NATIONAL QUALITY FORUM

Ambulatory Care Patient Safety

ENVIRONMENTAL SCAN DRAFT REPORT

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Contents

Introduction

Adverse patient safety events in hospitals received national attention in the groundbreaking Institute of Medicine (IOM) report, *To Err is Human*, which reported that medical errors contribute to 44,000 to 98,000 deaths each year. Since the report, there have been marked improvements in national patient safety indicators, such as a reduction of 50,000 preventable deaths between 2010 and 2013.[1] Patient safety in hospitals continues to be the primary focus of most research and quality improvement efforts, though the vast majority of patient care is provided in ambulatory settings.[2] According to the National Center for Health Statistics (NCHS), there were approximately 884.7 million physician office visits compared with 125.7 million hospital visits in 2014.[3] A review of patient safety in primary care found that incidents happen in between 2 and 3 percent of visits compared to 10 percent of hospitalizations.[4] Given the large number of individuals who seek care in ambulatory settings, the estimated number of incidents is alarming.

Ambulatory care is provided in various settings, from office-based practices and retail health clinics to outpatient surgical centers and mobile devices. Diverse settings create unique challenges for measurement and research. However, several studies have examined patient safety in ambulatory care and found significant opportunities for improvement. One national study found between 9 and 17 adverse drug events per 1,000 persons between 1995 and 2005.[5] In 2011, the American Medical Association (AMA) found major gaps in understanding of patient safety and noted that few studies were conducted to improve safety.[6]

Similarly, in 2016, the Agency for Healthcare Research and Quality (AHRQ) released a report to elucidate the scope of issues in ambulatory care patient safety through a literature review and key informant interviews, and AHRQ found crucial knowledge and implementation gaps around ambulatory safety issues.[7] Most recently, a systematic review of patient safety measures found 182 measures that gave insight into the extent of safety events that can cause harm in ambulatory settings.[8] Despite the opportunity for medical errors in ambulatory settings, there is no systematic approach to measurement and reporting.

Several unique barriers impede the measurement of patient safety in ambulatory care settings. First, ambulatory care often involves short, infrequent, or irregular interactions between patients and provider, which makes establishing a measurement period or episode of care challenging.[9] Second, the limited evidence-base regarding the nature and frequency of patient safety events and interventions to reduce them creates barriers to measure development. As a result, few guidelines or best practices exist for improving patient safety in ambulatory care. Third, patients interact with multiple providers and across multiple settings, including specialty and primary care, which makes it difficult to attribute processes and outcomes of care.

Despite these challenges, the number of measures that can assess patient safety in ambulatory care settings is growing. Measurement of patient safety in ambulatory care remains essential to ensure the health and well-being of patients and families. Measuring patient safety also provides a first step toward transparency, which can foster trust between patients and healthcare providers.[10] Finally, ensuring

patient safety in ambulatory care is increasingly important as the nation moves toward value-based care.[11]

Project Purpose and Approach

Recognizing the need to understand measurement in ambulatory care settings, the National Quality Forum (NQF), with funding from the Department of Health and Human Services (HHS), engaged an advisory group of experts to explore the complex intersection of issues related to measurement of patient safety in ambulatory care. This advisory group helped guide an environmental scan of measures to identify and inform the development of priority measures for patient safety in ambulatory care settings. This project aims to create a measure inventory to aid clinicians, health plans and health systems in uniformly evaluating patient safety events to improve their efforts in maximizing safety. This project involved:

1. An environmental scan of measures and measure concepts for ambulatory care patient safety;
2. Identification of priority areas for measurement and measurement gaps; and
3. Emerging topics and themes in ambulatory care patient safety measurement.

NQF developed search terms and research questions based on guidance from the advisory group at their first web meeting on November 29, 2017. Peer reviewed literature was found in academic databases such as PubMed, Academic Search Complete and many others. NQF identified measures by reviewing measure repositories (e.g., AHRQ's National Quality Measures Clearinghouse and the Centers for Medicare & Medicaid Services' (CMS) Measures Inventory) as well as peer-reviewed and grey literature. For complete details of the approach to the scan, please see Appendix B. The measures collected only apply to care provided to patients under the age of 65.

Preliminary environmental scan findings were presented to the advisory group during a web meeting on January 25, 2018. The advisory group provided feedback on which measures and measure concepts were most relevant to patient safety in ambulatory care settings. NQF also conducted interviews with a subset of advisory group members to discuss priority measures and measure gaps. This draft report is intended to allow NQF members and the public the opportunity to provide feedback on the representativeness of the measures identified in the scan and on gaps in measurement. Following a 30-day comment period from March 16 to April 16, 2018, the advisory group will meet again on May 8, 2018 to respond to comments and provide final feedback on the measure inventory.

Environmental Scan Findings

For this environmental scan, NQF maintained a distinction between 'measures' and 'measure concepts.' Safety metrics identified in the scan were considered measures if they included at least a description, a numerator, a denominator, and a data source, while metrics with fewer elements specified were considered measure concepts. Both NQF-endorsed measures and nonendorsed measures were included in the scan; measures that previously received NQF endorsement but are no longer endorsed were also included, as were measures that were submitted to NQF but not endorsed.

The initial environmental scan identified 146 measures that were potentially related to ambulatory care patient safety. Based on input and guidance from the Advisory Panel, as well as further review of the measures and stricter application of the exclusion criteria, a final set of 55 measures was included in the draft report (see Appendix D). In addition, the initial scan identified 417 measure concepts potentially related to ambulatory care patient safety. Upon further review, this list was later reduced to a final set of 297 ambulatory safety-related measure concepts (see Appendix D).

Of the 55 identified measures, 34 are process measures, 17 are outcome measures, two are structure measures, and two are patient experience measures. The measures use a variety of data sources (see Table 1); many are based on administrative claims data, either alone or in combination with other data. When available, information on the level of analysis (i.e., the level or entity for which performance is assessed) was collected for each measure (see Table 2). Many of the measures are specified for multiple levels of analysis. Of the 296 measure concepts, 219 are process measures, 10 are outcome measures, 62 are structure measures, four are patient experience measures, and one is an intermediate outcome measure.

Table 1. Measures by Data Source

Data source	#
Administrative Claims and Other Data	21
Administrative Claims Only	10
Electronic Health Record	11
Electronic Health Record and Other Data	5
Registry	3
Paper Medical Record	2
Patient-Reported Data	2
Pharmacy Data	1

Table 2. Measures by Level of Analysis

Level of analysis	#
Clinicians: Individual	19
Clinicians: Group/Practice	31
Clinicians: Other	1
Integrated Delivery System	19
Facility/Agency	6
Multisite/Corporate Chain	5
Health Plan	16

Level of analysis	#
Program: QIO	3
Population	15
Other	4
All	1
Not Specified/Available	10

Themes

Each measure or measure concept identified in the environmental scan was categorized into one of five themes: medication management and safety; care transitions and handoffs; diagnostic safety; prevention of adverse events and complications; and safety culture. These themes were selected based on analysis of the identified measures and measure concepts, a literature review conducted as part of the environmental scan, and input from the Advisory Panel.

Medication Management and Safety

Medication errors are among the most common and significant safety problems in ambulatory care. Medication safety has been defined in many ways. A 2016 technical brief prepared by RAND for the AHRQ defined medication safety to include "any deviation from optimal medication use, including errors in prescribing, dispensing, and monitoring, as well as failure to note medication interactions or appropriately discontinue medications."[7] The National Coordinating Council for Medication Error and Prevention (NCC MERP) defines a medication error as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may relate to professional practice, health care products, procedures, systems, including prescribing, order communication, product labeling, packaging, nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use." [12] In a review of research on ambulatory patient safety, the American Medical Association (AMA) Center for Patient Safety noted that adverse drug events (ADEs) are consistently defined as "any adverse outcome or patient injury caused in the medication use process (e.g., prescribing, dispensing, and taking medications)."[6]

For this environmental scan, the medication management and safety theme includes measures that assess the occurrence of adverse drug events, errors in the medication use process, or structures, processes, or practices intended to reduce such events.

Measures

Seventeen measures related to medication management and safety, including nine NQF-endorsed measures, were identified in the environmental scan. Topics addressed by these measures include medication reconciliation, opioid safety, use of health information technology (health IT) to improve medication safety, screening for medication side effects, and documentation of medication information in the medical record, among other issues.

Measure Concepts

The vast majority of measure concepts found in the scan—235 concepts—are related to medication management and safety. The bulk of these concepts aim to identify instances of inappropriate prescribing, using a wide range of criteria (e.g., prescription of medications that may result in adverse drug-drug interactions, prescription of medications to patients in whom the drug(s) may be contraindicated, etc.). Another group of measure concepts focuses on the use of health IT to improve medication safety. Other issues addressed by measure concepts in this category include whether patients taking certain medications are receiving appropriate lab testing and monitoring, medication reconciliation, and assessment of adherence to safe medication use practices. In addition, several measure concepts addressing ADEs were found.

Care Transitions and Handoffs

Care transitions present many opportunities for errors in ambulatory care, including failures in communication between caregivers and failure to appropriately coordinate or follow up on referrals.[7,13]

For the purposes of this environmental scan, this theme includes measures assessing the accurate and timely communication of patient information among caregivers when patients transition between care settings or providers.

Measures

Ten measures related to care transitions and handoffs were identified in the environmental scan. Seven of these are part of a suite of measures focused on 'closed loop referral,' which is intended to ensure that specialist referrals are followed through to completion, including communication of any critical information back to the referring clinician and the patient or family.[14] Two measures derived from supplemental items of the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey are also included, one specified for the health plan level of analysis, and one specified for clinician group practices. These measures are intended to assess patients' experience of care coordination across different providers. A number of other measures related to care transitions between the inpatient and outpatient settings were identified in the initial scan, but were excluded from this inventory because they are specified for the hospital/facility level of analysis and were considered outside the scope of this project.

Measure Concepts

Two measure concepts related to care transitions and handoffs were identified in the environmental scan. Similar to the CAHPS supplemental items for care coordination included in the measure inventory, the Ambulatory Care Experiences Survey (ACES) includes elements intended to measure patients' experiences with and assessment of care coordination. The second measure concept is a structural measure developed in England that assesses whether there are written protocols for prescribing across the primary-secondary care interface.

Diagnostic Safety

Diagnostic accuracy and diagnostic errors are areas of increasing concern in ambulatory care; IOM has estimated that at least 5 percent of adults seeking outpatient care experience a diagnostic error.[15]

In line with IOMs definition of diagnostic error, the diagnostic safety theme includes measures intended to assess structures, processes, or outcomes related to an organization or individual clinician's efforts to (a) establish an accurate and timely explanation of the patient's health problem(s) or (b) communicate that explanation to the patient. This includes measures related to diagnostic testing and follow-up.

Measures

Thirteen measures related to diagnostic safety were identified in the environmental scan. These include measures assessing the diagnostic accuracy of breast screening, follow-up on critical test results, timeliness of lab reporting for biopsies, and timeliness of diagnosis for ischemic stroke.

Measure Concepts

Thirteen measure concepts were also identified. These include measures assessing the extent to which diagnostic information is communicated adequately between different providers and between clinicians and patients, and measures related to follow-up on test results.

Prevention of Adverse Events and Complications

The environmental scan identified several measures intended to assess the prevention or occurrence of preventable adverse events or complications in ambulatory care. Adverse events have been defined as unintended harm to the patient by an act of commission or omission rather than by the underlying disease or condition of the patient.[16] This theme includes measures identifying cases of such harm in the ambulatory setting or measures of structures or processes intended to avoid the occurrence of such harm in the ambulatory setting.

Measures

Measures of adverse events identified in the environmental scan include a set of measures that aim to assess "potentially avoidable complications." These measures focus on specific conditions (e.g., diabetes, asthma, hypertension), and use claims data to identify patients who have experienced one or more complications that the measure developer assesses to be related to either the index condition or to broader system failures. Also identified were measures of acute care hospitalizations that may be preventable through appropriate ambulatory care, and three measures intended to prevent pressure ulcers through comprehensive assessment and evaluation.

Measure Concepts

Two concepts measuring adverse events were identified—one related to adverse events from inhaled corticosteroids, and one based on voluntary reporting of near-misses and adverse events in the ambulatory setting.

Safety Culture

It is widely recognized that organizational culture has a significant impact on quality and safety in healthcare, and that this is true for the ambulatory setting as well as inpatient care.[7,17] While this environmental scan did not identify any fully specified measures of safety culture in the ambulatory setting, it did identify a variety of measure concepts intending to assess conditions, structures, systems, or practices that indicate the extent to which an organization's culture supports and promotes patient safety. These include surveys evaluating the perceptions and attitudes of clinicians, and observational

assessments evaluating structures, practices, or organizational characteristics indicative of a culture of safety.

Key Informant Interviews

NQF staff conducted semi-structured interviews with five individuals implementing and/or developing measures for patient safety in ambulatory care. NQF staff used an interview guide (Appendix E) to ensure consistency across interviews for the identification of themes. The interviews focused on gathering feedback on sources of measures and measure concepts, gaps in measurement, priority measures, and barriers to measurement. NQF also asked for interviewees' opinions on which measures best capture ambulatory care patient safety and data sources that could be used for measurement development. Appendix C includes more information on each key informant and how they were selected.

Overall, key informants expressed the importance of measures for antibiotic overuse, hand hygiene, opioid prescription patterns, and safety culture. One informant suggested prioritizing measures that assess safety in pediatric care, particularly measures related to vaccination safety. In general, participants indicated that checklists and tool kits are important to assist them in practice. The AHRQ initiative on patient safety in ambulatory care setting identified similar priorities.[7] The following section describes the themes identified through the interviews.

Antibiotic Overuse

Like many medications, antibiotics carry certain risks, especially when inappropriately prescribed. Antibiotics were the most frequent drug class that lead to pediatric adverse drug event-related emergency room visits, and an estimated 50 percent of all outpatient antibiotic use could be inappropriate.[18–20] In one study, researchers estimated that 30 percent of antibiotic prescriptions were appropriate.[21] Another found that a 10 percent decrease in inappropriate prescribing resulted in a 17 percent reduction in *Clostridium difficile* infection.[22] There is growing evidence to support the need for antibiotic stewardship goals and the assessment of adherence to such guidelines in the outpatient setting.

