

Final Contract Report

Evaluation of Stage 3 Meaningful Use Objectives: Oklahoma and the District of Columbia

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Preface

This project was one of four task order contracts awarded under the Evaluation of Stage 3 Meaningful Use (MU) Objectives request for task order (RFTO). The purpose of the RFTO was to fund rapid cycle evaluation studies of the implementation of Stage 3 MU proposed objectives of the Medicare and Medicaid Electronic Health Record (EHR) Incentive Programs. Specifically, the evaluations were to yield—

- Proposed strategies for improving the objectives at the policy level.
- Proposed EHR innovations that would better enable providers to meet the proposed objectives.
- Suggestions for hospitals and/or ambulatory practices on how to increase the value to them of MU objectives.

About ACTION II

This project was funded as an Accelerating Change and Transformation in Organizations and Networks (ACTION) II task order contract. ACTION II is a model of field-based research designed to promote innovation in health care delivery by accelerating the diffusion of research into practice. The ACTION II network includes 17 large partnerships and more than 350 collaborating organizations that provide health care to an estimated 50 percent of the U.S. population.

For more information about this initiative, go to <http://www.ahrq.gov/research/findings/factsheets/translating/action2/index.html>

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Executive Summary

The Medicare and Medicaid Electronic Health Record (EHR) Incentive Program (i.e., the Meaningful Use [MU] program) mandated under the 2009 American Recovery and Reinvestment Act was intended to broaden the use of electronic health records (EHRs) to advance patient quality, safety, and health care affordability across the United States. Following the finalization of Stage 1 (2011) and Stage 2 (2014) objectives and metrics, proposed Stage 3 objectives are being considered in important areas such as care coordination and patient and family engagement.

This report summarizes findings and recommendations regarding the feasibility and clinical utility of the proposed Stage 3 MU objectives, and it is organized by the following sections: project overview and background on meaningful use, explanation of methodology, comprehensive results for both evaluation sites (Oklahoma Foundation for Medical Quality [OFMQ – Oklahoma City, OK] and Children’s National Medical Center [CNMC – Washington, DC]), discussion of key findings, limitations, and a summary of recommendations to facilitate Stage 3 MU implementation.

The purpose of this study was to provide field-based input to inform the development of the final Stage 3 MU objectives, which are anticipated to be released in 2016. Providers participating in the study represented those taking care of diverse patient populations, including adults and children in rural and urban settings within both ambulatory and inpatient environments. For each of the nine MU objectives studied, the quantitative and qualitative data were synthesized to identify summary findings, which informed the development of targeted recommendations for policymakers, EHR vendors, and participating organizations/providers.

The overall findings suggest that the bulk of information generated through patient encounters with the health care system is being recorded electronically and *meaningfully*—in other words, in a manner that makes sense for clinical care and sharing information amongst providers and health systems. Our study showed that six of the nine proposed Stage 3 MU objectives we examined are generally being met. In some cases where objectives were not being met, the clinically relevant and appropriate care is being delivered but obstacles surfaced in the ability of EHRs to accurately format and report on the capturing and sharing of this data electronically. In other situations where the objectives were not attained, the objectives themselves as currently articulated may not completely align with usual care and standards of practice.

Findings suggest that some MU objectives may not be feasible or useful without critical EHR improvements in the way that MU objectives are tracked and reported back to the provider and to the government. Inconsistencies in the recording and reporting of MU performance can undermine the purpose of the Medicare and Medicaid EHR Incentive Programs (referred to as the EHR Incentive Programs) by eroding provider trust and morale. For example, the study team found that providers were fulfilling the Family Health History measure (SGRP 119), but the EHR itself was not configured to reflect that fulfillment easily or accurately. Similarly, providers were, in fact, reviewing laboratory results in a timely fashion but the retrieval of the results electronically was a cumbersome process resulting in paper results being reviewed more immediately. In turn, such issues could make providers feel as if they were being judged unfairly, leading to disengagement with MU. In some cases, re-evaluating the assumptions for the policy itself and updating the MU objective language can clarify what is expected of providers to facilitate improved adoption of Stage 3 MU objectives. In order for the objectives to resonate with providers, they must reflect the most current standards for clinical thinking that can result in improved outcomes for patients (e.g., clinically useful patient education materials that are relevant and effective or clinically relevant CDS interventions). Furthermore, some of the policy benchmarks may currently be too broad and

thus unable to account for distinctions in the ways that specialists and primary care physicians practice. For example, patients may have limited need for secure messaging (SGRP 207) with their specialist providers, resulting in overall lower rates of attainment for this objective by specialists which do not necessarily indicate compromised care. Moreover, meaningful use approaches should clearly assess *provider* actions. An MU objective such as SGRP 207 (Secure Messaging) focuses on actions taken by patients, but does not necessarily reflect efforts or factors under the control of the provider nor the quality of care received by the patient.

Certain EHR modifications are fundamental to the viability of Stage 3 MU objectives. At a minimum, reports should be accurate and easily retrievable by the provider. Other EHR innovations that are needed include (1) increasing the data capture flexibility to account for alternative provider workflows or (2) developing low-cost options for customizable reporting. To ensure these standards are available across vendor products, a more robust certification process needs to be in place and vendors must be held accountable for the certification expectations. Addressing these issues before the products are publicly available can eliminate, or at least mitigate, many of the usability issues that providers encountered.

In some cases, it appears that organizations and providers have not adequately leveraged their EHR technologies. For example, quantitative data suggest that the time to review laboratory results received electronically is significantly higher than the time to review laboratory results received in paper format despite the immediate availability of electronic results. Unfortunately, some providers are simply “box-checking” to meet an objective, especially if they perceive it is not relevant to their practice. For example, one specialist affiliated with OFMQ turned on the minimum number of clinical decision support (CDS) interventions in order to meet the Stage 1 Meaningful Use objective, claiming the alerts were a nuisance since none of the existing CDS interventions pertained to his practice. Customization of EHR tools to increase relevance to practice can be costly, however, especially for small practices or community hospitals. CNMC confirmed this; as part of a large health system, they have expended considerable internal resources to customize patient education resources and CDS interventions. Similar customization was not observed for the smaller practices within OFMQ where cost and staff resources and capabilities were a likely barrier.

The ability to report results for this study faced several data limitations due to delays in vendor upgrades, incomplete EHR configurations, and incompatibility among interfaces. These limitations further reiterate the difficulty to obtain reliable, timely reports directly from EHRs even with the additional resources available as part of a study. For example, the challenges the team faced in accessing 2014-certified vendor products is in itself a critical finding as most of the ambulatory clinics involved in this study were still awaiting upgrades despite receiving certification almost a year ago. Another consideration to be weighed when interpreting these results is that the Health IT Policy Committee (HITPC) has changed its final recommendations for Stage 3 MU objectives since the launch of this evaluation study which may change the interpretation of these results. Based on the evaluation of OFMQ and CNMC providers, the team is optimistic that eligible providers and hospitals can meet the proposed Stage 3 MU objectives if the policies are revised to truly reflect provider effort with the goal of better clinical care.

Introduction and Background

Project Overview

The Medicare and Medicaid Electronic Health Record (EHR) Incentive Program (i.e., the Meaningful Use [MU] program) mandated under the 2009 American Recovery and Reinvestment Act was intended to broaden the use of electronic health records (EHRs) to advance patient quality, safety, and health care affordability across the United States. Following the finalization of Stage 1 (2011) and Stage 2 (2014) objectives and metrics, proposed Stage 3 objectives are being considered in important areas such as care coordination and patient and family engagement.

The Lewin Group, along with its partners Oklahoma Foundation for Medical Quality (OFMQ) and Children's National Medical Center (CNMC), collectively the project team, conducted a rapid-cycle evaluation of nine Stage 3 MU proposed objectives. OFMQ studied the data and experience of 10 ambulatory care providers across eight rural practice sites for six objectives, and CNMC analyzed quantitative data for more than 600 clinicians and studied the experience of 21 clinicians and experts across three different urban hospital settings, including inpatient, outpatient, and the emergency department for four objectives (one objective studied at both sites). The study encompassed three electronic health record (EHR) products: e-MDs, Cerner, and eClinical Works. Quantitative and qualitative data gathered from the EHRs and providers at the evaluation sites informed the findings presented in this final report.

This final report presents an overall assessment of the proposed implementation of selected Stage 3 MU objectives (as proposed) based on an evaluation of providers who serve diverse patient populations, representing adults and children in rural and urban settings within both ambulatory and inpatient environments. Input from providers and key experts also offered insight into potential barriers and mitigation strategies for the adoption of Stage 3 MU objectives. This report concludes with recommendations to improve the objectives at the policy level as well as proposes EHR innovations that could better enable providers to meet and endorse the proposed Stage 3 MU objectives. Expected impacts of this study include the potential refinement of the final Stage 3 MU objectives by policy makers and the creation of enhancements to EHRs through recommended innovations. These impacts, combined with suggested strategies for accelerating buy-in from the provider community, are expected to foster broader adoption of Stage 3 MU which will ultimately enhance the translation of health information technology (IT) into improved health care and health.

Evaluation Questions

The goal of the evaluation was to address the following questions:

1. What are proposed strategies for improving the objectives at the policy level?
2. What are recommended EHR innovations that would support meeting the proposed objectives?
3. What are ways for hospitals and/or ambulatory practices to increase the value to providers and practices of implementing meaningful use objectives?

Overview of HITECH, Meaningful Use, and HIE¹

To better understand the context within which the findings and recommendations below are determined, the team provides a high-level overview of the health IT policy landscape within which participating providers and meaningful use exist. The American Recovery and Reinvestment Act (ARRA) and the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 authorized the Centers for Medicare & Medicaid Services (CMS) to provide incentive payments to eligible professionals (EPs) and hospitals (EHs) who adopt, implement, upgrade, or demonstrate meaningful use of certified EHR technology. Thus the Medicare and Medicaid EHR Incentive Programs set forth requirements that encourage providers to use their electronic systems fully (e.g., as more than simply a stand-alone electronic medical chart), opening the potential for greater efficiency, improved quality, and better coordination of care. Meaningful users—that is, providers that fulfill the requirements— have the potential to earn as much as \$44,000 over 5 years within the Medicare program, or \$63,750 over 6 years within the Medicaid program. Similarly, hospitals can receive payments upward of \$2 million per year from FY 2011 to FY 2015.² In addition to incentives, starting in 2015, Medicare will implement payment reductions for EPs who are not meaningful EHR users. The Medicare and Medicaid EHR Incentive Programs are defined through three stages of rulemaking, with new requirements added at each stage of the program. Stage 1 MU began in 2011 and focused on data capture and sharing, Stage 2 MU began in 2014 with a focus on advanced clinical processes, and Stage 3 MU is targeted to launch in 2016 with more focus on improved outcomes and patient engagement.

HITECH also authorized the Office of the National Coordinator for Health Information Technology (ONC) to implement a program to promote adoption of EHRs. The HITECH Act developed Regional Extension Centers (RECs) to serve as comprehensive resource centers designed to disseminate best practices and provide technical assistance to meet the needs of providers in diverse settings and at different stages of the EHR adoption and implementation process. Sixty-two RECs operated under the program originally, as stewarded by ONC, some of which received a 1-year extension from ONC to their 4 years of funding to continue to operate through February 2015, after which there will be no additional Federal funding. These organizations have made great strides in engaging EPs and EHs in the adoption of EHRs and achievement of MU.

The Medicare and Medicaid EHR Incentive Programs require the use of certified EHR technology (CEHRT) to qualify for the incentive payments. Certification is designed to ensure that EHRs adhere to specified standards and are technically capable of providing a secure environment for sharing information among health care providers, patients, and public health entities. Vendors can submit their products to any one of the approved certifying bodies. The standards, implementation specifications, and certification criteria adopted by CMS and ONC establish the minimum requirements that certified EHRs must include to support the achievement of MU Stages 1, 2, or 3 by EPs and EHs under the Medicare and Medicaid EHR Incentive Programs. As the MU stages are defined, the certification requirements are also adjusted to align with the objectives of meaningful use. For example, a vendor's certified 2014 EHR product should have enhanced functionality that maps to the Stage 2 MU objectives where the previous versions may not have. However, there are no requirements detailing when in any given year the vendor must release their certified product, nor when their upgrades must be available to providers using that vendor. As the study team found during this project, a majority of the providers working in ambulatory care practices participating in this study were not able to acquire the 2014-certified version of their EHR

during the data collection period. This delay impacted the team's ability to collect data relevant to Stage 3 MU objectives.

The EHR vendor delay could potentially also impact a provider's ability to properly attest to meaningful use in the event of an audit. Medicare may select providers for post-payment audits; however, the Medicaid selection process varies by State (e.g., 100 percent of providers who attest for MU in Maryland are audited but this is not necessarily true for other States). Once selected for a Medicare audit, providers receive notification by Email and USPS mail from an auditing contractor that explains the audit process, what information is required, and how to submit the information. The audit is associated with a specific year of MU attestation, and the providers are required to submit the following information:

- Proof of EHR possession (invoice or license agreement) and the version number,
- CEHRT reports (containing numerator and denominator), and
- Documentation to support the achievement of the objectives, which may include screenshots and any additional documentation.

A provider who fails can appeal through the CMS appeals process, but the appeal may delay current and future attestation payments until resolved.

Another important component of the intended transformation of the U.S. health care system through health IT is electronic health information exchange (HIE). HIE allows health care providers and patients to appropriately access and securely share a patient's medical information electronically improving the speed, quality, safety, and cost of patient care. There are a number of ways that communities and States can approach HIE from a technological perspective, such as a centralized data repository or a federated cloud-based approach. No matter the model used, the value of electronically exchanging health information is also in the standardization of the data itself that is required to participate in an HIE. Once standardized, health data transferred can seamlessly integrate into the recipients' EHRs, further improving the quality of documentation on patient care. HIE allows providers in different geographic locations to appropriately share important medical information about patients in common. Adopting and meaningfully using EHRs is a critical step, but EHR products from different vendors are, in most cases, not currently able to effectively share information without some form of HIE. Many States received funding from ONC under the [State Health Information Exchange Cooperative Agreement Program](#) (State HIE), also funded through HITECH, to develop and implement plans to advance HIE. Across the country, States are in vastly different stages of HIE implementation, some with strong community HIEs, others with statewide HIEs and still others lagging with minimal HIE implementations complete.

Overview of Meaningful Use and Draft Objectives Being Studied

The researchers evaluated a subset of nine (of the 40) proposed Stage 3 MU objectives focused on patient engagement, interoperability, and care coordination. Exhibit 1 outlines the proposed objectives included in this study as well as the corresponding organization studying each proposed objective. The objectives represent the overarching goal for MU, and the measures indicate the minimum thresholds needed to demonstrate attainment of each objective.

Exhibit 1. Overview of Stage 3 MU Objectives

Topic/Focus Area/ SGRP#/ Partner	Proposed Stage 3 MU Objective ³
Family Health History/ Population Management SGRP 119 / OFMQ	Objective: Record patient family health history as structured data Measure: Record high priority family history in 40% of patients seen during reporting period
Electronic Notes/Care Coordination SGRP 120 / OFMQ	Objective: Record electronic notes in patient records Measure: Enter at least one electronic progress note created, edited and signed by an EP for more than 30% of unique patients with at least one office visit during the EHR Measure reporting period within four calendar days.
Secure Messaging/ Patient Engagement SGRP 207 / OFMQ	Objective: Use secure electronic messaging to communicate with patients on relevant health information Measure: More than 10% of patients use secure electronic messaging to communicate with EPs
Summary of care for transitions of care/Care Coordination SGRP 303 / OFMQ	Objective: The EP/EH/critical access hospital (CAH) who transitions their patient to another setting of care or provider of care or refers their patient to another provider of care provides summary care record for each transition of care or referral. Measure: The EP, EH, or CAH that site transitions or refers their patient to another setting of care (including home) or provider of care provides a summary of care record for 65% of transitions of care and referrals (and at least 30% electronically).
New Patient Referral/ Care Coordination SGRP 305 (new) / OFMQ	Objective: EP/EH/CAH to whom a patient is referred acknowledges receipt of external information and provides referral results to the requesting provider, thereby beginning to close the loop. Measure: For patients referred during an EHR reporting period, referral results generated from the EHR, 50% are returned to the requestor and 10% of those are returned electronically.
Clinical decision support/Population Management, Care Coordination SGRP 113 / OFMQ & CNMC	Objective: Use clinical decision support (CDS) to improve performance on high-priority health conditions Measure: 1. Implement 15 CDS interventions or guidance related to five or more clinical quality measures that are presented at a relevant point in patient care for the entire EHR reporting period. The 15 CDS interventions should include one or more interventions in each of the following areas, as applicable to the EPs specialty: <ul style="list-style-type: none"> ● Preventative care ● Chronic disease management, including hypertension ● Appropriateness of lab and radiology orders ● Advanced medication-related decision support 2. The eligible professional (EP), eligible hospital (EH), or critical access hospital (CAH) has enabled the functionality for drug-drug and drug-allergy interaction checks for the entire EHR reporting period.
Structured Electronic Lab Results /Care Coordination SGRP 121 / CNMC	Objective: Provide structured electronic lab results to EPs. Measure: Hospital labs send (directly or indirectly) structured electronic clinical lab results to the ordering provider for more than 80% of electronic lab orders received.

Topic/Focus Area/ SGRP#/ Partner	Proposed Stage 3 MU Objective ³
Patient Education/ Patient engagement SGRP 206 / CNMC	<p>Objective: Use Certified EHR Technology to identify patient-specific education resources and provide those resources to the patient.</p> <p>Measure: <i>Additional language support:</i> For the top five non-English languages spoken nationally, provide 80% of patient-specific education materials in at least one of those languages based on EP's or EH's local population, where publically available.</p>
Notifications/Care Coordination SGRP 308 (new) / CNMC	<p>Objective: The EH/CAH will send electronic notification of a significant health care event in a timely manner to key members of the patient's care team, such as the primary care provider, referring provider or care coordinator, with the patient's consent if required.</p> <p>Measure: For 10% of patients with a significant health care event (arrival at an Emergency Department (ED), admission to a hospital, discharge from an ED or hospital, or death), EH/CAH will send an electronic notification to at least one key member of the patient's care team, such as the primary care provider, referring provider or care coordinator, with the patient's consent if required, within 2 hours of when the event occurs.</p>

Methodology

The following section provides an overview of the methodology that guided the investigators' evaluation and approach. First, the recruitment and enrollment procedures for enlisting providers and practices into the study are described for both Oklahoma Foundation for Medical Quality at Oklahoma City, OK (OFMQ) and Children's National Medical Center in Washington, DC (CNMC). This is followed by a discussion of the data collection methods and an overview of the data analysis approach employed by the study team.

Recruitment and Enrollment Procedures

OFMQ

OFMQ focused on recruiting providers who accurately represent the ambulatory care environment in rural communities. All providers were selected from a pool of providers who are early achievers of Stage 1 MU and are currently making significant progress towards Stage 2 MU. As an REC, OFMQ drew upon its existing relationships with ambulatory care providers to recruit seven ambulatory practice sites (including two specialist clinics) representing nine providers where one practice has three providers and the others are sole provider practices. OFMQ tracked data for a 10th provider to serve as an alternate in the event that a participant dropped from the study. Because of certain data limitations described below, the project team elected to include data for this tenth provider in the results of this study despite the continued engagement of all the other nine providers. The two EHR vendors used by participating clinics were e-MDs and eClinicalWorks. Oklahoma market saturation and OFMQ familiarity with the software also contributed to the reasons these two EHR vendors (and providers using them) were selected.

After the sites agreed to participate in the evaluation, OFMQ performed initial site visits lasting two to four hours, during which study participants received a set of implementation tools to assist them in their work toward achieving Stage 2 MU and as an additional incentive to participate in the evaluation. This first site visit included a gap analysis and assessment of EHR capabilities (Appendix A) and a workflow assessment (Appendix B) to determine if and how the practice is evaluating and documenting each Stage 3 MU metric. These tools were provided on a flash drive and were supplemented with information on the OFMQ website and educational webinars.⁴ To fully enroll each site in the evaluation, OFMQ collaborated with the selected providers and office managers to determine a schedule and process for the ongoing site visits and data extraction associated with the study. OFMQ worked with participating clinics to develop a protocol for engaging staff, performing the workflow analysis, and working with the HIE and EHR vendor(s).

CNMC

All providers in CNMC's inpatient divisions, emergency department, and Goldberg Center for Pediatric Community Health in total more than 600 fulltime clinicians) were enrolled in this study without the need for formal recruitment as it was already a requirement of their positions. Quantitative data for all providers were extracted from Cerner (CNMC's inpatient and ED EHR) or eClinicalWorks (CNMC's outpatient EHR), and thus, participation in the quantitative data collection processes did not require any additional action on the part of the provider. All providers

originally enrolled in the study were followed throughout the study and none were lost to follow-up.

For the qualitative portion of the study, nine providers were selected from each care setting, inpatient and ED (totaling 18 providers) as a representative sample of providers who work in those domains based on level of experience with health IT and EHRs. Two distinct REDCap (Research Electronic Data Capture) surveys—one for each care setting—were administered to collect qualitative data from the 18 providers participating in the qualitative portion of the study at CNMC. Three additional outpatient providers were included in the study to specifically evaluate SGRP 121, which relates to sending hospital-based electronic laboratory results to outpatient providers. As such, a total of 21 providers were engaged in the qualitative research at CNMC.

The study team also used a selection of hospital leadership and super-users and experts involved in EHR implementation to comprise an expert panel for semi-structured interviews to evaluate Stage 3 MU criteria, highlight potential areas of EHR innovation, and identify vendor issues. For the purposes of this study, a “super-user” was defined as an expert in the EHR who had worked closely with the vendor and IT teams in the design and implementation of EHR functionality and/or those who had been formally trained by CNMC’s EHR vendor. Seven experts participated in the full interview panel, and three additional experts were invited to exclusively discuss transmission of electronic laboratory results, for a total of 10 experts.

