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HEALTH INFORMATION TECHNOLOGY

The Medicare Electronic Health Record Incentive Program: Provider Performance on Core and Menu Measures

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Objective. To measure performance by eligible health care providers on CMS's meaningful use measures.
Data Source. Medicare Electronic Health Record Incentive Program Eligible Professionals Public Use File (PUF), which contains data on meaningful use attestations by 237,267 eligible providers through May 31, 2013.
Study Design. Cross-sectional analysis of the 15 core and 10 menu measures pertaining to use of EHR functions reported in the PUF.
Principal Findings. Providers in the dataset performed strongly on all core measures, with the most frequent response for each of the 15 measures being 90–100 percent compliance, even when the threshold for a particular measure was lower (e.g., 30 percent). PCPs had higher scores than specialists for computerized order entry, maintaining an active medication list, and documenting vital signs, while specialists had higher scores for maintaining a problem list, recording patient demographics and smoking status, and for providing patients with an after-visit summary. In fact, 90.2 percent of eligible providers claimed at least one exclusion, and half claimed two or more.
Conclusions. Providers are successfully attesting to CMS's requirements, and often exceeding the thresholds required by CMS; however, some troubling patterns in exclusions are present. CMS should raise program requirements in future years.
Key Words. Electronic medical records, meaningful use, CMS, HITECH Act

The Health Information Technology for Economic and Clinical Health Act, a component of the 2009 American Recovery and Reinvestment Act, establishes incentive programs to encourage the adoption of electronic health records (EHRs) by Medicare and Medicaid providers (Steinbrook 2009; Blumenthal and Tavenner 2010; Marcotte et al. 2012). These dual incentive programs will provide up to $27 billion in incentive payments over the next

10 years to eligible providers (EPs) (Blumenthal and Tavenner 2010). EPs can receive up to $44,000 through Medicare or $63,750 through Medicaid for adopting a certified EHR. In addition to implementing a certified EHR, providers must utilize a range of prespecified EHR functions that demonstrate "meaningful use" of the system (Blumenthal and Tavenner 2010; Jain, Seidman, and Blumenthal 2010; Porter 2010; Stark 2010).

The Centers for Medicare and Medicaid Services (CMS) recently made a public use data file with the results of attestations in the CMS Medicare EHR Incentive Program. The purpose of this study was to examine the progress of the Medicare program based on these data and identify salient patterns that might inform the administration of both Medicare and Medicaid incentive programs in the future.

BACKGROUND

Under the Medicare incentive programs, EPs can receive maximum incentive payments ($44,000) by attesting to meaningful use of an EHR beginning in 2011 or 2012 (Blumenthal and Tavenner 2010; Marcotte et al. 2012). For the Medicare program, EPs include doctors of medicine, osteopathy, dental surgery, podiatry, optometry, and chiropractic (criteria are different for the Medicaid program). Those who qualify for payments later on receive a reduced total payment according to a payment schedule set by CMS. If providers fail to attest to meaningful use by 2015, they are subject to penalties in Medicare reimbursement. Under the Medicare program, eligible providers can receive maximum incentive payments ($63,750) by attesting beginning in 2011–2016. Since the Medicaid inventive program does not require providers to attest to meaningful use during the first year, results of the Medicaid incentive program are not discussed here.

Eligible providers can register for one of these two incentive programs. Complete payment schedules and additional details about both of these programs can be found on the CMS website (Centers for Medicare and Medicaid

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Services 2013c). Starting in April, 2013, CMS reduced incentive payments by 2 percent in response to the federal budget sequestration imposed by the Budget Control Act of 2011 (Centers for Medicare and Medicaid Services 2013c).

