

Electronic Medical Record Use by Office-Based Physicians and Their Practices: United States, 2006

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Abstract

Objectives—This report presents the latest information on the use of electronic medical records in physician offices. Percentages of medical practices and physicians within the practices using electronic medical records (EMR) are presented for 2006 by selected physician and practice characteristics.

Methods—Data from the physician induction interviews of the 2006 National Ambulatory Medical Care Survey (NAMCS) are presented. NAMCS includes a national probability sample of nonfederal office-based physicians who saw patients in an office setting. Sample data were weighted to produce national estimates of physicians. Estimates of medical practices were derived from NAMCS physician data by adjusting the weighting scheme using a multiplicity estimator.

Results—In 2006, 29.2 percent of office-based physicians reported using full or partial EMR systems, which represented a 22% increase since 2005 and a 60% increase since 2001, when the NAMCS began monitoring this technology. Starting in 2005, the NAMCS included questions about EMR system features that health information technology experts consider minimal for a comprehensive EMR, namely computerized orders for prescriptions, computerized orders for tests, reporting of test results (lab or imaging), and clinical notes. Based on these requirements, 12.4 percent of physicians surveyed used comprehensive EMR systems in 2006, a figure not significantly different from the 9.3 percent reported for 2005. From 2005 to 2006, the percentage of medical practices using full or partial EMR systems increased by 42% (from 18.3 to 25.9 percent), but the percentage of medical practices using a comprehensive EMR system did not change.

Keywords: physicians • electronic medical records • NAMCS

Introduction

This report examines use of electronic medical record (EMR) systems by office-based physicians in 2006, as well as their plans to install new EMR systems or replace their current systems within the next 3 years. Changes in EMR use by physicians

since 2001 are also examined (1,2). Two measures of EMR use are examined: use of full or partial (part paper) electronic medical records, and use of EMR systems that include features health information technology experts consider minimal for a comprehensive EMR, namely computerized orders for prescriptions, computerized orders for

tests, reporting of test results (lab or imaging), and clinical notes (3). Because the decision to use an EMR system is usually made at the organizational level of the practice, rather than by an individual physician, the report also presents estimates of medical practices that use EMR systems. Estimates of medical practices can be derived from the National Ambulatory Medical Care Survey (NAMCS) physician data by adjusting the weighting scheme using a multiplicity estimator. The number of physicians in the practice is used to modify the physician weight to yield a practice weight (4). This report presents 2006 estimates of EMR use by both office-based physicians and their practices by selected practice and location characteristics.

Methods

NAMCS is an annual probability survey of nonfederal, office-based physicians providing direct patient care who practice in the 50 states or the District of Columbia, excluding radiologists, anesthesiologists, and pathologists. The survey is conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics. A sample of 3,350 office-based physicians who reported that they were in direct patient care was taken



from the masterfiles of the American Medical Association and the American Osteopathic Association. The sample design includes 112 geographic primary sampling units (PSUs). Within those PSUs, physicians were stratified by specialty, and a sample of physicians was selected. Physicians were randomly assigned to 1 of 52 reporting weeks throughout the year. Of the 3,350 sampled physicians, 2,117 responded that they were eligible to participate in the survey (inscope). Eligible physicians must see patients in an office setting. In 2006, responses were obtained from 1,311 eligible sampled physicians who saw patients during their sample week and those who did not, for an unweighted response rate of 61.9 percent (63.6 percent weighted). For more information about NAMCS see www.cdc.gov/nchs/NAMCS.htm.

During the face-to-face induction interview for NAMCS, sampled physicians were asked to respond to questions about the scope and size of their office-based practices, including whether or not they used full or partial (part paper) EMRs. If they responded “yes” to either full or partial electronic records, they were asked seven additional questions about the features of their EMR system. Estimates of EMR use were calculated in two ways: physicians were considered to use EMRs if they reported “yes” to the general question on EMR use, and physicians were considered to use comprehensive EMR systems if they gave a “yes” response to all four features deemed minimally necessary for a comprehensive EMR system. The four features required of an EMR system are computerized orders for prescriptions, computerized orders for tests, test results, and clinical notes. The functionality of comprehensive EMR systems approximates the type of electronic health record systems proposed by the President to be used by most physicians by 2014 (3).

