

ONC Data Brief ■ No. 23 ■ April 2015

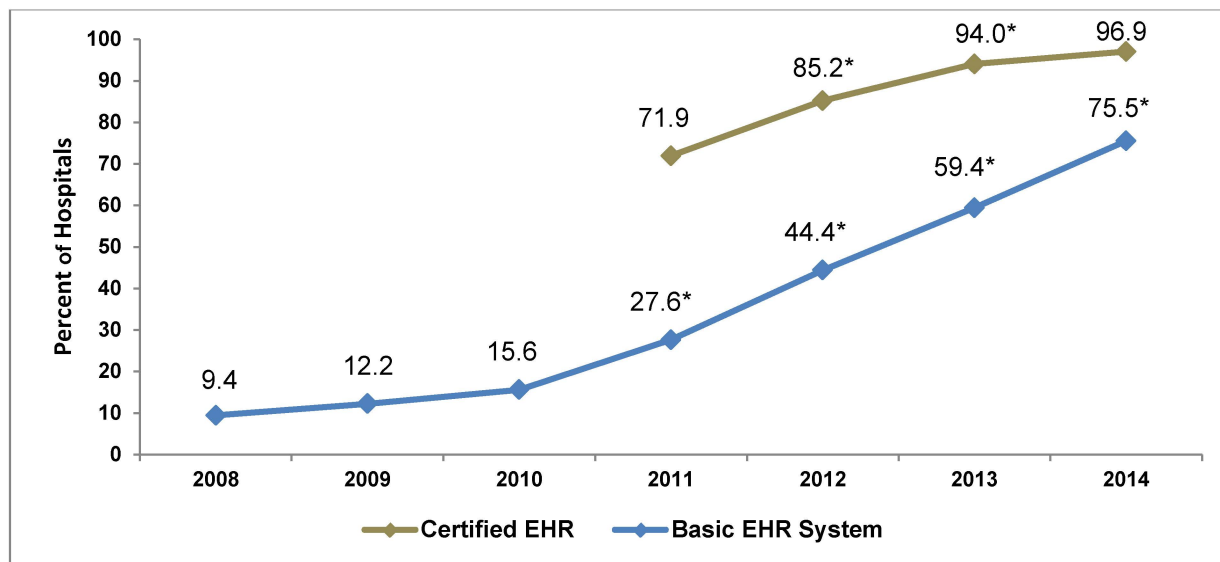
Adoption of Electronic Health Record Systems among U.S. Non-Federal Acute Care Hospitals: 2008-2014

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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). In addition, the adoption and increased use of health IT products is a keystone objective of the Federal Health IT Strategic Plan (1). This brief describes trends in adoption of EHR systems among non-federal acute care hospitals from 2008 to 2014. It tracks both the adoption of Basic EHR systems and the possession of EHR technology certified to meet federal requirements. Basic EHR adoption represents a minimum use of core functionality determined to be essential to an EHR system (see Table A1). This brief refers to Basic EHR adoption with clinical notes unless otherwise stated. A certified EHR is EHR technology that meets the technological capability, functionality, and security requirements adopted by the Department of Health and Human Services.

Three out of Four Hospitals have a Basic EHR System.

Figure 1: Percent of non-Federal acute care hospitals with adoption of at least a Basic EHR with notes system and possession of a certified EHR: 2008-2014



NOTES: Basic EHR adoption requires the EHR system to have a set of EHR functions defined in Table A1. A certified EHR is EHR technology that meets the technological capability, functionality, and security requirements adopted by the Department of Health and Human Services. 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 2014, 3 out of 4 (76%) hospitals had adopted at least a Basic EHR system. This represents an increase of 27% from 2013 and an eight-fold increase since 2008.
- ★ Nearly all reported hospitals (97%) possessed a certified EHR technology in 2014, increasing by 35% since 2011.

For all states, at least half of hospitals adopted a Basic EHR.

Table 1: Percent of non-federal acute care hospitals with adoption of at least a Basic EHR system by U.S. State, 2014.

