Ambulatory Care Patient Safety

ENVIRONMENTAL SCAN REPORT

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NATIONAL QUALITY FORUM

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EXECUTIVE SUMMARY

Measurement of patient safety in ambulatory care settings is critical to promoting better and safer care for patients and families. Yet the current landscape of performance measures that can assess patient safety in ambulatory care is poorly understood. The National Quality Forum (NQF), with funding from the Department of Health and Human Services (HHS), engaged an advisory group of experts to provide guidance for an environmental scan of existing ambulatory care patient safety measures and measure concepts to help inform the future development of priority measures.

The project aimed to identify a representative sample of measures and measure concepts that apply to care provided by clinicians, health plans, health systems and others engaged in ambulatory care. The environmental scan identified measures along the full spectrum of development. NQF found measures that are evidence-based, have been tested, and have high reliability and validity. Other measures are concepts that could be developed into performance measures but may lack clinical evidence and/or testing.

NQF identified 55 performance measures and 297 measure concepts (see **Appendix D**). For the purposes of the environmental scan, NQF defined a measure as an assessment tool that aggregates data to assess the structure, processes, and outcomes of care within and between entities. NQF defined a measure concept as a description of an existing or potential assessment tool or instrument that includes planned target and population.

Based on a literature review and input from the advisory group, measures and concepts were grouped into one of the following categories:

- medication management and safety;
- care transitions and handoffs;
- diagnostic safety;
- prevention of adverse events and complications; and
- and safety culture

NQF also conducted key informant interviews with experts who practice or research patient safety in ambulatory care to provide input on important areas for measure development based on the findings of the environmental scan. The advisory group and key informants identified antibiotic overuse and opioid prescription patterns as some of the most important topical areas for measurement. Both key informants and advisory group members acknowledged the barriers to measure development in ambulatory care. For example, there is lack of standardized methods for data collection, poor interoperability between medical record systems, and a lack of funding for clinical informatics to support continuous quality improvement.

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 diagnostic error, patient self-management, health information technology, prevention of adverse events, and other issues. Measures are also lacking to assess the safety of ambulatory care provided to the pediatric population. In addition, few measures assess communication between primary care and specialty providers, transitions of care, and patient engagement. Patient engagement measures are critical for improvement 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.

INTRODUCTION

Adverse patient safety events 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 in hospitals each year. Since the report, there have been marked improvements in national patient safety, such as an estimated 50,000 deaths averted between 2010 and 2013.[1] Patient safety research and measurement have largely focused on adverse events in hospital 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 2 to 3 percent of visits compared to 10 percent of hospitalizations.[4] Given the large number of individuals who seek care in ambulatory settings, there is a need to focus on improving patient safety in these settings. 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 challenges for measurement and research.

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 patient safety in ambulatory care and noted that relatively few studies have been conducted to improve safety.[6] Similarly, in 2016, the Agency for Healthcare Research and Quality (AHRQ) found crucial knowledge and implementation gaps around ambulatory safety issues.[7] Despite the opportunity for medical errors in ambulatory settings, there is no systematic approach to measurement and reporting.

Several barriers impede the measurement of patient safety in ambulatory care settings. First, ambulatory care often involves short, infrequent, or irregular interactions between patients and providers, which makes establishing a measurement period or episode of care challenging.[8] Second, the lack of standardized measures itself results in a limited evidence base for the nature and frequency of patient safety events and interventions to reduce them. 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. In addition, the heterogeneity across providers, professionals, and patient populations may undermine the comparability of measure results.

Despite these challenges, the number of measures that can assess patient safety in ambulatory care settings is growing. 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.[9] Measurement of patient safety in ambulatory care remains essential to promote the health and well-being of patients and families. Measuring patient safety can also foster trust between patients and healthcare professionals by promoting transparency.[10] Finally, ensuring patient safety in ambulatory care is increasingly important as the nation moves toward value-based care, accountability, and consumer choice.[11]

PROJECT PURPOSE AND APPROACH

With funding from the Department of Health and Human Services (HHS), the National Quality Forum (NQF) engaged an Advisory Group of experts to explore the complex intersection of issues related to measurement of patient safety in ambulatory care. The Advisory Group guided an environmental scan of measures to identify and inform the development of priority measures for patient safety in ambulatory care settings. The project aimed 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 did not attempt to identify all existing measures and measure concepts. Instead, NQF sought to identify a representative sample of ambulatory care patient safety measures. The measures included in the scan vary based on available evidence, scientific acceptability, use, and stage of development. The measures captured in the scan are included in an inventory posted to the NQF project webpage and in Appendix D. Inclusion in the environmental scan does not represent endorsement of a measure by NQF or a recommendation for use.

NQF developed search terms and research questions based on guidance from the Advisory Group at the 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 C. The measures collected apply only to care provided to patients under the age of 65.

For the purpose of this project, **ambulatory care** is defined as primary and specialty care provided in settings such as physicians', doctors', and nurse practitioners' offices, clinics, and urgent care centers. This project does not include measures that assess care that occurs in specialized outpatient settings such as physical, speech, and occupational therapy; ambulatory surgery centers; etc. Table C1 in Appendix C provides a complete list of the excluded settings. **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.

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 important areas for measurement and measure gaps.

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 Group, 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 scan (see Appendix D). In addition, the initial scan identified 417 measure concepts potentially related to ambulatory care patient safety. Using a process similar to the initial measure review, this list was later reduced to a final set of 289 ambulatory safety-related measure concepts (see Appendix D). Please note that measures and concepts identified vary in that some may be applied more broadly, such as closing referral loops, while other measures capture a small segment of ambulatory settings, such as monitoring for high-risk medication use.

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 289 measure concepts, 207 are process measures, 15 are outcome measures, 63 are structure measures, three are patient experience measures, and one is an intermediate outcome measure. Table 3 includes measures and concepts identified according to one of five measurement themes.