It should be noted that some items on EMR features collected in the 2005 survey were refined in the 2006 survey. For the first time, information on whether an EMR feature was available but turned off was collected (2.3 percent of physicians). In this report, any feature

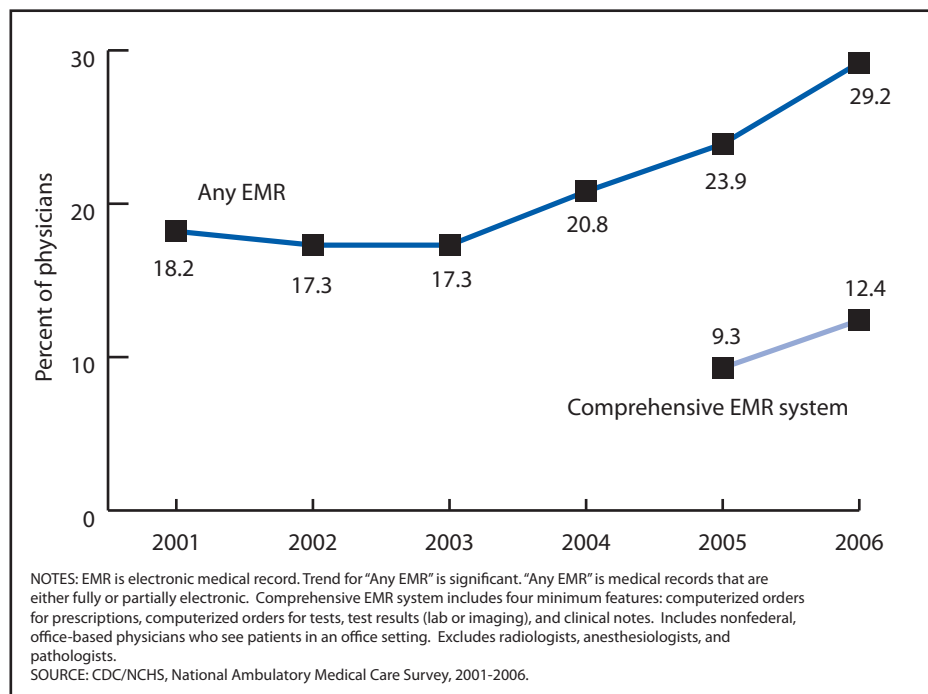


Figure 1. Percentage of office-based physicians using electronic medical records and using comprehensive electronic medical record systems: United States, 2001–2006

reported as turned off was considered available within the EMR. Information on availability of imaging results within the EMR was also collected for the first time in 2006. In this report, the presence of either lab or imaging results reported in 2006 is considered equivalent to having test results (collected in 2005) available within the EMR. Finally, the clinical notes feature collected in 2006 is considered equivalent to the physician notes feature collected in 2005.

Data on general use of EMRs were missing for fewer than 2 percent of physicians; for this analysis, cases missing data were considered as not having EMRs. If missing cases were randomly distributed, this approach would underestimate the incidence of EMR adoption.

The report presents national estimates of EMR use among both medical practices and physicians within the practices. To address that the NAMCS is based on a multistage sample of physicians, compound sampling weights were applied to make national estimates of EMR use and corresponding estimates of sampling error (5). Estimates of the medical practices can be derived from the NAMCS physician data by adjusting the weighting scheme using a multiplicity

estimator. The number of physicians in the practice is used to modify the physician weight to yield a practice weight (4). Statements of differences in estimates are based on statistical tests (e.g., chi-square tests of independence, Student’s *t*, or weighted linear regression) with significance at the $p < 0.05$ level. Additional information about the county in which the physician’s practice was located was obtained from the Area Resource File (ARF) (6).