Data Collection and Data Analysis

OFMQ

Data Collection. OFMQ’s field evaluator conducted a series of site visits at each provider site to perform onsite EHR data extraction and to implement the assessment tools. The field evaluator worked with staff to query the EHR and download reports as appropriate for each MU objective being assessed. EHR quantitative data and results from the assessment tool were saved to an encrypted flash drive for transfer from the provider site to OFMQ. The quantitative data were then compiled, and maintained in a de-identified manner. All quantitative data were reported by participating practices in aggregate (numerator/denominator). Data were collected using a secure, encrypted flash drive, assimilated by clinical site, and aggregated by MU objective each time they were collected. Any tools/resources utilized to analyze the provider/practice that did not include protected health information were summarized and saved to the encrypted flash drive, or saved as a PDF in its entirety.

The OFMQ field evaluator captured qualitative data using a workflow assessment tool as well as portions of the MU Assessment Gap Analysis Tool during onsite visits with each practice. The workflow assessment tool included open-ended questions that assessed staff engagement, vendor issues, user error, and workflow. The open-ended questions contained categorizations which correlate to the MU objectives being studied. For example, for the “Record patient family health history as structured data” MU objective, the workflow assessment tool included questions that determined how EHR captures and represents the relevant data as well as identifies the user that completes the documentation. Such preset questions eased the aggregation of responses during analysis. OFMQ collected qualitative data during every onsite interaction with participating providers to better understand the overall feasibility of using the MU objectives over time and how they were incorporated into the providers’ day-to-day operations. The onsite interaction and assessment in person was critical to better understand best practices as well as potential barriers in collecting this data. Data were collected by the field evaluator in Microsoft Word and transferred

using an encrypted flash drive from the provider office to OFMQ; responses to questions were then manually aggregated to a master document for analysis. All data were shared with the researchers via a secure FTP site. Exhibit 2 summarizes the data collection plan for OFMQ.

Exhibit 2. OFMQ data collection plan

Data Type	Site	Data Collection Tool	Sample	Stage 3 MU Objectives
Quantitative	All Sites	EHR Query (e-ClinicalWorks; e-MDs)	10 ambulatory end-users	SGRP 119-Family Health History SGRP 120-Electronic Notes SGRP 207-Secure Messaging SGRP 303-Summary of Care for Transitions of Care SGRP 305-New Patient Referral SGRP 113-Clinical Decision Report
		MU Assessment Gap Analysis Tool*		
Qualitative	All Sites	MU Assessment Gap Analysis Tool*	10 ambulatory end-users	
		Workflow Assessment Tool		

* MU Assessment Gap Analysis Tool used for both quantitative and qualitative data collection. Tools can be found in Appendixes A and B.

Data Analysis. OFMQ manually transferred data collected during the site visits to Microsoft Excel spreadsheets. The field evaluator performed onsite validation and cleaning of de-identified data, leaving information about the provider and practice from where it came intact. Data were summarized using the numerators, denominators and percentages, as obtained from the EHR. Instances where the data reports contained extraneous categories or protected health information (PHI) were identified; unnecessary data were removed manually to result in truly de-identified and research-specific data. Each measure followed the required parameters in order to be consistent with each Stage 3 MU objective where appropriate.

Once validated and cleaned, OFMQ’s data analyst analyzed quantitative data by categorizing and aggregating results at the provider and practice levels using traditional statistical methods, including means, ranges, and standard deviations. Results were tabulated in aggregate for all providers and subdivided by specialists and primary care providers to identify any variations and/or trends across MU objectives being studied. Independently, OFMQ’s project manager reviewed the aggregate findings to identify trends across participating study sites and conferred with the field evaluator to compare summaries and identify initial findings and themes.

OFMQ’s onsite field evaluator analyzed qualitative data. Open-ended responses were coded based on MU objective and issue type, consolidating individual responses into larger response patterns and themes. If coded responses fell into finite categories, analysis of these categories and any differences that existed based on site or provider characteristics were considered. Analysis of the finite categories was performed by OFMQ’s data analyst once data was transferred from the encrypted flash drive to OFMQ’s secure server. Individual responses to open-ended questions were used both to generate hypotheses for quantitative analysis and to enrich the explanation and interpretation of quantitative results. Once initial analysis has occurred onsite, the results were saved to an encrypted drive as aggregated and summarized results. OFMQ’s data analyst performed a final review to ensure that all data were properly de-identified prior to submission. These results were then shared with the researchers via a secure FTP site. The researchers reviewed the data independently and discussed findings with the field evaluator and data analyst.

CNMC

Data Collection. For CNMC's quantitative results, data queries were constructed in both EHRs (Cerner and eClinicalWorks) to acquire basic demographic and relevant clinical data. Most data were obtained from previously implemented reports in the Cerner platform, utilized for current EHR Incentive Programs reporting. For the data which were not readily available from the inpatient and emergency department EHR, custom reports were generated utilizing Cerner Command Language (CCL), a proprietary programming language utilized by the Cerner Corporation. EHR data were gathered on pediatric inpatient, emergency department, and ambulatory patients who presented for care at CNMC between October 1, 2012, and September 30, 2013, which represents the current Medicaid EHR Incentive Program Reporting Period (Medicare patients are not seen at CNMC). Inpatient health data were derived from the inpatient and emergency department EHR (Cerner), and inner-city outpatient clinic health data were derived from an ambulatory EHR (eClinicalWorks). Cerner is deployed across all inpatient divisions and the emergency department, and it is the primary system of record for all clinical data. The current version of Cerner is certified by the Certification Commission for Healthcare Information Technology under the 2014 ONC standard. eClinicalWorks is implemented in the Goldberg Center for Pediatric Community Health and is the primary system of record for all patient data in the outpatient setting, including demographics, clinical events and interventions, and provider-tracking. Version 10 of the software is also certified by the Certification Commission for Healthcare Information Technology as being in compliance with the 2014 ONC standard.

The qualitative portion of the study involved two distinct interview methodologies with thematic data analysis. The first methodology consisted of semistructured interviews with three types of key experts (inpatient, outpatient and emergency department staff) enhanced with follow-up, open-ended surveys of front-line users in the inpatient and emergency departments, including both experienced (greater than five years of clinical practice) and less experienced (fewer than five years of clinical practice) users. Study investigators conducted 1-hour, one-on-one interviews with each of the 10 experts. The interview protocol (Appendixes C-E) was provided to the expert in advance to facilitate reflection and maximize utilization of interview time. Each expert was asked open-ended questions to examine components of the select Stage 3 MU objectives based on importance, feasibility, innovation, and vendor issues. The expert was encouraged to answer each question in an open format allowing for full discussion of each question as determined by the expert. Interviews were digitally recorded, transcribed, and all remaining audio files deleted. Transcripts were then de-identified (with names removed) and assigned a number to maintain confidentiality.

Following the expert interviews, two distinct surveys were developed for (1) ED End-Users and (2) Inpatient End-Users based on key concepts from the interviews and designed to obtain further information and insight on these ideas (Appendix F and Appendix G). Experts who participated in the interviews were also invited to complete the surveys to allow for member-checking and an opportunity to further expand on ideas after a period of reflection. In total, nine participants completed the emergency department survey, and nine completed the inpatient survey. Participants were asked to complete a structured online survey to evaluate their EHR use. The questionnaires were developed in REDCap Survey Software (© 2010 Vanderbilt University) and delivered via work Email to the participating providers. Each survey was under two pages in length and consisted of up to 20 questions based on each of four critical domains including access, feasibility/usability, barriers and innovation for three Stage 3 MU objectives designated for evaluation by CNMC (thus the surveys did not capture information about SGRP 121, which is

more relevant to the outpatient providers). The surveys used a variety of response options, including multiple choice, Likert scale, yes-no, and open-ended questions. Survey data were stored and extracted from REDCap, and all answers provided were confidential and de-identified. The evaluation team reviewed the questionnaires for completeness, followed up with individual providers, and sent reminders by Email with due date deadlines to support a high response rate. Exhibit 3 summarizes CNMC’s data collection plan.

Exhibit 3. CNMC data collection plan

Data Type	Site	Data Collection Tool	Sample	Stage 3 MU Objectives
Quantitative	Inpatient & ED	EHR Query (Cerner)	600+ providers	SGRP 113-Clinical Decision Report SGRP 206-Patient Education SGRP 308-Notifications of Significant Health Care Events
	Outpatient	EHR Query (eClinicalWorks)	347 providers	SGRP 121-Structured Electronic Laboratory Results
Qualitative	Inpatient	Inpatient REDCap Survey	9 inpatient end-users	SGRP 113-Clinical Decision Report SGRP 206-Patient Education SGRP 308-Notifications of Significant Health Care Events
		Facilitated Semi-Structured Interview	3 inpatient experts	
	Outpatient	Facilitated Semi-structured Interview	3 outpatient end-users	SGRP 121-Structured Electronic Laboratory Results
	ED	ED REDCap Survey	9 ED end-users	SGRP 113-Clinical Decision Report SGRP 206-Patient Education SGRP 308-Notifications of Significant Health Care Events
		Facilitated Semi-Structured Interview	4 ED experts	

Data Analysis. CNMC validated the quantitative data with a SAS algorithm to detect data irregularities. Duplicates were identified and merged into a single record. Patients missing any of the required data elements for each report were excluded. Data associated with a date of admission outside of the study period were also excluded. For SGRP 121, any lab result that did not have a return and review date and time were excluded from further analysis, but were captured as quantitative frequency values (i.e., CNMC tracked how many times they occurred, but did not perform comparative analysis because there was no data for labs not returned or recorded). CNMC performed descriptive statistics using SAS 9.2, including the number and utilization of CDS interventions, lab results received by the Goldberg Center for Pediatric Community Health, printed patient education materials, and notifications of significant health care events. Results were compared to the proposed measure requirements to determine CNMC’s ability to meet the proposed measure. Confidence intervals were calculated for normally-distributed, continuous variables, and inter-quartile ranges were produced for non-normally-distributed continuous variables. Times-to-provider-review of laboratory results were compared between those results received electronically and those received via fax or mail utilizing a Mann-Whitney rank sum test.

For qualitative data analysis, a grounded theory approach was used. All members of the research team participated in the data analysis, constantly comparing results with one another in search of emergent themes. Four researchers initially examined a single interview transcript, coding and grouping it into categories. Any discrepancies were discussed among all four researchers until agreement was reached. The remaining nine interviews were examined by at least two of the researchers, which involved coding and grouping of key concepts into categories. The two researchers discussed any discrepancies until agreement was reached. All interviews were

reviewed again, comparing data in search of recurring patterns, as well as identifying both confirming and discrepant data.

Following this step, the researchers reached consensus on all codes and categories and applied them to the remaining data. Emergent themes and linkages among the data were drawn, revised and verified. Throughout the data analysis process, ongoing discussion occurred, and consensus was sought among team members to ensure the accuracy of the findings. Negative cases were sought and explored. The process continued until no new codes and themes emerged, saturation was achieved, and the accuracy of the findings was unanimously confirmed.

Results

The following results, organized by SGRP objective, present key findings, summary, and recommendations based on quantitative and qualitative data. In addition, limitations of data collection and results are described immediately below. Results for OFMQ represent eight clinics and 10 providers, seven of whom used eClinicalWorks while the other three used e-MDs. In total, CNMC worked with 21 providers across three care settings (inpatient, outpatient, and the emergency department) for the qualitative portion of the study and more than 600 fulltime clinicians for the quantitative component.

Limitations of Data Collection and Results

OFMQ

Over the course of the evaluation study, the researchers could not collect some key quantitative data due to delays in EHR software upgrades that affected both eClinicalWorks and e-MDs clinics. Although eClinicalWorks received 2014 ONC certification in July of 2013, none of the participating clinics were upgraded to the 2014-certified version or had access to Stage 2 MU reports* (necessary to obtain desired metrics for this study) through the end of the first data collection period (Q4 2013). For this reason, quantitative data for Q4 2013 is unavailable for four of the six measures being studied by OFMQ. Wherever possible, the investigators provided relevant data beyond the measure requirements (e.g., additional data available through external sources such as HIE) and input from the field research to augment the analysis.

During the second data collection period (Q1 2014), the researchers were able to access data for most of the practice sites using eClinicalWorks (six of seven). One eClinicalWorks clinic (eClinicalWorks 1) was upgraded to the 2014-certified version in this quarter. For five of the remaining clinics on eClinicalWorks, updated MU reports were made available through the eClinicalWorks dashboard. For the selected objective measures, the reporting structure for the Stage 2 MU and Stage 3 MU objectives are the same, with differences in the minimum threshold (i.e., 50 percent versus 80 percent requirement). Additionally, the updated MU reports serve to inform the development of Stage 3 MU, which is still evolving. The remaining eClinicalWorks clinic's MU dashboard did not automatically update after January 1, 2014. After speaking with the vendor, the reason for this data accessibility issue has not been resolved, thus there is no available data for eClinicalWorks 6.

Unfortunately, although the necessary updated MU reports were available, the team could not extract the MU data without completing a data request through eClinicalWorks for the six participating practice sites that had not yet upgraded to the 2014 certified version. Some of the requests to eClinicalWorks for reports were fulfilled quickly, while other clinics did not have their reports populated until the end of Q1 2014. After reviewing the reports, it became evident that some of the reports appeared incorrect and inconsistent with field observations. Further investigation with providers and collaboration with eClinicalWorks revealed that the updated MU reports would not be accurate until the clinics completed the upgrade to the 2014-certified version.

* The updated Stage 2 MU reports are referenced throughout this report as “updated MU report” to specify that the data were used to determine Stage 3 MU metrics.

However, since the field evaluator noticed minimal changes in reports after eClinicalWorks 1 upgraded to the 2014-certified version, the actual reports may not be significantly different for the remaining clinics, despite this guidance from the eClinicalWorks vendor. Additionally, the team discovered that the provider must follow specific configuration steps within the EHR in order for reports to populate accurately. These specific steps are referred to as “structured data” within eClinicalWorks. Certain data fields must be configured as data fields for the MU reports to capture results for certain objectives, such as family health history. This can be a barrier for some providers in accurately reporting on MU objectives if this configuration is not done correctly. The study team found providers were not even aware of this issue in some cases. To summarize, one of seven eClinicalWorks clinics was upgraded to the 2014-certified version, but it appears that certain configuration steps were not completed for that clinic, thus impacting the data validity. Five of the remaining eClinicalWorks clinics were not upgraded, but were provided access to the updated MU reports through the eClinicalWorks dashboard, which also have been deemed potentially inaccurate by the vendor since these clinics are not running the 2014-certified product yet. The final eClinicalWorks clinic has thus far been unable to retrieve any data after January 1, 2014.

Although e-MDs received 2014 ONC certification in November 2013, its 2014 version had yet to be released by the end of the study period. As such, without the upgrade the researchers did not have access to any updated MU reports, which limited the quantitative data available for the clinics using e-MDs. Despite these challenges, the team was able to obtain data for the CDS and summary of care (SOC) objectives. There is no specific report for CDS, so the field evaluator took a manual count of CDS interventions that were turned on at each site and supported this with screenshots, regardless of EHR vendor or upgrade status. SOC was a Stage 1 MU objective so numerator/denominator reports were available for all clinics. However, providers who were not on an upgraded version did not have the additional SOC report which shows how many SOC documents are transferred electronically to other health care providers since the technology was part of the 2014 certification process. After reaching out to e-MDs, the participating clinics were able to request inclusion in an early adopters group that would receive the upgrade before its public release. The requests were completed in March, but the three clinics (including the one alternate site) have not received approval or a time frame for the upgrade. As in the case of eClinicalWorks, the e-MDs product presented a series of challenges resulting in significant barriers to obtain real-time, true and accurate reports reflecting the work of the providers.

CNMC

CNMC was able to obtain most data from previously implemented reports in Cerner, utilized for current EHR Incentive Programs reporting. For data not readily available from the inpatient and emergency department EHR, custom reports were generated in Cerner. Data acquisition from eClinicalWorks was accomplished through the use of an ODBC/SQL program (an open, vendor-neutral way of accessing data stored in heterogeneous locations), since current EHR Incentive Programs reporting methods did not provide the level of detail required for this study.⁵ Although CNMC was able to obtain these additional reports with internal resources, the cost and time to develop customized reports with a Cerner consultant, often needed to tailor meaningful use for a pediatric setting for example, imposes a potential barrier for other organizations. Moreover, the cost and time to get internal technical and clinical subject matter experts also made the development of additional reports more difficult. Internal subject matter experts contribute their ability to program in the specific query language. Users must pay for training to use Cerner’s proprietary query language. Internal clinical experts know where the data resides in the EHR and

how it is entered and use. Finally, a subject matter expert with knowledge of MU is required in order to assure reports meet the specified objectives and are auditable.

The expert panel for laboratory results identified multiple concerns about the accuracy of the electronic laboratory results. Results do not always import properly (either the results do not return or they are matched to the wrong patient), thus the mechanism to highlight laboratory samples for which there are no results does not work consistently. As a result, providers must manually reconcile whether they have received lab results or not. Another concern is that the EHR only automatically highlights laboratory results with numeric values or positive/negative results, and as such, categorical laboratory results must be manually highlighted.

SGRP 119—Family Health History (OFMQ)

Proposed Objective Measure: Record high priority family history in 40 percent of patients seen during reporting period.

Findings

Experience in the field suggests that providers regularly document family health history and were doing so before it was required under the EHR Incentive Programs. However, this anecdotal high rate of participation did not translate into success on MU reports retrieved from EHRs during the study period. This is due to a combination of vendor issues (lack of timely upgrades that prevented the team from obtaining necessary data) and provider issues (lack of required action to either activate or populate a specific segment of the EHR that would allow reports to populate correctly). Changes in EHR certification criteria and in the MU policy require some data to now be captured as “structured data,” (data that resides in a fixed field within a record that can be easily tracked and reported), which was not previously required. This new requirement is sensible since free text or scanned documents, which are not structured data, are nearly impossible to evaluate and report. The setup for these changes may be the responsibility of the clinic depending on the EHR software. It appears that little or no communication from the vendor alerted providers of these changes in some cases. Furthermore, since family health history was not previously required to be collected as structured data, patients records that may already have family health history in them will now need to be updated—possibly manually—to ensure the data are reported in the required structured format.

Participating providers must use 2014-certified EHR products for the study team to be able to download the reports needed to test provider adoption of this objective, as discussed above. The results of the data downloads show that six eClinicalWorks clinics (with available data) recorded family health history for 0 percent of their patients during Q1 2014, as shown in Exhibit 4 below. In addition, data were not available for participating eClinicalWorks clinics in Q4 2013 as the 2014 upgrade and updated MU report access was not available until Q1 2014. One provider (eClinicalWorks 6) could not retrieve data for Q1 2014, and no data were available for any of the three e-MDs clinics during either quarter.

Exhibit 4. Rate of recording family health history

Practice	Q4 2013	Q1 2014
eClinicalWorks 1	--	0%
eClinicalWorks 2	--	0%

Practice	Q4 2013	Q1 2014
eClinicalWorks 3	--	0%
eClinicalWorks 4	--	0%
eClinicalWorks 5	--	0%
eClinicalWorks 6	--	**
eClinicalWorks 7	--	0%
e-MDs 1	--	--
e-MDs 2	--	--
e-MDs 3	--	--

-- Indicates no data were available due to EHR upgrade delays.

** Indicates reporting error in Q1 2014 for eClinicalWorks 6, as outlined in Limitations of data collection and results.

To validate the results, the researchers randomly selected 10 patient charts from the one clinic running the 2014-certified EHR eClinicalWorks product (eClinicalWorks1) and discovered that all 10 charts had family health history electronically documented. However, according to the eClinicalWorks Stage 2 MU attainment guide, the 2014-certified version of eClinicalWorks requires that ICD-9 codes used to record family history are mapped to SNOMED Clinical Terms (a comprehensive set of clinical terminology codes) to satisfy the objective measure. This task must be completed by the clinic after upgrading, and it is likely that the participating sites did not complete (or may not have known about) this step. Direct consultation with participating practices confirmed that providers received no known communication from the eClinicalWorks regarding this required end-user configuration for the reports to become fully functional. Time and staff expertise needed to complete this kind of configuration can be a barrier to implementation. ICD-9 codes are now required for family history to be recorded as structured data. Previously EHR systems accepted free text for the relative, disease, and other notes; the data must now be classified by family member and diagnosis code to be able to create reports. Most EHR systems also give an option for no known problems, so that providers can still populate the numerator of the report even if the patient has no known significant or relevant family history.

Summary and Recommendations

SGRP 119 requires that providers record patient family health history as structured data. Field experience supports the notion that providers were already capturing these data and, as such, it may represent an achievable Stage 3 MU objective that could help encourage providers in recognizing that Stage 3 MU objectives are indeed achievable. Therefore, the researchers recommend that SGRP 119 be included in the final Stage 3 MU rule, rather than excluded per the most recent HITPC recommendations. However, there are clear technical challenges in successfully reporting this objective particularly with the structured data requirements, even when providers are, in fact, collecting the necessary information as standard practice already. As such, the researchers propose the below recommendations for SGRP 119:

- Policy:** *Revise policy language to specify if the denominator is the percentage of new patients seen in the reporting period that have family health history documented or demonstrate the percentage of patients seen during the reporting period (new or existing patient) that have a family history populated.* The information does not necessarily need to be entered at every visit if it has already been populated in a previous visit as long as it appears in a structured and accessible way. The policy language is confusing as currently stated.

- **EHR Innovation:** *Structured data for MU fields should be a certification requirement with mechanisms to make it easier on providers entering structured data. The setup for capturing structured data should be completed by the vendor before going through certification.* Furthermore, vendors should increase awareness and provide more tools and training for capturing MU data and achieving MU thresholds. To reinforce this concept, the reports should alert the clinic of “incomplete configuration” or “structured data fields required” if they are not properly or completely configured. In addition, vendors should find innovative ways to make it easier for providers to enter family health history data such as drop down lists that contain the most common family history concerns or by setting up favorites.
- **EHR Innovation:** *Family health history data should be static and more visible to providers on a dashboard or up front in a patient record.* By making this information a clear part of what a provider sees every time they open a patient record (without having to search for it or input it again), providers will continue to see more and more value in this kind of data and may be more likely to use it in their treatment of patients.
- **EHR Innovation:** *Add other health history categories (e.g., past medical, surgical) to the EHR data fields,* which would give the provider a clearer perspective of the patient’s overall health and can be helpful in identifying at-risk patients and patient populations. Currently, adding additional health history categories can also augment the identification of appropriate CDS interventions to implement.
- **Provider:** *Include SGRP 119 in the final objectives and remove the required structured data component to allow providers to use free text for now, allowing the EHR vendors time to develop the innovations necessary to minimize the burden on providers entering this data in a structured way* (as described in the EHR innovation above). Since it appears that providers use EHR to collect and document family history already, inclusion of SGRP 119 could be a “low hanging fruit” that demonstrates that MU can be attainable. However, until vendors incorporate mechanisms to ease provider burden of entering data in a structured way (such as drop down menus and favorite lists) reporting this data could become a barrier.