State	Basic EHR, %	n (N)	State	Basic EHR, %	n (N)
United States	75.5	2682 (4451)	Missouri	68.5§	111(111)
Alabama	72.5	35(89)	Montana	70.6	27(54)
Alaska	76.1	7(21)	Nebraska	66.9	48(84)
Arizona	88.6†	31(62)	Nevada	63.6	13(30)
Arkansas	91.1†	35(71)	New Hampshire	71.7	17(26)
California	71.6	170(325)	New Jersey	70.0	44(64)
Colorado	81.7†	50(71)	New Mexico	73.4	18(32)
Connecticut	81.2	22(29)	New York	72.5	110(170)
Delaware	100.0†	5(6)	North Carolina	78.4	60(106)
District of Columbia	67.5	6(8)	North Dakota	81.7	14(41)
Florida	87.0†	119(182)	Ohio	67.5§	100(154)
Georgia	82.3†	66(130)	Oklahoma	68.7	47(105)
Hawaii	54.8§	12(22)	Oregon	81.4	36(59)
Idaho	69.5	19(38)	Pennsylvania	72.4	107(154)
Illinois	85.0†	126(177)	Rhode Island	82.6	6(10)
Indiana	83.1†	61(107)	South Carolina	68.1†	26(58)
Iowa	74.9	85(117)	South Dakota	95.1	22(51)
Kansas	60.0§	92(125)	Tennessee	77.9	52(114)
Kentucky	65.1§	60(96)	Texas	71.7§	231(342)
Louisiana	75.3	42(98)	Utah	77.5	21(44)
Maine	79.1	19(34)	Vermont	83.1	5(14)
Maryland	90.7†	33(45)	Virginia	93.2†	51(80)
Massachusetts	76.9	36(62)	Washington	77.4	32(89)
Michigan	71.7	83(128)	West Virginia	49.6§	24(49)
Minnesota	84.7†	124(128)	Wisconsin	77.4	82(125)
Mississippi	75.6	25(90)	Wyoming	67.9	15(24)

NOTES: Basic EHR adoption requires the EHR system to have a set of EHR functions defined in Table A1.

n = survey respondents; N = hospitals surveyed. All estimates met standards for reliability.

†Significantly higher than national average

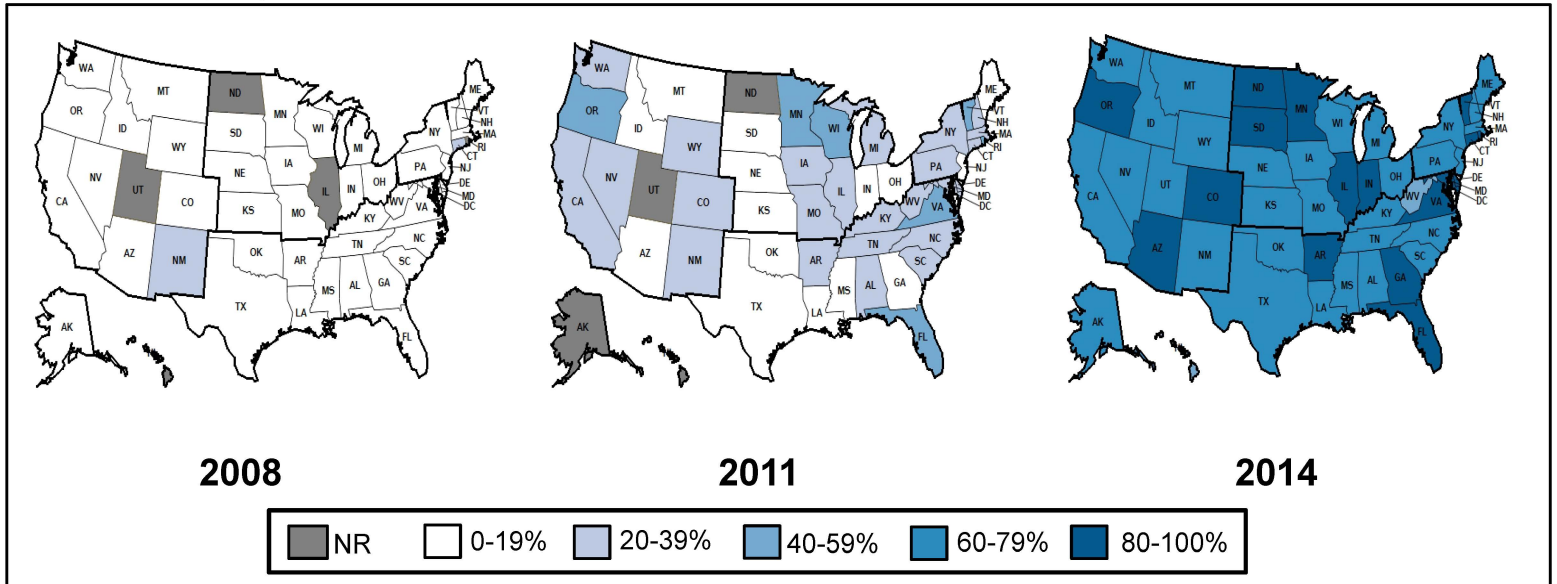
§Significantly lower than national average (p < 0.05)