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
Program: QIO	3
Population	15
Other	4
All	1
Not Specified/Available	10

TABLE 3. MEASURES AND CONCEPTS BY THEME

By Theme	# Measures	# Concepts
Medication Management and Safety	17	228
Care Transitions and Handoffs	10	2
Diagnostic Safety	13	16
Prevention of Adverse Events	15	2
Safety Culture	0	41

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 Group.

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".

Medication errors may relate to inadequate or harmful professional practice, healthcare 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, medication prescribing patterns, or practices intended to reduce medication safety related adverse events.

Measures

NQF identified 17 measures related to medication management and safety, including nine NQF-endorsed measures (Appendix D **page 30**). These measures assess 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—228 concepts—are related to medication management and safety (Appendix D **page 49**). 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, NQF identified several measure concepts that assess the prevention of ADEs.

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

NQF identified 10 measures related to care transitions and handoffs (Appendix D **page 25**). Seven 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

NQF identified two measure concepts (Appendix D **page 44**) related to care transitions and handoffs. 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, and offer another potential area for safety improvement; IOM has estimated that at least 5 percent of adults seeking outpatient care experience a diagnostic error.[15]

In line with IOM's 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

NQF identified 13 measures related to diagnostic safety (Appendix D **page 28**). 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

NQF also identified 16 measure concepts (Appendix D **page 45**). 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 of test results.

Prevention of Adverse Events and Complications

NQF identified several measures intended to assess the prevention or occurrence of preventable adverse events or complications in ambulatory care other than medication-related events. 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" (Appendix D **page 34**). 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. NQF also identified 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

NQF identified two measure concepts that assess adverse events—one related to adverse events from inhaled corticosteroids, and one based on voluntary reporting of near-misses and adverse events in the ambulatory setting (Appendix D **page 83**).

Safety Culture

Organizational culture has a significant impact on quality and safety in healthcare, and 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 41 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 (Appendix D **page 83**). 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 semistructured interviews, intended to supplement the environmental scan, 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 the ambulatory care setting identified similar priorities.[7] The following section describes the themes identified through the interviews.

Antibiotic Overuse

Like all 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] Growing evidence supports the need for antibiotic stewardship goals and the assessment of adherence to such guidelines in the outpatient setting. These goals and guidelines are in place both to protect individual patients from antibiotic-related adverse drug events (ADEs) and to prevent antibiotic resistance in individuals and communities.

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 Care, 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 growing evidence supports 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 less-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 tool, 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 perceptions of 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] There have been some efforts to elicit patient reports of adverse events and errors, such as the Health Care Safety Hotline, a pilot-tested consumer reporting system.[42] The authors concluded that the hotline offered a feasible method for consumer-oriented patient safety reporting; however, research is needed to determine how to increase consumers' use of such systems.

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 culture assessments, and providing opportunities for education and training.[43] 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 Care Safety

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: the child's physical characteristics (e.g., weight), development (e.g., physiological), and minor legal status (e.g., dependence on parent).[44] 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." [44]

Further, children may be less likely to verbalize whether they are experiencing adverse reactions, which, if not addressed, could cause harm.[45] 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.[46] 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.[45] 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.[47,48]

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.[49]

Barriers to Measurement

The Advisory Group and key informants noted the lack of standard ways to collect data and limited 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.[50]

Members of the Advisory Group 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.[51] 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.[51] Greater interoperability between systems can also allow for linking datasets to create a more complete picture of patient safety across different care settings such as the ambulatory settings. 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. Hence, there is a need to develop measure concepts that would measure interoperability related to patient safety in ambulatory care settings.

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

The Advisory Group and key informants identified several gaps in measurement 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 members in patient-centered medical homes, such as case managers for clients with co-morbid conditions, could provide insights into staffing models that can enhance patient safety.[52] Additional research and measures around physician burnout were also noted as areas of need, and may be especially important to consider given research associating burnout with safety culture.[53]

Access Measures

There are additional gaps in access measures related to patient safety in ambulatory care settings. Measures that assess access to ambulatory care settings ensure that patient health needs are met, medical care needs are met in a timely manner, and that appropriate services (e.g., financial needs, preventative services, etc.) are available. A key informant noted the importance to develop measures in ambulatory care settings that measure visit wait times and the access to interpreters when needed.

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."[54] 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.[55] 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.[56] 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.[55]

PUBLIC COMMENTS

A draft version of this report was posted for a 30-day comment period to gain feedback and input from members of the public. Comments were submitted on behalf of three organizations; the comments generally fell into one of the themes identified below. Submitted comments can be viewed in full in **Appendix F**.

Measurement of Hypoglycemic Events

A commenter noted that while diabetes agents that cause hypoglycemia have been identified as one of the top three priorities in the National Action Plan for Adverse Drug Event Prevention,[57] there are currently no measures for capturing patient-reported hypoglycemic events in the ambulatory setting. The commenter observed that the environmental scan identified one measure and one measure concept related to this issue, but suggested that patient reports may be a better source for reliable information on hypoglycemic events, and urged development of measures in this area.

Safety of Ambulatory Care for Pediatric Patients

A commenter recommended that ensuring safe care for all infants, children, and adolescents should be a critical component of efforts to improve safety in the ambulatory setting. The commenter noted specific issues that have a significant impact on pediatric safety, including continuity of care, access to subspecialty care and therapies, developmental screening, adolescent privacy, care coordination and care transitions—particularly for high-risk diagnoses, patient/parent health literacy, ADHD, appropriate use of medications following therapy, use of codeine in children, and pediatric-specific EHR functionality.

Need for Caution in Developing and Implementing Measures in the Ambulatory Setting

Several commenters highlighted the importance of developing and implementing measures for which there is clear evidence of linkages between processes or structures and relevant outcomes, and measures that are feasible to collect and report. Commenters reiterated that there are many challenges to measurement in the ambulatory setting, including limited evidence, and suggested that it may be particularly difficult to develop meaningful outcome measures at this time. The commenters also urged stakeholders to take measurement approaches that will be useful for performance improvement and that will not add unnecessary documentation burden.