SGRP 120—Recording Electronic Notes (OFMQ)

Proposed Objective Measure: Enter at least one electronic progress note created, edited and signed by an EP for more than 30 percent of unique patients with at least one office visit during the EHR measure reporting period within 4 calendar days.

Findings

All 6 of the 10 participating providers who had access to the updated MU reports (either through a 2014 upgrade or having access to the 2014 reporting structure as described above under Limitations of Data Collection and Results) achieved 100 percent success in recording electronic progress notes for all patients seen, far surpassing the MU objective threshold, as shown in Exhibit 5 below. The remaining four either did not have access to updated MU reports (three e-MDs providers) or encountered a reporting error (eClinicalWorks 6).

Exhibit 5. Percent of office visits for which electronic notes are recorded

Practice	Q4 2013	Q1 2014
eClinicalWorks 1	--	100%
eClinicalWorks 2	--	100%
eClinicalWorks 3	--	100%
eClinicalWorks 4	--	100%
eClinicalWorks 5	--	100%
eClinicalWorks 6	--	**
eClinicalWorks 7	--	100%
e-MDs 1	--	--
e-MDs 2	--	--
e-MDs 3	--	--

--“ Indicates no data were available due to EHR upgrade delays.

***“ Indicates reporting error in Q1 2014 for eClinicalWorks 6, as outlined in Limitations of data collection and results.

According to the proposed objective, the electronic note must be created by the eligible professionals (EP), but note creation by providers does not always occur in common practice. Due, in part, to the normal patterns of workflow, provider time constraints, or lack of provider engagement with the EHR, most of the electronic notes are either created by front office staff during patient registration or by the nursing staff in the patient room. Nurses, for example, often document the patient’s chief complaint and would thus create the note in eliciting the initial history. Providers later edit and approve the progress notes, but they may not receive credit for their actions in meeting this objective if the EHR only recognizes notes that have been created by the provider when calculating the numerator. The use of “medical scribes,” who serve as intermediaries between the provider and the EHR, also complete electronic documentation for the provider with the exception of entering a secure password to authenticate the documentation. Despite the fact that the observed workflows suggest very few providers are creating the notes, all providers in the study reportedly fulfilled the objective 100 percent of the time. Based upon this vendor’s reporting structure, the creation of the note is being measured; the actual user who creates the note is not factored into the calculation of the percentage of office visits for which electronic notes are recorded. Providers seem to be receiving credit for the creation of the note when they actually have not created it; they are merely editing, reviewing, and signing it.

Given the high success rate for providers with available data, it appears that SGRP 120 is attainable. However, these results are based on only one vendor (eClinicalWorks), and it is important to note that vendors generate their reports differently; that is, two vendors may both attain certification while using different pathways to allow providers to satisfy the MU objective. The multiple certifying bodies further complicate comparing results of providers using different EHRs as one product might give a provider credit for progress notes only when the provider actually creates the notes where as others, such as in the case of eClinicalWorks, will credit a provider as long as the provider reviews and signs the note but does not necessarily create it. For example, it appears eClinicalWorks gives credit even if the EP does not create the note since six of the providers reported 100 percent fulfillment for the measure even though qualitative data would suggest these providers more likely than not only reviewed and signed the note. Another vendor may have more strict rules that require notes be created by the provider in order to receive credit. If audited, this problem would be further exacerbated as the provider would need to prove creation of the note, a major challenge if their EHR does not actually track this action.

Based on field observations, workflow varied for providers, with the majority of them documenting their notes electronically at the point of care. One provider used a nurse as a scribe while he treated patients and then later reviewed the notes, added additional orders, and then signed the notes electronically with a secure password. Another provider completed paper notes and then re-entered the information electronically, thus meeting the MU objective but creating duplication, which illustrates the difficulty many providers face in changing behavior despite the inefficiencies that may arise. Reasons for this could be comfort with technology and focus on patient care. It may be quicker for providers to write by hand than to navigate the EHR, especially when dealing with an uncommon problem. Additionally, some providers consider the technology associated with EHR data input to be an interference with the traditional provider-patient interaction during a clinical encounter.

Summary and Recommendations

As currently proposed, SGRP 120 requires eligible professionals create, edit, and sign electronic notes in 30 percent of patient records. Overall, this objective appears feasible given that 100 percent of providers for whom quantitative data were available met the objective measure. Qualitative results based on workflow analysis supported this finding, though it is worth noting that providers in this study are early adopters and may be more advanced with health IT than mainstream providers. The objective does not account for different provider workflows as it is currently written since, in many cases, providers only review and sign the notes electronically, but are not, in fact, the ones to create the note itself. As such, the researchers propose the following recommendations for SGRP 120:

- **Policy:** *Revise the objective language to read “edited or reviewed and signed [by the EP]” instead of “created, edited, and signed [by the EP]”* since workflow varies greatly for each provider and it is not important clinically whether the note is created by staff instead of the provider.
- **EHR Innovation:** *Incorporate optical character recognition (e.g., to convert handwritten notes into typed text)* to improve the workflow of the busy rural health providers.
- **Provider:** *Provide access to the EHR at home or on mobile devices to allow more flexibility for providers to document progress notes*, which will also contribute to better notes as providers may have an extended opportunity to complete notes on the same day that the patient is seen.
- **Provider:** *Educate providers on the utility of having structured data; for example, the public health value for being able to track classes of diseases*. Since it appears to be more burdensome to follow the structured data format instead of free text, it is imperative that providers understand how this objective can impact patient care and population health.

SGRP 207—Secure Messaging (OFMQ)

Proposed Objective Measure: More than 10 percent of patients use secure electronic messaging to communicate with EPs.

Findings

As with other objectives, delays in vendor upgrades severely limited the data availability for secure electronic messaging. Since SGRP 207 was introduced in Stage 2 MU, the reports were

completely unavailable in EHR systems that have only met 2011 certification criteria. Accordingly, no data are available for all e-MDs clinics or any eClinicalWorks participating providers during Q4 2013. For those providers for whom quantitative data were available, none attained the minimum 10 percent success rate, although one eClinicalWorks provider (eClinicalWorks 7) came very close at 9.7 percent as displayed in Exhibit 6 below. This value represents a dedicated effort by a health IT fellow, who was an early adopter and physician champion for health informatics.

Exhibit 6. Percent of patients who use secure electronic messaging to communicate with providers

Practice	Q4 2013	Q1 2014
eClinicalWorks 1	--	8.2%
eClinicalWorks 2	--	8.4% (focus point)
eClinicalWorks 3	--	0%
eClinicalWorks 4	--	1.8%
eClinicalWorks 5	--	3.7%
eClinicalWorks 6	--	**
eClinicalWorks 7	--	9.7% (focus point)
e-MDs 1	--	--
e-MDs 2	--	--
e-MDs 3	--	--

--“ Indicates no data were available due to EHR upgrade delays.

***“ Indicates reporting error in Q1 2014 for eClinicalWorks 6, as outlined in Limitations of data collection and results.

The low values resulted from providers only receiving credit for SGRP 207 when a patient sends a message to the provider through the patient portal or personal health record, which does not reflect the efforts of the provider. For example, eClinicalWorks 1 has been live on a patient portal for over 5 years. This particular clinic also uses a mobile application (Healow) that allows patients to access their health information from mobile devices or interact with the clinic through other forms of social media (i.e., clinic Facebook page). Despite clearly being at the forefront of mobile health technology and patient engagement, only 8 percent of this clinic’s patients used secure e-messaging, thus not meeting this objective. The clinic has provided multiple ways to engage patients, and yet there is still low patient participation. Clearly, providers face significant challenges in achieving this proposed Stage 3 MU objective since even early adopters are still struggling to meet the minimum threshold. This is largely because the onus for achieving this objective falls on the patient. Furthermore, there may be a particular bias against specialists’ ability to meet this objective measure. Field observations suggest that many questions received electronically from patients are about laboratory results directed at their primary care providers.

Although the rate of secure messaging could not be adequately captured, the use of timely access reports allowed the researchers to assess how many patients have registered for portals. Since all participating clinics were live on a patient portal, results of the timely access report provide a secondary source of information to reflect patient portal adoption. The “timely access report” from which the data are drawn indicates how many patients have online access to health information, but it does not reveal actual usage of the patient portal (rate of messaging). **Exhibit 7** outlines the number and percent of patients registered for the patient portal during the reporting period.

Exhibit 7. Count and percentage of patients registered for patient portal

Practice	Patients Seen During Q4 2013 Registered for Patient Portal	Unique Patients Seen During Q4 2013	Percentage of Unique Patients Registered for the Portal
eClinicalWorks 1	220	530	42%
eClinicalWorks 2	37	83	45% focus point
eClinicalWorks 3	68	151	45% focus point
eClinicalWorks 4	51	367	13.9%
eClinicalWorks 5	57	146	39%
eClinicalWorks 6	649	902	42%
eClinicalWorks 7	71	167	42%
e-MDs 1	95	890	10.67%
e-MDs 2	51	724	7% focus point
e-MDs 3	230	568	40.5%

Summary and Recommendations

SGRP 207 requires the patients of EPs to use secure electronic messaging to communicate with their providers about relevant health information. All of the eClinicalWorks clinics with access to updated MU reports but who were not yet upgraded to the 2014-certified EHR product reportedly received zero secure messages from patients during the study period. However, there were positive values for view, download, and transmit, as well as for secure electronic messaging, demonstrating that patients actually did communicate with their providers. This could be due to reporting errors since most providers were not yet upgraded to 2014-certified products, described in Limitations of Data Collection and Results. An alternate reason for the low percentage could be a genuine lack of patient engagement. The researchers recommend:

- **Policy:** *Update the objective language to State “EP responds to at least 50 percent of secure messages sent by patients during the EHR reporting period; exclusion – any EP who receives no secure messages through CEHRT during the reporting period.”* Further, this objective could be enhanced if the denominator targeted those patients who have a reason or need to communicate with the provider as opposed to all patients seen.
- **EHR Innovation:** *Allow providers to communicate with patients seamlessly from within the EHR environment* with an interface that resembles traditional Email to make the process more intuitive for providers and health care staff as well as patients.
- **EHR Innovation:** *Track all activity by patients on the patient portal to help satisfy the measure requirement* (e.g., online prescription refill request).
- **Provider:** *Encourage providers to creatively engage patients* to increase patient portal adoption. For example, OFMQ suggested that providers instruct patients to send a message once they register for the portal or send a message to the patient and request a response. Providers will need effective marketing strategies and tools to accomplish this objective, such as displaying posters in the exam room to communicate the importance of patients’ involvement in their own care. Furthermore, when clinic staff helps patients register for the portal, they might provide information and/or materials to help guide patients in how to

reach their physician such as telephone calls for an urgent issue but secure messaging (Email) for questions about appointments or non-urgent communication.

- **Provider:** *Revise the objective measure to reflect the effort of the provider* and not of the patient, and require a clinical reason to use the system so that providers are not penalized for answering a question by phone rather than through the portal. The objective measure would more accurately reflect the work of the provider if it referenced the type and/or quantity of messages uploaded by the provider rather than holding the provider accountable for patient activity/action or lack thereof.

SGRP 303—Summary of Care for Transitions of Care (OFMQ)

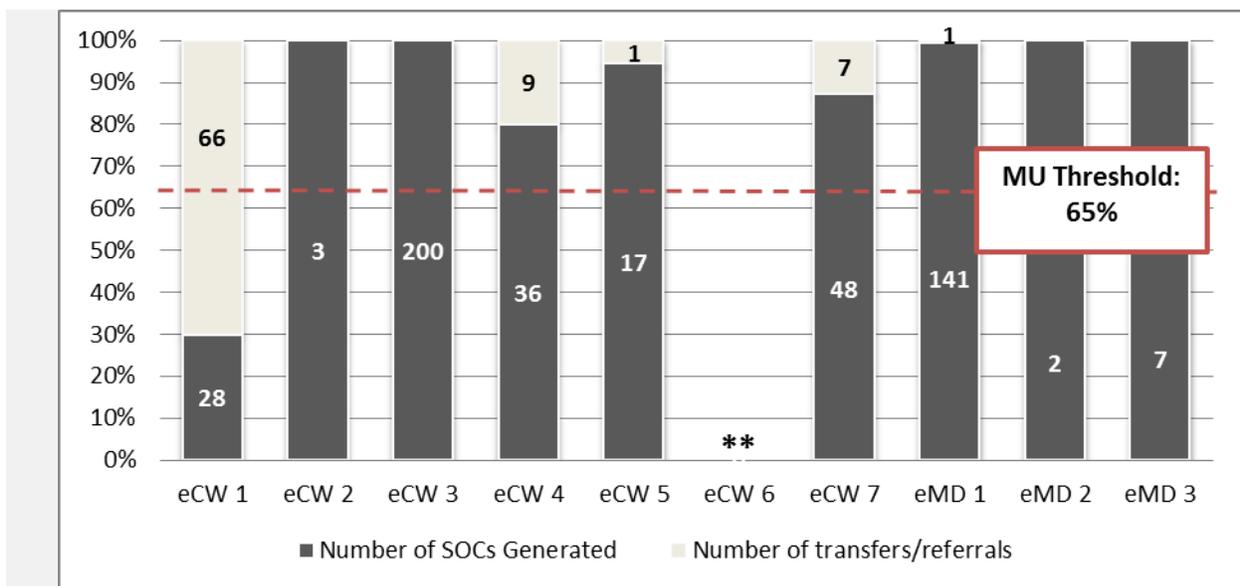
Proposed Objective Measure: The EP, EH, or CAH that site transitions or refers their patient to another setting of care (including home) or provider of care provides a summary of care record for 65% of transitions of care and referrals (and at least 30 percent electronically).

Findings

Evaluation results for the summary of care (SOC) objective are promising with all 9 providers for whom quantitative data were available meeting the objective measure requirements for the proposed objective in Q1 2014, and more than half (6 of 10) also meeting this requirement in the previous quarter. As with other objectives being studied, however, the researchers identified potential data inaccuracies. For example, one provider did not receive credit for this objective despite submitting SOC documents electronically because he used an alternate referral code (e.g., provider used a general “outgoing referral” code instead of “referral-cardiologist” code). This suggests a general lack of flexibility in the reporting systems’ ability to accurately document provider activity. A drop-down menu of approved codes may help providers. Additionally, appropriate training is necessary to educate providers on the specific workflow and nuanced referral codes required to demonstrate success for this objective measure.

The researchers observed discrepancies in how providers send SOC documents (e.g., mail, fax, or e-fax) and in the number of SOC documents generated, which ranged from 0 to 393 per provider over both quarters studied. Part of this variation depended on the number of transitions of care per provider (denominator), which determined the expected number of SOC documents required (numerator). Exhibit 8 shows the number of SOC documents generated as a percentage of the number of transfers of care or referrals for Q4 2013 and Q1 2014.

Exhibit 8. Number of SOC documents generated per transfer or referral (Q4 2013-Q1 2014)



*** Indicates reporting error for eClinicalWorks 6, as outlined in Limitations of data collection and results.

It is evident that most providers generated SOC documents for at least 65 percent of transfers or referrals over the duration of the evaluation period. One exception is eClinicalWorks 6, a specialist, who did not report any transfers or referrals, and thus produced zero SOC documents in Q4 2013. (Due to an EHR reporting error, the team was unable to retrieve eClinicalWorks 6’s data for Q1 2014.) Typically, specialists have relatively fewer opportunities for transition of care documentation compared to primary care providers since their communications back to the referring provider are considered closing the loop rather than a transition of care (the movement of a patient from one setting of care to another.) Surprisingly, the other participating specialist’s (eClinicalWorks 3) records indicate that 100 percent of the provider’s 393 patients who experienced a transition of care had an associated SOC document submitted.

A cross-cutting theme for both specialists and primary care providers is the considerable variability present for documenting transitions of care within EHRs. The researchers found that some providers generated the SOC documents electronically in the format of a continuity of care document (CCD), which is the electronic patient summary data that can be sent using Health Level 7 (HL7).^{*6} CCDs contain all of the data elements required for the SOC document with the added advantage of being in a standard format that fosters interoperability since the HL7 format can be read by different EHR systems. Other providers printed or faxed progress notes or different components of the chart depending on the particular type of transition of care instead of using the CCD.

The second portion of the objective requires at least 30 percent of the SOC documents to be sent electronically. Exhibit 9 below shows the number of CCDs uploaded to the local health information exchange (HIE) by participating providers as compared to the rate of SOC documentations indicated by data obtained for each providers’ EHR. The CCD is a document standard for a patient’s health summary which can be electronically transferred through HL7 messaging, typically using HIE. Although the SOC document terminology is used in the objective

* HL7 is a messaging standard that allows the exchange of clinical data between systems.

and in policy, technical audiences and providers are more familiar with the CCD term. During this study, the researchers recruited providers who were either already connected to an HIE or who had initiated the process of connecting to an HIE. This facilitated comparing the number of CCDs that were sent through the HIE to the number of SOC documents that providers were credited for in their practices' EHR. Over the duration of the study, a total of six eClinicalWorks providers were connected to an HIE. The remaining eClinicalWorks provider was not connected to one of the certified HIEs for Oklahoma, but it had access to the eClinicalWorks P2P network, which is an open, peer-to-peer network that provides a secure way for practices to communicate with one another.⁷ All three e-MDs clinics were in the on-boarding process.

Within eClinicalWorks, there is an embedded feature (eHX) that allows providers to upload content from the eClinicalWorks EHR to the HIE. For the seven providers using eClinicalWorks, EHR reports show that no SOC documents were sent electronically even though eHX indicates that CCDs were uploaded during this same time period, meaning providers should have gotten credit for sending the data through eHX but did not. The discrepancy between the two values in the same quarter indicates that providers who upload CCDs through the HIE, using the EHR's own eHX product, do not necessarily have a high success rate for the SGRP 303 objective measure as reported by their EHR. The implication is that providers are not receiving credit for sending electronic SOC documents even though there is evidence that they are doing so and thus reporting issues exist within the EHR product itself.

Exhibit 9. Comparison of CCD uploads to SOC documents transferred electronically

Practice	CCD Uploads to HIE (Q4 2013)	Percent of transfers/referrals with electronic SOC (Q4 2013)	CCD Uploads to HIE (Q1 2014)	Percent of transfers/referrals with electronic SOC (Q1 2014)
eClinicalWorks 1	--	0%	--	0%
eClinicalWorks 2*	100	0%	89	0%
eClinicalWorks 3	--	0%	--	0%
eClinicalWorks 4*	586	0%	641	0%
eClinicalWorks 5*	270	0%	157	0%
eClinicalWorks 6*	279	0%	401	**
eClinicalWorks 7*	179	0%	189	0%
e-MDs 1	--	--	--	--
e-MDs 2	--	--	--	--
e-MDs 3	--	--	--	--

“**” Indicates Providers live on HIE CCD uploads

--“ Indicates no data were available due to EHR upgrade delays.

“***” Indicates reporting error in Q1 2014 for eClinicalWorks 6, as outlined in Limitations of data collection and results.

Other providers faced system-based challenges for meeting this objective. For example, one participating provider using e-MDs showed zero out of zero patients meeting the summary of care objective in Q4 2013. However, after reviewing the provider's workflow, it was clear that the provider and their staff were documenting all of their referrals electronically within the progress note, yet the denominator was still 0. Upon further investigation, it was determined that the provider was using a referral code that was not on a list of referral codes specified by the EHR vendor to trigger the denominator for the SOC report within that vendor product. Once the

provider changed the referral code in their progress note template, he began to show positive results for the SOC objective measure. Many times there are specific workflows that must be completed within the EHR for a provider to achieve success on MU reports. Lack of training on these workflows represents a potential barrier for providers to successfully meet meaningful use. Exhibit 10 shows the percentage of SOC documents that were generated electronically by each provider. Some providers did not have access to updated MU reports due to delays in vendor upgrades, which resulted in 0 percent fulfillment for this objective measure. Other providers did have access to updated MU reports but still received 0 percent. The team speculates that this is due to an error in reporting because of incongruence between updated reports and the EHR version or because of a workflow issue where the provider was not receiving credit for the electronic transmission of a SOC document because of a coding error.

Exhibit 10. Rate of electronic summary of care document transfer

Practice	Q4 2013	Q1 2014
eClinicalWorks 1	--	0%
eClinicalWorks 2	--	0%
eClinicalWorks 3	--	0%
eClinicalWorks 4	--	0%
eClinicalWorks 5	--	0%
eClinicalWorks 6	--	**
eClinicalWorks 7	--	0%
e-MDs 1	--	0%
e-MDs 2	--	0%
e-MDs 3	--	0%

-- Indicates no data were available due to EHR upgrade delays.

** Indicates reporting error in Q1 2014 for eClinicalWorks 6, as outlined in Limitations of data collection and results.

Summary and Recommendations

SGRP 303 requires providers to provide a summary of care (SOC) document during transitions of care to another setting or provider. It is apparent from the HIE reports that providers are electronically generating health information about patients and sending it to other health care providers electronically. More research is needed to determine why providers are not receiving appropriate credit for electronic transfer on MU reports. To ensure the effectiveness of the SOC document, the researchers propose the following recommendations:

- Policy:** Revise policy to better articulate which information is considered mandatory and must be sent or received and adjust the vendor certification criteria accordingly. Currently, over one dozen fields are expected to be included in the SOC document, but they can be blank as long as the current problem list, medication list, and allergy lists are included. The extensive list detracts from the purpose of providing a true “summary” of care.
- Policy:** *Clarify the use of SOAP notes (Subjective Objective Assessment Plan) to satisfy the SOC measure requirement.* Currently, SOAP-based transmissions are not required for certification. CMS considers the use of SOAP notes to fulfill the electronic component of the measure,⁸ yet the requirements for a complete SOC record are inconsistent with the information available in a SOAP note.