SOURCE: ONC/AHA, AHA Annual Survey Information Technology Supplement

- ★ State rates of hospital adoption of at least a Basic EHR system ranged from 50% to 100%.
- ★ Delaware (100%), South Dakota (95%), and Virginia (93%) had the highest percent of hospitals with adoption of at least a Basic EHR system.
- ★ West Virginia (50%), Hawaii (55%), and Kansas (60%) had the lowest percent of hospitals with adoption of at least a Basic EHR system.

State adoption rates have increased from 2008 to 2014.

Figure 2: State percent of non-federal acute care hospitals with adoption of at least a Basic EHR system compared with prior years.



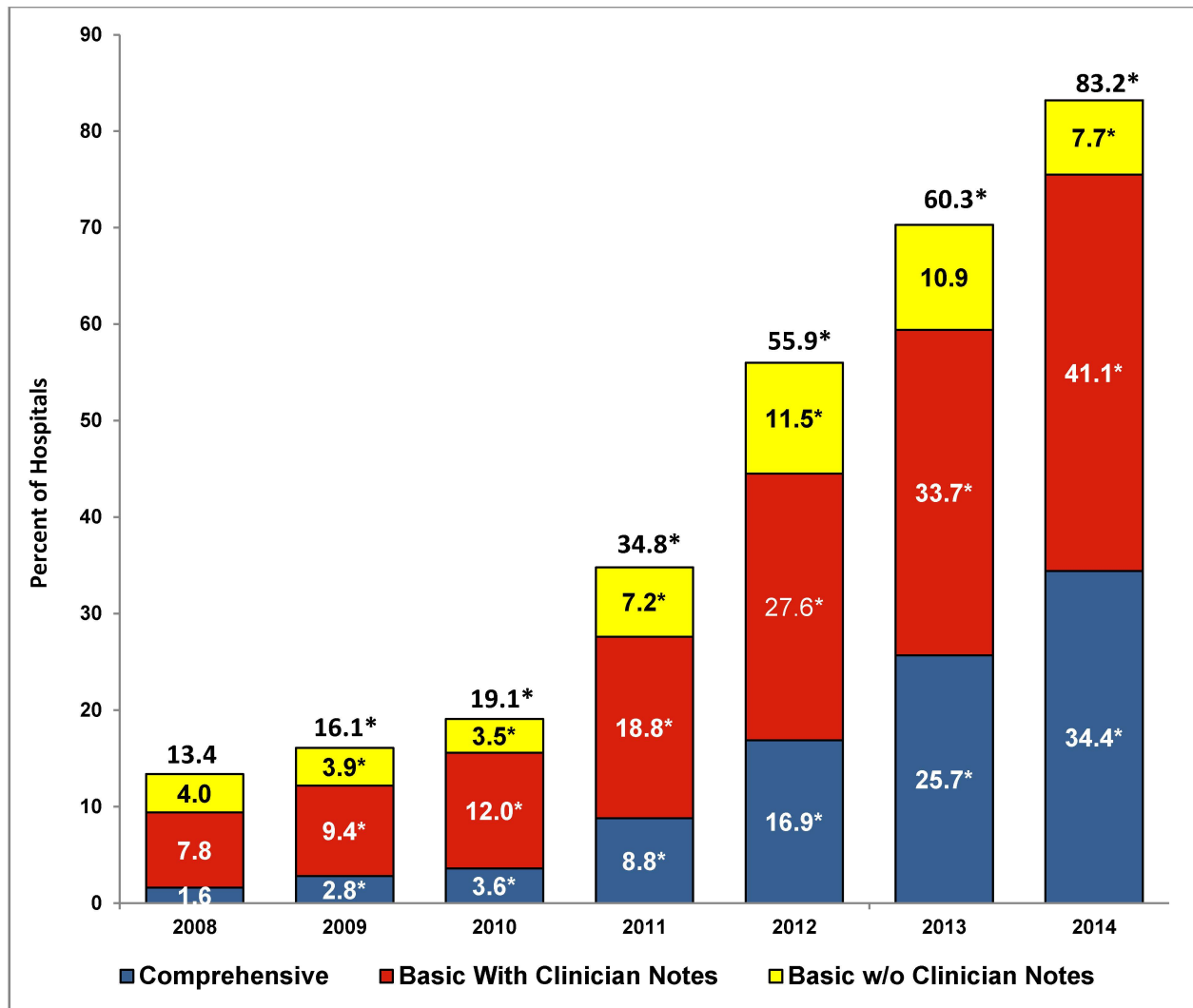
NOTES: Basic EHR adoption requires the EHR system to have at least a basic set of EHR functions, including clinician notes, as defined in [Table A1](#). Estimates for states shaded gray did not meet the standards for reliability (NR). See the [Table A2](#) for a complete list of 2008 and 2011 hospital adoption by state.