Hand Hygiene

Proper hand hygiene is critical for patient safety in ambulatory care settings. In one study, when microbiological samples were taken from doctors' hands in pediatric care settings and dermatology clinics, researchers found *Staphylococcus spp*., *Staphylococcus aureus*, and Methicillin-resistant *Staphylococcus aureus* (MRSA).[23,24] Although pediatric patients seen in outpatient settings are not considered to be prone to infection by the physicians' hands, providers need to adopt and adhere to safe handwashing techniques to avoid exposing patients to unnecessary risks.[23] The World Health Organization (WHO) guide, Hand Hygiene in Outpatient and Home-based Care and Long-term Care facilities, presents practical guidance for good hand hygiene practices in ambulatory care.[25] Measuring hand hygiene in ambulatory care settings may be difficult for several reasons, including lack of staff resources and feedback mechanisms, and challenges in monitoring or assessing compliance. One recommendation from WHO indicates that a measure of soap use and alcohol-based hand-rub product use could be calculated using the denominator of number of patient consultations per day.[25]

Opioid Prescription Patterns

Prescription opioids are one of the main drivers in the opioid epidemic and present risks including overdose and opioid use disorder.[26] A 2017 study examined the opioid prescribing patterns of emergency room physicians and described variation in the rates of opioid prescription among providers within the same emergency department.[27] For a small number of patients, long-term use of opioids could be driven in part by outpatient clinicians that continue to prescribe previously prescribed opioids.[27] The Veterans Health Administration (VHA) studied the implementation of opioid therapy guidelines in 141 facilities that included patients who had at least one inpatient or outpatient visit in 2013.[28] Researchers used a facility-level urine-screening metric to monitor urine screening before and after the intervention and found an increase in urine screening.[29] As part of quality improvement efforts, the VHA also developed 13 metrics based on the management of opioid therapy for chronic pain that can be used in non-Veterans Affairs settings.[29] These metrics may be a good starting point to assist healthcare providers with improving opioid prescription safety.

Drawing on population-based data has brought some success in reviewing prescription patterns. The Prescription Behavior Surveillance System (PBSS) allows public health authorities nationwide to monitor use and misuse of controlled prescription drugs.[30] Some states, such as Massachusetts and New York, have found success in generating population-based metrics to examine misuse.[31,32] In California, providers with licenses to prescribe controlled substances are required to check the Controlled Substance Utilization Review and Evaluation System to determine the last time a patient received a controlled substance. Given the increased attention on opioid prescription, overuse, and overdose in recent years, there is a need to measure, monitor, and learn from these events to ensure the safety of patients in ambulatory settings.

Safety Culture

Studies have linked poor perception of safety culture with increased error rates, but safety culture and the preventability of errors can be hard to measure. The Safety Attitudes Questionnaire (SAQ) is just one example of an instrument that can assess safety culture in healthcare settings.[33] The SAQ was adapted and tested in a large urban academic outpatient setting and was found to be a reliable tool for gathering provider attitudes related to medical error.[34] Another measure that assesses safety culture (e.g. safe communication and teamwork), TeamSTEPPS, has been expanded for use in primary care settings, and there is growing evidence to support its use.[35] AHRQ developed the Medical Office Survey on Patient Safety Culture specifically for outpatient providers; the survey asks providers' opinions on patient safety culture and quality of care in their offices.[36] Along with the survey, an Action Planning Tool is available for organizations to develop a plan of action to improve patient safety culture.

Executive walk rounds, where members of senior teams routinely interact with frontline staff, are a lesser-used but promising tool for improving safety culture. In one study, provider attitudes about safety were measured using the Safety Climate Survey before and after executive walk rounds.[37] Results showed that nurses who did not participate in the executive walk rounds had lower safety climate scores than nurses who did participate. Executive walk rounds have shown success in improving safety culture when expanded to ambulatory settings.[38] Walk rounds in outpatient settings have involved observing processes of care, cleanliness, improving patient flow, and safety for doctors and nurses. [38]

A standardized communication process measure, SBAR (situation, background, assessment, and recommendation), was developed to improve communication in inpatient settings but has also been expanded for use in ambulatory care.[39] The Blood and Marrow Transplant unit at the University of Pittsburgh adopted the SBAR in studying transitions of care between the inpatient and outpatient settings.[40] One key informant noted that SBAR has been used in an electronic format to develop a plan of care in the outpatient setting. The authors concluded that this format allowed direct communication with the outpatient provider and improved the handoff process.[40]

Overall, measurement of patient experience related to patient safety in ambulatory care is lacking. However, some patient advocacy organizations have equipped patients with tools adapted from the inpatient setting. For instance, Engaged Patients, a national campaign under the Empowered Patient Coalition, adapted the SBAR into the Outpatient SBAR, so patients can make a request of their outpatient provider, such as for an office visit, or laboratory or testing services.[41]

Privacy, ease, and feasibility of gathering patient experience data should be considered when selecting a measurement approach. One informant noted that patients may be less likely to report sensitive or potentially embarrassing information, such as side-effects like erectile dysfunction related to medications. Some events may go underreported but could have an influence on the patients' perception of their healthcare quality. Fostering an environment of trust and openness will improve communication between the provider and patient and improve safety culture.

Protections offered through the Patient Safety Act via patient safety organizations (PSO) could also improve patient safety culture. PSOs can facilitate improvement in safety culture in healthcare systems by conducting safety culture assessments, and providing opportunities for education and training.[42] Although there are a growing number of resources to improve safety with the potential to be tied to measurement, further research is still needed to assess whether these tools lead to actual improvements in safety beyond the few settings in which they have been employed.

Pediatric Population

Just as safety issues in inpatient settings are distinct from those in outpatient settings, so too are the issues in adult versus pediatric care. In a 2005 study, authors found three factors that contribute to patient safety issues in pediatric care, including the child's physical characteristics (e.g., weight), development (e.g., physiological), and minor legal status (e.g., dependence on parent).[43] The authors concluded that patients' "population specific vulnerabilities lead to patient safety risks and must be accounted for in the design and implementation of patient safety improvement interventions." [43]

Further, children may be less likely to verbalize whether they are experiencing adverse reactions, which, if not addressed, could cause harm.[44] Studies on errors in pediatric ambulatory settings are also limited, but some have recorded the following common errors: misfiled or erroneously entered patient information, missing or delayed laboratory testing results, medication prescription or dispensing discrepancies, vaccine errors, failure to provide requested referrals to patients, and delay in receipt of care.[45] Other studies found a majority of the errors reported in pediatric settings stemmed from medical treatment, patient identification, preventive care (including immunizations), diagnostic testing, and patient communication.[44] While AHRQ has developed a set of Pediatric Quality Indicators (PDI) focused

on inpatient care, the field of pediatric measurement is limited when compared to measurement of care provided to adults.[46,47]

One key informant noted that measures around vaccination safety, medication reconciliation, and exam room safety are vital for the pediatric population. For example, providers should routinely check vaccination lot numbers prior to administration—a potential process measure. In addition, research is needed to assess the extent to which medication reconciliation occurs for infants and children. Although there has been progress in addressing patient safety for the pediatric population, there is a need for expanded focus in the ambulatory settings.[48]

Barriers to Measurement

Informants noted the lack of standard ways to collect data and availability of data in codified fields. For example, it is difficult to establish a measurement period to assess falls in an outpatient clinic. Hospitals often use falls versus number of patient days in the facility. However, in ambulatory care, there is no standard way to collect data on falls. Some outpatient clinics have used the number of falls versus. patient volume within a given time period, but the rates are often small and may not be meaningful for quality improvement. Moreover, these events are often captured in clinical notes rather than codified fields within a medical record—making it harder to extract data for quality improvement. Some providers have implemented in-house patient safety event reporting systems. In-house patient safety reporting systems have been recommended as key instruments in learning about risks to patient safety.[49]

Informants also discussed the lack of interoperability—the ability of a system to exchange electronic health information with and use electronic health information from other systems without special effort on the part of the user—in ambulatory care settings.[50] The lack of interoperability can limit the transfer of critical information, such as current medications and other aspects of a patient's treatment or medical history, putting patients at greater risk for adverse events. The Office of the National Coordinator for Health Information Technology reports that just 14 percent of ambulatory care providers share data with outside providers, compared to 41 percent of hospitals.[50] Greater interoperability between systems can also allow for linking datasets to create a more complete picture of patient safety. For example, combined data from administrative claims, electronic health records, and patient experience surveys can provide greater insights than could be derived from a single data source.

Key informants noted a lack of funding for clinical informatics and a lack of expertise in developing patient safety measures in ambulatory care settings. Researchers and other professionals with expertise in measure development do not often work with providers on tailoring measures to specific settings. Often, providers are limited to using data they can already pull from existing systems. In addition, independent physicians and small group practices face challenges reporting performance measure data. Many do not have the resources available for maintaining, cleaning, and aggregating data for reporting. Overall, there is a need for a framework that describes the aspects of patient safety in ambulatory care most important to measure and that provides recommendations to overcome barriers to measurement.

Gaps in Measurement

Several gaps were identified during the interviews including the lack of structural measures, clarity around staffing models that enhance patient safety, the need for further investment in the development of electronic clinical quality measures (eCQM), and the use of natural language processing for data extraction. Informants also noted the lack of patient-reported outcome measures for patient safety in ambulatory care.

Structural Measures

Given the relative lack of knowledge about safety and the nascent stage of measurement in the ambulatory setting, structural measures related to patient safety could help advance best practices and build capacity for more ambitious measurement efforts in the future. For example, team presence and composition can affect patient safety.[7] Structural measures could focus on staffing levels and the use of staff (i.e., use of registered nurses versus registered nurse supervisors). Previous assessments of patient safety in the ambulatory environment have also suggested that the role of nurse practitioners be increased to aid in patient safety.[7] Staff resources found in patient-centered medical homes, such case managers for clients with co-morbid conditions, could provide insights into staffing models that can enhance patient safety.[51] Measures around physician burnout were also noted as an area of need, and may be especially important to consider given research associating burnout with safety culture.[52]

Outcome Measures

Patient safety outcomes are difficult to define, track, and attribute in the ambulatory care setting. As such, there were fewer outcome measures identified in the environmental scan. Informants noted the importance of developing and implementing more patient-reported outcome measures (PROs) for ambulatory care settings. Data for PROs could be collected through patient portals, web applications, or other electronically administered surveys during patient visits. Informants stressed the importance of buy-in from frontline staff to ensure patients understand the importance of providing feedback on care.

Electronic Clinical Quality Measures

Electronic clinical quality measures (eCQMs) offer an opportunity to reduce measurement burden by eliminating the need to manually extract patient safety data in ambulatory care settings. Key informants expressed the need for eCQMs that assess patient safety in ambulatory care to overcome feasibility barriers. Similarly, informants for an AHRQ assessment of ambulatory safety reported frustration with the lack of innovative processes for electronic data collection.[7] However, some providers "lack faith in the accuracy and completeness of eCQMs."[53] While there have been tremendous advancements in eCQMs, informants generally believed that there is still more work needed to identify the best ways to develop and implement meaningful eCQMs.

Natural Language Processing

Measures based on data extracted through natural language process (NLP) may also reduce measurement burden and create a more complete picture of safety. NLP algorithms decode disease or symptom knowledge from clinical narratives found in progress notes.[54] However, the success of NLP algorithms depend on the quality of written progress notes and can be costly. Nonetheless, key informants were optimistic about NLP since they believed that the benefits of NLP in improving patient

safety would ultimately outweigh costs.[55] Even with advances in electronic health records (EHR), including the creation of discrete data fields, there will likely always be a narrative aspect of the health record—as not all relevant information can be codified. Thus NLP will be needed to gather all the necessary information for the complex issues of patient safety in outpatient settings.[54]

Discussion

The environmental scan revealed significant gaps in research and performance measures that can assess safety in ambulatory care settings. The majority of research has focused on safety in hospital settings, which has created an evidence-base for many patient safety measures that exist today. However, there remains a need to research, measure, and mitigate harm in ambulatory care settings. The lag in patient safety research in ambulatory care has several potential causes. Primarily, patient safety in ambulatory care settings has yet to receive the national attention that errors in hospital settings have attracted. The lack of attention has stymied research and the implementation of measurement approaches. Researchers and measure developers will have to overcome several challenges unique to ambulatory settings.

Some perceive that the risk of harm in ambulatory care settings is relatively low.[56] As a result, nationally, there is limited monitoring of patient safety events in these settings. Ambulatory care settings also differ significantly in terms of scope of care, organization, and infrastructure.[57] These differences create numerous challenges to collecting data, reporting measures, and consistently implementing quality improvement strategies. In addition, ambulatory settings are typically smaller and have fewer resources to dedicate to measurement. Finally, there are numerous definitions for the domains of measurement for patient safety, many of which have yet to be defined for the ambulatory care setting. For example, one study found 25 different terms related to medication safety, and the terms had 119 different definitions.[58]

As a result, the current state of measurement is imbalanced. The vast majority of measures in ambulatory care settings relate to medication safety. Far fewer measures assess errors related to patient self-management, health information technology, prevention of adverse events, and other issues. Measures are also lacking to assess safety for the pediatric population. In addition, few measures assess communication between primary care and specialty providers, transitions of care, and patient experience. Patient experience measures are critical because patients are likely to witness errors in their diagnosis and treatment. Finally, there were no measures found that assess physician burnout, which some studies have linked to lower quality care and reduced patient safety.[59]

Despite the many challenges, promising initiatives could lead to the development of measures and the uptake of quality improvement strategies in the ambulatory care settings. For example, the World Health Organization (WHO) made improvements in ambulatory care a priority in 2016. WHO has launched a program to explore the risks to patients in primary care, understand the magnitude of preventable harm due to unsafe practices, and increase the use of preventative mechanisms to protect patients.[60] In addition, the 2018 Joint Commission (TJC) Ambulatory Patient Safety Goals include specific objectives to improve the identification of patients, increase medication safety, and prevent infections.[61]

Tool kits also can help primary care organizations create a culture of safety, introduce reporting systems, and reduce adverse safety related incidents.[62,63]

Many stakeholders have already begun to conceptualize frameworks for measurement and patient safety improvement in ambulatory care settings. The Institute for Healthcare Improvement has made a strong case for why frameworks are important for the future of measurement in patient safety.[64] Frameworks allow healthcare organizations to see the bigger picture of their patient safety improvement initiatives. Organizations are better able to identify what is important to measure and how to track performance. Frameworks can also spur measure development and inform a research agenda. Future efforts should identify a measurement framework for ambulatory care and prioritize concepts for measure development.