- **EHR Innovation:** *Include a drop-down menu of accepted referral codes (with an option to add other referral codes)* to eliminate provider confusion over which codes will count towards meeting the objective.
- **Provider:** *Limit the amount of required information in the SOC document* to the main facts of the condition requiring attention such as problem list, treatment recommendations, basic demographic information, medication list, allergies, and recent lab results. Providers will be more likely to complete (and read) the SOC document if it is less extensive, takes less time to generate and contains only clinically necessary information in a summarized fashion.

SGRP 305—New Patient Referral (OFMQ)

Proposed Objective Measure: For patients referred during an EHR reporting period, 50% of referral results generated from the EHR are returned to the requestor and 10 percent of those are returned electronically.

Findings

To satisfy SGRP 305, the eligible professionals or hospital to which a patient is referred must acknowledge receipt of external information and provide referral results to the requesting provider in order to close the loop. Based on the quantitative results, this did not seem to occur for any of the participating providers, as outlined in Exhibit 11 below. However, qualitative results and observations indicated that referral results were being returned to requestors either by fax or mail. Because this objective was introduced as a new objective in Stage 3 MU, reports for this objective had not been created, thus there was no way to measure this quantitatively with updated MU reports. Instead, the team relied on HIE data for the quantitative portion of this measure.

Exhibit 11. Percent of referral results returned electronically

Practice	Q4 2013	Q1 2014
eClinicalWorks 1	0%	0%
eClinicalWorks 2	0%	0%
eClinicalWorks 3	0%	0%
eClinicalWorks 4	0%	0%
eClinicalWorks 5	0%	0%
eClinicalWorks 6	0%	**
eClinicalWorks 7	0%	0%
e-MDs 1	--	--
e-MDs 2	--	--
e-MDs 3	--	--

-- Indicates no data were available due to EHR upgrade delays.

** Indicates reporting error in Q1 2014 for eClinicalWorks 6, as outlined in Section III A Limitations of data collection and results.

Workflow assessments demonstrated remarkable variability in the way providers document and send referrals. Some providers used the referral tracking modules within their EHR, while others simply documented a consult or referral within the progress note. All of the providers that were not connected to an HIE (4 of 10) faxed the information to the receiving provider. Providers

that were connected with an HIE (6 of 10) sent the information through one of two means: either by faxing the information to the receiving providers or electronically uploading files to an HIE for the receiving provider to access and download. There did not seem to be any consistency for how the information was sent.

Both specialty providers in the study were connected to an HIE. The workflow assessment revealed that the majority of their referral requests were coming in through the HIE. They did receive some requests by fax or phone, but those were mainly from rural providers or providers outside of their network. However, when the consult/referral was completed, the results were mostly returned to the referring provider via fax rather than through the HIE. All of the participating sites listed fax as their number one method of communication with other health care providers. The HIE seems to serve more as a unidirectional tool for specialists to receive information such as referral requests from primary care providers (PCPs). Typically, the information coming in from the HIE is in a CCD format containing more general categories such as medication list, allergies, and problem list. The results that the specialty providers send back, however, are not in that format and therefore they tended to use fax as their main method for closing the loop.

Summary and Recommendations

When the evaluation study was designed, new patient referrals was a proposed objective for Stage 3 MU. That objective has since been removed as a standalone objective in HITPC's final recommendations and incorporated into a broader proposed objective for order tracking. The new proposed objective reads: "Eligible Professionals use certified EHR technology (CEHRT) to assist with follow-up on orders (e.g., consult requests (referrals), lab[oratory], rad[iology], pathology) to improve the management of results." The threshold for the proposed measure was 10 percent, but the updated recommendation does not require a portion of the referral results to be returned electronically as proposed earlier.

- **Policy: *Reconsider the HITPC's final recommendation to merge this objective with SGRP 122 (Order Tracking).*** The team does not believe SGRP 122 captures the full breadth of "closing the referral loop," because SGRP 122 is focused on the ordering provider's ability to track information rather than the bi-directional exchange of information between providers that should occur when referring new patients, including the care coordination component. We believe there are two potential options:
 - Reconsider this as a stand-alone objective, or
 - Merge this objective with summary of care objective, which more appropriately focuses on the provider communication and care coordination components.
- **EHR innovation: *Enhance EHR functions to alert referring providers when referral results are received or not received within an appropriate time frame.*** This will allow providers to work this information into their care plans and may also help providers see more value in this objective as their reliance on this information increases.
- **Provider adoption: *Provide access to the EHR at home or on mobile devices to allow more flexibility for providers to document and send referral results.***

SGRP 113—Clinical Decision Support (OFMQ and CNMC)

Proposed Objective Measure: 1. Implement 15 CDS interventions or guidance related to five or more clinical quality measures that are presented at a relevant point in patient care for the entire EHR reporting period. The 15 CDS interventions should include 1 or more interventions in each of the following areas, as applicable to the EP's specialty: (1) preventive care, (2) chronic disease management, including hypertension, (3) appropriateness of lab[oratory] and radiology orders, (4) advanced medication-related decision support, and 2. The EP, eligible hospital, or CAH has enabled the functionality for drug-drug and drug-allergy interaction checks for the entire EHR reporting period.

Findings

CDS interventions are intended to provide relevant clinical information to providers at the time of care and can include order sets, preventive and follow-up health care reminders, clinical guidelines, computerized alerts, and more. This objective, evaluated by both OFMQ and CNMC, assesses the active implementation of 15 CDS interventions within the areas of five clinical quality measures (CQMs), as applicable to the provider's specialty, including—

- Preventive care (including immunizations)
- Chronic disease management
- Appropriateness of laboratory and radiology orders
- Advanced medication-related decision support (e.g., weight-based dosing)
- Drug-drug and drug-allergy interaction checks

OFMQ: As seen in Exhibit 12, the majority of participating providers (9 of 10) exceeded the proposed threshold of 15 CDS interventions based on Q4 2013 data. Although Q1 2014 data were unavailable for one provider (eClinicalWorks 6), the field evaluator later confirmed that eClinicalWorks 6 still had one intervention implemented in Q1 2014. The variation in the number of CDS interventions implemented appears to be associated with the EHR vendor product in use by each practice. Those providers using eClinicalWorks displayed relatively less variability in the number of CDS interventions, ranging from 1 to 43 compared to the range for e-MDs (between 2 and 93 actively implemented interventions). Upon further investigation, the team discovered that eClinicalWorks is installed with a preloaded list of active CDS interventions. e-MDs also preload CDS interventions, but the user must customize the selection of reports that are to execute daily. Thus, the default setting likely influences the results, since it appears e-MDs relies more on provider involvement for CDS interventions to be activated.

Exhibit 12. Number of CDS interventions implemented

Practice	Q4 2013	Q1 2014
eClinicalWorks 1	43	43
eClinicalWorks 2	39	39
eClinicalWorks 3	31	31
eClinicalWorks 4	37	37
eClinicalWorks 5	39	39
eClinicalWorks 6	1	1
eClinicalWorks 7	39	39
e-MDs 1	20	20
e-MDs 2	93	93
e-MDs 3	2	2

The number of active CDS interventions is determined at the clinic level, with some variation in how clinics choose to implement the interventions available. Some clinics had every CDS intervention implemented that was available through their EHR, while another clinic activated only a few interventions specifically for the purpose of meeting earlier MU requirements. One provider, eClinicalWorks 6, wanted to turn off all of the interventions because they did not relate to the scope of this provider’s specialty practice, but the provider left one active specifically for the purpose of meeting a former MU requirement for Stage 1. The other specialist, eClinicalWorks 3, had 31 interventions active. Qualitative data showed that at least one clinic created its own CDS interventions using order sets and registry reports to identify patients and track compliance.* Unlike other interventions, it did not fall into any of the categories described above nor was it tracked through the CDS module of the EHR so it is unlikely to count towards fulfilling the objective. Regardless, clinic staff felt their customized CDS interventions were more relevant than some of the interventions that came preloaded in their EHR. However, most practices do not have the dedicated IT personnel to help create new or customized CDS interventions. eClinicalWorks allows limited customization compared to e-MDs. The user-friendliness of the tools and helpfulness of vendor staff affect how clinics use the CDS interventions available to them.

Despite the high success rate for this objective, provider satisfaction with CDS interventions was low. Some providers complained of too many pop-ups within the EHR associated with CDS. Others did not understand why alerts on the EHR indicated that the CDS intervention was unsatisfied even after they completed the recommended action. Throughout the study, none of the clinics had associated the CDS interventions with clinical quality measures, and it appeared that providers simply report on the measures for which they have the best results. Educating providers and conveying the purpose of CDS interventions may help them see CDS interventions as a beneficial part of their practice rather than a routine, necessary but not useful task. This might encourage deliberate use of the CDS interventions rather than “box-checking” to satisfy the MU requirements.

Through speaking with providers and their staff, it became apparent that the term “clinical decision support” is not widely recognized. When asked what the term meant, a majority of study participants reported they did not know. Other responses included “software/EHR support” and

* Registry reports are ad hoc reports that can be customized by providers with different data fields to pull a specific population of patients. Categories can include age, sex, diagnosis code, procedure codes, etc.

“Meaningful Use consulting.” However, once the term “clinical decision support” was explained or the module within the EHR was displayed, the staff showed familiarity with the concept. Clinical decision support was more commonly referred to using the nomenclature used for CDS within the EHR, such as the “rule manager” or “health maintenance module.”

Currently, providers attest to this objective by checking “yes” or “no” for whether they meet the criteria. The attestation process does not require linking CDS to CQMs or demonstrating that a provider actually monitors the results of the CDS interventions. Even vendors that reach full certification do not have to include all CQM reports, a phenomenon which has led to the issue of providers not having enough CDS interventions that link to the appropriate number of CQMs. If a provider were audited for this specific objective, they would have to provide documentation and supporting screen shots showing the rules that were implemented and that they were turned on and tracked for the entire reporting period; this can place a huge burden on providers who are audited. They would also need proof that the selected CDS interventions related to CQMs from the five different domains. Currently, it is not possible to track which CDS interventions are actually used within eClinicalWorks and e-MDs; moreover, tying the CDS implemented back to CQMs falls to the provider and is not supported by the EHR products studied.

CNMC: The CDS interventions offered through CNMC’s inpatient and ED EHR (Cerner) encompass three broad categories: alerts (e.g., medication dosage), order sets (collection of recommended largely evidence-based treatments and admission orders for different reasons for admission), and diagnostic decision support (guidance on potential diagnoses). Across these three categories, CNMC exceeded the objective measure, which requires 15 CDS interventions related to a minimum of five CQMs. Over the course of the study, CNMC had a total of 364 CDS interventions across the required eCQMs, including three medication alerts, two diagnostic decision support interventions (only implemented in the ED), and 359 unique order sets that were active. The specific types of CDS interventions and clinical settings are listed in Exhibit 13.

Exhibit 13. Types of CDS interventions used during study period at CNMC by clinical setting

CDS Category	CDS Intervention	Inpatient	ED
Alert	Drug-drug and drug-allergy detections	X	X
Alert	Drug formulary check	X	X
Alert	Weight-based dosing check	X	X
Diagnostic Decision Support	Traumatic Brain Injury (TBI) risk criteria to determine CT scan eligibility		X
Diagnostic Decision Support	Acute Concussion Evaluation		X
Order Sets (ED and inpatient)	359 unique order sets (e.g., Sickle Cell Pain Crisis order set)	X	X

The team collected additional quantitative data for the two diagnostic CDS interventions implemented in the ED, which CNMC designed themselves: Traumatic Brain Injury (TBI) Risk Criteria and Acute Concussion Evaluation (ACE). Based on qualitative feedback, ED experts estimated a 10-fold reduction in the number of unnecessary tests (e.g., laboratory tests, CAT scans, x-rays) ordered for the same group of patients when using the CDS compared to the time period and patients for whom it was not used. Study participants believe the variation in care has also been reduced after using the customized CDS interventions. CNMC tracked the number of times providers followed the CDS intervention recommendations and the percentage of patients for

whom the CDS intervention was indicated, shown in Exhibit 14 below. Experts do not expect providers to use the CDS intervention for 100 percent of patients for whom the intervention is recommended because physicians stop relying on the CDS interventions once they become familiar with them, as there is no longer a need to reference them once the provider’s ordering behavior changes to meet the hospital or national standards. Thus, the gradual decrease in use of the CDS could reflect a positive outcome but may appear as failure to meet the objective if the CDS itself is not turned on.

Exhibit 14. Percent of patients for whom CDS Intervention was used when indicated

CDS Diagnostic Support	Number of Times Used	Percent of Patients for whom CDS Intervention was Used when Indicated
Traumatic Brain Injury (TBI) risk criteria to determine CT scan eligibility	1,432	30%
Acute Concussion Evaluation	614	17%

Based on user surveys, the researchers identified the CDS interventions that are used most frequently and the CDS interventions that are viewed as most important by CNMC staff. These qualitative results are displayed below in Exhibit 15. Not surprisingly, the top four most frequently used CDS interventions aligned exactly with the top four most important CDS interventions, as reported through provider surveys, suggesting that providers are deploying CDS for clinical insight and relevance as opposed to simply meeting the objective because it is required. This finding may also offer insight into the prioritization of the types of CDS interventions to deploy. Providers view medication support as most relevant to pediatric safety since medical errors can occur particularly easily in children for whom weight-based dosing is often, but not always, important. Targeted implementation of the most effective, efficient, and meaningful interventions can reduce alert fatigue and engage providers.

Exhibit 15. CNMC provider response to most frequently used and most important CDS interventions

Response Rank	Most Frequently Used CDS Interventions	Most Important CDS Interventions
1	Medication support	Medication support
2	Order sets and pathways	Order sets and pathways
3	Notification of critical lab/test values	Notification of critical lab/test values
4	Evidence-based treatment recommendations	Evidence-based treatment recommendations
5	Decision trees (conditional logic)	Diagnostic reasoning
6	Diagnostic reasoning	Decision trees (conditional logic)
7	Dashboards	Dashboards
8	Treatment costs	<i>* Treatment costs were not ranked as being an important CDS intervention</i>

Many of the CDS interventions deployed at CNMC were customized because the preloaded rules from vendors were not perceived to match pediatric patient needs appropriately, although

some of the drug-drug and drug-allergy were out-of-the-box services. The customization process is resource-intensive, which would preclude smaller community hospitals from customizing their EHR interventions. Study participants suggested that EHR vendors consider offering clinical decision support that focuses on pediatric-specific interventions to increase likelihood of use by providers. As it stands, the preloaded CDS interventions are not useful and thus providers do not use them as frequently as they are recommended.

Providers and key experts offered insight into the benefits and barriers for SGRP 113. They believe that CDS interventions offer several benefits for both patients and clinicians. These include—

- Standardization of care
- Implementation of evidence-based care
- Access to evidence-based information about available treatments
- Potential reduction in diagnostic errors
- Potential for improved timeliness and effectiveness of care
- Potential cost reductions

Of these benefits, most providers emphasized the importance of reducing variation in how medical care is provided to improve the quality of care for patients--as discussed earlier in this section. The CDS interventions help establish standards of care for providers. Despite the benefits of CDS interventions, CNMC providers also acknowledge several barriers that can interfere with the effectiveness of the CDS interventions. Most providers are concerned about the additional time and effort to integrate the use of CDS interventions into their workflows since it takes time to navigate and access the CDS interventions. Moreover, it can be difficult to apply the interventions for patients with unique clinical circumstances, especially since many interventions do not have the flexibility to support multiple variables that are markers of the heterogeneity of the patient population. Experts envision the future for CDS interventions to include decision support based on multiple variables (e.g., laboratory values, weight, risk factors, time on treatment).

Experts and stakeholders identified certain technical barriers as well. The use and maintenance of CDS interventions requires significant investment to ensure that interventions are working appropriately and modifications are made to meet the needs of the changing health care delivery system and patient needs. One stakeholder expressed concern that the assumptions made during health IT implementation may not be accurate or may quickly become out of date, emphasizing the importance of monitoring and maintaining CDS rules so that they align with current clinical guidelines. Although many vendors offer some support to organizations and providers, it is often very costly to update CDS interventions. Additionally, organizations must factor in the cost to access multiple subject matter experts. Other concerns include alert fatigue from the overuse of alerts and frustration when the EHR does not recognize a CDS rule as being satisfied. Most EHR vendors provide a limited number of customizable reports. To create additional reports, an IT specialist with specific training is required. For example, CNMC had to pay a Cerner consultant a service cost to change the custom-generated reports. This limits the ability of the front line provider to evaluate and evolve practice on a rapid pace and delays improvements in patient care. Currently, there is limited conditional logic integrated in the EHR, which is based on structured, numeric data. To allow for sequenced order of care, providers must employ work-around solutions to incorporate logic-based decision support.

Summary and Recommendations

Findings from both OFMQ and CNMC suggest a general lack of shared terminology for “clinical decision support,” with most providers relying on the language used by their respective vendors. Additionally, there were concerns about the reporting capability of EHRs since it is possible to have interventions turned on without capturing the actual utilization of the intervention. Specialists in particular found it difficult to identify relevant CDS interventions for their patients. Most EHR vendors provide a limited number of customizable reports. As noted above, to create additional reports an IT specialist with specific training is required. While it was possible for providers at CNMC to customize their own interventions because of in-house IT support, providers at OFMQ generally did not have the resources to do the same. This limits the ability of the front line provider to evaluate and evolve practice on a rapid pace and delays improvements in patient care. As a result of the high cost to create and refine CDS interventions, the experts recommend using leaders in medicine to develop the metrics and interventions. In order to allow for quick dissemination of best practices, the interventions should be open-source and accessible from a central clearinghouse. To improve this objective, the project team recommends:

- **Policy: *Require vendors, possibly through the certification process, to provide robust training and a mechanism for low-cost ongoing support to providers (such as interactive training manuals and resource guides) on how to customize and set up CDS interventions to meet their practice needs.*** Vendors currently can seek full certification (has capabilities to achieve all MU objectives) or modular certification (ability to achieve one or more MU objectives). However, the current certification process does not consider education and training services provided by the vendor; instead, it strictly reviews whether the vendor can capture MU data.
- **Policy: *Clarify the definition for “clinical decision support”*** since there remains ambiguity over what types of interventions constitute clinical decision support. For example, it is unclear based on current policy whether order sets count as clinical decision support.
- **Policy: *Require a certain number of CDS interventions to correspond with eCQMs in the EHR certification criteria,*** since there does not appear to be anything under the Certification and Standards Criteria that ties CDS to CQMs after reviewing the CMS Specification Sheets. Addressing this issue prior to attestation can minimize the burden on providers to prove compliance during an audit as well as ensure that CDS rules are aligned with high quality care.
- **Policy: *Create and maintain an open-source repository of both adult and pediatric evidence-based clinical decision support rules and logic*** that can be leveraged by vendors in developing EHR-specific CDS tools and interventions. This will allow the CDS products offered by vendors to better reflect current clinical thinking and best practices.
- **EHR Innovation: *Improve monitoring mechanisms to measure compliance with CDS interventions when indicated, following the example of ONC associating CDS to eCQMs for reporting purposes.*** Currently most EHRs do not provide tools for providers to monitor the usage of CDS interventions so they can understand if they are used appropriately (i.e., how they are used and by whom). This might also include personalized feedback for providers to track how often they are using CDS when indicated, which could further enhance provider adoption of CDS and improving care through feedback. This innovation could be further improved by requiring vendors to match CDS interventions available

through their EHR product to the National Quality Strategies (NQS) so that providers can better identify when choosing CDS interventions to implement that they are in fact choosing a selection that appropriately reflects NQS.

- **EHR innovation: *Develop flexible CDS interventions/alerts.*** For example, integrate two or more variables (e.g., lab result and medications prescribed, weight-based dosing and adult maximum dose, medication and cost) and develop CDS interventions that allow for delayed orders based on pathway recommendations (activate a CDS intervention if a certain clinical threshold is reached). Currently, there is logic in place that triggers the CDS intervention (order set or standard procedure) based on a specific set of rules at a single point in time, which are not dynamic and cannot change.
- **Provider: *CDS rules associated with patient safety concerns should adopt additional mechanisms for alerts to mitigate issues such as “alert fatigue.”*** Through expert interviews and survey results, many respondents identified “alert fatigue” as a common problem in CDS implementation. Alerts should have multiple levels of severity, with the most severe alert preventing the user from bypassing the alert without acknowledging the message and taking action. Less severe alerts can merely highlight an area of the screen.

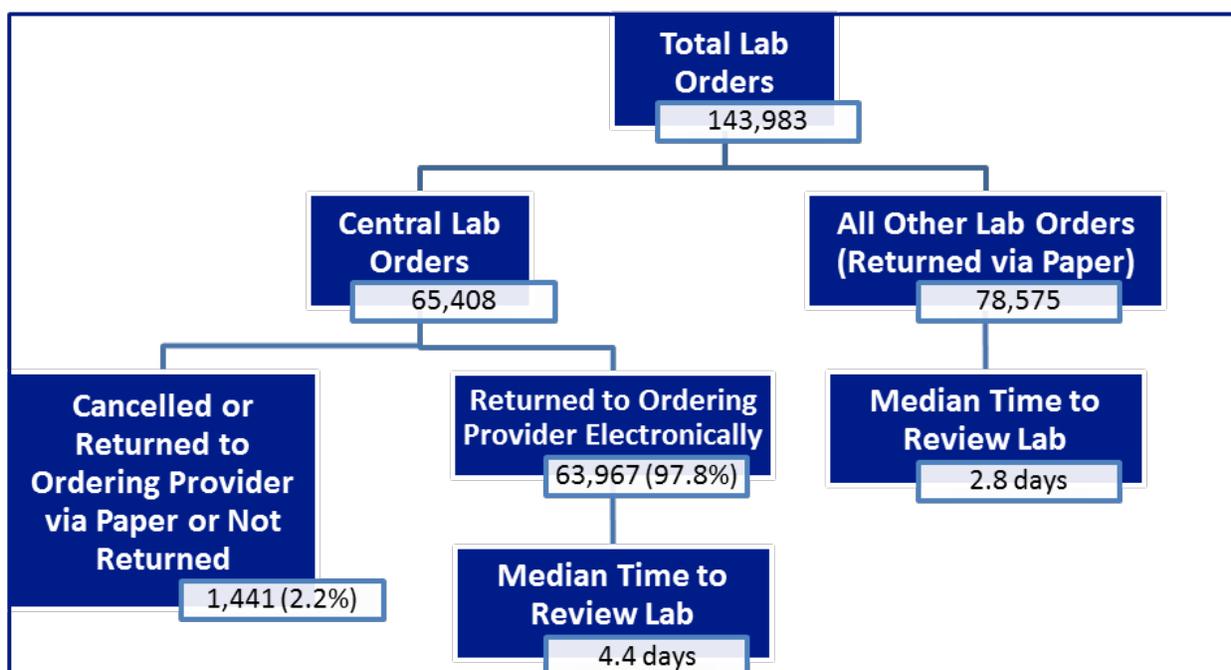
SGRP 121—Structured Electronic Lab Results (CNMC)

Proposed Objective Measure: Hospital lab[oratorie]s send (directly or indirectly) structured electronic clinical lab results to the ordering provider for more than 80 percent of electronic lab orders received.