Core and Menu Measures

According to MU criteria set out by CMS, providers must meet 15 core measures pertaining to their use of EHR functions such as vital sign entry, problem list utilization, computerized provider order entry (CPOE), drug-drug, and drug-allergy interaction checking and generation of clinical summaries. For example, providers must attest that at least 80 percent of their patients have at least one item on their problem list (or a coded notation that no problems exist). In addition, EPs must also choose five of ten menu measures, which include functionality such as immunization reporting, syndromic surveillance, and medication reconciliation. A summary of all core and menu measures including definitions of numerators and denominators is shown in Table 1.

Exclusions

Providers are allowed to claim specific exclusions for certain core and menu measures based on strict criteria. There are seventeen exclusions allowed for fourteen separate measures (six core measures and eight menu measures). Exclusions are designed to allow providers to participate in the incentive program even if a particular measure is not applicable to them. Many of the criteria are targeted toward providers who see few patients, write few prescriptions, or to whom a specific measure would be irrelevant for a range of reasons. For example, an eligible provider (EP) who receives no requests from patients for electronic copies of their health information is excluded from CM12—Electronic Copy of Health Information. A summary of exclusion criteria is included in Table 1 and complete criteria are available as part of the PUF. Providers may choose a menu measure and then claim an exclusion and still count the excluded menu measure toward the five required.

Attestation

In addition to meeting eligibility criteria for the incentive program, including installing a certified EHR and meeting MU requirements, providers must submit an attestation of meaningful use to CMS during designated reporting periods. Attestations are accepted via an online reporting tool: the Medicare &

Table 1: Stage 1 Core and Menu Measures

Measure	*Title*	*Description*	*Numerator*	*Denominator*	*Threshold (%)*	*Exclusions*
CM1	CPOE for medication orders	Use computerized provider order entry (CPOE) for medication orders directly entered by any licensed health care professional who can enter orders into the medical record per state, local, and professional guidelines	The number of patients in the denominator that have at least one medication order entered using CPOE	Number of unique patients with at least one medication in their medication list seen by the EP during the EHR reporting period	30	Any EP who writes fewer than 100 prescriptions during the EHR reporting period would be excluded from this requirement
CM2	Drug interaction check	Implement drug-drug and drug-allergy interaction checks	N/A	N/A	N/A	None
CM3	Maintain problem list	Maintain an up-to-date problem list of current and active diagnoses	Number of patients in the denominator who have at least one entry or an indication that no problems are known for the patient recorded as structured data in their problem list	Number of unique patients seen by the EP during the EHR reporting period	80	None

continued

Table 1. *Continued*

Measure	*Title*	*Description*	*Numerator*	*Denominator*	*Threshold (%)*	*Exclusions*
CM4	ePrescribing	Generate and transmit permissible prescriptions electronically (eRx)	Number of prescriptions in the denominator generated and transmitted electronically	Number of prescriptions written for drugs requiring a prescription to be dispensed other than controlled substances during the EHR reporting period	40	Any EP who writes fewer than 100 prescriptions during the EHR reporting period would be excluded from this requirement
CM5	Active medication list	Maintain active medication list	Number of patients in the denominator who have a medication (or an indication that the patient is not currently prescribed any medication) recorded as structured data	Number of unique patients seen by the EP during the EHR reporting period	80	None
CM6	Medication allergy list	Maintain active medication allergy list	Number of unique patients in the denominator who have at least one entry (or an indication that the patient has no known medication allergies) recorded as structured data in their medication allergy list	Number of unique patients seen by the EP during the EHR reporting period	80	None