THE PATH FORWARD

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. Other challenges include differences between individual providers and hospitals that may face different types of risks and relationships with patients (i.e., hospitals with large budgets have a greater risk of being sued than clinics or other ambulatory settings).

Some perceive the risk of harm in ambulatory care settings to be relatively low.[58] 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.[59] 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 with 119 different definitions.[60]

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 engagement. 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.[61]

Despite the many challenges, promising initiatives could lead to the development of measures and the uptake of quality improvement strategies in 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 preventive mechanisms to protect patients.[62] 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.[63] Tool kits also can help primary care organizations create a culture of safety, introduce reporting systems, and reduce adverse safety-related incidents.[64,65]

The Advisory Group identified several areas where measure development could have an especially significant impact on the safety of ambulatory care. The identification and prevention of diagnostic errors is one such area. Specifically, Advisory Group members noted that management of high-risk referrals and abnormal test results are

major vulnerabilities for patients in the ambulatory setting, and that there may be opportunities for technology to help busy clinicians identify information and patients that might otherwise be lost to follow-up. Another area of opportunity is measurement of patients' role in achieving safety in the outpatient setting, including treatment adherence and shared decision making. Measures that meaningfully address patient engagement and patient self-management could have a transformative impact on patient safety in ambulatory care.

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.[66] 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 select key concepts for measure development.

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

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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 clinicians and facilities can use to improve safety in ambulatory care. NQF staff compiled an 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 the 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 solicited 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 underwent a 30-day public comment period from March 16 through April 16, 2018. Subsequently, NQF staff gathered the public comments and presented them to the Advisory Group during the third web meeting. NQF staff then incorporated 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 as defined in Table C1. NQF used the search terms outlined in the subsection below and the search parameters (Table C1). 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 C1. 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.[a]

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?

Additionally, NQF staff identified 55 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 five key informant interviews in addition to the review of the literature and environmental scan. NQF staff developed a semistructured 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 C2 lists the key informants.

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

TABLE C2. 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 and 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. 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. 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. 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. http://www.commonwealthfund.org/~/media/files/publications/issue-brief/2011/nov/1550_chan_ehr_based_care_coord_ib_v2.pdf. Last accessed March 2018.

Care Transitions and Handoffs (measures, continued)

Measure Title	Measure Description	Measure Type	Source
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. 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. 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

Care Transitions and Handoffs (measures, continued)

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

Diagnostic Safety (measures, continued)

Measure Title	Measure Description	Measure Type	Source
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
Cancer Detection Rate	The percentage of screening mammograms interpreted as positive (BIRADS 0, 4 or 5) that had a tissue diagnosis of cancer with 12 months.	Outcome	NQF-Not Endorsed; American College of Radiology
Diagnostic Mammography Positive Predictive Value 2 (PPV2 - Biopsy Recommended)	Percentage of diagnostic mammograms recommended for biopsy or surgical consult (BIRADS 4 or 5) that result in a tissue diagnosis of cancer within 12 months. The measure is to be reported annually based on aggregated patient data for mammograms performed 12 to 24 months prior to the reporting date to allow a 12 month follow up.	Outcome	NQF-Not Endorsed; American College of Radiology
Screening Mammography Positive Predictive Value 2 (PPV2 - Biopsy Recommended)	Percentage of screening mammograms with abnormal interpretation (BIRADS 0, 4 or 5) that result in a tissue diagnosis of cancer within 12 months. The measure is to be reported annually based on aggregated patient data for mammograms performed 12 to 24 months prior to the reporting date to allow a 12 month follow up.	Outcome	NQF-Not Endorsed; American College of Radiology
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 Management and Safety (measures, continued)

Measure Title	Measure Description	Measure Type	Source
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

Medication Management and Safety (measures, continued)

Measure Title	Measure Description	Measure Type	Source
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

Medication Management and Safety (measures, continued)

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: Outpatient	This measure is used to assess the percentage of outpatients with pressure ulcer(s) whose medical record contains documentation of a comprehensive patient assessment and thorough wound evaluation that includes the following: • History and physical • Wound description/staging • Etiology of pressure • Nutritional status • Bacterial colonization/infection • Psychosocial needs (anxiety, depression, worries)	Process	Institute for Clinical Systems Improvement
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

Prevention of Adverse Events and Complications (measures, continued)

Measure Title	Measure Description	Measure Type	Source
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
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

Prevention of Adverse Events and Complications (measures, continued)

Measure Title	Measure Description	Measure Type	Source
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

Prevention of Adverse Events and Complications (measures, continued)

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

Prevention of Adverse Events and Complications (measures, continued)

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

Prevention of Adverse Events and Complications (measures, continued)

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

Prevention of Adverse Events and Complications (measures, continued)

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

Prevention of Adverse Events and Complications (measures, continued)

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

Prevention of Adverse Events and Complications (measures, continued)

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

Prevention of Adverse Events and Complications (measures, continued)

Measure Title	Measure Description	Measure Type	Source
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 and are marked with an asterisk.[a] 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.

a 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.

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.