Next Steps

Measurement is critical given the large number of individuals that receive care in ambulatory settings and the opportunity for errors. In spite of the challenges for ambulatory patient safety measurement, such as the variety of settings in which care is delivered, the lack of guidelines, and the limited evidence base detailing the nature and extent of patient safety errors, the measurement landscape is beginning to take shape.

According to the advisory group, measures that address antibiotic overuse, hand hygiene, opioid prescription patterns, safety culture, and pediatrics must be prioritized. Healthcare organizations and staff members also have a role in ensuring that they are fostering a culture that supports patient safety. To build on the current measure landscape, further investment and development are needed for structural and outcome measures, eCQMs, and natural language processing solutions.

In order to match the advances in patient safety in inpatient settings, leaders must come together to develop a measurement framework to better inform measurement and measure development in ambulatory settings. Innovative approaches are needed for data collection, and more research is needed to understand which measures are the most meaningful and feasible to implement. This project seeks to provide another resource for clinicians, healthcare systems, and health plans as they work to measure and improve ambulatory care patient safety.

References

1 Agency for Healthcare Research and Quality. *2013 Annual Hospital-Acquired Condition Rate and Estimates of Cost Savings and Deaths Averted From 2010 to 2013*. Rockville, MD: Agency for Healthcare Research and Quality; 2015. https://www.ahrq.gov/sites/default/files/publications/files/hacrate2013_0.pdf. Last accessed March 2018.

2 Efforts To Improve Patient Safety Result in 1.3 Million Fewer Patient Harms. https://www.ahrq.gov/professionals/quality-patient-safety/pfp/interimhacrate2013.html. Last accessed March 2018.

3 Centers for Disease Control and Prevention. FastStats. Ambulatory Care Use and Physician office visits. https://www.cdc.gov/nchs/fastats/physician-visits.htm. Last accessed March 2018.

4 Sarkar U. Tip of the iceberg: patient safety incidents in primary care. *BMJ Qual Saf*. 2015;25(7):477-479.

5 Bourgeois FT, Shannon MW, Valim C, et al. Adverse drug events in the outpatient setting: an 11-year national analysis. *Pharmacoepidemiol Drug Saf*. 2010;19(9):901-910.

6 *Research in Ambulatory Patient Safety 2000 2010: A 10-Year Review. | AHRQ Patient Safety Network*. https://psnet.ahrq.gov/resources/resource/23742/research-in-ambulatory-patient-safety-2000-2010-a-10-year-review. Last accessed March 2018.

7 Shekelle P, Sarkar U, Shojania K, et al. *Patient Safety in Ambulatory Settings. Technical Brief No. 27*. Rockville, MD: Agency for Healthcare Quality and Research; 2016. https://effectivehealthcare.ahrq.gov/topics/ambulatory-safety/technical-brief. Last accessed March 2018.

8 Hatoun J, Chan JA, Yaksic E, et al. A Systematic Review of Patient Safety Measures in Adult Primary Care. *Am J Med Qual Off J Am Coll Med Qual*. 2017;32(3):237-245.

9 Agency for Healthcare Research and Quality. Ambulatory Care Safety | AHRQ Patient Safety Network. PSNet. https://psnet.ahrq.gov/primers/primer/16/ambulatory-care-safety. Published June 2017. Last accessed March 2018.

10 Wachter R, Kaplan GS, Gandhi T, et al. You Can't Understand Something You Hide: Transparency As a Path To Improve Patient Safety. *Health Aff Blog*. June 2015. https://www.healthaffairs.org/do/10.1377/hblog20150622.048711/full/. Last accessed March 2018.

11 What is value-based healthcare? *NEJM Catal*. January 2017. https://catalyst.nejm.org/what-is-value-based-healthcare/. Last accessed March 2018.

12 National Coordinating Council for Medication Error Reporting and Prevention. About Medication Errors. http://www.nccmerp.org/about-medication-errors. Last accessed March 2018.

13 National Quality Forum. *Preferred Practices and Performance Measures for Measuring and Reporting Care Coordination: A Consensus Report*. Washington, DC; 2010.

14 Institute for Healthcare Improvement/National Patient Safety Foundation. *Closing the Loop: A Guide to Safer Ambulatory Referrals in the EHR Era*. Cambridge, Massachusetts; 2017. http://www.ihi.org/resources/Pages/Publications/Closing-the-Loop-A-Guide-to-Safer-Ambulatory-Referrals.aspx. Last accessed March 2018.

15 National Academies of Sciences E. *Improving Diagnosis in Health Care*.; 2015. https://www.nap.edu/catalog/21794/improving-diagnosis-in-health-care. Last accessed March 2018.

16 National Quality Forum. *NQF Patient Safety Terms and Definitions*. Washington, DC; nd. https://www.qualityforum.org/Topics/Safety_Definitions.aspx.

17 National Quality Forum. *Safe Practices for Better Healthcare - 2010 Update: A Consensus Report.* Washington, DC; 2010. https://www.qualityforum.org/Publications/2010/04/Safe_Practices_for_Better_Healthcare_%E2%80%93_2010_Update.aspx. Last accessed March 2018.

18 Shehab N, Lovegrove MC, Geller AI, et al. US Emergency Department Visits for Outpatient Adverse Drug Events, 2013-2014. *JAMA*. 2016;316(20):2115-2125.

19 Shapiro DJ, Hicks LA, Pavia AT, et al. Antibiotic prescribing for adults in ambulatory care in the USA, 2007-09. *J Antimicrob Chemother*. 2014;69(1):234-240.

20 Office-Related Antibiotic Prescribing for Persons Aged ≤14 Years --- United States, 1993--1994 to 2007--2008. https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6034a1.htm. Last accessed March 2018.

21 Fleming-Dutra KE, Hersh AL, Shapiro DJ, et al. Prevalence of Inappropriate Antibiotic Prescriptions Among US Ambulatory Care Visits, 2010-2011. *JAMA*. 2016;315(17):1864-1873.

22 Dantes R, Mu Y, Hicks LA, et al. Association Between Outpatient Antibiotic Prescribing Practices and Community-Associated Clostridium difficile Infection. *Open Forum Infect Dis*. 2015;2(3):ofv113.

23 Cohen HA, Matalon A, Amir J, et al. Handwashing patterns in primary pediatric community clinics. *Infection*. 1998;26(1):45-47.

24 Cohen HA, Kitai E, Levy I, et al. Handwashing Patterns in Two Dermatology Clinics. *Dermatology*. 2002;205(4):358-361.

25 WHO | Hand hygiene in outpatient care, home-based care and long-term care facilities. WHO. http://www.who.int/gpsc/5may/EN_GPSC1_PSP_HH_Outpatient_care/en/. Last accessed March 2018.

26 CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016. *MMWR Recomm Rep*. 2016;65. https://www.cdc.gov/mmwr/volumes/65/rr/rr6501e1.htm. Last accessed March 2018.

27 Barnett ML, Olenski AR, Jena AB. Opioid-Prescribing Patterns of Emergency Physicians and Risk of Long-Term Use. *N Engl J Med*. 2017;376(7):663-673.

28 Brennan PL, Del Re AC, Henderson PT, et al. Healthcare system-wide implementation of opioid-safety guideline recommendations: the case of urine drug screening and opioid-patient suicide- and overdose-related events in the Veterans Health Administration. *Transl Behav Med*. 2016;6(4):605-612.

29 Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med*. 2012;2(1):57-64.

30 Centers for Disease Control and Prevention. Controlled Substance Prescribing Patterns — Prescription Behavior Surveillance System, Eight States, 2013. Controlled Substance Prescribing Patterns — Prescription Behavior Surveillance System, Eight States, 2013. https://www.cdc.gov/mmwr/preview/mmwrhtml/ss6409a1.htm. Last accessed March 2018.

31 Katz N, Panas L, Kim M, et al. Usefulness of prescription monitoring programs for surveillance--analysis of Schedule II opioid prescription data in Massachusetts, 1996-2006. *Pharmacoepidemiol Drug Saf*. 2010;19(2):115-123.

32 Decrease in Rate of Opioid Analgesic Overdose Deaths — Staten Island, New York City, 2011–2013. https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6418a3.htm?s_cid=mm6418a3_w. Last accessed March 2018.

33 Sexton JB, Helmreich RL, Neilands TB, et al. The Safety Attitudes Questionnaire: psychometric properties, benchmarking data, and emerging research. *BMC Health Serv Res*. 2006;6:44.

34 Modak I, Sexton JB, Lux TR, et al. Measuring Safety Culture in the Ambulatory Setting: The Safety Attitudes Questionnaire—Ambulatory Version. *J Gen Intern Med*. 2007;22(1):1-5.

35 TeamSTEPPS for Office-Based Care Version. https://www.ahrq.gov/teamstepps/officebasedcare/index.html. Last accessed March 2018.

36 Medical Office Survey on Patient Safety Culture. https://www.ahrq.gov/sops/quality-patient-safety/patientsafetyculture/medical-office/index.html. Last accessed March 2018.

37 Thomas EJ, Sexton JB, Neilands TB, et al. The effect of executive walk rounds on nurse safety climate attitudes: A randomized trial of clinical units. *BMC Health Serv Res*. 2005;5:28.

38 Augello T. Executive Walk Rounds in Ambulatory Sites. https://www.rmf.harvard.edu/Clinician-Resources/Article/2005/Executive-Walk-Rounds-in-Ambulatory-Sites. Published September 1, 2005. Last accessed March 2018.

39 Institute for Healthcare Improvement: SBAR Tool: Situation-Background-Assessment-Recommendation. http://www.ihi.org:80/resources/Pages/Tools/SBARToolkit.aspx. Last accessed March 2018.

40 Quinlan G, Orndoff S, Hanchett S. Improving Transitions from the Inpatient to Outpatient Setting in BMT Patients. *Biol Blood Marrow Transplant*. 2015;21(2):S394.

41 Engaged Patients. Communication Archives. Engaged Patients. https://engagedpatients.org/category/communication/. Last accessed March 2018.

42 *Understanding How PSOs Help Health Care Organizations Improve Patient Safety Culture*. Rockville, MD: Agency for Healthcare Quality and Reserach; 2016.

43 Woods DM, Holl JL, Shonkoff JP, et al. Child-Specific Risk Factors and Patient Safety. *J Patient Saf*. 2005;1(1):17.

44 Mohr JJ, Lannon CM, Thoma KA, et al. Learning from Errors in Ambulatory Pediatrics. *Adv Patient Saf*. 1:355-368.

45 Neuspiel DR, Stubbs EH, Liggin L. Improving reporting of outpatient pediatric medical errors. *Pediatrics*. 2011;128(6):e1608-1613.

46 Pediatric Quality Indicators Overview. AHRQ - Quality Indicators. http://www.qualityindicators.ahrq.gov/modules/pdi_overview.aspx. Last accessed March 2018.

47 National Quality Forum. *Pediatric Measures*. Washington, DC: National Quality Forum; 2016. http://www.qualityforum.org/Publications/2016/06/Pediatric_Measures_Final_Report.aspx. Last accessed May 2016.

48 Principles of Pediatric Patient Safety: Reducing Harm Due to Medical Care. *Pediatrics*. 2011;127(6):1199-1210.

49 Health Quality & Safety Commission New Zealand. *Patient Safety Reporting Systems: A Literature Review of International Practice*. New Zealand; 2016. https://www.hqsc.govt.nz/assets/Reportable-Events/Publications/Patient-safety-reporting-systems-literature-review-Nov-2016.pdf. Last accessed March 2018.

50 The Office of the National Coordinator for Health Information Technology. Connecting Health and Care for the Nation: A Shared Nationwide Interoperability Roadmap. https://www.healthit.gov/sites/default/files/nationwide-interoperability-roadmap-draft-version-1.0.pdf. Published 2015. Last accessed March 2018.

51 Carr DD. Case managers optimize patient safety by facilitating effective care transitions. *Prof Case Manag*. 2007;12(2):70-80; quiz 81-82.

52 Vifladt A, Simonsen BO, Lydersen S, et al. The association between patient safety culture and burnout and sense of coherence: A cross-sectional study in restructured and not restructured intensive care units. *Intensive Crit Care Nurs*. 2016;36:26-34.

53 American Medical Informatics Association (AMIA)-MD. AMIA Response to CMS RFI on Quality Measure Reporting_Final. February 2016. https://www.regulations.gov/document?D=CMS-2016-0001-0035. Last accessed February 2018.

54 Richesson R, Andrews JE. *Clinical Research Informatics*. Springer Science & Business Media; 2012.

55 Healthcare's "Big Data" Challenge. AJMC. http://www.ajmc.com/journals/issue/2013/2013-1-vol19-n7/healthcares-big-data-challenge. Last accessed March 2018.

56 Panesar S, Carson-Stevens A, Salvilla SA, eds. *Patient Safety and Healthcare Improvement at a Glance*. Wiley Blackwell

57 Measuring and monitoring safety: a primary care perspective | The Health Foundation. http://www.health.org.uk/publication/measuring-and-monitoring-safety-primary-care-perspective. Last accessed March 2018.

58 Yu KH, Nation RL, Dooley MJ. Multiplicity of medication safety terms, definitions and functional meanings: when is enough enough? *BMJ Qual Saf*. 2005;14(5):358-363.

59 Dewa CS, Loong D, Bonato S, et al. The relationship between physician burnout and quality of healthcare in terms of safety and acceptability: a systematic review. *BMJ Open*. 2017;7(6):e015141.

60 WHO | Safer Primary Care. *WHO*. http://www.who.int/patientsafety/safer_primary_care/en/. Last accessed March 2018.

61 *Ambulatory Health Care: 2018 National Patient Safety Goals*. The Joint Commission https://www.jointcommission.org/assets/1/6/NPSG_Chapter_AHC_Jan2018.pdf. Last accessed March 2018.

62 Addressing Ambulatory Patient Safety in Your Practice -- FPM. https://www.aafp.org/fpm/2015/0900/p23.html. Last accessed March 2018.

63 Spencer R, Campbell SM. Tools for primary care patient safety: a narrative review. *BMC Fam Pract*. 2014;15:166.

64 Who Has Time for the Big (Patient Safety) Picture? http://www.ihi.org/communities/blogs/_layouts/15/ihi/community/blog/itemview.aspx?ID=374&List=7d1126ec-8f63-4a3b-9926-c44ea3036813. Last accessed March 2018.