continued

Table 1. *Continued*

Measure	*Title*	*Description*	*Numerator*	*Denominator*	*Threshold (%)*	*Exclusions*
CM7	Record demographics	Record all of the following demographics: preferred language, gender, race, ethnicity, date of birth	Number of patients in the denominator who have all the elements of demographics (or a specific exclusion if the patient declined to provide one or more elements or if recording an element is contrary with state law) recorded as structured data	Number of unique patients seen by the EP during the EHR reporting period	50	None
CM8	Record vital signs	Record and chart changes in vital signs: height, weight, blood pressure, calculate and display body mass index (BMI), plot and display growth charts for children 2–20 years, including BMI	Number of patients in the denominator who have at least one entry of their height, weight, and blood pressure are recorded as structured data	Number of unique patients age 2 or over seen by the EP during the EHR reporting period	50	An EP who sees no patients 2 years or older would be excluded from this requirement. An EP who believes all three vital signs of height, weight, and blood pressure have no relevance to their scope of practice
CM9	Record smoking status	Record smoking status for patients 13 years old or older	Number of patients in the denominator with smoking status recorded as structured data	Number of unique patients age 13 or older seen by the EP during the EHR reporting period	50	An EP who sees no patients 13 years or older would be excluded from this requirement

continued

Table 1. *Continued*

Measure	*Title*	*Description*	*Numerator*	*Denominator*	*Threshold (%)*	*Exclusions*
CM10	Clinical quality measures	Report ambulatory clinical quality measures to CMS	N/A	N/A	N/A	None
CM11	Clinical decision support rule	Implement one clinical decision support rule relevant to specialty or high clinical priority along with the ability to track compliance with that rule	N/A	N/A	N/A	None
CM12	Electronic copy of health information	Provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, medication allergies), upon request	Number of patients in the denominator who receive an electronic copy of their electronic health information within three business days	Number of patients of the EP who request an electronic copy of their electronic health information four business days prior to the end of the EHR reporting period	50	An EP who has no requests from patients or their agents for an electronic copy of patient health information during the EHR reporting period would be excluded from this requirement
CM13	Clinical summaries	Provide clinical summaries for patients for each office visit	Number of office visits in the denominator for which a clinical summary of the visit is provided within three business days	Number of office visits for the EP during the EHR reporting period	50	Any EP who has no office visits during the EHR reporting period would be excluded from this requirement

continued

Table 1. *Continued*

Measure	*Title*	*Description*	*Numerator*	*Denominator*	*Threshold (%)*	*Exclusions*
CM14	Electronic exchange of clinical information	Capability to exchange key clinical information (for example, problem list, medication list, allergies, diagnostic test results), among providers of care and patient authorized entities electronically	N/A	N/A	N/A	None
CM15	Protect electronic health information	Protect electronic health information created or maintained by the certified EHR technology through the implementation of appropriate technical capabilities	N/A	N/A	N/A	None
MM1	Drug formulary checks	Implement drug formulary checks	N/A	N/A	N/A	Any EP who writes fewer than 100 prescriptions during the EHR reporting period can be excluded from this requirement

continued

Table 1. *Continued*

Measure	*Title*	*Description*	*Numerator*	*Denominator*	*Threshold (%)*	*Exclusions*
MM2	Clinical lab test results	Incorporate clinical lab-test results into EHR as structured data	Number of lab test results whose results are expressed in a positive or negative affirmation or as a number which are incorporated as structured data	Number of lab tests ordered during the EHR reporting period by the EP whose results are expressed in a positive or negative affirmation or as a number	40	Any EP who orders no lab tests whose results are either in a positive/negative or numeric format during the EHR reporting period would be excluded from this requirement
MM3	Patient lists	Generate lists of patients by specific conditions to use for quality improvement, reduction of disparities, research or outreach	N/A	N/A	N/A	None
MM4	Patient reminders	Send reminders to patients per patient preference for preventive/follow-up care	Number of patients in the denominator who were sent the appropriate reminder	Number of unique patients 65 years old or older or 5 years older or younger	20	Any EP who has no patients 65 years old or older or 5 years old or younger with records maintained using certified EHR technology is excluded from this requirement