Diagnostic Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	The measure assesses the proportion of testing process errors related to communication including errors in communication with: patients, other providers sharing patient care, and/or errors in communication between the whole healthcare team.*	Process	Hickner J, Graham DG, Elder NC, et al. Testing process errors and their harms and consequences reported from family medicine practices: a study of the American Academy of Family Physicians National Research Network. *Qual Saf Health Care*. 2008;17(3):194-200. doi:10.1136/qshc.2006.021915.
N/A	The measure assesses the proportion of testing process errors related to notifying the patient of results including: failure to notify patient of test result, failure to notify patient test result in a timely fashion, failure to notify patient of test result in a sensitive manner, test results given to wrong patient, informed patient about same result more than once, incorrect test results given to patient, and/or notifying patients of investigation results (not otherwise specified).*	Process	Hickner J, Graham DG, Elder NC, et al. Testing process errors and their harms and consequences reported from family medicine practices: a study of the American Academy of Family Physicians National Research Network. *Qual Saf Health Care*. 2008;17(3):194-200. doi:10.1136/qshc.2006.021915.
N/A	The measure assesses the proportion of testing process errors related to treatments including medication errors.*	Process	Hickner J, Graham DG, Elder NC, et al. Testing process errors and their harms and consequences reported from family medicine practices: a study of the American Academy of Family Physicians National Research Network. *Qual Saf Health Care*. 2008;17(3):194-200. doi:10.1136/qshc.2006.021915.
N/A	This measure assesses the proportion of alerts for abnormal radiologic findings, flagged as requiring action by staff radiologists that had documented response to the alert in the EMR.*	Process	Singh H, Thomas EJ, Mani S, et al. Timely follow-up of abnormal diagnostic imaging test results in an outpatient setting: are electronic medical records achieving their potential? *Arch Intern Med*. 2009;169(17):1578-1586.
N/A	This measure assesses the proportion of alerts for abnormal radiologic findings, flagged as requiring action by staff radiologists that were acknowledged within two weeks.*	Process	Singh H, Thomas EJ, Mani S, et al. Timely follow-up of abnormal diagnostic imaging test results in an outpatient setting: are electronic medical records achieving their potential? *Arch Intern Med*. 2009;169(17):1578-1586.

Diagnostic Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of testing process errors related to clinician responding to the results including: responded incorrectly to test results, failure to notice or respond to abnormal test results, failure to notice will respond to abnormal test results in a timely manner, inappropriately responded to incomplete test results, failure to notice or respond to normal test results, failure to notice or respond to normal test results in a timely manner, and/or responding to investigation results (not otherwise specified).*	Process	Hickner J, Graham DG, Elder NC, et al. Testing process errors and their harms and consequences reported from family medicine practices: a study of the American Academy of Family Physicians National Research Network. *Qual Saf Health Care*. 2008;17(3):194-200. doi:10.1136/qshc.2006.021915.
N/A	This measure assesses the proportion of testing process errors related to reporting results to the clinician including: failure to report test results in a timely manner, failure to report correct results (wrong values on report), results never received my office, incorrect interpretation of results by facility or laboratory, previous results, images and specimens could not be found for comparison, Incorrect/incomplete information on reports, failure to report test results to provide a requesting test, and/or errors in reporting investigations to office (not otherwise specified).*	Process	Hickner J, Graham DG, Elder NC, et al. Testing process errors and their harms and consequences reported from family medicine practices: a study of the American Academy of Family Physicians National Research Network. *Qual Saf Health Care*. 2008;17(3):194-200. doi:10.1136/qshc.2006.021915.
N/A	This measure assesses the proportion of testing process errors related to test implementation including: requested test not done (including specimen not drawn, image not booked), specimen improperly collected or stored/old or in adequate specimen, specimen lost, specimen/patient sent to wrong facility, delay in obtaining specimen, wrong specimen obtained, stat or urgent test not processed or scheduled urgently, wrong test performed rescheduled, right test performed wrongly, failure to instruct patient how to prepare for investigation, test done but results lost, failure to alter medications for diagnostic procedure, and/or errors in implementing investigations (not otherwise specified).*	Process	Hickner J, Graham DG, Elder NC, et al. Testing process errors and their harms and consequences reported from family medicine practices: a study of the American Academy of Family Physicians National Research Network. *Qual Saf Health Care*. 2008;17(3):194-200. doi:10.1136/qshc.2006.021915.

Diagnostic Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of testing process errors related to test ordering including: needed test not ordered, wrong test ordered, unnecessary tests ordered, ordered tested wrong time, contra-indicated test ordered, wrong test/patient name recorded in law, test not entered into log; not border misinterpreted, incomplete or a loud illegible lab order slip, and/or errors in ordering investigations (not otherwise specified).*	Process	Hickner J, Graham DG, Elder NC, et al. Testing process errors and their harms and consequences reported from family medicine practices: a study of the American Academy of Family Physicians National Research Network. *Qual Saf Health Care*. 2008;17(3):194-200. doi:10.1136/qshc.2006.021915.

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.
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.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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.
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

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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
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.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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
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

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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.
N/A	This measure assesses NSAID dosing by calculating the total daily defined doses of NSAIDs divided by the number of patients standardized for age and level of morbidity, divided by number of days worked by the prescriber.*	Process	Fernández Urrusuno R, Pedregal González M, Torrecilla Rojas MA. Development of NSAIDs prescription indicators based on health outcomes. *Eur J Clin Pharmacol*. 2008;64(1):61-67. doi:10.1007/s00228-007-0384-3.
N/A	This measure assesses the change in average proton pump inhibitor (PPI) pills per month in the one month after a pharmacist's recommendation to taper the PPI as compared to the average PPI pills per month in the five months before, for any patient not requiring long- term PPI therapy.*	Process	Bundeff AW, Zaiken K. Impact of clinical pharmacists' recommendations on a proton pump inhibitor taper protocol in an ambulatory care practice. *J Manag Care Pharm JMCP*. 2013;19(4):325-333.
N/A	This measure assesses the proportion of all patients, excluding those with Raynaud's disease, who are prescribed a short-acting nifedipine.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588502
N/A	This measure assesses the proportion of female patients older than 35yrs, who are current cigarette smokers, who are prescribed a combined hormonal contraceptive.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588513
N/A	This measure assesses the proportion of female patients with a body mass index greater than or equal to 40 who are prescribed a combined hormonal contraceptive.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588514