Results

- In 2006, approximately 29.2 percent of physicians (95% confidence interval: 25.9–32.5) reported using full (14.5 percent) or partial (14.7 percent) EMR systems in their office-based practices. This represents a 22% increase since 2005 and a 60% increase since 2001 (Figure 1). EMR use did not vary by physician gender or specialty type; however, EMR use declined with physician age (Table 1).
- EMR use was related to several practice characteristics. EMR use increased with the size of the practice, as measured by number of physicians (Figure 2). EMR use was higher among health maintenance organizations compared with

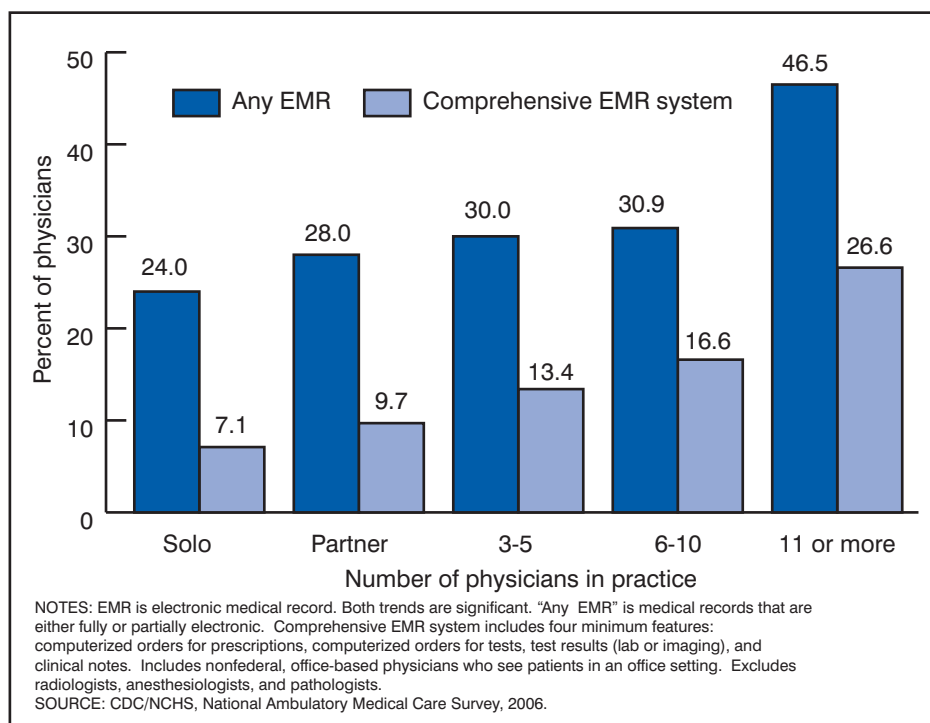


Figure 2. Percentage of physicians using electronic medical records and using comprehensive electronic medical record systems by practice size: United States, 2006