continued

Table 1. *Continued*

Measure	*Title*	*Description*	*Numerator*	*Denominator*	*Threshold (%)*	*Exclusions*
MM5	Patient electronic access	Provide patients with timely electronic access to their health information (including lab results, problem list, medication lists, and allergies) within four business days of the information being available to the EP	Number of patients in the denominator who have timely (available to the patient within four business days of being updated in the certified EHR technology) electronic access to their health information online	Number of unique patients seen by the EP during the EHR reporting period	10	Any EP who neither orders nor creates lab tests or information that would be contained in the problem list, medication list, or medication allergy list during the EHR reporting period would be excluded from this requirement
MM6	Patient-specific education resources	Use certified EHR technology to identify patient-specific education resources and provide those resources to the patient if appropriate	Number of patients in the denominator who are provided patient-specific education resources	Number of unique patients seen by the EP during the EHR reporting period	10	None
MM7	Medication reconciliation	The EP who receives a patient from another setting of care or provider of care or believes an encounter is relevant should perform medication reconciliation	Number of transitions of care in the denominator where medication reconciliation was performed	Number of transitions of care during the EHR reporting period for which the EP was the receiving party of the transition	50	An EP who was not on the receiving end of any transition of care during the EHR reporting period would be excluded from this requirement

continued

Table 1. *Continued*

Measure	*Title*	*Description*	*Numerator*	*Denominator*	*Threshold (%)*	*Exclusions*
MM8	Transition of care summary	The EP who transitions a patient to another setting of care or provider of care or refers a patient to another provider of care should provide summary of care record for each transition of care or referral	Number of transitions of care and referrals in the denominator where a summary of care record was provided	Number of transitions of care and referrals during the EHR reporting period for which the EP was the transferring or referring provider	50	An EP who does not transfer a patient to another setting or refer a patient to another provider during the EHR reporting period would be excluded from this requirement
MM9	Immunization registries data submission	Capability to submit electronic data to immunization registries or immunization information systems and actual submission in accordance with applicable law and practice	N/A	N/A	N/A	An EP who does not perform immunizations during the EHR reporting period would be excluded from this requirement If there is no immunization registry that has the capacity to receive the information electronically, an EP would be excluded from this requirement

continued

Table 1. *Continued*

Measure	*Title*	*Description*	*Numerator*	*Denominator*	*Threshold (%)*	*Exclusions*
MM10	Syndromic serveillance data submission	Capability to submit electronic syndromic surveillance data to public health agencies and actual submission in accordance with applicable law and practice	N/A	N/A	N/A	If an EP does not collect any reportable syndromic information on his/her patients during the EHR reporting period, then the EP is excluded from this requirement If there is no public health agency that has the capacity to receive the information electronically, then the EP is excluded from this requirement

Source. Centers for Medicare and Medicaid Services (2013a).

Medicaid EHR Incentive Program Registration and Attestation System (Centers for Medicare and Medicaid Services 2013a). Providers can also use the online Meaningful Use Attestation Calculator to determine whether or not they would qualify for the incentive program in advance of submitting an official attestation (Centers for Medicare and Medicaid Services 2012b).

All meaningful use attestations are self-reported by EPs and are not verified on an individual basis. However, prepayment checks and postpayment audits will be used to confirm provider eligibility in some cases (Centers for Medicare and Medicaid Services 2012a).

METHODS

Data were obtained from the *Medicare Electronic Health Record (EHR) Incentive Program Eligible Professionals Public Use File (PUF)*, which is available on the Centers for Medicare and Medicaid Services website (Centers for Medicare and Medicaid Services 2013b). The PUF contains attestation data on all EPs who participated in the incentive program from April 1, 2011, through May 30, 2013.

The PUF contains detailed data on the 237,267 EPs who participated in the program, including year of attestation, provider type, specialty, and responses to meaningful use core and menu measures for each participating provider. In addition, the PUF shows whether each provider had received the first incentive payment ($18,000) as of March 2013. Data from hospitals participating in the Medicare EHR Incentive Program as well as on participants in the Medicaid EHR Incentive Program are not included in the file and are not studied here. The file only contains data on EPs successfully attesting meaningful use; no information is provided on EPs who attested but did not successfully meet MU criteria.