Appendix A: ACPS Advisory Group, NQF Staff, and Federal Liaisons

Advisory Group

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Agency for Healthcare Research and Quality

Appendix B: Timeline of Project Activities

General Approach and Timeline

Over a 12-month period of performance, NQF staff developed an environmental scan for measures that that clinicians and facilities can use to improve safety in ambulatory care. NQF staff compiled a measure inventory of measures and measure concepts that are in development, in testing, and in use (Appendix D). Throughout this project, NQF staff solicited input from NQF's multistakeholder audience, including NQF membership and public stakeholders. The four steps in this project are described below:

1. Convene an Advisory Group
2. Conduct an environmental scan
3. NQF member and public comment
4. Develop a draft and final environmental scan report

Convene an Advisory Group

NQF staff convened a six-member Advisory Group that consisted of a diverse group of individuals with expertise in ambulatory care patient safety (Appendix A). NQF staff also consulted with CMS and federal liaisons to obtain guidance throughout the project. NQF staff convened with the Advisory Group via three web meetings. The first web meeting oriented the Advisory Group to the project background, scope, and objectives. During the second web meeting, NQF staff presented the environmental scan findings, solicited feedback from the Advisory Group on the measure inventory, and the priorities, barriers, and challenges related to ambulatory care patient safety. During the third and final web meeting, following the 30-day public comment period, NQF staff will solicit feedback from the Advisory Group on how to incorporate the comments into the final environmental scan report.

Conduct an Environmental Scan

With parameters established by the government task lead (GTL), contracting office representative (COR), and the Advisory Group, NQF staff conducted a three-step approach for the environmental scan. Appendix C describes the methodology. Upon completion of the environmental scan, NQF staff compiled the measures and measure concepts. Additionally, NQF staff solicited feedback from the Advisory Group and key informants on additional measures, gaps in measurement, and best practices and challenges related to patient safety in the ambulatory care setting.

NQF Member and Public Comment

NQF staff wrote a draft report based on the environmental scan findings, and with input from the key informants, NQF members, and the Advisory Group. The draft report will go through a 30-day public comment period from March 16 through April 16, 2018. Subsequently, NQF staff will gather the public comments and present the comments to the Advisory Group during the third web meeting. NQF staff will then incorporate the comments received from the web meeting into the final environmental scan report.

Appendix C: Environmental Scan Methodology

The environmental scan involved a three-step approach, which includes a literature review, measure scan, and key informant interviews. NQF conducted a review of the literature that included a search strategy with inclusion and exclusion criteria. NQF used the search terms outlined in the subsection below and the search parameters defined in Table A1 . Note that search words were combined with terms like “measure,” “measurement,” “survey,”, “scale,” etc. in order to help identify relevant measures.

Search Terms

- Adverse
- Ambulatory care
- Ambulatory settings
- Ambulatory facilities
- Care coordination
- Diagnosis
- Diagnostic accuracy
- Error
- Harm
- Medication safety
- Outpatient
- Outpatient care
- Outpatient settings
- Outpatient facilities
- Patient safety culture
- Primary care
- Referrals
- Safety
- Safety culture
- Safety outcomes
- Transfer
- Transitions of care
- Test results

Table A1. Search Parameters

Included	Excluded
• Developed or published after 2000 OR originally published prior to 2000 and still current • Measures that include specifications that meet the operational definition of patient safety measures • Ambulatory care will include physicians', doctors', and nurse practitioners' offices, and clinics, including urgent care centers • Instruments, scales, survey tools, and surveys • International sources that were published in English	• Published before 2000 and not current • Care that occur in specialized outpatient settings: physical, speech, and occupational therapy; home healthcare; hospice; community-based and other long-term care delivered outside of the home; ambulatory surgery centers; outpatient procedure settings including radiology, gastroenterology, and chemotherapy; and dialysis centers • Not available in English

Information sources were identified through various resources such as PubMed, Academic Search Premier, as well as grey literature and web searches through Google Scholar to identify reports, white papers, and other documentation related to ambulatory care patient safety. NQF used various combinations of key words such as patient safety, outpatient, ambulatory care, medication safety, care transitions, etc. These key words were combined with terms like measure, survey, and scale.

NQF staff initially reviewed over 2,834 abstracts, and reviewed articles that were relevant to the operational definition and research questions shown below. NQF staff then synthesized the sources and compiled a list of measure concepts related to ambulatory care patient safety (Appendix D).

- **Patient safety measures** are defined as measures related to the prevention and mitigation of healthcare-associated harm caused by errors of omission or commission, and involving the establishment of operational systems and processes that minimize the likelihood of errors and maximize the likelihood of intercepting them when they occur [1]

Research Questions:

- What measures are currently in use for ambulatory care patient safety (ACPS)?
- What measures are currently in development for ACPS?
- What measure concepts exist related to ACPS?
- What are the measurement gaps related to ACPS?
- What are emerging topics and themes in ACPS measurement?
- What are priority measures of patient safety in the ambulatory care setting for the nonelderly population?

[1] Angood P, Colchamiro E, Lyzenga A, et al. *Meeting of the National Quality Forum Patient Safety Team*. Washington, DC. August 2009. Unpublished.

Additionally, NQF staff identified 40 measures from the NQF's Quality Positioning System, the Centers for Medicare and Medicaid (CMS) Measures Inventory, and the Agency for Healthcare Research and Quality's National Quality Measures Clearinghouse and National Guidelines Clearinghouse (Appendix D).

Lastly, NQF staff conducted six key informant interviews in addition to the review of the literature and environmental scan. NQF staff developed a semi-structured interview guide (Appendix E) with questions to identify additional measures, measure concepts, or gaps in measurement related to ambulatory care patient safety. The interviews offered qualitative insight into the key research questions informing the project's research strategy. Key informants were selected on the basis of their work and expertise in ambulatory care patient safety. These key informants have expertise within the healthcare system, and bring years of experience in measurement, instrument development, and/or community-oriented interventions. Table A2 lists the key informants.

Table A2. List of Key Informants

Informant	Relevant Experience	Organization
Charisse Cassell, PhD, MPH	Dr. Cassell has been a registered nurse in the state of California for nearly 20 years. She has worked in a management capacity, monitoring safety and quality in various ambulatory care settings including community health clinics, as well as medical group and independent practice association (IPA) models. Currently, she is the director of quality & performance improvement at Cedars-Sinai Medical Network, which consists of an extensive network of medical group, IPA, and affiliated practitioners in the greater Los Angeles area. She is primarily responsible for monitoring and evaluating quality and patient safety in Cedars-Sinai Medical Network offices.	Cedars-Sinai Medical Network
Urmimala Sarkar, MD, MPH	Dr. Sarkar is associate professor of medicine at University of California, San Francisco, in the Division of General Internal Medicine, and a primary care physician at San Francisco General Hospital's Richard H. Fine People's Clinic. Her research focuses on patient safety in outpatient settings, including adverse drug events, missed and delayed diagnosis, and failures of treatment monitoring, health information technology to improve the safety and quality of outpatient care, and implementation of evidence-based innovations in real-world settings.	University of California, San Francisco
Kevin Sheahan, MD	Dr. Sheahan became the Chief of Nemours duPont Pediatrics in 2001. In his role as chief, he has led nine of the practices to National Committee for Quality Assurance (NCQA) level 3 certification, with all 11 projected to have NCQA level 3 certification by the end of 2017.	Nemours Children's Health System
Saul Weingart, MD, MPP, PhD	Dr. Weingart is chief medical officer at Tufts Medical Center and professor of medicine at Tufts University School of Medicine. Previously, he served as vice president for patient safety at Dana-Farber Cancer Institute. His research examines patient safety in primary and specialty care, patient engagement, and diagnostic errors.	Tufts Medical Center
Jinoos Yazdany, MD, MPH	Dr. Yazdany is associate professor of medicine, the Robert L. Kroc Endowed Chair in Rheumatic Diseases, and director of the Quality and Informatics Lab at the University of California, San Francisco. She is an expert in ambulatory patient safety, serving as principal investigator of an R01 grant from the AHRQ to study and develop electronic clinical quality measures (eCQMs) in patient safety. Moreover, she has served as principal investigator of eCQM development in rheumatoid arthritis, an effort that led to NQF endorsement of a patient safety eCQM.	University of California, San Francisco

Appendix D: Measure and Measure Concept Inventory

Measure Inventory

Care Transitions and Handoffs

Measure Title	Measure Description	Measure Type	Source
Critical Information Communicated with Request for Referral (sent by primary care provider)	Percentage of patients with relevant clinical information communicated using the Continuity of Care Document (HL7 CCD). This is sent along with the request for referral to specialist.	Process	Chan KS, Weiner JP, Scholle SH, et al. *EHR-Based Care Coordination Performance Measures in Ambulatory Care.* Washington, DC; 2011. Available at http://www.commonwealthfund.org/~/media/files/publications/issue-brief/2011/nov/1550_chan_ehr_based_care_coord_ib_v2.pdf. Last accessed March 2018.
Critical Information Communicated with Request for Referral (sent by received by specialist)	Percentage of patients with relevant clinical information communicated using the Continuity of Care Document (HL7 CCD) with request for referral to specialist.	Process	Chan KS, Weiner JP, Scholle SH, et al. *EHR-Based Care Coordination Performance Measures in Ambulatory Care.* Washington, DC; 2011. Available at http://www.commonwealthfund.org/~/media/files/publications/issue-brief/2011/nov/1550_chan_ehr_based_care_coord_ib_v2.pdf. Last accessed March 2018.
Primary Care Communication About Referral to Patient and Family	Percentage of referred patients for whom the primary care clinician gave patient written information on reason for referral or consultation.	Process	Chan KS, Weiner JP, Scholle SH, et al. *EHR-Based Care Coordination Performance Measures in Ambulatory Care.* Washington, DC; 2011. Available at http://www.commonwealthfund.org/~/media/files/publications/issue-brief/2011/nov/1550_chan_ehr_based_care_coord_ib_v2.pdf. Last accessed March 2018.
Specialist Communication of Results to Patient and Family	Percentage of patients seen by a specialist and provided with written results by the specialist.	Process	Chan KS, Weiner JP, Scholle SH, et al. *EHR-Based Care Coordination Performance Measures in Ambulatory Care.* Washington, DC; 2011. Available at http://www.commonwealthfund.org/~/media/files/publications/issue-brief/2011/nov/1550_chan_ehr_based_care_coord_ib_v2.pdf. Last accessed March 2018.
Primary Care Physician Review of Specialist Report	Percentage of referred patients seen by the specialist for whom the primary care clinician reviewed the results of the specialist report.	Process	Chan KS, Weiner JP, Scholle SH, et al. *EHR-Based Care Coordination Performance Measures in Ambulatory Care.* Washington, DC; 2011. Available at http://www.commonwealthfund.org/~/media/files/publications/issue-brief/2011/nov/1550_chan_ehr_based_care_coord_ib_v2.pdf. Last accessed March 2018.
Specialist Report to Primary Care Physician	Percentage of patients for whom the specialist communicated results in a report to the primary care clinician using the Continuity of Care Document (HL7 CCD).	Process	Chan KS, Weiner JP, Scholle SH, et al. *EHR-Based Care Coordination Performance Measures in Ambulatory Care.* Washington, DC; 2011. Available at http://www.commonwealthfund.org/~/media/files/publications/issue-brief/2011/nov/1550_chan_ehr_based_care_coord_ib_v2.pdf. Last accessed March 2018.
Critical Information Communicated with Request for Referral (sent by primary care provider)	Percentage of patients with relevant clinical information communicated using the Continuity of Care Document (HL7 CCD). This is sent along with the request for referral to specialist.	Process	Chan KS, Weiner JP, Scholle SH, et al. *EHR-Based Care Coordination Performance Measures in Ambulatory Care.* Washington, DC; 2011. Available at http://www.commonwealthfund.org/~/media/files/publications/issue-brief/2011/nov/1550_chan_ehr_based_care_coord_ib_v2.pdf. Last accessed March 2018.
Venous Thromboembolism Diagnosis and Treatment	This measure is used to assess the percentage of patients age 18 years and older with any of these diagnosis – venous thromboembolism (VTE), deep venous thrombosis (DVT), or pulmonary embolism (PE) – indicating a complete list of medications was communicated to the next clinician of service when the patient is referred or transferred to another setting, service, practitioner or level of care within or outside the organization.	Process	AHRQ National Quality Measures Clearinghouse Inventory
Closing the Referral Loop: Receipt of Specialist Report	Percentage of patients with referrals, regardless of age, for which the referring provider receives a report from the provider to whom the patient was referred.	Process	CMS Measures Inventory
CG CAHPS: Supplemental Item Care Coordination	Enrollee experience related to the following:- Doctor seemed informed and up-to-date about care from other health providers- Doctor had your medical records- Doctor followed up about blood test, x-ray results- Got blood test, x-ray results as soon as you needed them- Doctor talked about prescription drugs you are taking- Got help you needed from doctor's office manage your care among different providers CAHPS Health Plan 5.0- Supplemental Items.	Patient Experience	CMS Measures Inventory

Measure Title	Measure Description	Measure Type	Source
CG CAHPS: Supplemental Item Care Coordination	Percentage of provider had medical records during your visits. Percentage of provider's office followed up to give you results of test or X-ray. Percentage of patient needed help from your care team to manage care, tests, or treatment from different providers. Percentage of patient got help from your care team to manage care, tests, or treatment from different providers. Q66. Satisfaction with help from your care team to manage care, tests, or treatment from different providers.	Patient Experience	CMS Measures Inventory