SGRP 121 evaluates the ability of hospitals to provide electronic laboratory results to primary care providers using their clinical lab services. This ability was measured by communications between CNMC’s inpatient Sunquest Laboratory Information System (LIS) and CNMC’s outpatient EHR system, eClinicalWorks. The electronic connection between LIS and eClinicalWorks was established in December 2012, which initiated the data collection period. Consistent with the MU reporting fiscal year, the data collection period ran from December 2012 through September 2013. Over this period, a total of 65,408 unique laboratory tests were (ordered or) generated by outpatient providers for the hospital’s central laboratory, for which electronic result monitoring is possible. These represent 45 percent of the 143,983 total laboratory tests ordered. The remaining laboratories were ordered outside of the hospital (i.e., outside Sunquest) in compliance with the patient’s health insurance preferred laboratory and, therefore, cannot currently communicate with the provider’s EHR.

All orders to the hospital’s central laboratory are sent electronically from the outpatient EHR to the laboratory system; however, patients can also deliver paper orders when they arrive at the laboratory. Similarly, results are returned electronically and also duplicated in paper form. Although electronic ordering is important, this objective’s primary focus is the transmission of results back to the ordering physician. For the 65,408 tests conducted at the hospital’s central laboratory, 63,967 (97.8 percent) were returned to the ordering provider electronically. The remaining 1,441 were returned via paper reports or were not returned at all. Of the 239 ordering providers during the study period, 214 (89.5 percent) sent or received electronic laboratory orders, indicating a relatively high provider participation rate. The median number of orders to the central laboratory (i.e., tests that can potentially be returned electronically) sent per provider was 59 over the study period, and the interquartile range was 13 - 268. Exhibit 16 illustrates the breakdown of lab orders and the time to review.

Exhibit 16. Laboratory tests ordered and returned to provider electronically



Results from the other laboratories (not the central, inpatient laboratory) depend on paper results, since no electronic connection has been established. The process for ordering a test from a laboratory other than the central hospital laboratory requires the following steps:

1. Provider enters order for laboratory test in eClinicalWorks (via an alternate laboratory system, not central laboratory system), then copies the order to paper form appropriate to that lab.
2. The patients are handed the paper order and take it with them to the laboratory when producing a sample.
3. After laboratory is complete, results are transmitted back to the practice via fax/mail in paper form.
4. A medical assistant or practice administrator distributes the returned laboratory results to the provider or to their mailbox. Abnormal laboratory results (which are indicated on the paperwork) are immediately alerted to the attending on service that day.
5. The provider reviews the paper results and transcribes them into eClinicalWorks (at which time, the result is marked as reviewed. This is the time used to calculate time to provider review, discussed below).

Interestingly, the time to review laboratory results returned electronically was significantly longer than those returned by non-electronic (paper) means (median of 4.4 days for central lab compared to 2.8 days for other laboratories, respectively). Based on qualitative feedback, this could be because electronic review requires the sequential use of many interfaces. Providers must log into a patient's record to view the notification that a result has been returned rather than seeing an alert on a general dashboard across a provider's patient panel. This presents an opportunity for

EHR innovation to streamline the process to notify providers that lab results have been returned electronically. Providers may respond more quickly to physical paper reports when they arrive and are, effectively, handed to them instead of logging in at the end of the day to check electronic results.

Furthermore, when the laboratory interface went live at CNMC, providers did not trust the results (due to some inaccuracies in early results) which resulted in CNMC implementing a parallel process to validate laboratory results with paper reports in addition to the electronic delivery. Provider hesitation also stems from the EHR's inability to automatically populate or alert regarding non-numeric (categorical) lab results or complex test results (e.g., newborn metabolic screen), which must be checked manually, another potential area for EHR innovation.

Study participants identified multiple benefits for receiving electronic laboratory results, including:

- Speed of receiving results
- Immediate access to the patient record while viewing the result
- Ability to sign off on laboratories immediately and provide follow-up documentation

Interestingly, participants reported the speed of receiving results as a key benefit of electronic results, which appears to contradict the quantitative findings that electronic results generally take longer to review than those returned via other means. It could be that the providers appreciate the immediate access afforded by the electronic system, but they do not necessarily respond as quickly to the results. It could also be that providers recognize the potential for electronic results to be efficient, but the other aspects of the laboratory and clinic system have not supported a fully electronic process. eClinicalWorks allows remote access, so providers can review electronic results at home, which is not possible for paper laboratory results. Electronic results are available whenever they have time to review, whereas the paper results must be reviewed while in the clinic. This is a change in provider practice and culture which may contribute to the delay in reviewing electronic results.

CNMC, like many children's hospitals, is a teaching hospital with house staff (residents and interns) rotating through outpatient clinics. Typically, house staff have a primary care or continuity clinic once per week. Thus, they are only able to check lab results once per week for the paper results. Although they can access eClinicalWorks at home or elsewhere, they are unlikely to do so frequently for the electronic labs since the inpatient EHR (that they use frequently) is an entirely different product and runs independently. The workflow patterns of doctors in training thus further delay and complicate the time to review laboratory results for their patients.

Alert fatigue represents a major issue for most providers. The current system creates an alert for each individual abnormal item within a lab result. Therefore, instead of signing off once on a CBC with several abnormal values grouped together, providers must sign off on each value, each of which may not be clinically significant. Laboratory alerts do not differentiate between significantly abnormal values and slightly abnormal values which can lead the provider to not view the significant results in a timely manner. Since the majority of alerts for abnormal laboratory results are not clinically significant, the provider may habituate to not responding quickly to the alert. Providers still rely on verbal reporting for critical laboratory results, so the electronic alert has not eliminated the need for non-electronic forms of communication.

Concerns about accurate and timely transfer of information stem from the multiple interfaces involved in the process, such as laboratory, EHR and other hospital management systems. This highlights the problems that can arise if an institution does not have a sole provider for all EHR

services. Regardless, the need to interface with outside lab vendors (as required by the patient's insurance) such as Quest or LabCorp may result in the similar difficulties.

Summary and Recommendations

Results for SGRP 121 indicate that the electronic communication of laboratory results does not fully eliminate the need for other forms of communication. In particular, providers still perform manual cross-checks of laboratory results and respond most quickly to verbal alerts for critical laboratory results. Nevertheless, 97.8 percent of laboratories were returned electronically to the ordering provider for laboratories ordered in the central laboratory at CNMC, surpassing the 80 percent requirement for the objective measure. While the results are returned more quickly than by non-electronic means, findings show that providers actually take longer to review electronic results. This could be due to an inability to distinguish clinically critical results from slightly abnormal results based on the uniform alerts as well as indicative of idiosyncrasies of the workflow patterns at different hospitals. As a result, study participants reported alert fatigue in response to using electronic lab results. Providers must reconcile the electronic results with paper results because of difficulties with obtaining accurate data due to the multiple interfaces and the remnants of some early inaccuracies among lab results from different sources.

- **Policy:** *Mandate standardized interface methodology to facilitate the timely and accurate transfer of laboratory information from laboratory information systems (LIS) to all EHRs.* Key laboratory experts suggested that some of the inconsistencies occurred because of use among multiple products. Standardized laboratory result transmission was originally intended to use HL7 technology. However, because HL7 (and subsequent versions) have been modified by each vendor, there is no true standard for vendors. This complicates the transmission of laboratory results, as the process must be customized to make a specific interface between each EHR and each LIS system.
- **EHR innovation:** *Modify and intensify visual cues and provide notifications for critical laboratory results, including abnormal cultures and categorical results that are more accessible to providers.* Currently, all abnormal laboratories (positive/negative outcome or numeric values outside normal parameters) are highlighted; however, the highlight is a subtle color change from orange to red within eClinicalWorks. A more pronounced visual cue can improve rapid detection of markedly abnormal lab values. Laboratory notifications should be clearly visible from an EHR dashboard (rather than having to open each individual patient chart) of pending critical or abnormal laboratory results with staggering notifications that increase in intensity over time. In addition, making results available on mobile devices could improve electronic time to review and, when appropriate, time to respond.
- **EHR Innovation:** *Allow flexibility for multiple providers involved in the care of a given patient to access laboratory result data* in order to ensure timely review/response. Under the current system, access is limited to the ordering provider and the attending physician. However, if results arrive on a later day, these providers may not be available, thus also delaying the review of results.
- **Provider:** *Encourage laboratory services to implement a verification process for all outgoing laboratory results.* Qualitative interviews of providers receiving results revealed that laboratory results were often invalid, missing, or linked to wrong patients, which ultimately impeded their ability to rely on the electronic results and meet this objective.

SGRP 206—Identify Patient-specific Education (CNMC)

Proposed Objective Measure: *Additional language support:* For the top 5 non-English languages spoken nationally, provide 80 percent of patient-specific education materials in at least one of those languages based on EP’s or EH’s local population, where publically available.

Findings

Based on the study results, CNMC had a limited number of patient education resources available in a non-English language, thus the hospital did not meet this objective. However, more than 80 percent of patient education materials in the ED were available in Spanish, though they were not administered in a non-English language. All of the custom ED patient education content was translated into Spanish by fee for service interpreters. This process was very resource intensive and had prolonged turnaround time for content as long as 4 months—meeting the clinical need and the spirit of the objective and yet still not satisfying the measure.

Based on the 2011 Five Year American Community Survey,⁹ the top five non-English languages spoken in the United States are—

- Spanish
- Chinese (Mandarin/Cantonese)
- Tagalog
- Vietnamese
- French

The top six languages for the local population in the Washington, DC area are shown in Exhibit 17 below based on 106,247 unique visits over the study period to the ED and inpatient units. Note that only three of the top five non-English languages spoken in Washington, DC, overlap with the top five non-English languages spoken nationally.

Exhibit 17. Top 5 languages based on unique ED and inpatient visits

Primary Language	Number of ED & Inpatient Visits (n = 106,247)	Percentage of ED & Inpatient Visits
English	91,989	88.0%
Spanish	10,935	10.5%
Arabic	1,032	1.0%
Amharic	336	0.3%
Mandarin	199	0.2%
Vietnamese	102	0.1%

CNMC offered 36,347 printed education materials distributed through the ED and Inpatient Services. Of these 36,347 printed materials, only 2.7 percent (972) were provided in Spanish, and no alternate languages were documented. Interpreters address the language needs for all languages

other than English. Through the Get Well Network,^{*} providers can select educational videos about asthma with diagrams, pictures, and even assessment quizzes. None of the 439 video sessions performed were reported to be in a language other than English, but this could be due to an omission by the provider or staff in entering the language used in the EHR.

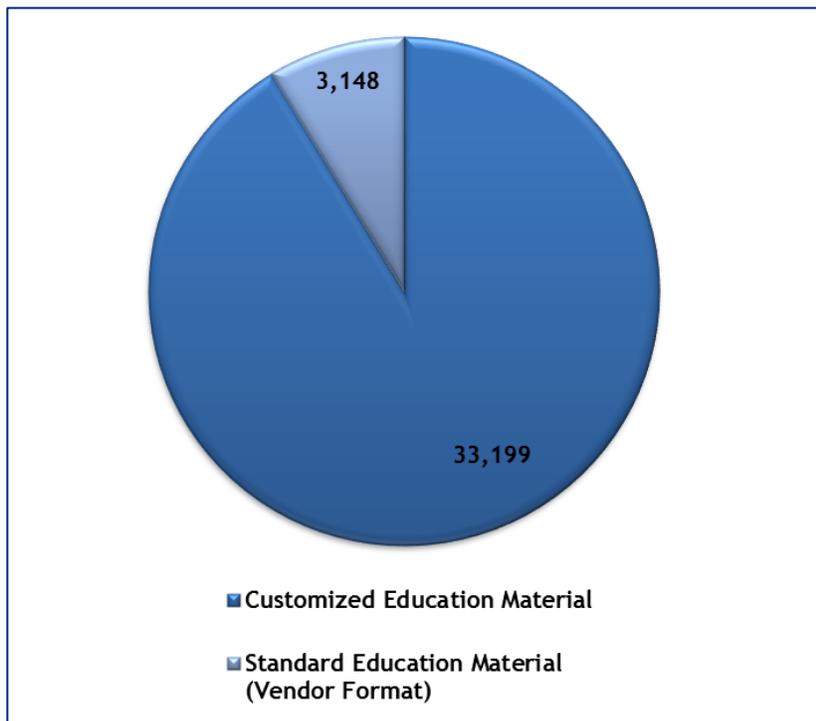
While CNMC is not currently able to meet this objective, its providers employ a number of other techniques to address the language needs of their patients. Qualitative findings show that CNMC study participants believe face-to-face clinical discussion is the best form of patient education; however, they acknowledged that written resources can be beneficial reminders, especially since patients and families may not absorb all of the information during stressful clinical encounters, particularly if their primary language is not English. The ED has piloted a program to send video discharge instructions to families to support the information that is provided in person, which offers an additional benefit to those with limited literacy. The actual discharge session is recorded and also provided to the patient families. Discharge videos (recorded during the actual interaction between the provider and family) can be ordered for a specific patient within the inpatient units as well.

Providers expressed concern about the lack of written pediatric-appropriate discharge information. One provider reported that much of the pediatric content provided by EHR vendors (standard education materials) is incomplete or inaccurate, requiring editing of each discharge instruction out of concern for risk management and quality control. Consequently, providers have created their own customized instructions either by translating their own text or finding resources from the Internet. This presents an additional challenge for translating the customized information accurately. The pie chart below (Exhibit 18) shows that a majority of the 36,347 materials were customized (not in the standard vendor format), indicating a relatively high level of engagement and effort by the providers. The custom content was modified by the hospital IT leadership or patient education SME, and was available to all end users in the patient education catalogue, accessible in the “Depart Process” as discharge instructions.

Although some EHRs have built-in functionality, most vendors partner with a patient education vendor to provide that content. It appears that the certification process only requires vendors have the *ability* to identify patient education materials without requiring the vendor to provide said materials. As a result, many EHRs include a plug-in to access third-party education materials. For example, CNMC patient education materials are provided by ExitCare that specializes in patient education and not by its main EHR vendor, Cerner. Unfortunately, the standard materials are often basic and inadequate for pediatric or complex care. Thus, the majority of the printed education materials distributed by CNMC were customized in some way, either by the providing clinician or by the institution to better serve the needs of the population.

^{*} The GetWellNetwork system enables hospitals to deliver educational content to patients through mobile devices, computers and televisions. Designed for health educators, nurses and other interdisciplinary teams, the GetWellNetwork Patient Education Library provides a virtual “one-stop-shop” to review quality, evidence-based content that can be made available to your patients. CNMC uses the GetWellNetwork in both English and Spanish.

Exhibit 18. Proportion of customized patient education materials to standard patient education materials at CNMC



Through the EHR, providers can select patient education materials based on chief complaint, but providers considered many recommendations to be inappropriate (e.g., it suggested pregnancy or back pain materials for many pediatric patients). Accordingly, CNMC experts have questioned whether EHR vendors are adequately equipped to provide patient education compared to companies that specialize in that area of knowledge. Another concern brought to light by study participants was the lack of medication instruction in multiple languages. Most often, dosing instructions (e.g., one teaspoon, twice a day) is provided only in English, which could place the patient at risk for improper medication dosage.

Study findings suggest there is potential for both low-tech and high-tech solutions for patient education materials. For example, access to a resource library of pictures and diagrams can supplement the existing materials. Alternatively, the use of social media and educational applications can provide reminders to perform treatments, take medications, and attend follow-up appointments after discharge.

Summary and Recommendations

Feedback from CNMC key experts and providers suggests that second-language materials are not easy to access. Though they can be useful for families to reference, the materials themselves are not adequate substitutes for verbal explanation. Moreover, providers appear to be more concerned about ensuring the accuracy of the materials than reaching a certain quota of second-language materials. CNMC providers report general dissatisfaction with the completeness and appropriateness of the preloaded education materials available in the EHR, such that most of them provide customized materials to their patients. To improve this objective, the project team recommends the following:

- **Policy:** Reword the objective language to clarify whether the non-English language materials are simply available through the EHR or whether there is some measurement to ascertain if those materials were in fact provided to patients with a preferred language other than English when warranted during the reporting period. As stated, the proposed objective can be interpreted in multiple ways.
- **EHR Innovation:** Provide the capability to deliver patient education materials electronically (i.e., through secure messaging to a personal health record or mobile device) in addition to paper (i.e., printing from the EHR). Currently, CNMC has the option to purchase a plug-in from its third party vendor, ExitCare, which allows the provider to send a specific resource to a patient through the EHR. However, there is no known support for mobile devices.
- **EHR Innovation:** *Notify the provider if the patient does not have English listed as the preferred language or generate the patient education materials in the preferred language by default.* Providers will be more likely to fulfill this objective if the education materials become standard and meet their patients' needs.
- **EHR Innovation:** *Provide automatic translation of customized information through the EHR,* such as medication dosing or additional discharge information.
- **Provider:** *Develop or incent the development of a more robust pipeline of patient education materials including those for special populations* (i.e., pediatric) as most existing patient education materials available through EHRs are primarily adult-based and very general. If providers had access to high quality and relevant patient education materials, EPs and EAs might be more motivated to make use of the EHR.

SGRP 308—Notifications of Significant Health Care Event (CNMC)

Proposed Objective Measure: For 10 percent of patients with a significant health care event (arrival at an Emergency Department (ED), admission to a hospital, discharge from an ED or hospital, or death), EH/CAH will send an electronic notification to at least one key member of the patient's care team, such as the primary care provider, referring provider or care coordinator, with the patient's consent if required, within 2 hours of when the event occurs.

Findings

CNMC implemented an external patient communication interface in July 2011 for providers on inpatient services. The interface allows for the automatic transmission of admission and discharge notifications to the patient's primary care physician or associated specialty care provider for significant health care events. Study participants classify significant health care events as admissions, major changes or escalation in care (such as transfer to ICU), prolonged stay (greater than 1 week) and discharge. Experts reported that death notifications should always be done verbally and not electronically.

The notification process includes automatic note generation in the EHR (on admission and/or discharge), which can be edited by the attending provider before being automatically faxed through the EHR to the listed primary care physician. This communication interface was expanded to include the EDs at both the main campus and satellite campus, leading to increased adoption across the entire institution, including mental health and outpatient clinics. During the study period, a total of 116,353 admission and discharge notifications were generated by medical staff. Of those,

100,655 (86.5 percent) were successfully sent from the care provider (no error received). As it is not a closed loop system, however, there is no indication of whether the provider actually received the notice. The remaining 15,697 (13.5 percent) resulted in a transmission error, which indicated that the notification was attempted but not delivered.

The team separately analyzed the ED and inpatient departments, since the ED has additional methods of contacting primary care physicians outside of the interface. During the study period, the inpatient department reported 19,654 admissions, of which 10,986 (55.9 percent) had successful electronic admission/discharge notifications made at any time using the interface described above, resulting in a total of 15,631 notifications. However, of admissions reported, only 785 (3.9 percent) of those had a notification transmitted within 2 hours of the event, which is far below the proposed measure threshold. The median time to notification transmission was 12 hours. Key stakeholders question the feasibility and the appropriateness of the 2-hour time limit because the information may not be known, available, or needed within 2 hours, nor does it align with the Joint Commission requirement of a medical history and examination within 24 hours.¹⁰ In particular, communication at night within 2 hours of the event does not seem feasible or clinically important to providers who are not on site and providing care to the patient at that moment.

Within the ED, primary care provider notification for admission and discharge can occur in two ways. Providers can use a PCP notification order through the EHR mentioned above or an automated process that links every inpatient bed request order to a PCP notification alert to the unit secretary, who then contacts the PCP by phone or fax. CNMC has noted that neither notification systems are native to the Cerner EHR platform. During the study period, the ED at both campuses generated 63,434 notifications through the electronic interface and 10,785 phone notifications. For those notifications sent electronically from the EHR, notification was sent to the PCP within a median of 2.7 hours of the event. In comparison, those notifications made via phone had a median time from order to notification of 0.3 hours. Since the PCP notification order is not an automated process, it is necessary to also evaluate the time between triage and order generation. The current process at CNMC involves providers filling out templates within the EHR that are transmitted directly to the PCP by fax through the EHR. As it stands, the objective does not clarify whether transmission by fax qualifies as “electronic,” which should be clarified in the final Stage 3 MU policy. Providers also need access to an accurate and well-maintained database of PCP contact information to fulfill this objective. Study participants revealed that many family members are unable to provide the name of their child’s pediatrician.

Summary and Recommendations

Study findings suggest that notifications sent electronically generally take longer than those sent by other means. Additionally, there is confusion over the term “electronic” and whether faxes sent through the EHR meet this requirement. PCPs serving the patients that CNMC serves have expressed a preference for fax. A small percentage of the inpatient notifications were within the 2-hour window, a time period that is probably too short for clinical importance. To improve this objective, the project team recommends the following:

- **Policy: *Revise the time requirement to 12-24 hours*** to allow time for more substantial information to be available and to account for providers not being available to access data 24 hours per day.
- **Policy: *Clarify the definition for “electronic”*** and whether it includes faxing through an EHR or what other methods might suffice to meet the electronic definition.