SOURCE: ONC/AHA, AHA Annual Survey Information Technology Supplement

- ★ In 2008, hospital adoption of at least a Basic EHR system was above 20% in only 2 states (Connecticut and New Mexico).
- ★ Three years later, hospital adoption of at least a Basic EHR system was above 20% in 32 states and above 40% in 7 states.
- ★ In 2014, hospital adoption of at least a Basic EHR system was above 60% in all but 2 states (Hawaii and West Virginia), and above 80% in 17 states.

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: 2008-2014.



NOTES: Definitions of Basic EHR and Comprehensive EHR systems are reported in Table A1.

*Significantly different from previous year ($p < 0.05$).

SOURCE: ONC/AHA, AHA Annual Survey Information Technology Supplement.

- ★ Fewer hospitals are using Basic EHRs without Clinician Notes, while the systems with more advanced functionality have increased significantly.
- ★ Hospital adoption of Comprehensive EHR systems has increased eleven-fold since 2009, rising to a third (34.4%) of hospitals in 2014.



Summary

Adoption of EHR systems by non-federal acute care hospitals has steadily increased since HITECH. Basic EHR adoption represents a minimum use of core functionality determined to be essential to an EHR system (2). In 2014, 3 in 4 (76%) non-federal acute care hospitals had adopted at least a Basic EHR system with clinician notes. This represents a 27% increase from the previous year and a more than eight-fold increase in EHR adoption since 2008. At 16 percentage points higher than 2013, this is the second highest increase in adoption since 2012 (17 percentage points).

Moreover, since the passage of the HITECH Act in 2009, state EHR adoption rates have increased. EHR adoption rates increased from only 2 states reporting rates higher than 20% to all states reporting rates 50% or higher by 2014. Furthermore, only 2 states currently have adoption rates below 60%.

In addition to growth in EHR adoption overall, hospital adoption of technology with advanced functionality increased significantly. While fewer hospitals used Basic EHR systems without clinician notes, significantly more adopted systems with clinician notes. Additionally, over a third of hospitals were using more advanced EHR functionality. Hospital adoption of Comprehensive EHR systems has increased more than eleven-fold in the last five years.

Finally, a vast majority of acute care hospitals (97%) possessed EHR technology certified to meet federal requirements. These hospitals should have the technology needed to meet EHR Incentive Program objectives. These systems are also certified to be secure and able to work with other certified systems to share information. Thus, the increase in the rate of adoption for certified EHR technology shed a positive light on hospitals' progress towards the interoperable exchange of health information.



Definitions

Non-federal acute care hospital: Includes acute care general medical and surgical, general children's, 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 (3). However, it is more consistent with the population of hospitals eligible for federal health IT adoption incentives.

Adoption of Basic EHR: Table A1 defines the electronic functions required for hospital adoption of a Basic or Comprehensive EHR system, which a consensus expert panel established (2). Basic EHR adoption requires that each function be implemented in at least one unit in the hospital. However, Comprehensive EHR adoption requires that each function be implemented in all units.

Because 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) (2). 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). However, clinician notes are now 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 meets the technological capability, functionality, and security requirements adopted by the Department of Health and Human Services. This includes the capability to securely work with other certified EHR systems to share information (interoperability). "Possession" of certified EHR technology is considered to be either the physical possession of the medium on which a certified EHR system resides or a legally enforceable right by a health care provider to access and use, at its discretion, the capabilities of a certified EHR system.



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 2014 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 2014 to the end of February 2015.

This analysis consisted of non-federal, acute care hospitals, including children's and cancer hospitals. Differences in the estimates in this brief from a prior study reporting Basic EHR adoption with clinician notes (6) are due to the inclusion of children's and cancer hospitals and small differences in the calculation of hospital-level weights.