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of female patients with a history of breast cancer who are prescribed transdermal estrogens.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588511
N/A	This measure assesses the proportion of female patients with a history of venous or arterial thromboembolism who are prescribed a combined hormonal contraceptive.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588510
N/A	This measure assesses the proportion of female patients with an intact uterus who are prescribed oral or transdermal estrogen without progesterone.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588512
N/A	This measure assesses the proportion of patients aged > 40yrs and with cardiovascular disease risk > 20% who are prescribed a COX II selective NSAID.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol.* 2012;12(1):5.
N/A	This measure assesses the proportion of patients older than 50 years who are prescribed combined hormone replacement therapy for greater than or equal to five years.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients over 50 years old without a hysterectomy who are prescribed estrogens without cyclical progestogen.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients receiving a beta-blocker who are prescribed verapamil.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588525
N/A	This measure assesses the proportion of patients receiving a nitrate or nicorandil who are prescribed a phosphodiesterase type-5 inhibitor (e.g. sildenafil).*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588522
N/A	This measure assesses the proportion of patients receiving an ACE inhibitor or angiotensin II receptor antagonist who are prescribed a potassium salt or potassium-sparing diuretic (excluding aldosterone antagonists, such as spironolactone).*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588524
N/A	This measure assesses the proportion of patients receiving simvastatin who are prescribed clarithromycin or erythromycin with no evidence of being advised to stop the simvastatin while taking the antibiotic.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588523
N/A	This measure assesses the proportion of patients treated with a beta-blocker who are prescribed verapamil or diltiazem.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with a strong opioid (morphine > 10 mg or equivalent) for > 4 weeks who are not prescribed a laxative.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients treated with active asthma without COPD who are prescribed a non-cardio-selective oral beta-blocker.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with active asthma, defined by having a prescribed beta agonist inhaler in the last year, and without COPD, who are prescribed any oral beta blocker.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with an ACE-inhibitor or angiotensin receptor blocker (ARB) and a diuretic who are prescribed an oral nonsteroidal anti-inflammatory.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with digoxin and a calcium channel blocker (lercanidipine, nicardipine, nifedipine, diltiazem, verapamil) who are prescribed digoxin ≥ 250 mcg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with digoxin and amiodarone who are prescribed digoxin ≥ 250 mcg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients treated with digoxin and chloroquine or hydroxychloroquine who are prescribed digoxin ≥ 250 mcg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with digoxin and ciclosporin who are prescribed digoxin ≥ 250 mcg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with digoxin and propafenone who are prescribed digoxin ≥ 250 mcg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with digoxin and quinine who are prescribed digoxin ≥ 250 mcg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with low dose aspirin who are prescribed an oral COX II selective NSAID.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients treated with methotrexate who are not given explicit dose instructions of weekly dosing.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with methotrexate who are prescribed more than one strength of methotrexate tablets.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with simvastatin and a fibrate (except fenofibrate) who are prescribed simvastatin > 10 mg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with simvastatin and amiodarone who are prescribed simvastatin > 20 mg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with simvastatin and an HIV protease inhibitor who are prescribed simvastatin > 10 mg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients treated with simvastatin and ciclosporin who are prescribed simvastatin > 10 mg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with simvastatin and verapamil who are prescribed simvastatin > 10 mg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with stage 3, 4, or 5 chronic kidney disease (eGFR < 60) who are prescribed digoxin ≥ 250 mcg/day.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with stage 4 or 5 chronic kidney disease who are prescribed a sulphonylurea other than gliclazide or tolbutamide.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with stage 4 or 5 chronic kidney disease who are prescribed a thiazide diuretic.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients treated with stage 4 or 5 chronic kidney disease who are prescribed an aldosterone antagonist.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with stage 4 or 5 chronic kidney disease who are prescribed metformin.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with warfarin who are prescribed a macrolide.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with warfarin who are prescribed a slufonamide.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with warfarin who are prescribed an azole antifungal.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients treated with warfarin who are prescribed chloramphenicol.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with warfarin who are prescribed griseofulvin.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with warfarin who are prescribed isoniazid.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with warfarin who are prescribed metronidazole.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with warfarin who are prescribed rifampin.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients who are prescribed warfarin in combination with an oral NSAID.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588521
N/A	This measure assesses the proportion of patients with a computer-coded diagnosis of peptic ulcer disease, who have not also had a prescription for a proton pump inhibitor (PPI) in the six months prior to data collection, and a computer record for one or more prescriptions for a non-selective NSAID in the six months prior.*	Process	Hemming K, Chilton PJ, Lilford RJ, et al. Bayesian cohort and cross-sectional analyses of the PINCER Trial: a pharmacist-led intervention to reduce medication errors in primary care. Emmert-Streib F, ed. *PLoS ONE*. 2012;7(6):e38306. doi:10.1371/journal.pone.0038306.
N/A	This measure assesses the proportion of patients with a history of allergy to penicillin who are prescribed a penicillin-containing preparation.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588526
N/A	This measure assesses the proportion of patients with a history of gout and treated with a thiazide diuretic who are not prescribed allopurinol.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with a history of peptic ulcer who are prescribed a non- selective NSAID, without co-prescription of an ulcer healing drug.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588516
N/A	This measure assesses the proportion of patients with a history of peptic ulcer who are prescribed a non- selective NSAID.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588515