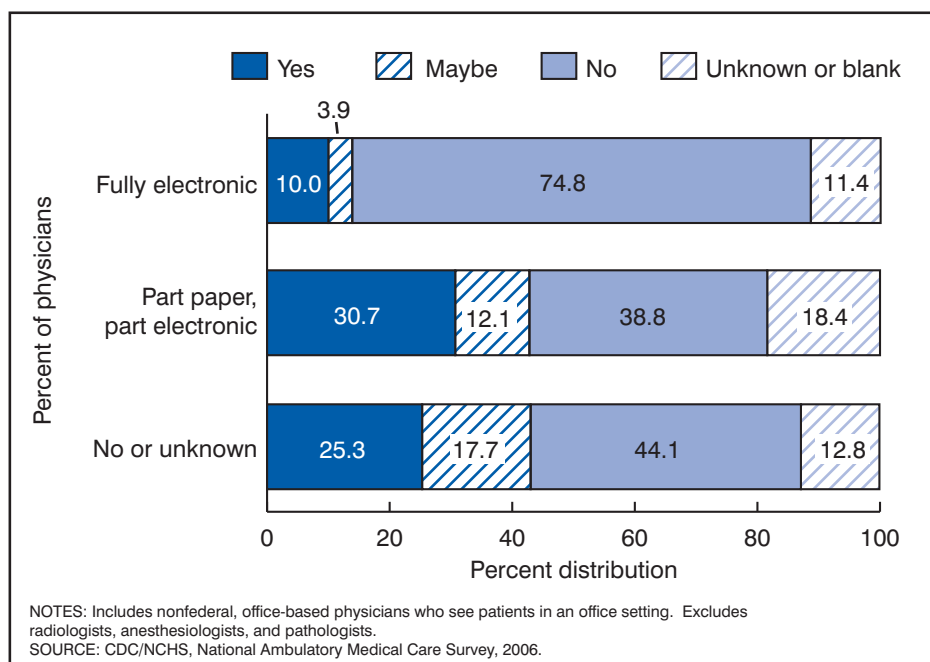


Figure 3. Percent distribution of physicians planning new or replacement electronic medical record systems within next 3 years by whether current system is fully or partially electronic: United States, 2006

physicians in private practice and other types of ownership, and varied by number of managed care contracts (Table 1).

- Physicians in the West (42.3 percent) were more likely to use EMRs than were those in the Northeast

(23.5 percent), Midwest (29.3 percent), and South (24.2 percent) (Table 2). Physicians in metropolitan statistical areas (30.3 percent) were more likely to use EMRs than were those in

nonmetropolitan statistical areas (20.2 percent).

- In 2006, 12.4 percent of physicians (95% CI: 9.9–14.9) reported having the four features deemed minimally necessary for a comprehensive EMR system (last column in Tables 1 and 2). Although it appears that this percentage increased since 2005 (Figure 1), the difference is not statistically significant. The relationships observed between this measure of EMR use and characteristics of the physician, practice, and location characteristics were generally the same as those found for use of full or partial EMRs, with the following exceptions: use of comprehensive EMR systems was higher among physicians in multi-specialty practices than in solo or single-specialty practices, however, use of comprehensive EMR systems was unrelated to the number of managed care contracts, or metropolitan statistical area status.
- Table 3 presents responses to the seven items concerning the specific features of the EMR system used by the physician. Percentages are provided for all physicians, as well as for physicians reporting that their medical record systems are fully or partially electronic. Although 26.2 percent of physicians have electronic patient demographics, only 6.6 percent reported having electronic public health reporting capabilities. In 2006, 20.4 percent of physicians could view either lab (19.3 percent) or imaging (15.0 percent) results electronically. Among physicians with fully electronic systems, 63.7 percent reported their EMR systems included reminders for guideline-based interventions and/or screening tests, and about one-half (52.9 percent) sent prescriptions to the pharmacy electronically, or had tests orders sent electronically (46.5 percent) (Table 3).
- In 2006, 23.9 percent of office-based physicians reported that they planned to install new EMR systems or replace their current systems within the next 3 years, and 14.9 percent reported that they might do so (data not shown). Physicians currently without EMR systems were more