Diagnostic Safety

Measure Title	Measure Description	Measure Type	Source
Mammography assessment category data collection	Percentage of patients undergoing screening mammograms whose assessment category [e.g., Mammography Quality Standards Act (MQSA), Breast Imaging Reporting and Data System (BI-RADS®), or FDA approved equivalent categories] is entered into an internal database that will, at a minimum, allow analysis of abnormal interpretation (recall) rate.	Structure	NQF-Not Endorsed; American Medical Association-Physician Consortium for Performance Improvement
Communication of suspicious findings from the diagnostic mammogram to the patient	Percentage of patients undergoing diagnostic mammograms that are classified as "suspicious" or "highly suggestive of malignancy" with documentation of direct communication of findings from the diagnostic mammogram to the patient within 5 business days of exam interpretation.	Process	NQF-Not Endorsed; American Medical Association-Physician Consortium for Performance Improvement
Communication of suspicious findings from the diagnostic mammogram to the practice managing ongoing care	Percentage of patients undergoing diagnostic mammograms that are classified as "suspicious" or "highly suggestive of malignancy" with documentation of direct communication of findings from the diagnostic mammogram to the practice that manages the patient's on-going care within 3 business days of exam interpretation.	Process	NQF-Not Endorsed; American Medical Association-Physician Consortium for Performance Improvement
Communication to Referring Physician of Patient's Potential Risk for Fracture for All Patients Undergoing Bone Scintigraphy	Percentage of patients, regardless of age, undergoing bone scintigraphy considered to be potentially at risk for fracture in a weight-bearing site for whom there is documentation of direct communication to the referring physician within 24 hours of completion of the imaging study.	Process	NQF-Not Endorsed; American Medical Association-Physician Consortium for Performance Improvement
BIRADS to Biopsies	Timely follow-up after abnormal mammogram.	Process	Los Angeles County Department of Health Services, San Francisco Health Network
Correlation With Existing Imaging Studies for All Patients Undergoing Bone Scintigraphy	Percentage of final reports for all patients, regardless of age, undergoing bone scintigraphy that include physician documentation of correlation with existing relevant imaging studies (e.g., x-ray, MRI, CT) that were performed.	Process	NQF-Not Endorsed; American Medical Association-Physician Consortium for Performance Improvement
Basal Cell Carcinoma (BCC)/Squamous Cell Carcinoma: Biopsy Reporting Time - Pathologist to Clinician	Percentage of biopsies with a diagnosis of cutaneous Basal Cell Carcinoma (BCC) and Squamous Cell Carcinoma (SCC) (including in situ disease) in which the pathologist communicates results to the clinician within 7 days of biopsy date.	Process	CMS Measures Inventory
Biopsy: Reporting Time – Clinician to Patient	Percentage of patients with skin biopsy specimens with a diagnosis of cutaneous basal or squamous cell carcinoma (including in situ disease) who are notified of their final biopsy pathology findings within less than or equal to 14 days from the time the biopsy was performed.	Process	CMS Measures Inventory
Non-Melanoma Skin Cancer (NMSC): Biopsy Reporting Time - Clinician	Length of time taken from when a biopsy is performed to when a patient is notified by the biopsying physician that he or she has cutaneous basal or squamous cell carcinoma (including in situ disease). This measure evaluates the reporting time between the biopsying clinician and patient.	Process	CMS Measures Inventory
Diagnosis and Treatment of Ischemic Stroke	This measure is used to assess the percentage of patients age 18 years and older initially presenting with transient ischemic attack (TIA) who are admitted to the hospital, observation unit or expedited outpatient TIA clinic with documentation of clinical TIA symptoms within the last 24 hours.	Outcome	AHRQ National Quality Measures Clearinghouse Inventory

Medication Management and Safety

Measure Title	Measure Description	Measure Type	Source
Adoption of Medication e-Prescribing	Documents whether provider has adopted a qualified e-Prescribing system and the extent of use in the ambulatory setting.	Structure	NQF-Not Endorsed; Centers for Medicare & Medicaid Services
Documentation of allergies and adverse reactions in the outpatient record	Percentage of patients having documentation of allergies and adverse reactions in the medical record.	Process	National Committee for Quality Assurance (NCQA)
Documentation of Current Medications in the Medical Record	Percentage of visits for patients aged 18 years and older for which the eligible professional attests to documenting a list of current medications using all immediate resources available on the date of the encounter. This list must include ALL known prescriptions, over-the-counters, herbals, and vitamin/mineral/dietary (nutritional) supplements AND must contain the medications' name, dosage, frequency and route of administration	Process	NQF-Endorsed; Centers for Medicare & Medicaid Services
Diabetes Medication Dosing (DOS)	The percentage of patients who were dispensed a dose higher than the daily recommended dose for the following therapeutic categories of oral hypoglycemics: biguanides, sulfonlyureas and thiazolidinediones. The measure is comprised of three measure rates which are reported separately for each therapeutic category. The rates include: – Dosing for Biguanides – Dosing for Sulfonylureas – Dosing for Thiazolidinediones The full detailed measure specifications have also been submitted as a separate attachment.	Process	NQF-Not Endorsed; NCQA
Medication Change	For visits at which there was a medication change,* the percentage of visits where all medications prescribed by the provider were reconciled.	Process	Keogh C, Kachalia A, Fiumara K, et al. Ambulatory Medication Reconciliation: Using a Collaborative Approach to Process Improvement at an Academic Medical Center. *Jt Comm J Qual Patient Saf*. 2016;42(4):186-194.
Medication Change - Active	For visits at which there was a medication change,* the % of medications prescribed by the provider on the patient's medication list that were reconciled.	Process	Keogh C, Kachalia A, Fiumara K, et al. Ambulatory Medication Reconciliation: Using a Collaborative Approach to Process Improvement at an Academic Medical Center. *Jt Comm J Qual Patient Saf.* 2016;42(4):186-194.
Medication Reconciliation Post-Discharge	The percentage of discharges for patients 18 years of age and older for whom the discharge medication list was reconciled with the current medication list in the outpatient medical record by a prescribing practitioner, clinical pharmacist or registered nurse.	Process	AHRQ National Quality Measures Clearinghouse Inventory
Medication reconciliation post-discharge: percentage of discharges from January 1 to December 1 of the measurement year for members 18 years of age and older for whom medications were reconciled the date of discharge through 30 days after discharge (31 total days).	This measure is used to assess the percentage of discharges from January 1 to December 1 of the measurement year for members 18 years of age and older for whom medications were reconciled the date of discharge through 30 days after discharge (31 total days).	Process	AHRQ National Quality Measures Clearinghouse Inventory
Use of Opioids at High Dosage in Persons Without Cancer	The proportion (XX out of 1,000) of individuals without cancer receiving prescriptions for opioids with a daily dosage greater than 120mg morphine equivalent dose (MED) for 90 consecutive days or longer.	Process	NQF-Endorsed; PQA
Use of Opioids from Multiple Providers and at High Dosage in Persons Without Cancer	The proportion (XX out of 1,000) of individuals without cancer receiving prescriptions for opioids with a daily dosage greater than 120mg morphine equivalent dose (MED) for 90 consecutive days or longer, AND who received opioid prescriptions from four (4) or more prescribers AND four (4) or more pharmacies.	Process	NQF-Endorsed; PQA
Use of Opioids from Multiple Providers in Persons Without Cancer	The proportion (XX out of 1,000) of individuals without cancer receiving prescriptions for opioids from four (4) or more prescribers AND four (4) or more pharmacies.	Process	NQF-Endorsed; PQA
Overuse Of Opioid Containing Medications For Primary Headache Disorders	Percentage of patients aged 12 years and older diagnosed with primary headache disorder and taking opioid containing medication who were assessed for opioid containing medication overuse within the 12-month measurement period and treated or referred for treatment if identified as overusing opioid containing medication.	Process	CMS Measures Inventory
Tuberculosis Test Prior to First Course Biologic Therapy	Percentage of patients 18 years and older with a diagnosis of rheumatoid arthritis that are newly prescribed a biologic therapy during the measurement period and whose medical record indicates tuberculosis testing in the 12 months preceding the biologic prescription.	Process	Yazdany J, Bansback N, Clowse M, et al. Rheumatology informatics system for effectiveness: a national informatics-enabled registry for quality improvement. *Arthritis Care Res (Hoboken)*. 2016;68(12):1866-1873.
INR for Individuals Taking Warfarin and Interacting Anti-Infective Medications	Percentage of episodes with an International Normalized Ratio (INR) test performed three to seven days after a newly started interacting anti-infective medication for individuals receiving warfarin.	Process	NQF-Endorsed; Centers for Medicare & Medicaid Services
INR Monitoring for Individuals on Warfarin	Percentage of individuals 18 years of age and older with at least 56 days of warfarin therapy who receive an International Normalized Ratio (INR) test during each 56-day interval with warfarin.	Process	NQF-Endorsed; Centers for Medicare & Medicaid Services

Measure Title	Measure Description	Measure Type	Source
Annual Monitoring for Patients on Persistent Medications (MPM)	This measure assesses the percentage of patients 18 years of age and older who received a least 180 treatment days of ambulatory medication therapy for a select therapeutic agent during the measurement year and at least one therapeutic monitoring event for the therapeutic agent in the measurement year. Report the following three rates and a total rate: - Rate 1: Annual Monitoring for patients on angiotensin converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARB): At least one serum potassium and a serum creatinine therapeutic monitoring test in the measurement year. - Rate 2: Annual monitoring for patients on digoxin: At least one serum potassium, one serum creatinine and a serum digoxin therapeutic monitoring test in the measurement year. - Rate 3: Annual monitoring for patients on diuretics: At least one serum potassium and a serum creatinine therapeutic monitoring test in the measurement year. - Total rate (the sum of the three numerators divided by the sum of the three denominators)	Process	NQF-Endorsed; NCQA
EHR with EDI prescribing used in encounters where a prescribing event occurred.	Of all patient encounters within the past month that used an electronic health record (EHR) with electronic data interchange (EDI) where a prescribing event occurred, how many used EDI for the prescribing event.	Process	NQF-OPUS Database; City of New York Department of Health and Mental Hygiene
Wrong-Patient Retract-and-Reorder (Wrong Patient-RAR) Measure	A Wrong-Patient Retract-and-Reorder (Wrong Patient-RAR) event occurs when an order is placed on a patient within an EHR, is retracted within 10 minutes, and then the same clinician places the same order on a different patient within the next 10 minutes. A Wrong-Patient Retract-and-Reorder rate is calculated by dividing Wrong Patient-RAR events by total orders examined.	Outcome	NQF-Endorsed; New York-Presbyterian Hospital

Prevention of Adverse Events and Complications

Measure Title	Measure Description	Measure Type	Source
Pressure ulcer prevention and treatment protocol: percentage of outpatients with a pressure ulcer(s) with documentation in the medical record that education was provided to patient, family and/or caregiver regarding the treatment, progression, and prevention of pressure ulcers	This measure is used to assess the percentage of outpatients with a pressure ulcer(s) with documentation in the medical record that education was provided to patient, family and/or caregiver regarding the treatment, progression, and prevention of pressure ulcers.	Process	AHRQ National Quality Measures Clearinghouse Inventory
Ambulatory care sensitive conditions: age-standardized acute care hospitalization rate for conditions where appropriate ambulatory care prevents or reduces the need for admission to the hospital, per 100,000 population younger than age 75 years.	This measure is used to assess the age-standardized acute care hospitalization rate for conditions where appropriate ambulatory care prevents or reduces the need for admission to the hospital, per 100,000 population under age 75 years.	Outcome	AHRQ National Quality Measures Clearinghouse Inventory
Potentially avoidable complications (PACs) in COPD patients	Percent of adult population aged 18 years and above who were diagnosed with COPD and were followed for one-year and had one or more of the following potentially avoidable complications (PACs): hospitalization or emergency room visit related to COPD and their associated professional services; Professional services related to the following conditions: pneumonia, lung complications, respiratory failure, respiratory insufficiency, tracheostomy, mechanical ventilation, minor lung procedures, bronchiectasis, empyema, lung abscess, phlebitis, deep vein thrombosis, pulmonary embolism, acute exacerbation of COPD, asthma, Syncope, Dizziness, Hypotension, diabetic emergency with Hypo- or Hyperglycemia, Stroke, Septicemia, Meningitis, Hepatitis, Adverse effects of drugs, overdose, poisoning, Complications of medical care, surgery, implanted device, grafts, Cardiac dysrhythmias, AMI, Coronary thrombolysis, Acute Renal Failure, Urinary tract infections, Decubitus ulcer, gangrene, arterial thrombosis, gastritis, ulcer, GI hemorrhage, fracture neck femur, falls, skin and wound care, traction, splints or osteomyelitis, antiemetics, antiarrhythmic agents, inotropic agents and vasopressors, antifungals, antiseptics, other topical agents, pulmonary hypertension drugs, drugs for poisoning.	Outcome	NQF-Not Endorsed; Health Care Incentives Improvement Institute

Measure Title	Measure Description	Measure Type	Source
Proportion of Adult Asthma patients that have Potentially Avoidable Complications (PACs).	Percent of adult population aged 18 years and above who were diagnosed with Asthma and were followed for one-year and had one or more of the following potentially avoidable complications (PACs): hospitalization or emergency room visit related to Asthma and their associated professional services; Professional services related to the following conditions: Pneumonia, Lung complications, Respiratory failure, Respiratory insufficiency, Tracheostomy, Mechanical ventilation, Minor lung procedures, Bronchiectasis, Empyema, Lung abscess, Bronchitis, Pulmonary embolism, Acute exacerbation of Asthma, Diabetic emergency with Hypo- or Hyperglycemia, Syncope, coma, hypotension, dizziness, Stroke, Septicemia, meningitis, other infections, Adverse effects of drug overdose, poisoning, Complications of medical care, Surgery, implanted device, grafts, Cardiac dysrhythmias, AMI, coronary thrombolysis, Acute renal failure, Decubitus ulcer, gangrene, arterial thrombosis, Phlebitis, DVT, skin and wound care, Traction, splints, osteomyleitis, Infectious arthritis, Gastritis, ulcer, GI hemorrhage, GI infection, Antiemetics, antiarrhythmic agents, inotropic agents and vasopressors, Antifungals, Antiseptics, other topical agents, Pulmonary hypertension drugs, Drugs for poisoning.	Outcome	NQF-Not Endorsed; Health Care Incentives Improvement Institute
Proportion of Diabetes patients that have Potentially Avoidable Complications (PACs).	Percent of adult population aged 18 years and above who were diagnosed with Diabetes and were followed for one-year and had one or more of the following potentially avoidable complications (PACs): hospitalization or emergency room visit related to diabetes and their associated professional services; Professional services related to the following conditions: Diabetic Emergency, Hypo- Hyper-glycemia, Subarachnoid and Intracerebral hemorrhage (Stroke, CVA), Syncope, Hypotension, Dizziness, Septicemia, Meningitis, Other Infections, Urinary Tract Infections, Visual loss, Blindness, Surgery for retinal tear, detachment, Acute Eye Infections, Acute Myocardial Infarction, Coronary thrombolysis, Acute Renal Failure, Pneumonia, lung complications, Tracheostomy, Mechanical ventilation, minor lung procedures, Gastritis, ulcer, GI hemorrhage, Acute post-hemorrhagic anemia, Decubitus Ulcer, Gangrene, Arterial Thrombosis, Phlebitis, DVT, pulmonary embolism, Embolectomy, Skin and wound care, traction, splints, osteomyleitis, infectious arthritis , Fracture neck femur, Falls, traction, splints, osteomyleitis, infectious arthritis , Adverse effects of drugs, overdose, poisoning, Complications of medical care, surgery, implanted device, grafts, antiemetics, ophthalmic anti-infectives and anti-inflammatories, ophthalmic steroid preparations, inotropic agents and vasopressors, thrombolytics, antibiotics, antifungals, antiseptics, other topical agents, drugs for poisoning, pulmonary hypertension drugs, agents for hypertensive emergencies.	Outcome	NQF-Not Endorsed; Health Care Incentives Improvement Institute