For each EP (Doctors of Medicine or Osteopathy, Doctors of Dental Surgery or Dental Medicine, Doctors of Podiatric Medicine, Doctors of Optometry, and Chiropractors), the file shows a numerical score for each core measure and the five menu measures chosen. For measures requiring EPs to use a specific EHR function a certain percentage of the time, EPs receive a score based on the decile in which they fell. For example, CPOE use 35 percent of the time would receive a score of 4, while CPOE use 92 percent of the time would receive a score of 10. For "Yes/No" requirements, providers received a score of "1" for successfully meeting a specific requirement. Finally, EPs received a score of "−1" if they claimed an exclusion for a specific requirement.

Based on these data, we cross-tabulated results for all core and menu measures. In addition, we examined patterns of exclusions and menu measure selections by provider. Finally, we compared meaningful use scores between primary care physicians (PCPs) and specialists. Primary care physicians were defined as those in “Family Practice,” “General Practice,” “Geriatric Medicine,” “Internal/Medicine,” “Obstetrics/Gynecology,” and “Pediatric Medicine.” Doctors of chiropractic, dental surgery or dental medicine, optometry, and podiatry were excluded from this analysis. We report mean scores for PCPs and specialists. We used the Mann–Whitney test to compare scores because the scores are ordinal rather than continuous measures and Pearson’s chi-squared tests to compare the proportion of PCPs who claimed exclusions for each core measure to the proportion of specialists who claimed exclusions on each core measure; we employed a Bonferroni correction to account for multiple comparisons within each set of analyses. Data analysis was performed using Microsoft Excel and SAS 9.3.

Results

According to data released by the Centers for Medicare and Medicaid Services, 237,267 EPs registered for the Medicare EHR incentive program as of May 30, 2013. A total of $3,026,566,206 in incentive payments were made (or were in the process of being made) by CMS to these EPs.

Core Measures and Exclusions

Since the dataset only contains data on providers who had attested successfully, all core measures were met successfully by all attesting providers. Data on all core measures (including median scores and exclusions) are shown in Table 2. Notably, the most common response for all core measures was the 90–100 percent category—even for measures requiring only 30 percent compliance. Among those core measures that allowed providers to claim an exclusion, the most commonly excluded was CM12—Electronic Copy of Health Information (70.3 percent).

Menu Measure Choices and Exclusions

Providers were required to choose exactly 5 of 10 menu measures. The most commonly chosen menu measures were MM1—Drug Formulary Checks