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients with a history of peptic ulcer who are prescribed an NSAID, without co-prescription of an ulcer healing drug.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588518
N/A	This measure assesses the proportion of patients with a history of vascular events who are prescribed a COX II selective NSAID.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with an estimated 10 year cardiovascular disease risk greater than or equal to 20% who are prescribed combined contraceptives.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with asthma, excluding those with a cardiac condition, who are prescribed a beta-blocker.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588501
N/A	This measure assesses the proportion of patients with asthma, who are not also using an inhaled corticosteroid, who are prescribed a long-acting beta-2 agonist inhaler.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588506
N/A	This measure assesses the proportion of patients with atrial fibrillation who are prescribed warfarin despite CHADS2 score = 0.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed a class 1 or 3 antiarrhythmics except amiodarone.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed a glitazone.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed a tricyclic antidepressant.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed antifungals that are not itraconazole (e.g. ketoconazole, fluconazole).*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed any oral NSAID.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed disulfiram.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed itraconazole.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed minoxidil.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed tadalafil.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with chronic heart failure who are prescribed verapamil or diltiazem.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients with chronic renal failure (CKD3 or worse) who are prescribed an NSAID.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588520
N/A	This measure assesses the proportion of patients with diabetes, without diagnosed ischemic heart disease, who receive high-dose statins (atorvastatin ≥40 mg/dL, rosuvastatin ≥10 mg/dL, and simvastatin >40 mg/dL).*	Process	Beard AJ, Hofer TP, Downs JR, et al. Assessing Appropriateness of Lipid Management Among Patients With Diabetes Mellitus Moving From Target to Treatment. Circ Cardiovasc Qual Outcomes. 2013;6(1):66-74.
N/A	This measure assesses the proportion of patients with heart failure who are prescribed an NSAID.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588519
N/A	This measure assesses the proportion of patients with heart failure who are prescribed diltiazem or verapamil.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588505
N/A	This measure assesses the proportion of patients with heart failure, who are in sinus rhythm, who are prescribed digoxin at greater than 125µg daily.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588504
N/A	This measure assesses the proportion of patients with low trauma fracture that are treated with an oral corticosteroid for ≥ 12 weeks who are not prescribed bone protection (a bisphosphonate, calcitriol or hormone replacement therapy).*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients with Parkinson's disease who are prescribed metoclopramide.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588507
N/A	This measure assesses the proportion of patients with Parkinson's disease who are prescribed prochlorperazine.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588508
N/A	This measure assesses the proportion of patients with previous peptic ulcer treated with a nonsteroidal anti- inflammatory for > 12 weeks who are not prescribed gastro-intestinal prophylaxis.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with previous peptic ulcer treated with low dose aspirin who are not prescribed gastro-intestinal prophylaxis.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with previous vascular disease or events who are prescribed any hormone replacement therapy.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with renal impairment (CKD 3 or worse) who are prescribed digoxin at greater than 125µg daily.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588503

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients with stage 3 chronic kidney disease who are prescribed an oral nonsteroidal anti-inflammatory.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with stage 4 or 5 chronic kidney disease who are prescribed an oral nonsteroidal anti-inflammatory.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients with a history of convulsions who are prescribed mefloquine.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588509
N/A	This measure assesses the proportion of patients without a record of a full blood count within the previous 3 months who are prescribed methotrexate.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588534
N/A	This measure assesses the proportion of patients without a record of a lithium level being measured within the previous 6 months who are prescribed lithium.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588533
N/A	This measure assesses the proportion of patients without a record of an International Normalized Ratio (INR) having been measured within the previous 12 weeks (excluding patients who self-monitor) who are prescribed warfarin.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588528

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients without a record of an International Normalized Ratio (INR) having been measured within the previous 12 weeks who are prescribed warfarin.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588527
N/A	This measure assesses the proportion of patients without a record of liver function being measured in the previous 9 months who are prescribed amiodarone.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588529
N/A	This measure assesses the proportion of patients without a record of liver function having been measured within the previous 3 months who are prescribed methotrexate.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588535
N/A	This measure assesses the proportion of patients without a record of renal function and electrolytes being measured prior to starting therapy who are prescribed an ACE inhibitor or angiotensin II receptor antagonist.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588532
N/A	This measure assesses the proportion of patients without a record of renal function and electrolytes being measured prior to starting therapy who are prescribed an ACE inhibitor.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588531
N/A	This measure assesses the proportion of patients without a record of thyroid function being measured in the previous 9 months who are prescribed amiodarone.*	Process	Avery AJ, Dex GM, Mulvaney C, et al. Development of prescribing-safety indicators for GPs using the RAND Appropriateness Method. *Br J Gen Pract*. 2011;61(589):526-536. doi:10.3399/bjgp11X588530