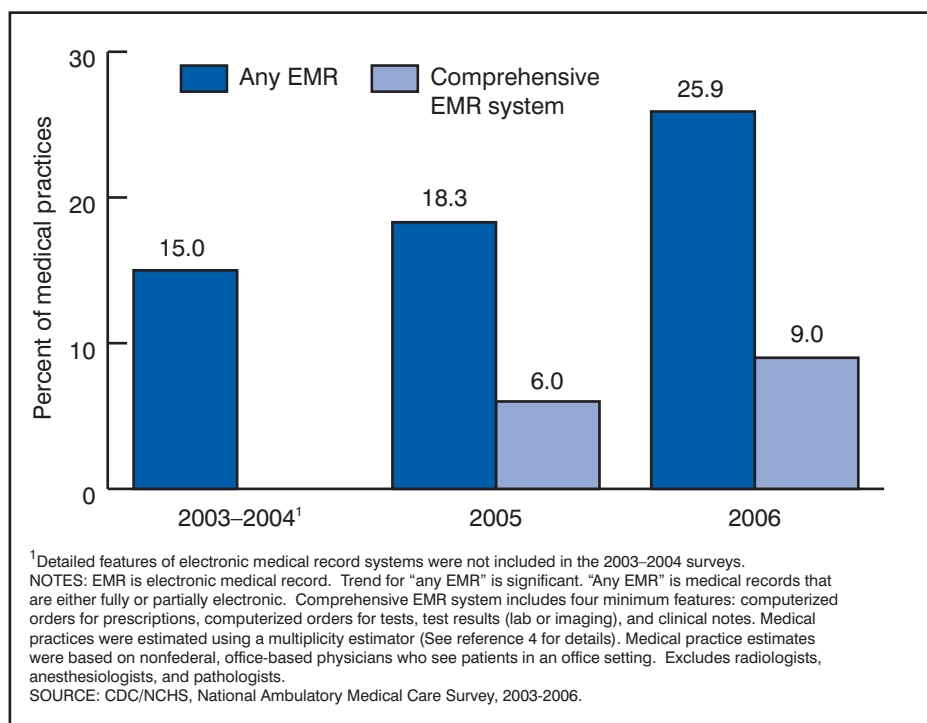


Figure 4. Percentage of medical practices using electronic medical records and using comprehensive electronic medical record systems: United States, 2003-04 through 2006

likely to report plans to install new EMR systems within the next 3 years compared with those with fully-electronic systems. Physicians with partially electronic systems were more likely to report plans to replace current systems within the next 3 years compared with those with fully electronic systems (Figure 3).

- Decisions to adopt a new EMR system are usually made at the practice level. The percentage of medical practices that reported using any form of electronic medical records increased by 42% since 2005 and by 73% since 2003-2004 (Figure 4). Although the percentage of medical practices using a comprehensive EMR system appeared to increase between 2005 and 2006, the difference was not significant (Figure 4).

Conclusion

These estimates show recent progress toward the goal of universal electronic health records. Between 2005 and 2006, the percentage of office-based medical practices using any form of EMR increased by 42% (Figure 4),

while the percentage of physicians within these practices using any form of EMR increased by 22% (Figure 1). In 2006, nearly one in four physicians without an EMR system planned to install a new EMR system within the next 3 years, while 31 percent of physicians with partially-electronic systems planned to replace their current systems within the next 3 years. There continues to be room for improvement. In 2006, about 1 in 10 (9.0 percent) office-based medical practices and physicians within these practices (12.4 percent) had an EMR system with the minimal four features of a comprehensive system, unchanged since 2005 (Figures 1 and 4). In 2006, features of EMR systems in use varied widely; availability of EMR functions to order prescriptions or tests electronically and public health reporting capabilities lag behind other features of the system. This study confirms previous research (7,8) that showed that not all EMR features available to physicians are used. The NAMCS data found that about 2.3 percent of physicians turn off some available features. Finally, this study found that even among physicians who report using fully electronic medical

record systems, only 63.7 percent reported using reminders for guideline-based interventions or screening tests and about one-half used computerized prescription order entry (52.9 percent) or computerized test order entry (46.5 percent) features within their EMR system (Table 3). These are the features that may be most likely to result in improved management and quality of care. The 2006 NAMCS findings suggest continued efforts are needed to increase the adoption rate of comprehensive EMR systems.