- **Policy:** *Standardize the required data elements for communication of significant health care events*, particularly for discharge to enhance continuity of care.
- **EHR Innovation:** *Create a method for verification that the primary care team received the notification of a significant health care event* to improve communication tracking and care coordination and ensure that the patient receives appropriate follow-up.
- **EHR Innovation:** *Increase flexibility of EHRs to allow changes by providers so that end-users can update patient's primary care team names or contacts' information directly, including allowing for more than one contact as part of the care team.*
 Currently, if providers discover that the *patient's primary care team* information entered during registration is incorrect or incomplete, they are unable to directly update the contact information in the EHR. Furthermore, to move towards a “medical home” approach of primary care delivery, it is critical that nursing staff, school providers, and home care providers as appropriate are included in notifications. Most EHRs do not accommodate the functionality to store information for multiple care team members.
- **Provider:** *Enhance SGRP 308 to include a component targeting appropriate follow-up on the receiving provider end.* Communication reciprocity on both ends of the care team can lead to better provider adoption of this and similar Stage 3 MU objectives. For example, a hospitalist sends notification to a PCP of a patient's admission and the PCP is then able to provide relevant patient history to the hospitalist while the patient is in their care. Without this notification, the hospitalist would be left to treat the patient with only patient generated data or information and any history available within the hospital inpatient EHR, which may not be recent or relevant.

Discussion

Common Themes

Study participants appear to have mixed perceptions and experiences in attaining the nine objectives evaluated in this study. In many cases, the qualitative results support a richer effort on the part of the providers in meeting each objective than is captured by the quantitative data. Reasons for this discrepancy include ambiguous policy language within the objectives themselves, limitations in EHR functionality and support to meet objectives, and provider workflow incompatibility.

Unclear Expectations Based on Policy Language

Although the proposed objectives serve as a good foundation for Stage 3 MU, the current objectives do not always appear to be consistently aligned with generally accepted clinical practices or to necessarily enhance clinical care. For example, providers questioned the usefulness of many of the CDS interventions available through their EHR; therefore, it makes little sense to penalize providers for not following a CDS recommendation that does not benefit the care of patients seen in that practice. In some instances, the HITPC has already recommended changes for certain Stage 3 MU objectives released in their April 2014 final recommendations; however, additional clarity of policy language may further improve the overall adoption of these objectives.

As currently stated, many of the MU objectives do not account for differences in provider type or regional setting. Our field research suggests this is most likely to impact CDS (SGRP 113), secure messaging (SGRP 207), and summaries of care (SOC, SGRP 303). Differences between specialists and PCPs need to be considered in how MU objectives are crafted and articulated as policy. For example, specialists reported to OFMQ and CNMC that specialties were underrepresented in the CDS interventions available through their EHRs, which could contribute to lower adoption rates for specialists. Additionally, the OFMQ field evaluators observed that patients use secure messaging most frequently to ask about laboratory test results, hence they may be more likely to want to communicate with PCPs than specialists through secure messaging, possibly also impacting the ability of specialists to meet SGRP 207. The degree of urbanization in geographic locale may also impact the use of health IT. For example, OFMQ noticed participating providers connected to an HIE lived in a more metropolitan area and were located within the same community as the HIE, whereas the participating rural providers were either not connected to an HIE, or were still in the process of joining an HIE. While this apparent difference may not directly impact Stage 3 MU, it certainly illustrates how health IT adoption may take longer to extend to communities not directly linked to an HIE, which can allow differences among providers in different geographic locations to appropriately share important medical information about common patients. As in the case for SGRP 303 (SOC for transitions of care), HIE data can be a useful method for validating the accuracy of EHR data by cross-checking transmissions sent and received by the HIE and EHR.

Limitations in EHR Functionality and Support

Finally, frustration with EHR functionality and the lack of availability of 2014 certified products characterized the experience of study participants and evaluators and made data recording and collection cumbersome or unattainable. Rigid programming within the EHRs does not accommodate alternative workflows; that is, providers must follow a specific pathway for the EHR

to recognize fulfillment of the objective. Both OFMQ and CNMC experienced challenges with the existing interfaces built into the EHR products—across platforms and even within the same vendor family (e.g., inconsistencies between eClinicalWorks and eHX communicating properly). To mitigate the interface issues, a standardized interface methodology and appearance can facilitate communication between different products. Although HL7 (a messaging standard that allows the exchange of clinical data between systems) was intended to standardize interface methodology, vendor modifications have ultimately negated the standardization.

Some of the issues faced by providers and their staff could be minimized with changes to the certification process. Establishing standards for certifying bodies can ensure consistent measure performance across providers/practices. Historically, vendors have not been held accountable for designing and releasing functional and robust technology that meets the needs of the providers' workflow and the demands of MU. The project team experienced vendor delays firsthand, and thus suggests that vendors successfully submit an electronic format to CMS to receive EHR certification and provide a deadline by which they will make the product available to the public. During the upgrade process, vendors should clearly indicate any changes that providers need to know about in order to record data properly. Additionally, a built-in EHR function could display a message to notify end-users if configuration is incomplete or if there are any updates pending in order to guarantee accurate transfer of information. Further training is needed to ensure that providers use the correct fields and/or codes to receive credit for certain activities. Currently, it appears that vendor support is inadequate or expensive, which may create additional barriers for smaller organizations. For this reason, the project team believes vendor training of providers and other users should also be enhanced to ensure that providers and staff are adequately prepared to understand and use the EHR functions, such as customizing settings. This training might be conducted onsite with vendor representatives or through low-cost alternatives, such as interactive tutorials within the EHR.

Provider Workflow Incompatibility

As noted earlier, provider adoption lags for objectives that are not perceived as beneficial or relevant to how providers practice. For example, documenting family history for SGRP 119 at the ICD-9 level of detail defies the conventional practice of documenting general illnesses or disease. Even objectives that are relevant may interfere with provider workflow compatibility, especially if providers lack easy accessibility to EHR features or real-time feedback. Across all sites studied for this evaluation, participants expressed unanimous support for improved reporting structures for end-users to monitor compliance and utilization of EHR functions. Accurate reports (used to track adherence to and progress towards MU objectives) that are easily accessible through the EHR will add considerable value to providers and can thus contribute to more widespread adoption of appropriate use of EHRs and their features. Additionally, improving the accuracy of reports could increase provider morale if the EHR is able to document appropriately when a provider fulfills an objective measure. As yet, the reporting abilities of the EHRs studied present data inaccuracies in the recording and reporting of EHR activity, resulting in provider mistrust and duplicative work.

Summary Recommendations

Exhibit 19 presents key findings and recommendations for all nine proposed Stage 3 MU objectives studied in this evaluation. Included in this exhibit are the top priority recommendations

that the project team believes may have the greatest potential impact if implemented. Each of these recommendations is described in more detail in the Results section above.

Exhibit 19. Summary recommendations

Proposed Stage 3 MU Objectives		Key Findings/Recommendations		
Objective Language Used in Pilot Implementation Project (January 2013) ³	Updated Objective Language (April 2014) ¹¹	Strategies for improving objectives at the policy level	Proposed EHR innovations to enable meeting proposed objectives	Suggestions for organizations on how to increase internal value of implementing the objective
SGRP 119: Family Health History				
<p>Objective: Record high priority family history data</p> <p>Measure: Record high priority family history in 40% of patients seen during reporting period</p>	Not included in final recommendations	<p>Revise policy language to specify if the denominator is the percentage of new patients seen in the reporting period that have family health history documented or demonstrate the percentage of patients seen during the reporting period (new or existing patient) that have a family history populated. The information does not necessarily need to be entered at every visit if it has already been populated in a previous visit as long as it appears in a structured and accessible way.</p>	<p>Structured data for MU fields should be a certification requirement with mechanisms to make it easier on providers entering structured data. The setup for capturing structured data should be completed by the vendor before going through certification. Furthermore, vendors should increase awareness and provide more tools and training for capturing MU data and achieving MU thresholds.</p>	<p>Include SGRP 119 in the final objectives and remove the required structured data component to allow providers to use free text for now, allowing the EHR vendors time to develop the innovations necessary to minimize the burden on providers entering this data in a structured way (as described in the EHR innovation). Since it appears that providers use EHR to collect and document family history already, inclusion of SGRP 119 could be a “low hanging fruit” that demonstrates that MU can be attainable.</p>

Exhibit 19. Summary recommendations (continued)

SGRP 119: Family Health History				
		The policy language is confusing as currently stated.	To reinforce this concept, the reports should alert the clinic of “incomplete configuration” or “structured data fields required” if they are not properly or completely configured. In addition, vendors should find innovative ways to make it easier for providers to enter family health history data such as drop down lists that contain the most common family history concerns or by setting up favorites.	However, until vendors incorporate mechanisms to ease provider burden of entering data in a structured way (such as drop down menus and favorite lists) reporting this data could become a barrier.
SGRP 120: Electronic Notes				
<p>Objective: Record electronic notes in patient records</p> <p>Measure: Enter at least one electronic progress note created, edited and signed by an EP for more than 30% of unique patients with at least one office visit during the EHR Measure reporting period within four calendar days.</p>	<p>Eligible Professionals (EPs) record an electronic progress note, authored by the EP.</p> <p>Electronic progress notes (excluding the discharge summary) should be authored by an authorized provider of the Eligible Hospital (EH) or Critical Access Hospital (CAH).</p> <p>Notes must be text-searchable. Non-searchable scanned notes do not qualify but this doesn’t mean that all of the content has to be character text. Drawings & other content can be included w/ notes under this measure.</p>	<p>Revise the objective to read “reviewed and signed [by the EP]” instead of “created, edited, and signed [by the EP]” since workflow varies greatly for each provider it is not important clinically whether the note is created there is little clinical impact if the note is authored by staff instead of the provider.</p>	<p>Incorporate optical character recognition (e.g., to convert hand-written notes into typed text) to improve the workflow of the busy rural health providers.</p>	<p>Provide access to the EHR at home or on mobile devices to allow more flexibility for providers to document progress notes, which will also contribute to better notes as providers may have an extended opportunity to complete notes on the same day that the patient is seen.</p>

Exhibit 19. Summary recommendations (continued)

SGRP 207: Secure Messaging				
<p>Objective: Use secure electronic messaging to communicate with patients on relevant health information</p> <p>Measure: More than 10% of patients use secure electronic messaging to communicate with EPs</p>	<p>EP: Patients use secure electronic messaging to communicate with EPs on clinical matters.</p> <p>⇒ Threshold: Low (e.g., 5% of patients send secure messages)</p> <p>Certification criteria: EHRs have the capability to:</p> <ol style="list-style-type: none"> 1. Indicate whether the patient is expecting a response to a message they initiate 2. Track the response to a patient-generated message(e.g., no response, secure message reply, telephone reply) 	<p>Update the objective language to state “EP responds to at least 50% of secure messages sent by patients during the EHR reporting period; exclusion – any EP who receives no secure messages through CEHRT during the reporting period.”</p> <p>Further, this objective could be enhanced if the denominator targeted those patients who have a reason or need to communicate with the provider as opposed to all patients seen.</p>	<p>Allow patients to communicate with providers seamlessly from within the EHR environment with an interface that resembles traditional Email to make the process more intuitive for patients, providers and health care staff as well as patients.</p>	<p>Encourage providers to creatively engage patients to increase patient portal adoption. For example, OFMQ suggested that providers instruct patients to send a message once they register for the portal or send a message to the patient and request a response. Providers will need effective marketing strategies and tools to accomplish this objective, such as displaying posters in the exam room to communicate the importance of patients’ involvement in their own care. Furthermore, when clinic staff help patients register for the portal, they might provide information and/or materials to help guide patients in how to reach their physician such as telephone calls for an urgent issue but secure messaging (Email) for questions about appointments or non-urgent communication.</p>

Exhibit 19. Summary recommendations (continued)

SGRP 303: Summary of Care for Transitions of Care				
<p>Objective: The EP/EH/CAH who transitions their patient to another setting of care or provider of care or refers their patient to another provider of care provides summary care record for each transition of care or referral.</p> <p>Measure: The EP/EH/CAH that site transitions or refers their patient to another setting of care (including home) or provider of care provides a summary of care record for 65% of transitions of care and referrals (and at least 30% electronically).</p>	<p>EP/EH/CAH provides a summary of care record during transitions of care.</p> <p>Types of transitions:</p> <ul style="list-style-type: none"> ⇒ Transfers of care from one site of care to another (e.g., Hospital to: PCP, hospital, SNF, HHA, home, etc.) ⇒ Consult (referral) request (e.g., PCP to Specialist; PCP, SNF to ED) [pertains to EPs only] ⇒ Consult result note (e.g., consult note, ER note) <p>Summary of care may (at the discretion of the provider organization) include, as relevant:</p> <ul style="list-style-type: none"> ⇒ A narrative that includes a synopsis of current care and expectations for consult/transition or the results of a consult [required for all transitions] ⇒ Overarching patient goals and/or problem-specific goals ⇒ Patient instructions, suggested interventions for care during transition ⇒ Information about known care team members (including a designated caregiver) 	<p>Revise policy to better articulate which information is considered mandatory and must be sent or received and adjust the vendor certification criteria accordingly.</p> <p>Currently, over one dozen fields are expected to be included in the SOC, but they can be blank as long as the current problem list, medication list, and allergy lists are included. The extensive list detracts from the purpose of providing a true “summary” of care.</p>	<p>Include a drop-down menu of accepted referral codes (with an option to add other referral codes) to eliminate provider confusion over which codes will count towards meeting the objective.</p>	<p>Limit the amount of required information in the SOC document to the main facts of the condition requiring attention such as problem list, treatment recommendations, basic demographic information, medication list, allergies, and recent lab results. Providers will be more likely to complete (and read) the SOC document if it is less extensive, takes less time to generate and contains only clinically necessary information in a summarized fashion.</p>

Exhibit 19. Summary recommendations (continued)

SGRP 305: New Patient Referral				
<p>Objective: EP/EH/CAH to whom a patient is referred acknowledges receipt of external information and provides referral results to the requesting provider, thereby beginning to close the loop.</p> <p>Measure: For patients referred during an EHR reporting period, referral results generated from the EHR, 50% are returned to the requestor and 10% of those are returned electronically.</p>	<p>Merged with SGRP 122 for order tracking.</p>	<p>Reconsider the HITPC’s final recommendation to merge this objective with SGRP 122 (Order Tracking). The team does not believe SGRP 122 captures the full breadth of “closing the referral loop,” because SGRP 122 is focused on the ordering provider’s ability to track information rather than the bi-directional exchange of information between providers that should occur when referring new patients, including the care coordination component. We believe there are two potential options: 1) Reconsider this as a stand-alone objective, or 2) Merge this objective with summary of care objective, which more appropriately focuses on the provider communication and care coordination components.</p>	<p>Enhance EHR functions to alert referring providers when referral results are received or not received within an appropriate time frame. This will allow providers to work this information into their care plans and may also help providers see more value in this objective as their reliance on this information increases.</p>	<p>Provide access to the EHR at home or on mobile devices to allow more flexibility for providers to document and send referral results.</p>

Exhibit 19. Summary recommendations (continued)

SGRP 113: Clinical Decision Support				
<p>Objective: Use clinical decision support (CDS) to improve performance on high-priority health conditions</p> <p>Measure:</p> <p>1. Implement 15 CDS interventions or guidance related to five or more clinical quality measures that are presented at a relevant point in patient care for the entire EHR reporting period. The 15 CDS interventions should include one or more interventions in each of the following areas, as applicable to the EP's specialty:</p> <ul style="list-style-type: none"> ⇒ Preventative care ⇒ Chronic disease management, including hypertension ⇒ Appropriateness of lab and radiology orders ⇒ Advanced medication-related decision support <p>2. The EP, EH, or CAH has enabled the functionality for drug-drug and drug-allergy interaction checks for the entire EHR reporting period.</p>	<p>EP/EH/CAH demonstrates use of multiple CDS interventions that apply to quality measures in at least 4 of the 6 National Quality Strategy priorities.</p> <p>⇒ Recommended intervention areas:</p> <ol style="list-style-type: none"> 1. Preventive care 2. Chronic condition management 3. Appropriateness of lab and radiology orders 4. Advanced medication-related decision support 5. Improving the accuracy/completeness of the problem list, medication list, drug allergies 6. Drug-drug and drug-allergy interaction checks <p>Certified EHR Technology (CEHRT) should have the functionality to enable intervention tools (the intention is not to be overly prescriptive, but to encourage innovation in these areas):</p> <ol style="list-style-type: none"> 1. Ability to track "actionable" CDS interventions and user responses to interventions, such as: <ol style="list-style-type: none"> a. How often an alert has fired b. What immediate actions the user took (when those options are presented in the context of the alert) c. Optional reason for overriding alert 2. Perform age-appropriate maximum daily-dose weight-based calculation 	<p>Require vendors, possibly through the certification process, to provide robust training and a mechanism for low-cost ongoing support (such as interactive training manuals and resource guides) to providers on how to customize and set up CDS interventions to meet their practice needs. Vendors currently can seek full certification (has capabilities to achieve all MU objectives) or modular certification (ability to achieve one or more MU objectives). However, the current certification process does not consider education and training services provided by the vendor; instead, it strictly reviews whether the vendor can capture MU data.</p>	<p>Improve tracking mechanisms to measure compliance with CDS interventions when indicated, following the example of ONC associating CDS to eQMs for reporting purposes. Currently most EHR do not provide tools for providers to track the usage of CDS interventions so they can understand if they are used appropriately (i.e., how they are used and by whom). This might also include personalized feedback for providers to track how often they are using CDS when indicated, which could further enhance provider adoption of CDS and improving care through feedback. This innovation could be further improved by requiring vendors to match CDS interventions available through their EHR product to the National Quality Strategies (NQS) so that providers can better identify when choosing CDS interventions to implement that they are in fact choosing a selection that appropriately reflects NQS.</p>	<p>CDS rules associated with patient safety concerns should adopt additional mechanisms for alerts to mitigate human factor issues such as "alert fatigue."</p> <p>Through expert interviews and survey results, many respondents identified "alert fatigue" as a common problem in CDS implementation. Alerts should have multiple levels of severity, with the most severe alert preventing the user from bypassing the alert without acknowledging the message and taking action. Less severe alerts can merely highlight an area of the screen.</p>

Exhibit 19. Summary recommendations (continued)

SGRP 121: Structured Electronic Laboratory Results				
<p>Objective: Provide structured electronic lab[oratory] results to EPs.</p> <p>Measure: Hospital lab[oratorie]s send (directly or indirectly) structured electronic clinical lab[oratory] results to the ordering provider for more than 80% of electronic lab[oratory] orders received.</p>	<p>No Change</p> <p>EHs and CAHs submit electronic reportable laboratory results, for the entire reporting period, to public health agencies, except where prohibited, and in accordance with applicable law and practice</p>	<p>Mandate standardized interface methodology to facilitate the timely and accurate transfer of lab information from laboratory information systems (LIS) to all EHRs. Key lab experts suggested that some of the inconsistencies occurred because of use among multiple products. Standardized lab result transmission was originally intended to use HL7 technology. However, because HL7 (and subsequent versions) have been modified by each vendor, there is no true standard for vendors. This complicates the transmission of lab results, as the process must be customized to make a specific interface between each EHR and each LIS system.</p>	<p>Modify and intensify visual cues and provide notifications for critical lab results, including abnormal cultures and categorical results more accessible to providers. Currently, all abnormal labs (positive/negative outcome or numeric values outside normal parameters) are highlighted; however, the highlighting is a subtle color change from orange to red within eClinicalWorks. A more pronounced visual cue can improve rapid detection of markedly abnormal lab values. Lab notifications should be clearly visible from an EHR dashboard (rather than having to open each individual patient chart) of pending critical/abnormal lab results with staggering notifications that increase in intensity over time. In addition, making results available on mobile devices could improve electronic time to review and, when appropriate, time to respond.</p>	<p>Encourage hospital laboratory services to implement verification processes for all outgoing laboratory results. Qualitative interviews of providers receiving results revealed that lab results were often invalid, missing, or linked to wrong patients, which ultimately impeded their ability to rely on the electronic results and meet this objective.</p>

Exhibit 19. Summary recommendations (continued)

SGRP 206: Patient Education				
<p>Objective: Use Certified EHR Technology to identify patient-specific education resources and provide those resources to the patient.</p> <p>Measure: Additional language support: For the top 5 non-English languages spoken nationally, provide 80% of patient-specific education materials in at least one of those languages based on EP's or EH's local population, where publically available.</p>	<p>Continue educational material objective from stage 2 for EPs and EHs. Threshold: Low</p> <p>EPs and EHs use CEHRT capability to provide patient-specific educational material in non-English speaking patient's preferred language, if material is publically available, using preferred media (e.g., online, print-out from CEHRT). Threshold: Low, this should be a number and not a percentage</p> <p>Certification criteria: EHRs are capable of providing patient-specific educational materials in at least one non-English language</p>	<p>Reword the objective language to clarify whether the non-English language materials are simply available through the EHR or whether there is some measurement of if those materials were in fact provided to patients with a preferred language other than English when warranted during the reporting period. As stated, the proposed objective can be interpreted in multiple ways.</p>	<p>Provide the capability to deliver patient education materials electronically (i.e., through secure messaging to a personal health record or mobile device) in addition to paper (i.e., printing from the EHR). Currently, CNMC has the option to purchase a plug-in from its third party vendor, ExitCare, which allows the provider to send a specific resource to a patient through the EHR. However, there is no known support for mobile devices.</p>	<p>Develop or incentivize the development of a more robust pipeline of patient education materials including those for special populations (i.e., pediatric) as most existing patient education materials available through EHRs are primarily adult-based and very general. If providers had access to high quality and relevant patient education materials, EPs and EHs might be more motivated to make use of the EHR.</p>

Exhibit 19. Summary recommendations (continued)

SGRP 308: Notifications of Significant Health Care Events				
<p>Objective: The EH/CAH will send electronic notification of a significant health care event in a timely manner to key members of the patient's care team, such as the primary care provider, referring provider or care coordinator, with the patient's consent if required.</p> <p>Measure: For 10% of patients with a significant health care event (arrival at an Emergency Department (ED), admission to a hospital, discharge from an ED or hospital, or death), EH/CAH will send an electronic notification to at least 1 key member of the patient's care team, such as the primary care provider, referring provider or care coordinator, with the patient's consent if required, within 2 hrs. of when the event occurs.</p>	<p>Menu: EHs and CAHs send electronic notifications of significant health care events within 4 hours to known members of the patient's care team (e.g., the primary care provider, referring provider, or care coordinator) with the patient's consent, if required</p> <p>Significant events include:</p> <ul style="list-style-type: none"> • Arrival at an Emergency Department (ED) • Admission to a hospital • Discharge from an ED or hospital • Death 	<p>Revise the time requirement to 12-24 hours to allow time for more substantial information to be available and to account for providers not being available to access data 24 hours per day.</p>	<p>Create a method for verification that the primary care team received the notification of a significant health care event to improve communication tracking and care coordination and ensure that the patient receives appropriate follow-up.</p>	<p>Include a component targeting appropriate follow-up on the receiving provider end.</p> <p>Communication reciprocity on both ends of the care team can lead to better provider adoption of this and similar Stage 3 MU objectives. For example, a hospitalist sends notification to a PCP of a patient's admission and the PCP is then able to provide relevant patient history to the hospitalist while the patient is in their care. Without this notification, the hospitalist would be left to treat the patient with only patient generated data/information and any history available within the hospital inpatient EHR, which may not be recent or relevant.</p>

Impact of HITPC Final Recommendations

The evaluation study launched before HITPC released its final recommendations for Stage 3 MU objectives in April 2014. Exhibit 20 below highlights changes from the proposed objectives studied in this evaluation (January 2013) to the updated objective language from HITPC (April 2014), including an overview of the impact these changes may have on the recommendations.