Measure Title	Measure Description	Measure Type	Source
Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year.	Percent of adult population aged 18+ years who were identified as having at least one of the following six chronic conditions: Asthma, Chronic Obstructive Pulmonary Disease (COPD), Coronary Artery Disease (CAD), Heart Failure (HF), Hypertension (HTN), or Diabetes Mellitus (DM), were followed for at least one-year, and had one or more potentially avoidable complications (PACs) during the most recent 12 months. Please reference attached document labeled NQF_Chronic_Care_PACs_01_24_17.xls, in the tabs labeled PACs I-9 & I-10 for a list of code definitions of PACs relevant to each of the above chronic conditions. We define PACs as one of two types: (1) Type 1 PACs - PACs related to the index condition: Patients are considered to have a PAC, if they receive services during the episode time window for any of the complications directly related to the chronic condition, such as for acute exacerbation of the index condition, respiratory insufficiency in patients with Asthma or COPD, hypotension or fluid and electrolyte disturbances in patients with CAD, HF or diabetes etc. (2) Type 2 PACs - PACs related to Patient Safety or broader System Failures: Patients are also considered to have a PAC, if they receive services during the episode time window for any of the complications related to patient safety or health system failures such as for sepsis, infections, phlebitis, deep vein thrombosis, pressure sores etc. All relevant hospitalizations for patients with chronic conditions are considered potentially avoidable and flagged as PACs. This particularly applies to hospitalizations due to acute exacerbations of the index condition. For example, a hospitalization for diabetic emergency in a diabetic patient, or a hospitalization for acute pulmonary edema in a heart failure patient is considered a PAC. PACs are counted as a dichotomous (yes/no) outcome. If a patient had one or more PACs, they get counted as a "yes" or a 1. The summary tab in the enclosed workbook labeled NQF_Chronic_Care_PACs_01_24_17.xls gives the overview of the frequency and costs associated with each of these types of PACs for each of the six chronic conditions. Detailed drill-down tabs with graphs are also provided in the same workbook for each of the six chronic conditions to highlight high-frequency PACs. The Decision Tree tabs in the same workbook highlight the flow diagrams for the selection of patients into each chronic condition episode. The information is based on a two-year claims database from a commercial insurer with 3,258,706 covered lives and $25.9 billion in "allowed amounts" for claims costs. The database is an administrative claims database with medical as well as pharmacy claims. It is important to note that while the overall frequency of PAC hospitalizations is low (for all chronic care conditions summed together, PAC frequency was 1.6% for all PAC occurrences), they amount to over 52% of the PAC medical costs.	Outcome	NQF-Endorsed; Altarum Institute

Measure Title	Measure Description	Measure Type	Source
Proportion of Patients with Arrhythmias (ARR) that have a Potentially Avoidable Complication (during the episode time window)	Percent of adult population aged 18 + years with arrhythmias (ARR) who are followed for at least one-year and have one or more potentially avoidable complications (PACs) during the most recent 12 months. Please reference attached document labeled NQF_ARRBLK_all_codes_risk_adjustment_01.25.17.xls, in the tabs labeled PACs I-9 and PAC I-10 for a list of code definitions of PACs relevant to ARR. We define PACs as one of two types: (1) Type 1 PACs - PACs related to the index condition: Patients are considered to have a PAC, if they receive services during the episode time window for any of the complications directly related to ARR, such as for hypotension, acute heart failure, fluid and electrolyte disturbances etc. (2) Type 2 PACs - PACs related to Patient Safety or broader System Failures: Patients are also considered to have a PAC, if they receive services during the episode time window for any of the complications related to patient safety or health system failures such as for sepsis, infections, phlebitis, deep vein thrombosis, pressure sores etc. All relevant admissions in a patient with ARR are considered potentially avoidable and flagged as PACs. This particularly applies to hospitalizations due to acute exacerbations of the index condition. For example, a hospitalization for acute pulmonary edema in an arrhythmia patient is considered a PAC. PACs are counted as a dichotomous (yes/no) outcome. If a patient had one or more PACs in the most recent 12 months, they get counted as a "yes" or a 1. The "PAC overview" tab in the enclosed workbook labeled NQF_ARRBLK_all_codes_risk_adjustment_01.25.17.xls gives the percent of ARR episodes that have a PAC and the tab labeled "PAC drill down" gives the types of PACs and their frequencies in ARR episodes within this dataset. The Decision Tree tab in the same workbook highlights the flow diagrams for the selection of patients with ARR for this measure. The information is based on a two-year claims database from a commercial insurer. The database had over 3.2 million covered lives and over $25.9 billion in "allowed amounts" for claims costs. The database is an administrative claims database with medical as well as pharmacy claims.	Outcome	NQF-Not Endorsed; Altarum Institute

Measure Title	Measure Description	Measure Type	Source
Proportion of Patients with Coronary Artery Disease (CAD) that have a Potentially Avoidable Complication (during the episode time window)	Percent of adult population aged 18 + years with coronary artery disease (CAD) who are followed for at least one-year and have one or more potentially avoidable complications (PACs) during the most recent 12 months. Please reference attached document labeled NQF_CAD_all_codes_risk_adjustment_01.25.17.xls, in the tabs labeled PACs I-9 and PAC I-10 for a list of code definitions of PACs relevant to CAD. We define PACs as one of two types: (1) Type 1 PACs - PACs related to the index condition: Patients are considered to have a PAC, if they receive services during the episode time window for any of the complications directly related to CAD, such as for hypotension, acute heart failure, fluid and electrolyte disturbances etc. (2) Type 2 PACs - PACs related to Patient Safety or broader System Failures: Patients are also considered to have a PAC, if they receive services during the episode time window for any of the complications related to patient safety or health system failures such as for sepsis, infections, phlebitis, deep vein thrombosis, pressure sores etc. All relevant admissions in a patient with CAD are considered potentially avoidable and flagged as PACs. This particularly applies to hospitalizations due to acute exacerbations of the index condition. For example, a hospitalization for acute pulmonary edema in a heart failure patient is considered a PAC. PACs are counted as a dichotomous (yes/no) outcome. If a patient had one or more PACs in the most recent 12 months, they get counted as a "yes" or a 1. The "PAC overview" tab in the enclosed workbook labeled NQF_CAD_all_codes_risk_adjustment_01.25.17.xls gives the percent of CAD episodes that have a PAC and the tab labeled "PAC drill down" gives the types of PACs and their frequencies in CAD episodes within this dataset. The Decision Tree tab in the same workbook highlights the flow diagrams for the selection of patients with CAD for this measure. The information is based on a two-year claims database from a commercial insurer. The database had over 3.2 million covered lives and over $25.9 billion in "allowed amounts" for claims costs. The database is an administrative claims database with medical as well as pharmacy claims.	Outcome	NQF-Not Endorsed; Altarum Institute

Measure Title	Measure Description	Measure Type	Source
Proportion of Patients with Heart Failure (HF) that have a Potentially Avoidable Complication (during the episode time window)	Percent of adult population aged 18 + years with heart failure (HF) who are followed for at least one-year and have one or more potentially avoidable complications (PACs) during the most recent 12 months. Please reference attached document labeled NQF_HF_all_codes_risk_adjustment_01.25.17.xls, in the tabs labeled PACs I-9 and PAC I-10 for a list of code definitions of PACs relevant to HF. We define PACs as one of two types: (1) Type 1 PACs - PACs related to the index condition: Patients are considered to have a PAC, if they receive services during the episode time window for any of the complications directly related to HF, such as for hypotension, acute heart failure, fluid and electrolyte disturbances etc. (2) Type 2 PACs - PACs related to Patient Safety or broader System Failures: Patients are also considered to have a PAC, if they receive services during the episode time window for any of the complications related to patient safety or health system failures such as for sepsis, infections, phlebitis, deep vein thrombosis, pressure sores etc. All relevant admissions in a patient with HF are considered potentially avoidable and flagged as PACs. This particularly applies to hospitalizations due to acute exacerbations of the index condition. For example, a hospitalization for acute pulmonary edema in a heart failure patient is considered a PAC. PACs are counted as a dichotomous (yes/no) outcome. If a patient had one or more PACs in the most recent 12 months, they get counted as a "yes" or a 1. The "PAC overview" tab in the enclosed workbook labeled NQF_HF_all_codes_risk_adjustment_01.25.17.xls gives the percent of HF episodes that have a PAC and the tab labeled "PAC drill down" gives the types of PACs and their frequencies in HF episodes within this dataset. The Decision Tree tab in the same workbook highlights the flow diagrams for the selection of patients with HF for this measure. The information is based on a two-year claims database from a commercial insurer. The database had over 3.2 million covered lives and over $25.9 billion in "allowed amounts" for claims costs. The database is an administrative claims database with medical as well as pharmacy claims.	Outcome	NQF-Not Endorsed; Altarum Institute

Measure Title	Measure Description	Measure Type	Source
Proportion of Patients with Hypertension (HTN) that have a Potentially Avoidable Complication (during the episode time window)	Percent of adult population aged 18 + years with hypertension (HTN) who are followed for at least one-year and have one or more potentially avoidable complications (PACs) during the most recent 12 months. Please reference attached document labeled NQF_HTN_all_codes_risk_adjustment_01.25.17.xls, in the tabs labeled PACs I-9 and PAC I-10 for a list of code definitions of PACs relevant to HTN. We define PACs as one of two types: (1) Type 1 PACs - PACs related to the index condition: Patients are considered to have a PAC, if they receive services during the episode time window for any of the complications directly related to HTN, such as for hypotension, acute heart failure, fluid and electrolyte disturbances etc. (2) Type 2 PACs - PACs related to Patient Safety or broader System Failures: Patients are also considered to have a PAC, if they receive services during the episode time window for any of the complications related to patient safety or health system failures such as for sepsis, infections, phlebitis, deep vein thrombosis, pressure sores etc. All relevant admissions in a patient with HTN are considered potentially avoidable and flagged as PACs. This particularly applies to hospitalizations due to acute exacerbations of the index condition. For example, a hospitalization for acute pulmonary edema in a hypertension patient is considered a PAC. PACs are counted as a dichotomous (yes/no) outcome. If a patient had one or more PACs in the most recent 12 months, they get counted as a "yes" or a 1. The "PAC overview" tab in the enclosed workbook labeled NQF_HTN_all_codes_risk_adjustment_01.25.17.xls gives the percent of HTN episodes that have a PAC and the tab labeled "PAC drill down" gives the types of PACs and their frequencies in HTN episodes within this dataset. The Decision Tree tab in the same workbook highlights the flow diagrams for the selection of patients with HTN for this measure. The information is based on a two-year claims database from a commercial insurer. The database had over 3.2 million covered lives and over $25.9 billion in "allowed amounts" for claims costs. The database is an administrative claims database with medical as well as pharmacy claims.	Outcome	NQF-Not Endorsed; Altarum Institute

Measure Title	Measure Description	Measure Type	Source
Proportion of Patients with Pneumonia that have a Potentially Avoidable Complication (during the episode time window)	Brief Description of Measure: Percent of adult population aged 18+ years with Community Acquired Pneumonia who are followed for one-month, and have one or more potentially avoidable complication (PAC) during the episode time window. Please reference the attached document labeled NQF_PNE_all_codes_risk_adjustment_12_14_15.xls, in the tab labeled PACS I-9 & I-10 for a list of code definitions of PACs relevant to pneumonia. Community Acquired Pneumonia may be managed in an inpatient setting, where the patient is admitted to a hospital within 1-3 days of onset of symptoms, or in milder cases, patients may be hospitalized a little later in the course of illness, or never at all where management could be solely in an outpatient setting. In any of these circumstances, potentially avoidable complications (PACs) may occur during the index stay, in the post-discharge period; or in patients who were never hospitalized, PACs may occur any time during the episode time window. Readmissions due to pneumonia or due to any related diagnosis are also considered as PACs. We define PACs as one of two types: (1) Type 1 PACs - PACs directly related to the index condition: Patients are considered to have a type 1 PAC if they develop one or more complication directly related to pneumonia or its management. Examples of these PACs are respiratory insufficiency, other lung complications, fluid electrolyte acid base problems, sepsis, respiratory failure etc. (2) Type 2 PACs - PACs suggesting Patient Safety Failures: Patients are considered to have a type 2 PAC, if they develop any of the complications related to patient safety failures such as phlebitis, deep vein thrombosis, pressure sores or for any of the CMS-defined hospital acquired conditions (HACs). PACs are counted as a dichotomous (yes/no) outcome. If a patient had one or more PAC in any of the above settings, they get counted as a "yes" or a 1. The enclosed workbook labeled NQF_PNE_all_codes_risk_adjustment_12_14_15.xls serves as an example. The tab labeled PAC overview gives the percent of pneumonia episodes that have a PAC and the tab labeled "PAC drill down" gives the types of PACs and their frequencies in pneumonia episodes within this dataset. The information is based on a two-year claims database from a large regional commercial insurer. The database had 3,258,706 covered lives and $25.9 billion in "allowed amounts" for claims costs. The database is an administrative claims database with medical as well as pharmacy claims.	Outcome	NQF-Endorsed; Health Care Incentives Improvement Institute
Proportion of Pediatric Asthma patients that have Potentially Avoidable Complications (PACs).	Percent of pediatric population aged 2-17 years who were diagnosed with Asthma and were followed for one-year and had one or more of the following potentially avoidable complications (PACs): hospitalization or emergency room visit related to Asthma and their associated professional services; Professional services related to the following conditions: Pneumonia, Lung complications, Respiratory failure, Respiratory insufficiency, Tracheostomy, Mechanical ventilation, Minor lung procedures, Bronchiectasis, Empyema, Lung abscess, Bronchitis, Pulmonary embolism, Acute exacerbation of Asthma, Diabetic emergency with Hypo- or Hyperglycemia, Syncope, coma, hypotension, dizziness, Stroke, Septicemia, meningitis, other infections, Adverse effects of drug overdose, poisoning, Complications of medical care, Surgery, implanted device, grafts, Cardiac dysrhythmias, AMI, coronary thrombolysis, Acute renal failure, Decubitus ulcer, gangrene, arterial thrombosis, Phlebitis, DVT, skin and wound care, Traction, splints, osteomyleitis, Infectious arthritis, Gastritis, ulcer, GI hemorrhage, GI infection, Antiemetics, antiarrhythmic agents, inotropic agents and vasopressors, Antifungals, Antiseptics, other topical agents, Pulmonary hypertension drugs, Drugs for poisoning.	Outcome	NQF-Not Endorsed; Health Care Incentives Improvement Institute
Diabetes, Short-Term Complication Rate (pediatric)	Admission rate for diabetes short term complications in children ages 6 to 17, per 100,000 population (area level rate)	Outcome	NQF-Not Endorsed; Wisconsin Department of Employee Trust Funds an Agency for Healthcare Research and Quality

Measure Concept Inventory

NQF staff compiled a list of relevant measure concepts related to ambulatory care patient safety from the literature review (e.g., peer-reviewed articles, grey literature, etc.). In addition to the complied list below, a list of measure concepts from a systematic review of safety measures in adult primary care are included in this inventory.[1] The aforementioned list presents a wide spectrum of measure concepts from various peer-reviewed journals categorized by safety dimension, measure type, study country, and data sources.

