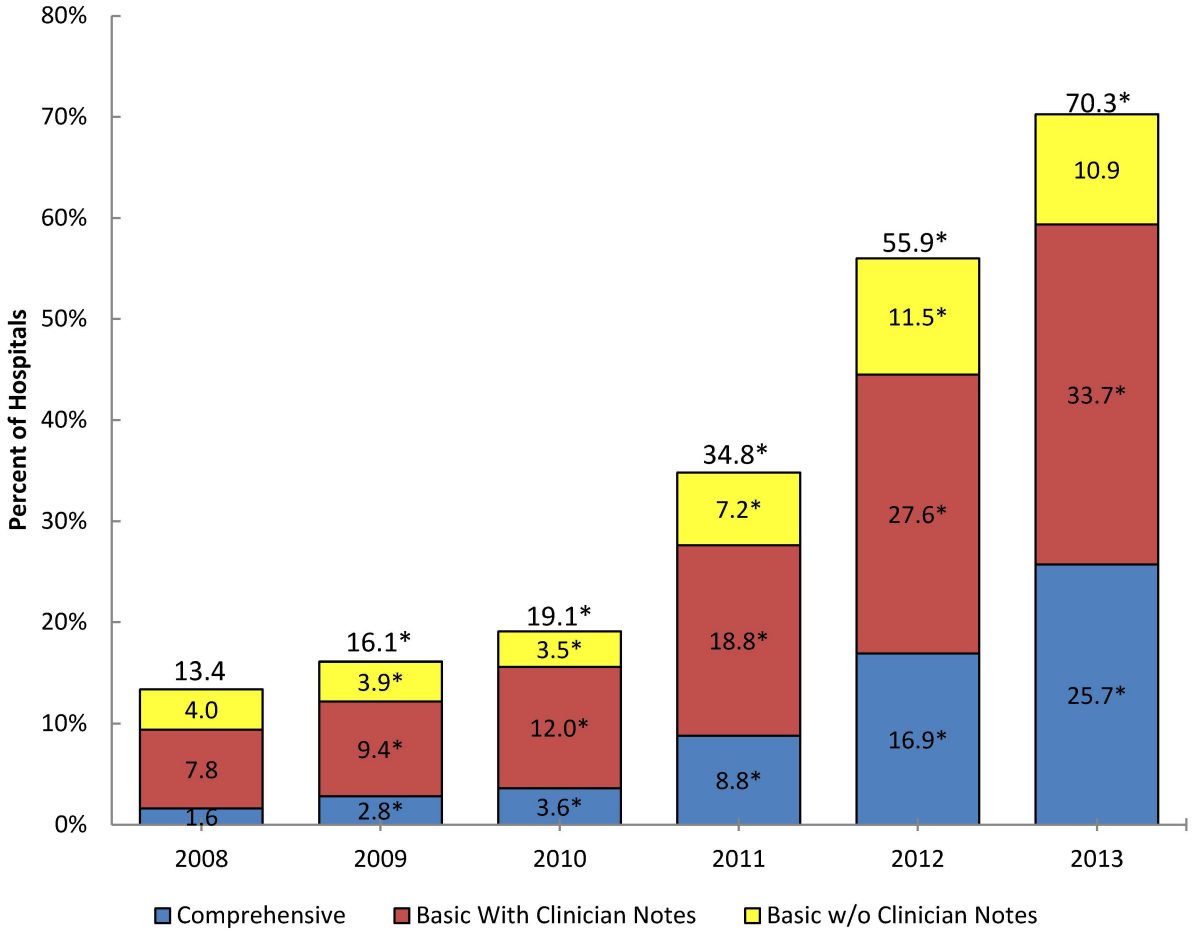
- ★ Hospital adoption of at least a Basic EHR system was significantly higher than the national average in fifteen states (Arizona, Arkansas, Colorado, Connecticut, Hawaii, Illinois, Maryland, Massachusetts, Michigan, Minnesota, North Carolina, North Dakota, South Dakota, Wisconsin, and Wyoming) (Figure 2).

- ★ Hospital adoption of at least a Basic EHR system was significantly lower than the national average in eleven states (Kansas, Kentucky, Maine, Mississippi, Nebraska, New Jersey, Oklahoma, Pennsylvania, Texas, Utah, and West Virginia).

- ★ Most of the states with adoption rates significantly higher than the national average were located in the Midwest.

**Trends in EHR adoption show increasing use of advanced functionality.**

Figure 3: Percent of non-federal acute care hospitals with adoption of EHR systems by level of functionality: 2008-2013




NOTES: Definitions of Basic EHR and Comprehensive EHR systems are reported in Table 2.
*Significantly different from previous year ($p < 0.05$).
A prior study reported estimates of hospital adoption based on at least Basic EHR with Clinician Notes (1).
Differences in the estimates in this brief from (1) are due to the inclusion of children's and cancer hospitals and small differences in the calculation of hospital-level weights.
SOURCE: ONC/AHA, AHA Annual Survey Information Technology Supplement

- ★ Hospital adoption of a Basic EHR without Clinician Notes has declined marginally while the systems with more advanced functionality have increased significantly (Figure 3).

- ★ Hospital adoption of Comprehensive EHR systems has increased eight-fold since 2009, rising to over a quarter (26%) of hospitals in 2013.