Table 2: Performance by Eligible Providers on Core and Menu Measures

	Compliance												
Measure	10–19.99%	20–29.99%	30–39.99%	40–49.99%	50–59.99%	60–69.99%	70–79.99%	80–89.99%	90–100%	Selected	% Choosing*	Exclusions	% Exclusions**
CM1	0	0	7,595	9,757	11,821	14,419	19,538	28,400	101,167	237,267	100.0	44,570	18.8
CM2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	237,267	100.0	0	0
CM3	0	0	0	0	0	0	0	27,146	210,121	237,267	100.0	0	0
CM4	0	0	0	9,384	11,366	17,756	28,825	45,775	73,260	237,267	100.0	50,901	21.5
CM5	0	0	0	0	0	0	0	19,657	217,610	237,267	100.0	0	0
CM6	0	0	0	0	0	0	0	25,303	211,964	237,267	100.0	0	0
CM7	0	0	0	0	5,339	8,945	16,286	34,339	172,358	237,267	100.0	0	0
CM8	0	0	0	0	6,095	8,499	15,234	32,151	152,809	237,267	100.0	22,479	9.5
CM9	0	0	0	0	5,622	8,859	16,458	36,477	169,123	237,267	100.0	728	0.3
CM10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	237,267	100.0	0	0
CM11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	237,267	100.0	0	0
CM12	0	0	0	0	1,269	1,537	1,859	2,429	63,484	237,267	100.0	166,689	70.3
CM13	0	0	0	0	34,838	30,297	34,546	44,081	88,808	237,267	100.0	4,697	2.0
CM14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	237,267	100.0	0	0
CM15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	237,267	100.0	0	0
MM1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	201,435	84.9	0	0
MM2	0	0	0	3,118	3,878	5,067	7,565	12,882	108,246	151,354	63.8	10,598	7.0
MM3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	170,070	71.7	0	0
MM4	0	6,975	5,287	4,526	3,948	3,598	3,662	4,261	11,501	45,002	19.0	1,244	2.8
MM5	6,761	5,386	4,788	4,077	3,784	3,287	3,093	3,895	42,598	81,103	34.2	3,434	4.2
MM6	23,288	16,495	12,923	10,767	10,164	9,679	9,693	10,807	21,446	125,262	52.8	0	0
MM7	0	0	0	0	4,282	5,803	9,214	16,761	66,083	109,474	46.1	7,331	6.7
MM8	0	0	0	0	1,577	2,053	2,750	3,594	21,539	38,688	16.3	7,175	18.5
MM9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	191,701	80.8	104,017	54.3
MM10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	72,249	30.5	57,226	79.2

Note. Each provider chooses exactly five menu measures and exclusions count toward this total.
*% choosing is the overall % of providers that chose this menu measure.
**% excluding is the % of providers choosing a given measure that claim an exclusion.
CM, core measure; mm, menu measure.

(84.9 percent), MM9—Immunization Registries Data Submission (80.8 percent), and MM3—Patient Lists (71.7 percent). The most commonly claimed menu measure exclusions were for MM10—Syndromic Surveillance Data Submission (79.2 percent of providers choosing this menu measure claimed an exclusion) and MM9—Immunization Registries Data Submission (54.3 percent of providers choosing this menu measure claimed an exclusion). Results for all menu measures, including menu measure choices and exclusions, are shown in Table 2.

Multiple Exclusions

Overall, 90.2 percent of eligible providers claimed one or more exclusions; 77.6 percent claimed one or more exclusions on a core measure, and 63.4 percent claimed one or more exclusions on a menu measure. The majority of EPs (56.9 percent) claimed two or more exclusions and only 9.8 percent of providers claimed no exclusions. Complete data on the number of providers claiming one or more exclusions is shown in Table 3. Forty-four providers claimed an exclusion for all five menu measures they selected.

Provider Specialty

Most attesters (88.9 percent) were Doctors of Medicine or Osteopathy. Doctors of Optometry (4.6 percent), Podiatry (3.7 percent), Chiropractors (2.6 percent), and Doctors of Dental Surgery or Dental Medicine (0.1 percent) represented a small proportion of attesters.

We assessed differences in measure performance between specialists and PCPs among Doctors of Medicine or Osteopathy. There were statistically significant differences for many of the measures; however, in many cases, the differences were very small but still significant due to the large sample size, even after employing the Bonferroni correction, which reduced the significance threshold for comparisons from $\alpha = .05$ to $\alpha = .05/25 = .002$. PCPs scored significantly higher than specialists on CM1—CPOE for Medication Orders (mean score 8.96 vs. 8.58, $p < .0001$), CM4—ePrescribing (8.67 vs. 8.63, $p = .007$), CM5—Active Medication List (9.95 vs. 9.93, $p < .0001$), CM6—Medication Allergy List (9.914 vs. 9.907, $p < .0001$), CM8—Record Vital Signs (9.68 vs. 9.51, $p < .0001$), and CM9—Record Smoking Status (9.518 vs. 9.516, $p = .008$). PCPs were significantly less likely to claim exclusions on CM1—CPOE for Medication Orders (5.39 percent vs. 16.98 percent, $p < .0001$), CM4—ePrescribing (6.16 percent vs. 20.24 percent, $p < .0001$),