Care Transitions and Handoffs

Measure Title	Measure Description	Measure Type	Source
Ambulatory Care Experiences Survey (ACES) measure of care coordination	Patient Survey: In the last 12 months… (Screen) …are there other doctors or nurses in your personal doctor's office who you have seen for any of your visits? If response is yes or missing: 1) …how often did you feel that these other doctors or nurses had all the information they needed to provide your care? Asked of all respondents: 2) …how often did your personal doctor seem informed and up-to-date about the care you received from specialist doctors? 3) …when your personal doctor sent you for a blood test, x-ray, or other test, did someone from your doctor's office follow up to give you the test results?	Patient Experience	Safran DG, Karp M, Coltin K, et al. Measuring patients' experiences with individual primary care physicians. results of a statewide demonstration project. *J Gen Intern Med*. 2006; 21(1):13-21.
N/A	There are locally agreed written protocols for prescribing across the primary-secondary care interface including hospital initiated prescribing	Structure	Shield T, Campbell S, Rogers A, et al. Quality indicators for primary care mental health services. *Qual Saf Health Care*. 2003;12:100-107.

Diagnostic Safety

Measure Title	Measure Description	Measure Type	Source
N/A	Web-based decision support tools and online reference materials are available to all providers to aid differential diagnosis.	Structure	Singh H, Graber ML, and Hofer TP. Measures to Improve Diagnostic Safety in Clinical Practice. *J Patient Saf*. 2016; epub.
Biopsy Follow-Up	Percentage of new patients whose biopsy results have been reviewed and communicated to the primary care/referring physician and patient by the performing physician.	Structure	CMS Quality Measures Inventory
Communication of Changes in Patient Care: Percentage of Healthcare Professionals Who Affirm That in Their Unit or Area Information Affecting a Patient Diagnosis is Always Communicated Clearly and Rapidly to All Professionals Involved in the Care of That Patient	This measure is used to determine the percentage of healthcare professionals who affirm that in their unit or area information affecting a patient's diagnosis is always communicated clearly and rapidly to all professionals involved in the care of that patient.	Process	AHRQ National Quality Measures Clearinghouse Inventory
N/A	Patients are given information about their condition, treatments, medication (including side effects) and coping strategies	Process	Shield T, Campbell S, Rogers A, et al. Quality indicators for primary care mental health services. *Qual Saf Health Care*. 2003;12:100-107.
Care Coordination: Pending Diagnostic Test Results	Care Coordination related to Pending Diagnostic Test Results is a nurse-sensitive process measure aimed at capturing the percentage of times pending diagnostic test results are documented as being provided to the patient and family in the ambulatory setting as well as the percentage of times that education was documented as being administered to the patient or family related to the pending diagnostic test results.	Process	Martinez K, Battaglia R, Start R, et al. Nursing-sensitive indicators in ambulatory care. *Nurs Econ*. 2015;33(1):59-63.
N/A	Proportion of abnormal diagnostic test results returned but not acted upon within an appropriate time window.	Process	Singh H, Graber ML, and Hofer TP. Measures to improve diagnostic safety in clinical practice. *J Patient Saf*. 2016; epub.
N/A	Proportion of clinical providers who identify a surrogate to review diagnostic test results while on vacation or when leaving employment.	Process	Singh H, Graber ML, and Hofer TP. Measures to improve diagnostic safety in clinical practice. *J Patient Saf*. 2016; epub.

Medication Management and Safety

Measure Title	Measure Description	Measure Type	Source
N/A	Percentage of health plans that include access to MAT in their contracts with providers.	Structure	Centers for Medicare & Medicaid Services
N/A	Institute reporting requirement for opioid-related adverse drug events (ADEs); compare data year-to-year.	Structure	Centers for Medicare & Medicaid Services
Drug orders (Methotrexate)	Clinical decision support provides pended orders for folic acid whenever methotrexate is prescribed.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Drug orders and weight (Hydroxychloroquine)	Clinical decision support provides suggested dosing based on patient's most recent weight.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.

[1]Hatoun J, Chan JA, Yaksic E, et al. A systematic review of patient safety measures in adult primary care. *Am J Med Qual*. 2017;32(3):237-245.

Measure Title	Measure Description	Measure Type	Source
Orders for Immunosuppressants and antibiotics	Enables identification of patients receiving "high-risk" drugs such as cyclophosphamide or rituximab.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Drug orders and lab results (Methotrexate, leflunomide)	Flags labs that are meaningfully abnormal or reflect a trend as opposed to "above the upper limit of normal."	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Orders for NSAID and acid reducer	Incorporates data regarding risk factors from problem list and clinical notes to identify high-risk patients.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Drug orders and ophthalmology procedures or results	Incorporates data regarding risk factors from problem list and clinical notes to identify high-risk patients.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Rituximab and Lab Results for Hepatitis B tests	Incorporates hepatitis test results from clinical notes.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017; 37:1603-1610.
Orders for Immunosuppressants and antibiotics	Incorporates information from allergies and clinical notes to assist in selection of appropriate prophylactic antibiotic.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Drug Orders (cyclosphosphamide, lefunomide, or other teratogenic drug)	Incorporates information from problem list and medications to identify patients of child-bearing age at risk for pregnancy.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Orders for immunosuppressants, PPD and Quantiferon gold results, appropriate TB treatment	Incorporates information from scanned outside hospital records (regarding prior PPD, chest radiograph results, TB treatment).	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Rituximab and Lab Results for Hepatitis B tests	Incorporates information scanned from outside hospital records.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Drug orders and lab results (Methotrexate, leflunomide)	Incorporates information scanned from outside hospital results.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Orders for immunosuppressants, PPD and Quantiferon gold results, appropriate TB treatment	Incorporates PPD results from clinical notes.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Drug orders and opthalmology procedures or results (Hydroxychloroquine)	Real-time clinical decision support provides pended ophthalmology referral after 5 years of use or sooner for high-risk patients.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Rituximab and Lab Results for Hepatitis B tests	Real-time clinical decision support provides pended order for lab test or prophylactic antibiotic when patient with a missing or positive hepatitis B is prescribed rituximab.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Orders for NSAID and acid reducer	Real-time clinical decision support provides pended order for prophylactic acid reducer when high-risk patient receives NSAID.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Orders for Immunosuppressants and antibiotics	Real-time clinical decision support provides pended order for prophylactic antibiotic when patient receives immunosuppressant.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Drug Orders (cyclosphosphamide, lefunomide, or other teratogenic drug)	Real-time clinical decision support suggests possible contraceptive options.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
Drug orders and lab results (Methotrexate, leflunomide)	Real-time triggers when patient has missed labs for >5 months.	Structure	Schmajuk G, Yazdany J. Leveraging the electronic health record to improve quality and safety in rheumatology. *Rhematol Int*. 2017;37:1603-1610.
N/A	Patients on repeat maintenance drugs are offered regular reviews of their medication including monitoring for possible side effects and interactions with other drugs.	Structure	Shield T, Campbell S, Rogers A, et al. Quality indicators for primary care mental health services. *Qual Saf Health Care*. 2003;12:100-107.
N/A	There are written protocols and mechanisms in place for monitoring prescribing of psychotropic drugs.	Structure	Shield T, Campbell S, Rogers A, et al. Quality indicators for primary care mental health services. *Qual Saf Health Care*. 2003;12:100-107.
N/A	Details of currently prescribed maintenance drugs are prominently recorded in the medical record.	Structure	Shield T, Campbell S, Rogers A, et al. Quality indicators for primary care mental health services. *Qual Saf Health Care*. 2003;12:100-107.
N/A	Percentage participating in CMS-endorsed training on pain management.	Structure	Centers for Medicare & Medicaid Services
Appropriate follow-up	Proportion of new opioid prescriptions where patients have a clinical encounter with VA within 4 weeks. This metric is for opioid naive patients receiving their initial prescription.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.

Measure Title	Measure Description	Measure Type	Source
N/A	For incidences in which naloxone is administered to beneficiaries, what percentage of those beneficiaries were receiving Extended release/long-acting opioids.	Process	Centers for Medicare & Medicaid Services
N/A	For incidences in which naloxone is administered to beneficiaries, what percentage of those beneficiaries were receiving A concurrent benzodiazepine prescription.	Process	Centers for Medicare & Medicaid Services
N/A	For incidences in which naloxone is administered to beneficiaries, what percentage of those beneficiaries were receiving Opioid prescriptions exceeding the CDC guideline.	Process	Centers for Medicare & Medicaid Services
Cardiovascular - contraindicated use of calcium-channel blockers	Percent of patients with heart failure who were dispensed a potentially contraindicated calcium-channel blocker.	Process	Pharmacy Quality Alliance
N/A	Percentage of beneficiaries receiving an opioid prescription without other supportive therapies/treatments.	Process	Centers for Medicare & Medicaid Services
N/A	Percentage of naloxone prescriptions issued for beneficiaries receiving opioid prescriptions: Over a certain dose (e.g., exceeding CDC recommended guideline), etc.	Process	Centers for Medicare & Medicaid Services
N/A	Percentage of naloxone prescriptions issued for beneficiaries receiving opioid prescriptions: As a co-prescription with medication assisted treatment for opioid use disorder because these people may be vulnerable to overdose if they relapse.	Process	Centers for Medicare & Medicaid Services
N/A	Percentage of naloxone prescriptions issued for beneficiaries receiving opioid prescriptions: Over a certain period of time (e.g. over 90 days).	Process	Centers for Medicare & Medicaid Services
N/A	Percentage of opioid prescriptions exceeding 7 days of treatment.	Process	Centers for Medicare & Medicaid Services
N/A	Percentage of opioid prescriptions exceeding CDC guideline of 90 morphine milligram equivalents (MME) per day.	Process	Centers for Medicare & Medicaid Services
N/A	Percentage of opioid prescriptions issued vs. all opioid and non-opioid pain management medication prescriptions; vs. referrals to other treatment modalities.	Process	Centers for Medicare & Medicaid Services
N/A	Percentage of opioid prescriptions written for extended release/long-acting opioids.	Process	Centers for Medicare & Medicaid Services
N/A	Percentage of physicians treating a beneficiary diagnosed with opioid use disorder who prescribed one or more MAT medications.	Process	Centers for Medicare & Medicaid Services
N/A	Rate of naloxone administration to beneficiaries.	Process	Centers for Medicare & Medicaid Services
Concurrent Use of Opioids and Benzodiazepines	The percentage of adults with concurrent prescriptions for opioids and benzodiazepines.	Process	Pharmacy Quality Alliance
Triple Threat: Concurrent Use of Opioids, Benzodiazepines or Nonbenzodiazepine Sedative/Hypnotics, and Muscle Relaxants (MDT 7)	The percentage of adults with concurrent prescriptions for opioids, benzodiazepines or nonbenzodiazepine sedative/hypnotics, and muscle relaxants.	Process	Pharmacy Quality Alliance
Inappropriate Duplicate Therapy	The percentage of adults with prescriptions for duplicate therapies	Process	Pharmacy Quality Alliance
Antipsychotic Use in Children Under 5 Years Old	The percentage of children under age 5 using antipsychotic medications during the measurement period.	Process	Pharmacy Quality Alliance
Polypharmacy: Use of Multiple CNS-Active Agents or Anticholinergics in The Elderly	The percentage of older adults with prescriptions for 3 or more CNS- active agents or 2 or more anticholinergics.	Process	Pharmacy Quality Alliance
Diabetes Medication Dosing (DOS)	The percentage of patients who were dispensed a dose higher than the daily recommended dose for the following therapeutic categories of oral hypoglycemics: biguanides, sulfonlyureas, thiazolidinediones and DPP-IV inhibitors. Report each of the following rates separately: • Dosing for Biguanides • Dosing for Sulfonylureas • Dosing for Thiazolidinediones • Dosing for DPP-IV Inhibitors	Process	Pharmacy Quality Alliance
Diabetes - medication dosing	The percentage of patients who were dispensed a dose higher than the maximum recommended dose for each therapeutic category of oral hypoglycemics: biguanides, sulfonylureas and thiazolidinediones.	Process	Pharmacy Quality Alliance
Safety - duplication of therapy (separate measures: sulfonylureas, biguanide, TZD)	The percentage of patients who were dispensed two or more different medications in the same therapeutic class simultaneously.	Process	Pharmacy Quality Alliance
Use of Multiple Antipsychotic Medications	The percentage of patients with concurrent therapy of three or more distinct antipsychotic medications for more than 30 days during the measurement year.	Process	Pharmacy Quality Alliance
Safety - duplication of therapy (calcium-channel blocker)	The proportion of patients with cardiovascular disease who are experiencing therapeutic duplication with calcium-channel blockers.	Process	Pharmacy Quality Alliance
Cardiovascular - avoidance of chronic NSAIDS in patients with heart failure	The proportion of patients with a documented diagnosis of heart failure that do not receive dispensings for an NSAID.	Process	Pharmacy Quality Alliance
Safety - duplication of therapy (ACEI / ARB)	The proportion of patients with cardiovascular disease who are experiencing therapeutic duplication for ACEI/ARB medications.	Process	Pharmacy Quality Alliance
Safety - duplication of therapy (beta-blocker)	The proportion of patients with cardiovascular disease who are experiencing therapeutic duplication for beta-blocker medication.	Process	Pharmacy Quality Alliance