Exhibit 20. Impact of HITPC’s updated objective language

Objective Language Used in Pilot Implementation Project (January 2013) ³	HITPC’s Updated Objective Language, (April 2014) ¹¹	Impact on Proposed Recommendations
SGRP 119: Family Health History		
<p>Objective: Record high priority family history data</p> <p>Measure: Record high priority family history in 40% of patients seen during reporting period.</p>	<p>Not included in final recommendations</p>	<p>HITPC’s decision to remove SGRP 119 as an objective means that the recommendations are not actionable unless the decision is reversed. Acknowledging that crucial EHR innovations are needed to make this objective viable, the team still believes that SGRP 119 should be included as an Stage 3 MU objective as this is clinical information providers are generally already capturing and could be seen as ‘low hanging fruit’ in achieving MU.</p>
SGRP 120: Electronic Notes		
<p>Objective: Record electronic notes in patient records</p> <p>Measure: Enter at least one electronic progress note created, edited and signed by an EP for more than 30% of unique patients with at least one office visit during the EHR Measure reporting period within four calendar days.</p>	<p>EPs record an electronic progress note, authored by the EP.</p> <p>Electronic progress notes (excluding the discharge summary) should be authored by an authorized provider of the EH or CAH</p> <p>Notes must be text-searchable</p> <p>Non-searchable scanned notes do not qualify but this does not mean that all of the content has to be character text. Drawings and other content can be included with text notes under this measure</p>	<p>The updated policy language states that the electronic progress note does not require a discharge summary. It is unclear whether discharge summaries were previously required. However, the new policy does not specify the percentage of unique patients for whom the EP must author an electronic note, nor is it clear if the EP must “create” the electronic note.</p>

Exhibit 20. Impact of HITPC’s updated objective language (continued)

Objective Language Used in Pilot Implementation Project (January 2013) ³	HITPC’s Updated Objective Language, (April 2014) ¹¹	Impact on Proposed Recommendations
SGRP 207: Secure Messaging		
<p>Objective: Use secure electronic messaging to communicate with patients on relevant health information.</p> <p>Measure: More than 10% of patients use secure electronic messaging to communicate with EPs.</p>	<p>No change in objective</p> <p>EP</p> <ul style="list-style-type: none"> ⇒ Patients use secure electronic messaging to communicate with EPs on clinical matters. ⇒ Threshold: Low (e.g., 5% of patients send secure messages) ⇒ Certification criteria: EHRs have the capability to: <ol style="list-style-type: none"> 1. Indicate whether the patient is expecting a response to a message they initiate <p>Track the response to a patient-generated message(e.g., no response, secure message reply, telephone reply)</p>	<p><i>No change in objective.</i></p>
SGRP 303: Summary of Care for Transitions of Care		
<p>Objective: The EP/EH/CAH who transitions their patient to another setting of care or provider of care or refers their patient to another provider of care provides summary care record for each transition of care or referral.</p> <p>Measure: The EP, EH, or CAH that site transitions or refers their patient to another setting of care (including home) or provider of care provides a summary of care record for 65% of transitions of care and referrals (and at least 30% electronically).</p>	<p>EP/EH/CAH provides a summary of care record during transitions of care.</p> <p>Types of transitions:</p> <ul style="list-style-type: none"> ⇒ Transfers of care from one site of care to another (e.g., Hospital to: PCP, hospital, SNF, HHA, home, etc.) ⇒ Consult (referral) request (e.g., PCP to Specialist; PCP, SNF to ED) [pertains to EPs only] ⇒ Consult result note (e.g., consult note, ER note) <p>Summary of care may (at the discretion of the provider organization) include, as relevant:</p> <ul style="list-style-type: none"> ⇒ A narrative that includes a synopsis of current care and expectations for consult/transition or the results of a consult [required for all transitions] ⇒ Overarching patient goals and/or problem-specific goals ⇒ Patient instructions, suggested interventions for care during transition ⇒ Information about known care team members (including a designated caregiver) ⇒ Threshold: No Change 	<p>There is no change in the threshold for SGRP 303, and thus no major anticipated impacts on the proposed recommendations.</p>

Exhibit 20. Impact of HITPC’s updated objective language (continued)

Objective Language Used in Pilot Implementation Project (January 2013) ³	HITPC’s Updated Objective Language, (April 2014) ¹¹	Impact on Proposed Recommendations
SGRP 305: New Patient Referral		
<p>Objective: EP/EH/CAH to whom a patient is referred acknowledges receipt of external information and provides referral results to the requesting provider, thereby beginning to close the loop.</p> <p>Measure: For patients referred during an EHR reporting period, referral results generated from the EHR, 50% are returned to the requestor and 10% of those are returned electronically.</p>	<p>Merged with SGRP 122 for order tracking.</p>	<p>HITPC’s decision to merge SGRP 305 with order tracking (SGRP 122) conflicts with the project team’s assessment of the objective.</p>
SGRP 113: Clinical Decision Support		
<p>Objective: Use clinical decision support (CDS) to improve performance on high-priority health conditions</p> <p>Measure:</p> <p>1. Implement 15 CDS interventions or guidance related to five or more clinical quality measures that are presented at a relevant point in patient care for the entire EHR reporting period. The 15 CDS interventions should include one or more interventions in each of the following areas, as applicable to the EP’s specialty:</p> <ul style="list-style-type: none"> ▶ Preventative care ▶ Chronic disease management, including hypertension ▶ Appropriateness of lab and radiology orders ▶ Advanced medication-related decision support <p>2. The EP, EH, or CAH has enabled the functionality for drug-drug and drug-allergy interaction checks for the entire EHR reporting period.</p>	<p>⇒ EP/EH/CAH demonstrate use of multiple CDS interventions that apply to quality measures in at least 4 of the 6 National Quality Strategy priorities.</p> <p>⇒ Recommended intervention areas:</p> <ol style="list-style-type: none"> 1. Preventive care 2. Chronic condition management 3. Appropriateness of lab and radiology orders 4. Advanced medication-related decision support 5. Improving the accuracy/completeness of the problem list, medication list, drug allergies 6. Drug-drug and drug-allergy interaction checks <p>Certified EHR Technology (CEHRT) should have the functionality to enable intervention tools (the intention is not to be overly prescriptive, but to encourage innovation in these areas):</p> <ol style="list-style-type: none"> 1. Ability to track “actionable” CDS interventions and user responses to interventions, such as: <ol style="list-style-type: none"> a. How often an alert has fired b. What immediate actions the user took (when those options are presented in the context of the alert) c. Optional reason for overriding alert 2. Perform age-appropriate maximum daily-dose weight-based calculation 	<p>The updated language appears to make it easier for EPs and EHS to meet the objective, with the option to cover 4 of the 6 quality priorities instead of all 5 of the eCQMs in the proposed objective.</p>

Exhibit 20. Impact of HITPC’s updated objective language (continued)

Objective Language Used in Pilot Implementation Project (January 2013) ³	HITPC’s Updated Objective Language, (April 2014) ¹¹	Impact on Proposed Recommendations
SGRP 121: Structured Electronic Lab Results		
<p>Objective: Provide structured electronic lab results to EP.</p> <p>Measure: Hospital labs send (directly or indirectly) structured electronic clinical lab results to the ordering provider for more than 80% of electronic lab orders received.</p>	<p>No Change</p> <p>EHs and CAHs submit electronic reportable laboratory results, for the entire reporting period, to public health agencies, except where prohibited, and in accordance with applicable law and practice</p>	<p><i>No change in objective.</i></p>
SGRP 206: Patient Education		
<p>Objective: Use Certified EHR Technology to identify patient-specific education resources and provide those resources to the patient.</p> <p>Measure: Additional language support: For the top five non-English languages spoken nationally, provide 80% of patient-specific education materials in at least one of those languages based on EP’s or EH’s local population, where publically available.</p>	<p>Continue educational material objective from stage 2 for EPs and hospitals. Additionally, EPs and hospitals use CEHRT capability to provide patient-specific educational material in non-English speaking patient’s preferred language, if material is publically available, using preferred media (e.g., online, print-out from CEHRT). Threshold: Low, this should be a number and not a percentage</p> <p>Certification criteria: EHRs are capable of providing patient-specific educational materials in at least one non-English language</p>	<p>Updated HITPC recommendations altered the objective language from “for the top 5 non-English languages spoken nationally, provide 80% of patient-specific education materials in at least one of those languages” to providing materials “in non-English speaking patient’s preferred language.” However, this change does not impact the team’s recommendations.</p>
SGRP 308: Notifications of Significant Health Care Events		
<p>Objective: The EH/CAH will send electronic notification of a significant health care event in a timely manner to key members of the patient’s care team, such as the primary care provider, referring provider or care coordinator, with the patient’s consent if required.</p> <p>Measure: For 10% of patients with a significant health care event (arrival at an Emergency Department (ED), admission to a hospital, discharge from an ED or hospital, or death), EH/CAH will send an electronic notification to at least one key member of the patient’s care team, such as the primary care provider, referring provider or care coordinator, with the patient’s consent if required, within 2 hours of when the event occurs.</p>	<ul style="list-style-type: none"> ● New ● Menu: EHs and CAHs send electronic notifications of significant health care events within 4 hours to known members of the patient’s care team (e.g., the primary care provider, referring provider, or care coordinator)with the patient’s consent, if required ● Significant events include: <ul style="list-style-type: none"> ○ Arrival at an Emergency Department(ED) ○ Admission to a hospital ○ Discharge from an ED or hospital ○ Death 	<p>The maximum time window to send an electronic notification has doubled from 2 to 4 hours. Although this is an improvement, it is considerably smaller than the team’s recommendation for 12-24 hours.</p>

Limitations

Despite a carefully designed methodology, this study faced certain limitations. As previously discussed, data collection was limited by delays in EHR software upgrades for many clinics studied by OFMQ. Quantitative data for Q4 2013, for example, was unavailable for four of six measures studied by OFMQ due to its delayed adoption of the 2014-certified version of eClinicalWorks. In addition, eClinicalWorks data collection from OFMQ required that the researchers complete data requests for each study practice site. Some requests were fulfilled late or inaccurately or were outdated relative to the 2014-certified eClinicalWorks version. Nevertheless, a review of the submitted data revealed that there were likely minimal changes once the reports were updated with the 2014-certified version. At CNMC, most data were available from Cerner, but some reports were acquired from eClinicalWorks through an ODBC/SQL program and with the assistance of a Cerner consultant, adding challenges of cost and time.

In addition to data collection issues, the study included a relatively small number of providers: from OFMQ, eight practice sites and 10 providers; and from CNMC, 600 providers from different departments but all within one practice site. Moreover, a general limitation of the study was the inclusion only of providers who were early achievers of Stage 1 Meaningful Use. As a result, findings related to providers' use of EHR may disproportionately represent providers who are proficient in and more likely to use EHR tools. For example, providers included in the study were either already connected to a health information exchange (HIE) or were in the process of connecting to one. This commonality could affect the providers' likelihood of sending summary of care and continuity of care documents to other care settings, which forms the basis of one proposed objective in the study. A broad provider sample with greater diversity of experience with health information technology could reveal additional considerations and difficulties related to meeting such objectives.

Finally, the project team recognizes that variations in provider workflow necessarily limit the study's applicability to all practice sites. Established provider methods of recording and transmitting EHR data may vary across clinical settings nationwide. As a result, the workflow practices included in this study may use clinical methods that are closer to or farther from achieving the objectives than the methods used by other practices.

Conclusions

The bulk of information generated through patient encounters with the health care system is being recorded electronically and *meaningfully*—in other words, in a manner that makes sense for clinical care and sharing amongst providers and health systems. Overall our study showed that six of the nine proposed Stage 3 MU objectives are generally being met. In some cases where objectives were not being met, the clinically relevant and appropriate care is being delivered but obstacles surfaced in the ability to format and report on the capturing and sharing of this data electronically. Alternatively, in other situations where the objectives were not attained, the objectives themselves as currently stated may not completely align with usual care and standards of practice.

Study results suggest potential directions for refinement of the selected proposed Stage 3 MU objectives, with the goal of maximizing provider implementation and ability to facilitate and improve clinical care. Comparison of the objectives to providers' current clinical practices revealed areas of potential improvement. In general, the project team found that the EHRs captured much of the information needed to achieve Stage 3 MU objectives and measures, including recording electronic notes, summary of care for transitions of care, and electronic lab results among others. However, the proposed Stage 3 MU objectives themselves do not always sufficiently account for variations across provider types, EHR vendors, and practice sites. One such variation is the difference in needs between specialists and primary care providers (PCPs). For example, transitions of patient care are more likely to occur from a PCP to a specialist via referrals. PCPs may then have more opportunities than specialists to provide SOC documents for their patients, affecting their ability to meet the proposed Stage 3 MU objective regarding SOCs. Practices may also use different workflow processes for documenting transitions of care. An objective to capture a provider's rate of SOC document completion needs to account for the different ways in which a provider may document transitions of care within an EHR.

Other proposed objectives also require a closer look at how variations between practices could affect implementation of Stage 3 MU objectives. For example, OFMQ's results from ambulatory clinics suggested that a provider's EHR vendor and established clinical workflow could affect the number of active CDS interventions. In addition, the study revealed that most providers are unfamiliar with the term "clinical decision support" and rely instead on their vendors' terminology. As a result, the researchers recommended adjustments to the CDS objective, including terminology standardization and improved CDS flexibility to allow for interventions tailored to a practice's clinical needs.

To improve rates of Stage 3 MU implementation, the project team also recommends that EHR vendors take specific actions. Providers would have difficulty meeting Stage 3 MU objectives if their EHR vendors offered products that did not have appropriate technology for the procedures required by Stage 3 MU. The project team proposes that certifying bodies ensure that EHR vendors offer products with consistent measure performance across providers and practices. Similarly, the product must have capabilities for practices to track their own compliance with EHR functions and Stage 3 MU objectives.

Overall, the proposed Stage 3 MU objectives reflect appropriate goals for providers. Still, a closer look at how practices attempt to meet the goals reveals ways in which the objectives could be improved. In general, Stage 3 MU implementation must be accessible to all practices, regardless of EHR vendor, specialty, or individual provider. To improve accessibility, Stage 3 MU standards should account for the differences in workflow among practices and types of providers. Objectives

like CDS should reflect the various ways in which providers might use their EHR capabilities to improve care. Finally, EHR vendors should design their products to make Stage 3 MU measure functions easy to use, customize, and monitor.

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Appendixes

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Appendix A. OFMQ MU Assessment Gap Analysis Tool

	Meaningful Use: Practice Plan		Practice:		
			Vendor:		
			Report Date Range:		
Meaningful Use Requirements		Practice Plan for Achieving Meaningful Use			
Objective	Measure	Current Practice Threshold	Meaningful Use Stage 3 Treshold	Notes/Comments	##
CORE OBJECTIVES					
Goal: Improving quality, safety, efficiency, and reducing health disparities					
Clinical Decision Support: Implement 15 clinical decision support interventions or guidance related to 5 or more clinical quality measures that are presented at a relevant point in patient care for the entire Her reporting period.	Implement 15 CDS interventions.	15	15		✓
Family Health History: Record patient family health history as structured data	Record high priority family health history in 40% of patients seen during reporting period.	22%	40%		
e-Progress Notes: Record electronic progress notes in patient records	Record electronic notes in patient records for more than 30% of office visits within four calendar days.	60%	30%		✓
Secure e-messaging: Use secure electronic messaging to communicate with patients on relevant health information	More than 10% of patients use secure electronic messaging to communicate with EPs.	55%	10%		✓
Summary of Care: The EP who transitions their patient to another setting of care or provider of care or refers their patient to another provider of care provides summary of care record for each transition of care or referral.	The EP that transitions or refers their patient to another setting of care (including home) or provider of care provides a summary of care record for 65% of transitions of care and referrals (and at least 30% electronically).	78%	65%		✓
Summary of Care: The EP who transitions their patient to another setting of care or provider of care or refers their patient to another provider of care provides summary of care record for each transition of care or referral.	The EP that transitions or refers their patient to another setting of care (including home) or provider of care provides a summary of care record for 65% of transitions of care and referrals (and at least 30% electronically) .		30%		
Closing the loop: EP to whom a patient is referred acknowledges receipt of external information and provides referral results to the requesting provider, thereby beginning to close the loop.	For patients referred during an EHR reporting period, referral results generated from the EHR, 50% are returned to the requestor and 10% of those are returned electronically.		50%		
Closing the loop: EP to whom a patient is referred acknowledges receipt of external information and provides referral results to the requesting provider, thereby beginning to close the loop.	For patients referred during an EHR reporting period, referral results generated from the EHR, 50% are returned to the requestor and 10% of those are returned electronically .	12%	10%		✓

Appendix B. OFMQ Workflow Assessment Tool

Practice Assessment – MU Stage 3



Practice Contact Information	
Assessment date:	Practice name:
Lead Provider	First Name: Last Name: Credential:
Specialty:	
Address (with city/country/zip):	
Telephone (with area code):	
Primary contact / Title:	
Direct phone:	Fax:
E-mail:	
Secondary contact / Title:	
What is your preferred method of contact? (Select one) <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> E-Mail	
Physician champion (if not primary contact or lead physician):	
Direct phone:	Fax:
E-mail:	

A. Staff Characteristics	
Number of physicians	#
Number of non-physician providers (NPs, PAs)	#
Number of non-provider clinicians (Nurses, LPNs, MAs)	#
Number of ancillary clinicians (lab techs, dieticians, etc.)	#
Number of non-clinicians (front/back office, administrative)	#

A. Staff Characteristics
How often do you conduct staff meetings? <input type="checkbox"/> Never <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Other (specify):

B. Existing Information Technology		
If you have implemented any of the following, please list the systems currently in place:		
	Vendor or Software Name	Want to implement in next 6 months (list vendor)
Practice Management Software (NOTE: Always check current Practice Management software contract timeframes with client)		
Electronic Medical Record (EMR)		
Decision Support (Guidelines / Protocols)		
Registry System		
E-Prescribing		
Document Imaging		
Interfaces (Labs / Hospitals / Radiology)(list all existing)		
Email – General		
How many computers are in your office(s)?	#	
Server in office or Web based? <input type="checkbox"/> In office <input type="checkbox"/> Web based		
Do you communicate regularly in-house via email? <input type="checkbox"/> Yes <input type="checkbox"/> No		
What do providers/staff use the PCs for (check all that apply): <input type="checkbox"/> e-Mail <input type="checkbox"/> Web Browsing <input type="checkbox"/> Word Processing <input type="checkbox"/> Other (list):		
What type of internet access do you have? <input type="checkbox"/> T1 or similar <input type="checkbox"/> Cable or similar <input type="checkbox"/> DSL or similar <input type="checkbox"/> Dial-up modem <input type="checkbox"/> None <input type="checkbox"/> Other (specify):		
Please check any external or internal systems that require linkages that you currently do not have(interface): <input type="checkbox"/> Prescription writing <input type="checkbox"/> Laboratories <input type="checkbox"/> Radiology <input type="checkbox"/> Immunization Registries <input type="checkbox"/> Patient Portal		

B. Existing Information Technology
<input type="checkbox"/> Health Information Exchange <input type="checkbox"/> Hospital: _____ <input type="checkbox"/> Other: _____
Who currently handles your computer maintenance needs (e.g., internal, consultant, vendor – list name, phone and address if known)?

C. Workflow / Change Management

1. Which workflow issues cause the *greatest problems* in your office? (Check all that apply)
- | | |
|--|--|
| <input type="checkbox"/> Unable to stay on office schedule | <input type="checkbox"/> Results management (e.g., labs, referrals – tracking and follow-up) |
| <input type="checkbox"/> Inefficient use of resources | <input type="checkbox"/> Medication Refills |
| <input type="checkbox"/> Phone and fax processing | <input type="checkbox"/> Patient waits |
| | <input type="checkbox"/> Patient satisfaction |
| | <input type="checkbox"/> Other (describe): |

What workflow solutions have you implemented or considered? (Check all that apply)

- | | |
|---|---|
| <input type="checkbox"/> Hired a practice management consultant | <input type="checkbox"/> Changed workflow to address inefficiencies |
| <input type="checkbox"/> Hired additional clinicians (e.g., NP, PA) | <input type="checkbox"/> Changed/added staffing to address phone triage |
| <input type="checkbox"/> Reorganized supplies in exam room/office | <input type="checkbox"/> Automated phone service |
| <input type="checkbox"/> Implemented patient tracking system | <input type="checkbox"/> Other (describe): |
| <input type="checkbox"/> Outsourcing billing services | |

2. Overall, do you feel that the benefits from your EHR have matched your projected goals for the system? No Yes

3. What is your relationship with your vendor? (Circle, highlight or X to the right of the number)

1 2 3 4 5
 Very Unsatisfied Very Satisfied

4. What problems have you encountered with your EHR system, if any?
5. What problems have you encountered with you patient portal, if any?
6. What problems have you encountered with your HIE, if any?
7. What Meaningful Use objectives have you found are the most relevant?
8. What Meaningful Use objectives do you have a problem with or disagree with, if any?

Front Desk

How many patients do you see daily, on average?

Do you do reminders? Explain what type....