The response rate for non-federal acute care hospitals was 60%. 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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Suggested Citation

Charles, D., Gabriel, M., Searcy T. (April 2015) Adoption of Electronic Health Record Systems among U.S. Non-Federal Acute Care Hospitals: 2008-2014. *ONC Data Brief*, no.23. Office of the National Coordinator for Health Information Technology: Washington DC.

Appendix

Table A1: 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

Table A2: Percent of non-federal acute care hospitals with adoption of at least a Basic EHR system by U.S. State, 2008 & 2011.

State	2008 Basic EHR, %	n (N)	State	2011 Basic EHR, %	n (N)
United States			United States		
Alabama	9%	34(99)	Alabama	22%	44(95)
Alaska	0%	7(21)	Alaska	NR	13(22)
Arizona	14%	31(60)	Arizona	17%	31(62)
Arkansas	9%	53(75)	Arkansas	32%	40(72)
California	9%	179(343)	California	22%	153(333)
Colorado	11%	41(70)	Colorado	30%	42(72)
Connecticut	22%	24(31)	Connecticut	22%	22(30)
Delaware	0%	4(6)	Delaware	39%	5(6)
District of Columbia	NR	5(9)	District of Columbia	37%	8(9)
Florida	11%	96(186)	Florida	51%	93(183)
Georgia	5%	78(140)	Georgia	15%	53(139)
Hawaii	NR	11(22)	Hawaii	NR	9(23)
Idaho	NR	24(39)	Idaho	19%	24(39)
Illinois	9%	130(185)	Illinois	35%	131(180)
Indiana	11%	70(106)	Indiana	19%	66(107)
Iowa	2%	79(117)	Iowa	35%	83(117)
Kansas	0%	76(122)	Kansas	19%	102(123)
Kentucky	6%	67(97)	Kentucky	24%	58(98)
Louisiana	8%	58(108)	Louisiana	14%	48(101)
Maine	3%	29(36)	Maine	20%	24(36)
Maryland	16%	37(46)	Maryland	28%	39(46)
Massachusetts	9%	35(71)	Massachusetts	37%	39(67)
Michigan	14%	103(133)	Michigan	31%	87(133)
Minnesota	17%	80(128)	Minnesota	44%	127(131)
Mississippi	8%	39(90)	Mississippi	17%	37(88)
Missouri	9%	69(113)	Missouri	35%	113(113)
Montana	6%	33(54)	Montana	15%	31(54)
Nebraska	6%	50(83)	Nebraska	19%	52(84)
Nevada	0%	11(29)	Nevada	36%	13(30)
New Hampshire	4%	23(26)	New Hampshire	29%	14(26)
New Jersey	16%	40(66)	New Jersey	11%	41(63)
New Mexico	22%	16(31)	New Mexico	23%	16(29)
New York	11%	120(190)	New York	26%	118(177)
North Carolina	11%	79(109)	North Carolina	24%	76(111)
North Dakota	NR	20(42)	North Dakota	NR	15(42)
Ohio	4%	115(157)	Ohio	20%	96(158)
Oklahoma	15%	56(103)	Oklahoma	14%	39(102)
Oregon	17%	30(57)	Oregon	42%	25(58)
Pennsylvania	8%	111(163)	Pennsylvania	30%	109(158)
Rhode Island	NR	6(11)	Rhode Island	55%	9(11)
South Carolina	7%	39(59)	South Carolina	27%	24(57)
South Dakota	11%	47(51)	South Dakota	17%	27(51)
Tennessee	6%	61(114)	Tennessee	21%	49(116)
Texas	9%	215(346)	Texas	20%	175(349)
Utah	NR	20(41)	Utah	NR	8(41)
Vermont	15%	13(14)	Vermont	45%	7(14)
Virginia	15%	52(80)	Virginia	53%	40(79)
Washington	7%	46(85)	Washington	38%	51(85)
West Virginia	7%	38(50)	West Virginia	23%	27(50)
Wisconsin	10%	85(122)	Wisconsin	47%	73(121)
Wyoming	10%	20(24)	Wyoming	21%	15(24)

NOTES: Basic EHR adoption requires the EHR system to have a set of EHR functions defined in Table A1.
n = survey respondents; N = hospitals surveyed. NR = estimate does not meet standards for reliability.
SOURCE: ONC/AHA, AHA Annual Survey Information Technology Supplement