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Table 1. Use of electronic medical records by characteristics of office-based physicians: United States, 2006

Physician and practice characteristics	Percent distribution of all physicians (based on weighted responses from 1,311 sample physicians)	Percent of physicians reporting use of fully or partially electronic medical records ¹ (standard error)	Percent of physicians reporting minimum features for comprehensive electronic medical record systems ² (standard error)
All physicians ³	100.0	29.2 (1.7)	12.4 (1.3)
Physician age ^{4,5}			
Under 35 years	6.4	47.0 (6.6)	*24.7 (6.2)
35–44 years	28.3	35.4 (3.2)	15.6 (2.5)
45–64 years	34.2	30.1 (2.8)	12.4 (2.0)
55–64 years	24.2	22.4 (2.9)	8.4 (1.6)
65 years and over	7.0	*7.6 (2.6)	*1.6 (1.0)
Physician specialty type ⁶			
Primary care	49.4	28.2 (2.4)	14.3 (2.0)
Surgical	21.2	31.3 (3.0)	12.3 (2.3)
Medical	29.4	29.5 (2.7)	9.3 (1.6)
Physician gender			
Male	75.4	29.3 (2.0)	11.7 (1.3)
Female	24.6	29.0 (3.3)	14.5 (2.7)
Practice size ^{4,5}			
Solo	34.1	24.0 (2.8)	7.1 (1.7)
Partner	12.3	28.0 (4.3)	9.7 (2.6)
3–5	29.9	30.0 (3.0)	13.4 (2.1)
6–10	15.3	30.9 (4.2)	16.6 (3.6)
11 or more	8.4	46.5 (6.4)	26.6 (5.3)
Breadth of specialization ⁵			
Solo and single-specialty	79.0	28.0 (2.0)	10.4 (1.4)
Multi-specialty	20.5	34.5 (3.5)	20.5 (3.3)
Unknown	0.4	–	...
Practice ownership ^{4,5}			
Physician or physician group	81.8	26.9 (1.7)	9.9 (1.1)
Health maintenance organization (HMO)	2.7	75.8 (8.5)	60.4 (10.3)
Other	15.5	33.5 (4.7)	17.2 (3.9)
Number of managed care contracts ⁴			
None	12.4	26.5 (4.3)	*10.7 (3.8)
1–2	8.3	39.7 (5.9)	15.1 (4.2)
3–10	33.7	23.2 (2.9)	9.8 (2.0)
More than 10	39.5	32.2 (2.8)	13.4 (2.0)
Unknown	6.1	34.8 (6.6)	*20.0 (6.2)
Percentage revenue from Medicaid			
Under 5%	31.7	29.4 (2.7)	9.9 (1.7)
5–19%	29.9	30.3 (2.9)	12.9 (2.0)
20% or more	26.2	28.0 (3.2)	13.6 (2.6)
Unknown	12.2	28.8 (5.0)	14.9 (4.0)

* Figure does not meet standards of reliability or precision.

– Quantity zero.

... Category not applicable.

¹Electronic medical record (EMR) refers to physicians' reporting that their medical records are either fully or partially electronic. Percentages may be underestimates because physicians missing information on EMR use (1.9 percent) are assumed to not use EMRs.

²Minimum features include computerized prescription ordering, computerized test ordering, test results (lab or imaging), and clinical notes; minimum features that were available but turned off were included.

³Includes nonfederal, office-based physicians who see patients in an office setting. Excludes radiologists, anesthesiologists, and pathologists.

⁴Significant relationship between use of full or partial EMR and physician or practice characteristic based on chi-square test.

⁵Significant relationship between use of comprehensive EMR system and physician or practice characteristic based on chi-square test.

⁶Specialty type based on categorization of physician subspecialties obtained from the American Medical Association (see reference 4 appendix).