Table 3: Exclusions Claimed by Eligible Providers for Core and Menu Measures

Number of Exclusions	*Core Measures* *Number of Providers*	*Percentage of Providers*
0	53,047	22.36
1	122,712	51.72
2	26,430	11.14
3	27,255	11.49
4	6,645	2.80
5	921	0.39
6	257	0.11
Menu measures		
0	86,907	36.63
1	117,535	49.54
2	25,895	10.91
3	6,064	2.56
4	822	0.35
5	44	0.02
Total exclusions		
0	23,184	9.77
1	79,159	33.36
2	67,316	28.37
3	31,274	13.18
4	19,847	8.36
5	9,008	3.80
6	4,779	2.01
7	1,605	0.68
8	769	0.32
9	279	0.12
10	41	0.02

CM8—Record Vital Signs (0.61 percent vs. 9.07 percent, $p < .0001$), CM12—Electronic Copy of Health Information (68.93 percent vs. 71.07 percent, $p < .0001$), and CM13—Clinical Summaries (0.8 percent vs. 2.13 percent, $p < .0001$). PCPs were significantly more likely to claim an exclusion on CM9—Record Smoking Status (0.29 percent vs. 0.22 percent, $p = .005$).

For menu measures, we analyzed data only for those physicians who selected a given menu measure (not counting exclusions). PCPs scored significantly lower than specialists on MM2—Clinical Lab Test Results (9.44 vs. 9.49, $p < .0001$), MM4—Patient Reminders (6.63 vs. 6.81, $p < .0001$), and MM8—Transition of Care Summary (9.26 vs. 9.34, $p < .0001$). PCPs scored significantly higher than specialists on MM5—Patient Electronic Access (7.86 vs. 7.77, $p = .04$) and MM6—Patient-specific Education Resources (5.98 vs.

Table 4: Proportion of Eligible Providers Claiming Each Menu Measure

	PCP (%)	*Specialist (%)*
MM1	86.76	86.07
MM2	76.62	64.88
MM3	69.39	71.05
MM4	14.84	15.40
MM5	34.22	34.27
MM6	48.78	51.60
MM7	45.44	49.68
MM8	14.58	16.28
MM9	85.69	81.44
MM10	23.68	29.34

5.72, $p < .0001$). The proportions of PCPs and specialists choosing each menu measure are shown in Table 4.

DISCUSSION

Overall, a large number of eligible providers have attested to adoption of electronic medical records as part of the CMS Medicare EHR Incentive Program. Over 237,000 providers successfully registered for the Medicare incentive program and have received or will receive an incentive payment of $18,000. Stage 1 meaningful use measures set attainable goals for providers of many different specialties, backgrounds, and practice settings.

Notably, many providers significantly exceeded the meaningful use thresholds in Stage 1. For example, providers were required to utilize computerized provider order entry (CPOE) for at least 30 percent of orders under stage 1 MU requirements. However, nearly half of attesters utilized CPOE for over 90 percent of orders. It is not surprising that providers used this functionality frequently once the barriers of implementation were overcome; once the system is in place, it appears that many providers gravitated toward using CPOE exclusively. Similar patterns are evident for many other core and menu measures such as CM7—Demographics and MM2—Clinical Test Results. CMS increased the threshold for several of the measures in the Stage 2 requirements (Centers for Medicare and Medicaid Services 2012d). For example, the threshold for the CPOE core measure, which was 30 percent in Stage 1, increases to 60 percent for medication orders (laboratory and radiology orders were maintained at 30 percent), and the threshold for recording demographics

increases from 50 to 80 percent. Our analysis suggests that providers will be able to achieve a higher degree of meaningful EHR use in future stages.