## Summary

Adoption of EHR systems by non-federal acute care hospitals has steadily increased since HITECH. In 2013, nearly six in ten (59%) non-federal acute care hospitals had adopted at least a Basic EHR system with clinician notes. This represents a 34% increase from the previous year and a more than five-fold increase in EHR adoption since 2008. In addition, a vast majority of acute care hospitals (93%) possessed EHR technology certified as meeting federal requirements for Meaningful Use objectives.

Hospital adoption of EHR systems varied across U.S. states. Rates of hospital adoption of at least a Basic EHR system were significantly above the national average in fourteen states and significantly below the national average in eleven other states. Hospitals in Hawaii, South Dakota, and North Dakota had the highest rates of adoption. Hospitals in Utah, Kansas, and Nebraska had the lowest adoption rates.

In addition to growth in EHR adoption overall, hospital adoption of advanced functionality has increased significantly. Hospital adoption of comprehensive EHR systems has increased more than eight-fold in the last four years.

## Definitions

Non-federal acute care hospital: Includes acute care general medical and surgical, children's general, and cancer hospitals owned by private/not-for-profit, investor-owned/for-profit, or state/local government and located within the 50 states and District of Columbia. The inclusion of children's general and cancer hospitals makes this definition different from previous peer-reviewed research (2). However, it is more consistent with the population of hospitals eligible for federal health IT adoption incentives.

Adoption of Basic EHR: Table 2 defines the electronic functions required for hospital adoption of a Basic or Comprehensive EHR system, which a consensus expert panel established (3). The panel disagreed on the need to include physician notes and nursing assessments to classify a Basic system, so they developed two definitions of Basic EHR adoption (Basic EHR without Notes and Basic EHR with Notes) (3). Since the first stage of the CMS EHR Incentive Program did not require clinician notes, an earlier brief reported Basic EHR without Clinician Notes (4). Since clinician notes are a requirement for the second stage (5), the definition of Basic EHR in this brief includes clinician notes as a requirement for at least a Basic EHR system.

Possession of Certified EHR: A certified EHR is EHR technology that has been certified as meeting federal requirements for some or all of the hospital objectives of the CMS EHR Incentive Program. "Possession" of certified EHR technology is considered to be either the physical possession of the medium on which a certified Complete EHR, or certified Modular EHR resides, or a legally enforceable right by an eligible health care provider to access and use, at its discretion, the capabilities of a certified Complete EHR or certified Modular EHR. An eligible health care provider may determine the extent to which it will implement or use these capabilities, which will not affect the provider's "possession" of the certified Complete EHR or certified EHR Module.

Table 2: Electronic Functions Required for Hospital Adoption of Basic or Comprehensive EHR Systems

| EHR Functions Required | Basic EHR without Clinician Notes | Basic EHR with Clinician Notes | Comprehensive EHR |
|---|---|---|---|
| **Electronic Clinical Information** | | | |
| Patient demographics | ★ | ★ | ★ |
| Physician notes | | ★ | ★ |
| Nursing assessments | | ★ | ★ |
| Problem lists | ★ | ★ | ★ |
| Medication lists | ★ | ★ | ★ |
| Discharge summaries | ★ | ★ | ★ |
| Advance directives | | | ★ |
| **Computerized Provider Order Entry** | | | |
| Lab reports | | | ★ |
| Radiology tests | | | ★ |
| Medications | ★ | ★ | ★ |
| Consultation requests | | | ★ |
| Nursing orders | | | ★ |
| **Results Management** | | | |
| View lab reports | ★ | ★ | ★ |
| View radiology reports | ★ | ★ | ★ |
| View radiology images | | | ★ |
| View diagnostic test results | ★ | ★ | ★ |
| View diagnostic test images | | | ★ |
| View consultant report | | | ★ |
| **Decision Support** | | | |
| Clinical guidelines | | | ★ |
| Clinical reminders | | | ★ |
| Drug allergy results | | | ★ |
| Drug-drug interactions | | | ★ |
| Drug-lab interactions | | | ★ |
| Drug dosing support | | | ★ |

NOTES: Basic EHR adoption requires each function to be implemented in at least one clinical unit, and Comprehensive EHR adoption requires each function to be implemented in all clinical units

## Data Source and Methods

Data are from the American Hospital Association (AHA) Information Technology (IT) Supplement to the AHA Annual Survey. Since 2008, ONC has partnered with the AHA to measure the adoption and use of health IT in U.S. hospitals. ONC funded the 2013 AHA IT Supplement to track hospital adoption and use of EHRs and the exchange of clinical data.

The chief executive officer of each U.S. hospital was invited to participate in the survey regardless of AHA membership status. The person most knowledgeable about the hospital's health IT (typically the chief information officer) was requested to provide the information via a mail survey or secure online site. Non-respondents received follow-up mailings and phone calls to encourage response. The survey was fielded from November 2013 to the end of February 2014.

The response rate for non-federal acute care hospitals was 59%. A logistic regression model was used to predict the propensity of survey response as a function of hospital characteristics, including size, ownership, teaching status, system membership, availability of a cardiac intensive care unit, urban status, and region. Hospital-level weights were derived by the inverse of the predicted propensity.

Estimates considered unreliable had a relative standard error adjusted for finite populations greater than 0.49. Responses with missing values were assigned zero values. Significant differences were tested using $p < 0.05$ as the threshold.

## References

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The authors are with the Office of the National Coordinator for Health Information Technology, Office of Economic Analysis, Evaluation and Modeling.

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