Table 2. Use of electronic medical records by location characteristics of office-based physicians: United States, 2006

Location characteristic	Percent distribution of all physicians (based on weighted responses from 1,311 sample physicians)	Percent of physicians reporting use of fully or partially electronic medical records ¹ (standard error)	Percent of physicians reporting minimum features for comprehensive electronic medical record system ² (standard error)
All physicians ³	100.0	29.2 (1.7)	12.4 (1.3)
Geographic region ^{4,5}			
Northeast	20.6	23.5 (2.7)	7.6 (1.6)
Midwest	20.0	29.3 (3.2)	14.1 (2.7)
South	36.5	24.2 (3.0)	8.7 (1.9)
West	22.9	42.3 (4.3)	21.1 (3.5)
Metropolitan status ⁴			
Metropolitan statistical area	89.0	30.3 (1.9)	13.0 (1.3)
Nonmetropolitan statistical area	11.0	20.2 (3.0)	*7.7 (2.5)
Percent of county population that is non-Hispanic white ⁶			
Over 75%	43.0	26.8 (2.6)	13.4 (2.1)
50–75%	32.4	30.2 (3.3)	9.4 (2.3)
Under 50%	24.6	32.1 (4.2)	14.6 (2.8)

* Figure does not meet standards of reliability or precision.

¹Electronic medical record (EMR) refers to physicians' reporting that their medical records are either fully or partially electronic. Percentages may be underestimates because physicians missing information on EMR use (1.9 percent) are assumed to not use EMRs.

²Minimum features include computerized prescription ordering, computerized test ordering, test results (lab or imaging), and clinical notes; minimum features that were available but turned off were included.

³Includes nonfederal, office-based physicians who see patients in an office setting. Excludes radiologists, anesthesiologists, and pathologists.

⁴Significant relationship between use of full or partial EMR and location characteristic based on chi-square test.

⁵Significant relationship between use of comprehensive EMR system and location characteristic based on chi-square test.

⁶Based on data from the Area Resource File (reference 6).

Table 3. Percentage of office-based physicians reporting selected features of their system, according to whether medical records are reported to be fully or partially electronic: United States, 2006

Electronic medical record system feature	All physicians ¹	Standard error	Fully electronic ²	Standard error	Partially electronic ³	Standard error
Patient demographics	26.2	1.6	94.7	2.1	82.1	3.8
Physician clinical notes	22.9	1.5	93.9	1.7	62.2	4.5
Medical history and follow-up notes	19.2	1.4	83.3	2.9	47.8	5.0
Guideline-based interventions and/or screening test reminders	13.1	1.2	63.7	4.0	26.3	3.7
Test results (lab or imaging)	20.4	1.5	83.6	3.0	53.1	4.5
Lab results	19.3	1.5	81.5	3.1	48.2	4.4
Out of range values highlighted	13.3	1.2	61.4	3.8	29.1	4.1
Imaging results	15.0	1.3	67.1	4.3	34.1	4.1
Electronic images returned	7.4	0.8	34.9	4.1	15.8	3.0
Computerized orders for prescriptions	19.5	1.4	84.0	2.6	49.4	4.5
Drug interaction or contraindication warnings provided	14.6	1.3	66.2	3.8	34.0	4.1
Prescriptions sent to pharmacy electronically	11.9	1.3	52.9	4.7	28.9	4.2
Computerized orders for tests	16.2	1.4	72.7	3.8	37.8	4.5
Test orders sent electronically	9.5	1.1	46.5	4.1	18.0	3.7
Public health reporting	6.6	0.8	25.5	3.5	18.3	3.0
Notifiable diseases sent electronically	3.5	0.6	15.2	2.7	*7.5	2.4

* Figure does not meet standards of reliability or precision.

¹Based on responses from 1,311 physicians. Includes nonfederal, office-based physicians who see patients in an office setting. Excludes radiologists, anesthesiologists, and pathologists.

²Based on 199 sample physicians reporting use of fully electronic medical records (14.5 percent of physicians, weighted).

³Based on 176 sample physicians reporting use of partially electronic medical records (14.8 percent of physicians, weighted).

NOTES: Percentages may be underestimates because physicians missing information on electronic medical record (EMR) use (1.9 percent) are assumed to not use EMRs. Features are reported as available even if they are turned off.

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