- Calls
- Letters/cards
- Electronic (e-mail, portal)
- Does your system generate reminders?
- Do you send forms to the patient to complete before their visit?

9. What do you do to prepare for the next day's appointments (ask same-day appointments and walk-in patients)?

What methods of communication do you use to correspond with patients?

- Mail
- E-mail
- Fax (regular or e-fax?)

- Patient Portal

- Health Information Exchange

What methods of communication do you use to correspond with other health care providers?

- Mail
- E-mail
- Fax (regular or e-fax?)
- Patient Portal
- Health Information Exchange

Do you have a role in any of the following?

- Progress note creation/documentation
- Documentation of family health history
- Patient referrals
- Transition of care
- Patient portal/Health Information Exchange

If you answered yes to any of the above, please explain:

Check-Out Process:

When is the visit documentation completed?

- As the visit concludes
- Immediately after the visit in the nursing station
- Between visits, when the PHYSICIAN has time
- At the end of the day
- Days/weeks later
- Usually within _____ hours/days

Is this timeframe an issue?

Is there variability between providers in the time it takes to complete the documentation in the EHR system?

How long are the providers keeping their patient notes open?

Can billing be completed if note is open/not signed?

MA/Nurse

MA/Nurse begins visit (include where these items are done):

- Height/Weight
- Vitals
- Review medications
- Other (e.g., foot exam, UA, strep screen, procedure set up)

Explain your involvement in progress note documentation: Who creates the progress note? In what sections of the note do you document?

How is family health history captured?

- Face-to-face
- Paper Form
- Electronically (from portal/HIE)

How detailed is your family health history?

Are you currently doing any type of population-based care management (e.g., tracking diabetes visits, identifying patients who are overdue for health maintenance, cluster visits, etc)?

- No Yes →→→ Do you use the EHR for this? →→→ No Yes

What does Clinical Decision Support mean to you?

How do you use/track clinical decision support within the clinic?

Explain your role in the referral process:

Explain your role in transition of care:

How do you know a referral/TOC has occurred and been completed (i.e., results returned)?

How does the MA/Nurse notify the provider the patient is ready and which is the next room?

- Electronic Messaging
- Whiteboard
- Flag System
- Other:

What types of communication methods are used between the MA/NURSE and the PROVIDER?

- Face-to-face
- Electronic Messaging
- Sticky notes
- Whiteboard
- Other:

Are there protocols associated with electronic messaging? (Definition of urgent messages, how often messages should be checked, etc.)

Provider

Does the provider create, edit, and sign the progress note within the EHR?

What does the provider document w/in the progress note?

Is paper involved anywhere in the process, or is all documentation electronic?

How long after a visit is the note signed?

Who documents family health history?

How detailed is the family health history?

Does the provider use clinical decision support? If yes, how do you track CDS?

Does the provider use CPOE for any of the following?

- Medications
- Lab tests
- Radiology/Imaging
- Other:

How are referrals ordered and relayed to other staff members?

How is Transition of Care documented/ordered and relayed to other staff members?

How do you know a referral/TOC has occurred and been completed (i.e., results returned)?

Patient Portal/HIE

Who uses the portal on the clinic side?

- Front Office
- Clinical (non-Provider)
- Provider
- Office Manager/Admin

What options are available through the portal?

- Forms (i.e., New patient paperwork, Notice of Privacy Practices, etc.)
 - o What forms are available?
- Appointment Requests
- Progress note documentation (i.e., Reason for visit, Past medical history, Family health history, social history, etc.)
 - o What sections can the patient submit?
- Lab Results
- Allergies
- Medications
- Update demographics
- Referral requests
- Other (explain):

Who uses the HIE on the clinic side?

- Front Office
- Clinical (non-Provider)
- Provider
- Office Manager/Admin

Explain what the HIE is most commonly used for:

Appendix C. CNMC Inpatient Facilitated Semi-Structured Interview Template

Children’s National Qualitative Interview Assessment for Inpatient Care

Qualitative transcript review:

1. Read through the transcript to get a general sense of the information and overall meaning. You can circle or highlight areas of interest, make notes in the margins
 - a. What are the general ideas?
 - b. What is the general tone?
2. Read through the transcript in detail and organize the material into meaningful chunks. This is somewhat artificially done through the theme of the question, but each expert had a different area that they highlighted.
 - a. Techniques include counting frequently used words of themes, such as “fast, quick access”
 - b. Highlight or write down specific statements that capture the essence of the interview or question.

The questions are provided on the next sheet, you can use them for your notes/findings. Use only one sheet per interview. We will combine all the information once everyone has done their review.

Focused Questions for Stage 3 criteria—Inpatient

SGRP 113—Clinical Decision Support

1. **Types:** What are the various types of clinical decision support tools currently in use?

2. **Benefits:** What are the benefits of CDS tools?

3. **Barriers:** What are the barriers or difficulties with implementing multiple CDS tools? Are there limitations to implementing several CDS tools at one time or within 1 year?

-
-
-
4. **Prioritization:** How do you determine if a CDS tool's benefit outweighs the barriers? How do you prioritize what areas/conditions/functions to use a CDS tools?

-
-
-
5. **Use:** How do you imbed the CDS tools in the EHR? Is there a difference in active and passive CDS tools?

-
-
-
6. **Metrics:** How do you measure the use of CDS tools? Is this easy or difficult to do? How do you use the data? How do you determine success of a tool?

-
-
-
7. **Reporting:** What reporting features need to be available to support the best use of CDS tools?

SGRP 206—Patient Education

1. **Volume:** Are there any difficulties or challenges for the EHR platform to handle the necessary amount of patient/parent educational material?

-
-
-
-
2. **Second Language:** Are second language educational materials available and easy to access in the EHR? Does the EHR actively identify the appropriate language for educational materials for the provider? Can the EHR handle more than 2 language options for educational material?

-
-
-
-
3. **Benefits:** What is the benefit of providing written education in the native language vs. English with a translator?

-
-
-
-
4. **Ease of Use:** Have you used any education material in a language other than English? What made the material easy or helpful to use? What aspects make it difficult to use?

SGRP 308— Provider Communication

1. **Challenges:** What are the IT challenges to generating electronic messages to outside providers? Can the EHR platform handle electronic messaging to other EHR platforms?
-
-

-
-
-
2. **Defining Significant Event:** In terms of notifying the primary care provider about a significant health care event, how do you define a significant health care event?

-
-
-
3. **Effect on Workflow:** What is the cost in workflow to generate an admission, event, or discharge notification note?

-
-
-
4. **Benefits:** What is the benefit to providing electronic messaging to the PCP and other medical providers?

-
-
-
5. **Cost/Benefit Analysis:** Does the benefit of the communication to the external provider outweigh the workflow modification? What can be done to increase the benefit and decrease the cost (workflow/time)?

-
-
-
6. **Ease of Use:** Is the note function easy to find? What are the challenges to auto generated letters or communication?

7. **Identification of Patient's Medical Providers:** Are there challenges to identifying the PCP and key medical team members? Any strategies to overcome these challenges?

Appendix D. CNMC Outpatient Facilitated Semi-Structured Interview Template

SGRP 121- Transmission of Structured Lab Results

Semi-Structured Provider Survey, Children's National Health System

Instructions to Evaluators:

Use these questions as a guide. Allow the discussion to flow freely and the participant to speak as long as they desire. Not all questions must be answered directly, but the information provided should match the intent of these questions.

Instructions to Participants:

This survey is designed to assess your knowledge and beliefs on the transmission of structured lab data from the hospital's lab system to your EHR. Please answer these questions to the best of your ability and feel free to provide as full an answer as possible.

Questions to be asked:

1. What is your experience with bringing the lab interface system online? Was it easy? Are there any unresolved issues left over from go-live?
2. When comparing lab results which come back electronically with those that come back on paper, which ones tend to be received faster?
3. How are providers notified of lab results returning electronically? What about those returning on paper?
4. Are there built in alerting capabilities for abnormal lab results? Do they work well (specific and sensitive)?
5. When looking at lab results, are the data supplied to you in electronic form as informative as those provided in paper?
6. If you could set your own rules for how lab results were sent back to ordering providers, what are some of the things you might suggest?
7. Is there anything we missed or anything more you would like to tell us about any of the previous points?

Appendix E. CNMC ED Facilitated Semi-Structured Interview Template

Children’s National Qualitative Interview Assessment for ED

Qualitative transcript review:

1. Read through the transcript to get a general sense of the information and overall meaning. You can circle or highlight areas of interest, make notes in the margins
 - a. What are the general ideas?
 - b. What is the general tone?
2. Read through the transcript in detail and organize the material into meaningful chunks. This is somewhat artificially done through the theme of the question, but each expert had a different area that they highlighted.
 - a. Techniques include counting frequently used words of themes, such as “fast, quick access”
 - b. Highlight or write down specific statements that capture the essence of the interview or question.

The questions are provided on the next sheet, you can use them for your notes/findings. Use only one sheet per interview. We will combine all the information once everyone has done their review.

Focused Questions for Stage 3 criteria – Emergency Department SGRP 113 – Clinical Decision Support

1. Types: What are the various types of clinical decision support tools currently in use?

2. Benefits: What are the benefits of CDS tools?

3. Barriers: What are the barriers or difficulties with implementing multiple CDS tools? Are there limitations to implementing several CDS tools at one time or within 1 year?

4. Prioritization: How do you determine if a CDS tool's benefit outweighs the barriers? How do you prioritize what areas/conditions/functions to use a CDS tools?

5. Use: How do you imbed the CDS tools in the EHR? Is there a difference in active and passive CDS tools?

6. Metrics: How do you measure the use of CDS tools? Is this easy or difficult to do? How do you use the data? How do you determine success of a tool?

7. Reporting: What reporting features need to be available to support the best use of CDS tools?

SGRP 206 – Patient Education

1. Volume: Are there any difficulties or challenges for the EHR platform to handle the necessary amount of patient/parent educational material?

2. Second Language: Are second language educational materials available and easy to access in the EHR? Does the EHR actively identify the appropriate language for educational materials for the provider? Can the EHR handle more than 2 language options for educational material?

3. Benefits: What is the benefit of providing written education in the native language vs. English with a translator?

4. Ease of Use: Have you used any education material in a language other than English? What made the material easy or helpful to use? What aspects make it difficult to use?

SGRP 308—Provider Communication

1. Challenges: What are the IT challenges to generating messages to outside providers? Can the EHR platform handle electronic messaging to other EHR platforms?

2. Defining Significant Event: In terms of notifying the primary care provider about a significant health care event, how do you define a significant health care event?

-
-
-
3. Effect on Workflow: What is the cost in workflow to generate an admission, event, or discharge notification?

-
-
-
4. Benefits: What is the benefit to providing electronic messaging to the PCP and other medical providers?

-
-
-
5. Cost/Benefit Analysis: Does the benefit of the communication to the external provider outweigh the workflow modification? What can be done to increase the benefit and decrease the cost (workflow/time)?

-
-
-
6. Ease of Use: Are the PCP notifications easy to find? What are the challenges to PCP communication?
-
-
-

7. Identification of Patient's Medical Providers: Are there challenges to identifying the PCP and key medical team members? Any strategies to overcome these challenges?

Appendix F. CNMC ED REDCap Survey

Evaluation of Stage 3 Meaningful Use Objectives

Thank you for your interest in this survey. By participating in this survey, you will help us to determine the feasibility of meeting Stage 3 MU objectives by providers in hospital settings. Information gathered from the evaluation will be used to improve care delivery and patient engagement.

None of the answers to the survey will be able to be linked back to your identity. We will know whether you completed the survey but will not be able to track your answers.

Participation in this survey is not mandatory and will not affect your employee status at CNMC. By answering the survey questions, consent to participate in the survey will be implied. Thank you again for participating in our survey.

1. A. Which of the following best describes your current position?

- Attending Physician- Emergency Department
- Attending Physician- Hospitalist
- Attending Physician- Intensive Care Department
- Attending Physician- Outpatient Pediatrics

B. How many years of experience do you have in your chosen field?

- Less than 5 years of experience
- 5 years of experience or more

At CNMC, Cerner is the electronic and paperless medical record system which contains inpatient, emergency room, and outpatient transcription dictations and medical records since 5/18/08.

If respondent is an outpatient provider (responded to “D” to question 1A), survey will ask different questions. Those questions are at the end of this document)

The following questions will ask about your use of clinical decision support systems (CDSSs) in Cerner to improve performance on high-priority health conditions.

The ED has many CDSSs in practice at CNMC to improve patient care. A few examples of CDSSs are the pathways for TBI's, Concussions, Sickle Cell Disease, and Asthma.

2. Please rate how satisfied you are with the following statements:

	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat dissatisfied	Dissatisfied
Ease of use of the CDSS tools					
Reliability of the system (i.e., system speed, system failure)					
Sharing of best practices and evidence based medicine					

3. Do CDSSs help to avoid researching into treatment strategies outside of one’s field of expertise?

- Yes
- No
- I don’t know

The Acute Concussion Evaluation ED (ACE ED) is the screening form imbedded as clinical decision support in our Cerner EHR. It is available by clicking on the “Brain” icon on the tracking board or as a Powerform in Formbrowser

4. Have you ever used the CDSS ACE ED for Concussions?

- Yes
- No

	Never	Rarely	Some of the Time	Most of the Time	Always
This CDSS is helpful					
This tool increases my screening for concussion in patients with head trauma					
I access this CDSS when assessing children with head trauma					
I am more likely to give the concussion care plan discharge instructions to my patients if they screen positive for					

	Never	Rarely	Some of the Time	Most of the Time	Always
concussion					
The brain icon helps me with management of concussions					

4b. What could facilitate your use of this CDSS?

5. How would you describe the efficacy of ACE ED when prompted?

	Never	Rarely	Some of the Time	Most of the Time	Always
It increases the quality of patients' care and outcomes					
It is time efficient/ worth the time it takes					
It completes one's personal clinical practice and judgment					

5b. What could be adjusted in order to increase the efficacy of the ACE ED?

6. Please rate how much you agree with the following statements:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
After completion of an ACE ED questionnaire, I am confident with taking subsequent actions for treatment					
Usage of ACE ED for diagnosis and treatment should be signaled to the parents of a patient?					

Explain your answer:

7. Have you ever used the CDSSs regarding CT for TBI titled "Risk Criteria for TBI" this is available on the tracking board as a "Skull" icon and also in form browser and preceding the order for "Trauma CT Head or Brain"?

- Yes
- No

	Never	Rarely	Some of the Time	Most of the Time	Always
This CDSS is helpful					
This tool decreases my rate of unnecessary CTs					
I access this CDSS when assessing children with head trauma					
I use the reference literature from the Lancet article in this CDSS					
I am familiar with the algorithm and recommendations so I am more likely to use the evidence in this tool from memory and not complete the form in the EHR					

7b. What could facilitate your use of this CDSS?

- Please think about the last time you used The ED Pathway for Evaluation/Treatment of Children with Sickle Cell Disease and PAIN. Do you think using this pathway resulted in improvement treatment for the patient? Why or Why not?
- Please think about the last time you used The ED Pathway for Evaluation/Treatment of Children with Sickle Cell Disease with Fever. Do you think using this pathway resulted in improvement treatment for the patient? Why or Why not?
- Please describe your experience with the “Asthma” Pathway. When responding please consider any barriers to use, what elements would you want to improve on and if anything could be done to increase your use of this pathway as well as how often you use this pathway.
- Please think about the last time you used The ED Pathway for “Fever and Suspected Neutropenia”. Do you think using this pathway resulted in improvement treatment for the patient? Why or Why not?

12. Please think about the last time you used The ED Pathway for “Suspected Diabetic Ketoacidosis”. Do you think using this pathway resulted in improvement treatment for the patient? Why or Why not?
13. Please think about the last time you used The ED Pathway for “Metabolic”. Do you think using this pathway resulted in improvement treatment for the patient? Why or Why not?
14. Please think about the last time you used The ED Pathway for “Migraine”. Do you think using this pathway resulted in improvement treatment for the patient? Why or Why not?

The next set of questions will ask you about the use of Certified Electronic Health Record Technology to identify patient-specific education resources and provide those resources to the patient.

15. Please rate how much you agree with the following statement:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Second language education materials are easy to access in CDSS					

16. What benefits does providing education in the native language have vs. providing in English with a translator?)
17. Since January 1, 2013; how often have you used any education material in a language other than English?
 - Never
 - Rarely
 - Sometimes
 - Most of the time
 - Always

The survey is almost complete. Please answer the following questions regarding sending electronic notification of a significant health care event in a timely manner to key members of the patient’s care team, such as the primary care provider, referring provider or care coordinator, with the patient’s consent if required

18. A. How often do you notify your patient’s primary care physician of an ED visit?
 - Never

- Rarely
- Sometimes
- Most of the time
- Always

B. I believe the current practice for ED follow up and linkage to primary care physicians, the “ED PCP Notify” order, following ED visit or for a significant health event is adequate.

- Never
- Rarely
- Sometimes
- Most of the time
- Always

C. What could facilitate your notification of the primary care provider?

Some cities like NYC have created health information exchange systems. These systems send emails to the primary care physician and ask them to call the ED physician.

19. If a health information exchange system existed would you be willing to send emails to your patient’s primary care physicians to notifying them of the ED visit and summarizing what treatment and procedures were performed?

- Definitely would
- Probably would
- Not Sure/I don’t know
- Probably would not
- Definitely would not

Thank you for completing this survey. If you have any questions about the survey, please let us know in the comment box or contact Shireen Atabaki at SATABAKI@childrensnational.org.

Appendix G. CNMC Inpatient REDCap Survey

Children’s National Assessment for Meaningful Use of the Electronic Health Record in the Inpatient Care Setting

Thank you for participating in this survey. This study is sponsored by AHRQ and approved by the IRB at Children’s National. Your responses will be kept confidential.

The purpose of this survey is to guide the development of Stage 3 Meaningful Use Criteria (see definition below). The entire study includes quantitative and qualitative evaluation of emergency medicine, inpatient, and outpatient providers. This portion of the study is to survey front line inpatient users to include experienced providers (>5 years of experience) and early career providers (< 5 years of experience). Your input is crucial to developing EHR criteria that will actually improve patient care and the use of the EHR.

A final report will be provided to AHRQ to inform the guidelines and requirements of step 3 criteria. If any specific comments from this survey are used, they will be referenced by using a generic title such as experienced provider #1, early career provider #2, etc.

Below are definitions and descriptions of Meaningful Use Criteria.

Meaningful Use Defined

AHRQ defines “Meaningful Use” as the use of electronic health record (EHR) technology to:

- Improve quality, safety, efficiency, and reduce health disparities
- Engage patients and family
- Improve care coordination, and population and public health
- Maintain privacy and security of patient health information

Ultimately, it is hoped that the meaningful use compliance will result in:

- Better clinical outcomes
- Improved population health outcomes
- Increased transparency and efficiency
- Empowered individuals
- More robust research data on health systems

Stage 3: Meaningful Use Criteria includes:

- Improving quality, safety, and efficiency, leading to improved health outcomes
- Decision support for national high-priority conditions
- Patient access to self-management tools
- Access to comprehensive patient data through patient-centered HIE
- Improving population health

SGRP 113 – Clinical Decision Support

1. How many years of experience do you have in your chosen field”
 - a. Less than 5 years of experience
 - b. 5 or more years of experience

2. **What are the various types of clinical decision support tools you currently use? Select all that apply.**
- a. Medication support: Dose range checking, medication interactions, allergies, or duplications
 - b. Notification of critical lab or test values
 - c. Pathways and Order sets
 - d. Treatment cost
 - e. Diagnostic reasoning or Differential Diagnosis generator
 - f. Evidence based diagnostic work up and treatment recommendations, such as hyperlinks to the latest AAP guidelines or recommendations.
 - g. Decision trees (conditional logic)
 - h. Dashboards (to identify key metrics: # days central line is in place, # of hours patient is in observation status, etc...)
 - i. Others (List: _____) Can we create the option to list more than one?

3. **Rank the list above with the most important clinical decision tools to the least. 1 = most important**

(Can the rank list include all the options above including the others listed by the survey taker?)

4. **What are the barriers or difficulties with using clinical decision support tools?**

Free text answer

5. **What are the most important items to consider when implementing a clinical decision support tool? Rank list in order of most important to least important. 1 = most important.**

- a. Time required to access support tool
- b. Number of clicks to access support tool
- c. Accuracy of information
- d. Concise information
- e. Access to entire article or publication
- f. Minimal impact on workflow
- g. Ability to demonstrate value of tool (does it improve care?)
- h. Other: (List: _____) Can we create the option to list more than one 'other'?

6. **How do you determine the success of a clinical tool?**

Free text answer

SGRP 206—Patient Education

7. **Second language (language other than English) educational materials are easy to access in the electronic medical record.**
 - a. Strongly agree
 - b. Agree
 - c. Neutral
 - d. Disagree
 - e. Strongly Disagree

8. **What are the advantages or disadvantages of providing written educational materials in the native language vs. English with a translator?**

Free text answer

9. **In the past year how often have you used any written educational material in a language other than English?**
 - a. Never
 - b. Rarely
 - c. Sometimes
 - d. Most of the time
 - e. Daily

10. **What are the most important features of written educational material?**

Free text answer

SGRP 308—Provider Communication

11. **When is it important to contact a primary care provider during a patients admission to the hospital?**

Free text answer

12. **How often do you send a message (either by fax or email) to the primary care provider via the electronic medical record?**
 - a. Never
 - b. Occasionally
 - c. At least once during a patient's admission
 - d. Twice during a patient's admission
 - e. More than twice during a patient's admission

13. **Have you used the admission, event, or discharge notification note in CERNER?**
 - a. Yes

b. No (skip to question #16)

14. How much time did it take to complete and send the notification note?

- a. Less than 1 minute
- b. 1-3 minutes
- c. 3-5 minutes
- d. > 5 minutes
- e. Not sure

15. What are the key features that make an electronic notification note easy and quick to complete?

Free text answer

16. What is the maximum amount of time that a notification note should take to complete and send?

- a. Less than 1 minute
- b. 1-3 minutes
- c. 3-5 minutes
- d. > 5 minutes
- e. Not sure

17. Are there any other providers besides the primary care provider that should be notified of a patient's admission to provide optimal patient care?

- a. No
- b. Yes (Who? List: _____)

18. Is there anything else that the electronic medical record should do to improve communication with the primary care provider?

Free text answer