Despite the initial success of the program, the pattern of exclusions claimed by attesters raises some questions. Exclusion criteria were designed to ensure that providers could receive incentive payments even if one or more of the measures was not relevant to them We found that exclusions were exceptionally common in this cohort—a majority of EPs took two or more exclusions. Importantly, a substantial number of eligible providers selected menu items for which they subsequently claimed exclusions. Since these excluded menu measures count toward the five required for the provider, the provider may be avoiding other menu measures that might be relevant. This represents a significant flaw in the current strategy for collecting meaningful use attestations as it allows providers to skirt MU requirements while still following the letter of the law and collecting incentive payments. This gap has been closed by CMS, which, starting in 2014, will no longer permit a provider to select and then exclude a menu measure so long as there is another menu measure that the provider could select instead (Centers for Medicare and Medicaid Services 2012c).

Another notable pattern within the exclusion data was the high number of exclusions claimed for menu measures related to reporting (MM9—Immunization Registries Data Submission and MM10—Syndromic Surveillance Data Submission). These measures are unique in that they necessitate that electronic public health reporting infrastructure be available to the provider. Exclusions were granted for these measures in the event that no state registry or public health agency had the capacity to electronically receive the required information. This exclusion pattern suggests that the electronic public health reporting infrastructure as a whole may be lagging behind the goals set forth by the incentive programs.

These preliminary results suggest that a large number of providers are taking advantage of loopholes in the MU rules to attest to meaningful use more easily. Given the patterns in attestations we observed here, we believe, and the Office of the Inspector General agrees, that it will be important to monitor the attestation process for inappropriate reporting behavior by providers (Department of Health and Human Services Office of the Inspector General 2013). Currently, all attesters are, in theory, subject to auditing by CMS. CMS selected an auditing contractor in summer 2012; however, no reports on the results of these audits (or the number of audits completed) have been released.

Another exclusion pattern of note is the exceptionally high number of EPs who claimed an exclusion for CM12—Electronic Copy of Health Information. For this measure, EPs were required to provide patients with an elec-

tronic copy of their health information upon request, with 50 percent of patients receiving a copy within three business days. However, more than 70 percent of providers claimed an exclusion on the grounds that not a single patient requested such information during the entire reporting period. This finding speaks to the need to educate patients about their rights to their own electronic health information, as well as to make additional tools, such as patient portals, available to them which would allow them to integrate and use their electronic heatlh information. EHRs can generate patient records easily and it may be beneficial to both patients and providers to encourage patients to seek this information more often.

Finally, comparison between PCP and specialist scores also points to potentially important differences between provider populations. For example, PCPs score higher on e-prescribing (CM1), while specialists are more likely to claim an exclusion on this measure. PCPs scored higher than specialists on all core measures, with most differences being significantly different. However, specialists scored higher than PCPs on MM2—Clinical Lab Test Results, MM4—Patient Reminders, MM7—Medication Reconciliation, and MM9—Immunization Registries Data Submission. These differences should be investigated further and monitored during future phases of the incentive program to ensure that disparities in EHR use do not develop between PCPs and specialists.

Ultimately, our analysis of data from the first years of the Medicare incentive program suggests that the program is successful thus far and that future MU goals (Stages 2 and 3) should raise the bar further in encouraging EHR use. Final Stage 2 MU goals, released in August 2012, will advance these measures to encourage greater and more sophisticated use of the EHR (Centers for Medicare and Medicaid Services 2012d). It is clear from these results that, despite misgivings expressed prior to the launch of the program, many providers were well equipped to meet and even exceed Stage 1 goals; however, the extended reporting period may prove more difficult than expected for many providers. Future phases of the incentive program should be monitored carefully to prevent potential abuses and ensure that no major disparities develop between different provider populations.

Conclusion

Overall, a large number of eligible providers adopted and attested to use of electronic medical records under the Medicare EHR Incentive Program. However, further research and policy revision are needed to maximize the

efficacy of this program and encourage increased EHR adoption among eligible providers.

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Supporting Information

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.