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients, with a computer-coded diagnosis of asthma, and computer record of one or more prescriptions for a beta-blocker (oral preparations or eye drops) in the six months prior.*	Process	Hemming K, Chilton PJ, Lilford RJ, et al. Bayesian cohort and cross-sectional analyses of the PINCER trial: a pharmacist-led intervention to reduce medication errors in primary care. Emmert-Streib F, ed. *PLoS ONE*. 2012;7(6):e38306. doi:10.1371/journal.pone.0038306.
N/A	This measure assesses the ratio of total daily defined doses for analgesics to the total daily defined doses of NSAIDs.*	Process	Fernández Urrusuno R, Pedregal González M, Torrecilla Rojas MA. Development of NSAIDs prescription indicators based on health outcomes. *Eur J Clin Pharmacol*. 2008;64(1):61-67. doi:10.1007/s00228-007-0384-3.
N/A	This measure assesses the ratio of total daily defined doses for gastro-protective drugs to the total daily defined doses of NSAIDs.*	Process	Fernández Urrusuno R, Pedregal González M, Torrecilla Rojas MA. Development of NSAIDs prescription indicators based on health outcomes. *Eur J Clin Pharmacol*. 2008;64(1):61-67. doi:10.1007/s00228-007-0384-3.
N/A	This measure assesses the proportion of HMO members with both a pharmacy fill for a base drug in the year of interest and a fill for a conflicting drug (as defined by study authors).*	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 Pt 1):753-759.
N/A	This measure assesses the proportion of patients prescribed a potassium wasting diuretic and digoxin that last had their urine and electrolytes checked before treatment start.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients prescribed a potassium wasting diuretic and digoxin that last had their urine and electrolytes checked more than 48 weeks ago.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients prescribed an ACE-inhibitor and an angiotensin receptor blocker (ARB) that have not had urine and electrolytes checked in the last 24 weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with a loop AND a thiazide diuretic or metolazone who don't have urine and electrolytes checked in the last 24 weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with a loop diuretic who don't have urine and electrolytes checked before treatment start.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with a potassium sparing diuretic AND an ACE- inhibitor or ARB who don't have urine and electrolytes checked in the last 48 weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients treated with a potassium sparing diuretic who are prescribed a potassium supplement for greater than or equal to four weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with a potassium sparing diuretic who don't have urine and electrolytes checked before treatment start.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with a potassium sparing diuretic who don't have urine and electrolytes checked in the last 48 weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with amiodarone who did not have a thyroid function test in last nine months.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with and ACE-inhibitor or an angiotensin receptor blocker (ARB) who did not have urine and electrolytes checked before treatment start.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients treated with auranofin without a complete blood count in the last eight weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with aurothiomalate without a complete blood count in the last eight weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with azathioprine without a complete blood count in the last 12 weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with leflunomide without a complete blood count in the last eight weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of patients treated with methotrexate without a complete blood count in the last 12 weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients treated with penicillamine without a complete blood count in the last 12 weeks.*	Process	Dreischulte T, Grant AM, McCowan C, et al. Quality and safety of medication use in primary care: consensus validation of a new set of explicit medication assessment criteria and prioritisation of topics for improvement. *BMC Pharmacol Toxicol*. 2012;12(1):5.
N/A	This measure assesses the proportion of medication discrepancies (when recorded medications are not the same as medications actually taken) that involve medications taken at an incorrect dosage.*	Process	Bedell SE, Jabbour S, Goldberg R, et al. Discrepancies in the use of medications: Their extent and predictors in an outpatient practice. *Arch Intern Med*. 2000;160(14):2129-2134. doi:10.1001/archinte.160.14.2129.
N/A	This measure assesses the proportion of medication discrepancies (when recorded medications are not the same as medications actually taken) that involve medications taken that were not in the medical record.*	Process	Bedell SE, Jabbour S, Goldberg R, et al. Discrepancies in the use of medications: Their extent and predictors in an outpatient practice. *Arch Intern Med*. 2000;160(14):2129-2134. doi:10.1001/archinte.160.14.2129.
N/A	This measure assesses the proportion of medication discrepancies (when recorded medications are not the same as medications actually taken) that involve not taking a recorded medication.*	Process	Bedell SE, Jabbour S, Goldberg R, et al. Discrepancies in the use of medications: Their extent and predictors in an outpatient practice. *Arch Intern Med*. 2000;160(14):2129-2134. doi:10.1001/archinte.160.14.2129.
N/A	This measure assesses the proportion of patients, who were prescribed and dispensed at least one prescription medication, with one or more of the following prescribing problems: drug-disease, drug- drug, drug-allergy, and/or drug-age contraindications, and/or excess dose or therapeutic duplication alerts identified by the drug knowledge database decision support system.*	Process	Tamblyn R, Huang A, Taylor L, et al. A Randomized Trial of the Effectiveness of On-demand versus Computer-triggered Drug Decision Support in Primary Care. *J Am Med Inform Assoc*. 2008;15(4):430-438. doi:10.1197/jamia.M2606.
N/A	The measure assesses the proportion of patient profiles in which allergy status is documented before dispensing the first prescription or medication order to the patient.*	Process	Nigam R, MacKinnon N, U D, et al. Development of Canadian safety indicators for medication use. *Healthc Q*. 2008;11(sp):47-53. doi:10.12927/hcq.2008.19649.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	The measure assesses the proportion of prescription or medication orders for high-alert medications using an administering protocol.*	Process	Nigam R, MacKinnon N, U D, et al. Development of Canadian safety indicators for medication use. *Healthc Q*. 2008;11(sp):47-53. doi:10.12927/hcq.2008.19649.
N/A	The measure assesses the proportion of prescriptions or medication orders using potentially dangerous dose abbreviations.*	Process	Nigam R, MacKinnon N, U D, et al. Development of Canadian safety indicators for medication use. *Healthc Q*. 2008;11(sp):47-53. doi:10.12927/hcq.2008.19649.
N/A	The measure assesses the proportion of prescriptions or medication orders using potentially dangerous medication abbreviations.*	Process	Nigam R, MacKinnon N, U D, et al. Development of Canadian safety indicators for medication use. *Healthc Q*. 2008;11(sp):47-53. doi:10.12927/hcq.2008.19649.
N/A	The measure assesses the proportion of prescriptions or medication orders with "take as directed" as the only instruction for use.*	Process	Nigam R, MacKinnon N, U D, et al. Development of Canadian safety indicators for medication use. *Healthc Q*. 2008;11(sp):47-53. doi:10.12927/hcq.2008.19649.
N/A	The measure assesses the proportion of prescriptions or medication orders with incorrect leading and/or trailing zeros with decimal points.*	Process	Nigam R, MacKinnon N, U D, et al. Development of Canadian safety indicators for medication use. *Healthc Q*. 2008;11(sp):47-53. doi:10.12927/hcq.2008.19649.
N/A	This measure assesses the proportion of high alert prescription medications that are differentiated from other medications using flags, highlighting, or some other system.*	Process	Nigam R, MacKinnon N, U D, et al. Development of Canadian safety indicators for medication use. *Healthc Q*. 2008;11(sp):47-53. doi:10.12927/hcq.2008.19649.
N/A	This measure assesses the proportion of patients, with a prescribed or scheduled medication, with a complete individual medication or medication list. A individual medication was defined as "complete" if the name, dose, frequency, and route of administration were documented. A medication list was defined as "complete" if all four components were documented for each individual medication in the medication list.*	Process	Nassaralla CL, Naessens JM, Chaudhry R, Hansen MA, Scheitel SM. Implementation of a medication reconciliation process in an ambulatory internal medicine clinic. *Qual Saf Health Care*. 2007;16(2):90-94. doi:10.1136/qshc.2006.021113.