Measure Title	Measure Description	Measure Type	Source
Concurrent Use of Opioids and Benzodiazepines	This measure examines the percentage of individuals 18 years and older with concurrent use of prescription opioids and benzodiazepines.	Process	Pharmacy Quality Alliance
Safety - duplication of therapy (respiratory)	This measure summarizes the percentage of patients who fill 2 or more prescriptions for different medications within the same therapeutic category for 2 or more consecutive fills.	Process	Pharmacy Quality Alliance
Receipt of high-risk prescription drugs (NCQA)	The receipt of any outpatient prescription drug on the High-Risk Medications in the Elderly list.	Process	Lund BC, Carrel M, Gellad WF. Incidence-versus prevalence-based measures of inappropriate prescribing in the Veterans Health Administration. *J Am Geriatr Soc*. 2015;63(8):1601-1607.
Psychosocial treatments	Proportion of opioid therapy patients who receive any of the following treatments within the year: (1) Coping skills/stress management training; (2) Psychotherapy procedures.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
Other pharmacotherapies	Proportion of patients with an opioid prescription who also received any of the following within the year: (1) Nonopioid analgesics including nonsteroidal anti-inflammatory drugs and acetaminophen; (2) Tricyclic antidepressants; (3) Serotonin–norepinephrine reuptake inhibitors; (4) Anticonvulsants; and (5) Topical medications.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
Rehabilitation medicine	Proportion of opioid therapy patients who receive treatments to increase activity including: (1) physical therapy; (2) occupational therapy; (3) special populations therapy; (4) recreational therapy; (5) pain clinic; and (6) others.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
Complementary and alternative medicine treatments	Proportion of opioid therapy patients who receive treatments considered complementary and alternative therapies.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
Risky sedative coprescription	Proportion of patients with overlapping prescriptions for an outpatient opioid and a barbiturate, benzodiazepine, or carisoprodol.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
Acetaminophen overprescription	Proportion of patients with overlapping prescriptions that total more than 3 g/ day or more than 4 g/day of acetaminophen.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
Frequency of potential DDI's in health plan members served by medical groups	Frequency of potential DDI's in health plan members served by medical groups.	Process	Solberg LI, Hurley JS, Roberts MH, et al. Measuring patient safety in ambulatory care: potential for identifying medical group drug-drug interaction rates using claims data. *Am J Manag Care*. 2004;10(11):753-759.
Safety - drug-drug interactions (alert overridden)	Percentage of DDI interaction alerts (level one severity) that were overridden by the pharmacists and dispensed as written.	Process	Pharmacy Quality Alliance
Safety - drug-drug interactions (alert with change in medication)	Percentage of DDI interaction alerts (level one severity) that were responded to by pharmacists, with a different medication dispensed.	Process	Pharmacy Quality Alliance
Safety - drug-drug interactions (alert with no medication dispensed)	Percentage of DDI interaction alerts (level one severity) that were responded to by pharmacists, with no medication dispensed.	Process	Pharmacy Quality Alliance
Safety - drug-drug interactions (incidence)	The percentage of patients who received a prescription for a target medication during the measurement period and who were dispensed a concurrent prescription for a precipitant medication.	Process	Pharmacy Quality Alliance
MTM - Drug Therapy Problem Resolutions	The percentage of drug therapy problem recommendations resolved as a result MTM services.	Process	Pharmacy Quality Alliance
Provision of MTM Services Post Hospital Discharge	The percentage of high-risk patients that have been discharged from the hospital and that receive MTM from a pharmacist within 7 days (Quality Improvement Indicator- not intended for comparative purposes).	Process	Pharmacy Quality Alliance
MTM - Medication Therapy Problem Resolution (MDT 9)	Not given.	Process	Pharmacy Quality Alliance
Care Coordination: Medication Reconciliation	Care Coordination related to Medication Reconciliation is a nurse-sensitive process measure aimed at capturing the percentage of times the medication reconciliation tool was documented as provided to the patient and family in the ambulatory setting as well as the percentage of times that education was documented as being administered to the patient or family related to the medication reconciliation process.	Process	Martinez K, Battaglia R, Start R, et al. Nursing-sensitive indicators in ambulatory care. *Nurs Econ*. 2015;33(1):59-63.
Medication Reconciliation - High risk patients making transition to ambulatory care with medication reconciliation at community pharmacy	Percent of high risk patients with a new prescription or renewal of a prescription for whom their medications were reconciled.	Process	Pharmacy Quality Alliance
QII: Medication Reconciliation Upon Admission to Long-Term Care (MDT 4)	The percentage admissions to LTC for which medication reconciliation was completed by a pharmacist within 3 days.	Process	Pharmacy Quality Alliance
Medication Reconciliation - evidence of a patient's personal medication list	The percentage of patient encounters where a patient's personal medication list is available.	Process	Pharmacy Quality Alliance
Medication Reconciliation - patient personal medication list portability	The percentage of patient encounters where the patient is provided a reconciled personal medication list compared to the number of patient encounters.	Process	Pharmacy Quality Alliance

Measure Title	Measure Description	Measure Type	Source
Medication Reconciliation - personal medication list creation	The percentage of patients where a documented personal medication list was created among patients without a documented personal medication list.	Process	Pharmacy Quality Alliance
Medication Reconciliation - patient's personal medication list discrepancies resolved	The percentage of the patient's personal medication list discrepancies resolved per patient encounter compared to the patient's personal medication list discrepancies identified per patient encounter.	Process	Pharmacy Quality Alliance
Medication Reconciliation - patient's personal medication list comprehensive review and reconciliation	The proportion of pharmacist-patient encounters where a patient's personal medication list is reviewed, updated, and reconciled.	Process	Pharmacy Quality Alliance
Documentation of Current Medications in the Medical Record (0-18 yo) (variation on NQF 0419)	N/A	Process	PRIME Projects and Metrics Protocol. From the Alameda Health System
Misuse risk: Psychiatric at-risk SUD	Proportion of patients with a substance use disorders (SUD) diagnosis not in remission seen in a specialty SUD setting for SUD treatment AND with urine drugs screens (UDSs)/labs within every 90 days supply of the opioid.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
All patients receive UDSs/screens	Proportion of patients receiving an opioid prescription that received the following: (1) drug screen for nonopioid abusable substances; (2) drug screen for heroin/morphine; and (3) drug screen for nonmorphine opioid compounds.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
N/A	Comparison of number of Part D prescription drug events (PDEs) for buprenorphine-naloxone across calendar years (looking for an increase in PDEs year-to-year).	Process	Centers for Medicare & Medicaid Services
Safety - high-alert drug review (2 indicators)	#1 Percentage of high alert drug reviews conducted by a pharmacy when presented with a high alert drug prescription. #2 Percentage of patients receiving counseling when receiving a prescription for a high alert drug	Process	Pharmacy Quality Alliance
N/A	No drug is prescribed unless the health professional understands the potential efficacy and side effects.	Process	Shield T, Campbell S, Rogers A, et al. Quality indicators for primary care mental health services. *Qual Saf Health Care*. 2003;12:100-107.
Bowel Regimen with Opioid Therapy	Percentage of persons prescribed an opioid regimen with / without a bowel regimen.	Process	Pharmacy Quality Alliance
Absolutely contraindicated opioid prescriptions	Number of new opioid prescriptions that are for a high-dose opioid formulation.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
Medication management/pharmacy reconciliation	Proportion of opioid therapy patients with evidence of medication management or pharmacy reconciliation.	Process	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
Override rate for prescription drug alert	Override ratio; override ratio per 100 prescriptions, and override rate per 100 alerts.	Process	Cho I, Slight SP, Nanji KC, et al. The effect of provider characteristics on the responses to medication-related decision support alerts. *Int J Med Inform*. 2015;84(9):630-639.
Cardiovascular - INR monthly testing for patients on anticoagulants	Average percentage of monthly intervals in which patients having claims for warfarin do not receive an INR test during the measurement period.	Process	Pharmacy Quality Alliance
Bowel regimen	Proportion of patients with an outpatient opioid prescription who are prescribed a bowel regimen.	Process	Shield T, Campbell S, Rogers A, et al. Quality indicators for primary care mental health services. *Qual Saf Health Care*. 2003;12:100-107.
Hospital Admission or ED Visit for Bleeding Events Associated with Anticoagulant Medications (MDT 1)	The rate of events among individuals receiving anticoagulant medications that have evidence of a hospitalization or emergency department visit related to a bleeding event.	Outcome	Pharmacy Quality Alliance
Serious Hypoglycemic Events Requiring Hospital Admission or ED Visit Associated with Anti- Diabetic Medications	The rate of events among individuals receiving anti-diabetes medications that have evidence of a hospitalization or emergency department visit related to a hypoglycemic event and expressed as number of events per member-months. This measure is used among plans with both prescription and medical claims/services, and a lower value is indicative of higher quality.	Outcome	Pharmacy Quality Alliance
Hospital, Emergency Department, and/or Urgent Care Utilization Related to Prescription Opioids (MDT 6)	The rate of events among individuals receiving prescription opioid medications that have evidence of opioid-related hospitalizations, ED visits, and/or urgent care visits.	Outcome	Pharmacy Quality Alliance
Readmission of Patients Provided MTM Services Post Hospital Discharge	The percentage of high-risk patients that received MTM from a pharmacist within 7 days post hospital discharge that are readmitted within 30 days of their discharge (Quality Improvement Indicator- not intended for comparative purposes).	Outcome	Pharmacy Quality Alliance
Serious adverse effects	Proportion of patients with evidence of a serious adverse effect that might be related to opioid therapy in the 6 months following an opioid prescription.	Outcome	Midboe AM, Lewis ET, Paik MC, et al. Measurement of adherence to clinical practice guidelines for opioid therapy for chronic pain. *Transl Behav Med.* 2012;2(1):57-64.
MTM - Patient Survey Following Comprehensive Medication Review (MDT 4)	Patient satisfaction/experience with Comprehensive Medication Review.	Patient Experience	Pharmacy Quality Alliance

Prevention of Adverse Events

Measure Title	Measure Description	Measure Type	Source
Respiratory - adverse event from inhaled corticosteroids	The percentage of non-immunocompromised patients who were dispensed an inhaled corticosteroid who were also dispensed oral antifungal therapy within 30 days.	Outcome	Pharmacy Quality Alliance

Safety Culture

Measure Title	Measure Description	Measure Type	Source
Primary Care Patient Measure of Safety (PC PMOS) questionnaire	50-item questionnaire covering 15 domains of patient safety. The questionnaire measures factors contributing to safety from the patient perspective.	Patient Experience	Hernan AL, Giles SJ, Fuller J, et al. Patient and carer identified factors which contribute to safety incidents in primary care: a qualitative study. *BMJ Qual Saf.* 2015;24(9):583-593.

Appendix E: Key Informant Interview Questions

Introduction

Thanks for joining us. Our understanding is that you are a stakeholder with interest and expertise in the field of ambulatory care patient safety.

We are holding this interview to inform our environmental scan of measures or measure concepts related to ambulatory care patient safety. Before we get started, I'd like to share a brief description of the project and our work done to date.

According to reports from the Centers for Disease Control and Prevention, more than 83 percent of U.S. adults use ambulatory care services annually. Although there has been tremendous research on patient safety in inpatient settings, less is known about addressing safety issues in ambulatory care.

This work, funded under NQF's contract with the Department of Health and Human Services, includes an environmental scan to identify existing measures, measures in development, and measure concepts related to ambulatory care patient safety in the nonelderly population. We sought nominations for six Advisory Group members to help guide us in conducting an environmental scan of performance measures. We are conducting this interview to supplement our findings from the environmental scan, which could include the identification of additional measures, gaps in measurement, and any best practices and challenges related to measurement of patient safety in the ambulatory care setting.

We do have an hour for this call, so we will try to fit in as much as we can in this limited time. We have some questions to guide the interview, but feel free to provide any information that you feel would be relevant or helpful.

Everything you tell us will be confidential. At any time during our conversation, please feel free to let me know if you have any questions or if you would rather not answer any specific question. You can also stop the interview at any time for any reason.

Please remember that we want to know what you think and feel and that there are no right or wrong answers. Do you have any questions?

Role and Organization

I'd like to begin by asking you some questions about your current job.

- Can I please confirm your role within your organization? What are your major responsibilities in your current position?
- Can you tell me a bit about your work and experience as it relates to ambulatory care patient safety?

Now, let's talk about your organization.

- What is your organization's experience with developing or using measures of ambulatory care patient safety?
- Have you partnered with other organizations on these efforts? Who are they? What is the nature of the relationship with those organizations?

Measures/Measure Concepts

I'd like to ask you some questions about measures and measure concepts related to ambulatory care patient safety.

- In your opinion, what indices or existing measures best capture ambulatory care patient safety?
- Do you know of any data sources that could/should be leveraged to assist in the measurement of ambulatory care patient safety?
- Are you aware of any measure concepts related to ambulatory care patient safety?

Measurement Gaps

- Can you describe any gaps or areas in greatest need of improvement in measurement of ambulatory care patient safety?

Best Practices and Challenges

- In your opinion, what are the most impactful best practices to address ambulatory care patient safety?
- In your opinion, what are the greatest challenges with analyzing or measuring ambulatory care patient safety?

General Considerations

That concludes our specific questions. Time permitting, we would like to ensure that you do not have any other thoughts that we did not capture.

- What would you take into consideration if you were developing new quality measures that evaluate ambulatory care patient safety?
- What is the most important message that you want us to take away from this interview?
- Is there anything else that you would like to add about any of the topics that we've discussed or other areas that we didn't discuss but you think are important?
- If you know of any research, tools, or resources that may be useful to include in the environmental scan, please send them to me.

Thank you for your time and participation in this interview. The information that you provided to us will be very helpful.