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of patients, with a prescribed or scheduled medication, with a correct individual medication or medication list. A medication list was defined as "correct" if there was no discrepancy in the name, dose and frequency between the current medication list documented in the EMR and the medications the patient was actually taking at home. An individual medication was defined as "correct" if there was no discrepancy in the name, dose and frequency of an individual medication item.*	Process	Nassaralla CL, Naessens JM, Chaudhry R, Hansen MA, Scheitel SM. Implementation of a medication reconciliation process in an ambulatory internal medicine clinic. *Qual Saf Health Care*. 2007;16(2):90-94. doi:10.1136/qshc.2006.021113.
N/A	This measure assesses the proportion of prescriptions or medication orders for high alert medications that are double-checked and documented (with initials) by a pharmacist before administration.*	Process	Nigam R, MacKinnon N, U D, et al. Development of Canadian safety indicators for medication use. *Healthc Q*. 2008;11(sp):47-53. doi:10.12927/hcq.2008.19649.
N/A	This measure assesses the proportion of time during which International Normalised Ratio (INR) values fell within pre-determined ranges of a target.*	Intermediate Outcome	Claes N. The Belgian Improvement Study on Oral Anticoagulation Therapy: a randomized clinical trial. *Eur Heart J*. 2005;26(20):2159-2165. doi:10.1093/eurheartj/ehi327.
N/A	This measure assesses the proportion of patients over 18yrs with a new diagnosis of hypertension, who were prescribed an antihypertensive medication, and who have an adverse event related to medication initiation by either ICD codes, chief complaint, CPT codes, prescription orders, labs, or vital signs.*	Outcome	Brixner DI, McAdam-Marx C, Ye X, Lau H, Munger MA. Assessment of time to follow-up visits in newly-treated hypertensive patients using an electronic medical record database. *Curr Med Res Opin*. 2010;26(8):1881-1891.
N/A	This measure assesses the count of thromboembolic complications.*	Outcome	Claes N. The Belgian Improvement Study on Oral Anticoagulation Therapy: a randomized clinical trial. *Eur Heart J*. 2005;26(20):2159-2165. doi:10.1093/eurheartj/ehi327.
N/A	This measure assesses the number of hemorrhages as defined by the European Atrial Fibrillation Trial Study Group.*	Outcome	Claes N. The Belgian Improvement Study on Oral Anticoagulation Therapy: a randomized clinical trial. *Eur Heart J.* 2005;26(20):2159-2165. doi:10.1093/eurheartj/ehi327.
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

Medication Management and Safety (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
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
N/A	This measure assesses the proportion of incident reports with any event in a patient's medical care which did not go as intended and either harmed or could have harmed the patient.*	Outcome	Plews-Ogan ML, Nadkami MM, Forren S, et al. Patient Safety in the Ambulatory Setting. *J Gen Intern Med*. 2004;19(7):719-725. doi:10.1111/j.1525-1497.2004.30386.x.

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.
N/A	This measure assesses the "Hygiene" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 5 questions related to: adequate disinfection of equipment, use of sterile instruments, adequate disposal of unused equipment, adequate use of protective equipment, and proper disposal of sharp and hazardous material.*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.
N/A	This measure assesses the "Incident Reporting" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 3 questions related to: having a critical incident register, analyzing critical incidents, and taking action on critical incidents.*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.

Safety Culture (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the "Medical Record Keeping" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 6 questions related to: privacy of medical records, electronic medical records, use of ICPC codes, requirements for usernames and passwords, having a firewall, and having a virus scan.*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.
N/A	This measure assesses the "Medication Safety" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 8 questions related to: having emergency drugs in stock, controlled drugs in a cupboard, a list of contents of doctor's bags, an inventory of emergency drugs available, an explicit procedure for reviewing repeat prescribing, an explicit procedure for updating emergency drugs present, a procedure to review repeat medication, and electronic prescribing.*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.
N/A	This measure assesses the "Organized Patient Feedback" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 4 questions related to: having a suggestion box present and visible, having the patient complaint procedure available, and making practice information available to those in waiting room.*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.
N/A	This measure assesses the "Organized Secondary Prevention Programs" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 3 questions related to: organized secondary prevention programs for cardiovascular disease, diabetes mellitus, and congestive obstructive pulmonary disease.*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.

Safety Culture (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the "Overall Patient Safety Rating" item of the Medical Office Survey on Patient Safety.*	Structure	Hagopian B, Singer ME, Curry-Smith AC, Nottingham K, Hickner J. Better Medical Office Safety Culture Is Not Associated With Better Scores on Quality Measures: *J Patient Saf*. 2012;8(1):15-21. doi:10.1097/PTS.0b013e31823d047a.
N/A	This measure assesses the "Professional Competence" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 5 questions related to: additional training for providers at regular intervals, having a designated staff member for collapse/resuscitation, production of an annual report including quality matters, having QI targets sets, and having clinical guidelines in the practice (paper or electronic).*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.
N/A	This measure assesses the "Quality Improvement" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 3 questions related to: having arrangements to improve care processes with other providers, an annual report with quality matters, and targets for improvement in the last year.*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.
N/A	This measure assesses the "Safe Practice Building" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 5 questions related to: care parking for disabled, ramp to main entrance, doors wide enough for wheel chair, enough seating, and an elevator (or on ground floor).*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.

Safety Culture (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the "Telephonic Accessibility and Triage" domain of patient safety by totaling positive responses from the European Practice Assessment observational study out of a subset of 3 questions related to: having a separate line for emergency calls, making record of all telephonic advice by non GPs, or having a written protocol for clinical advice given to patients by non-GPs over the phone.*	Structure	Gaal S, van den Hombergh P, Verstappen W, Wensing M. Patient safety features are more present in larger primary care practices. *Health Policy.* 2010;97(1):87-91. doi:10.1016/j.healthpol.2010.03.007.
N/A	This measure assesses the average of the percent positive responses to a clinician survey across 12 safety culture dimensions.*	Structure	Hagopian B, Singer ME, Curry-Smith AC, Nottingham K, Hickner J. Better Medical Office Safety Culture Is Not Associated With Better Scores on Quality Measures: *J Patient Saf*. 2012;8(1):15-21. doi:10.1097/PTS.0b013e31823d047a.
N/A	This measure assesses the concept of "Detection of Quality and Safety Problems" by calculating a mean score using 5 indicators from a clinician survey.*	Structure	Szecsenyi J, Campbell S, Broge B, et al. Effectiveness of a quality-improvement program in improving management of primary care practices. *Can Med Assoc J*. 2011:cmaj – 110412.
N/A	This measure assesses the concept of "Quality Development and Quality Policy" by calculating a mean score using 7 indicators from a clinician survey.*	Structure	Szecsenyi J, Campbell S, Broge B, et al. Effectiveness of a quality-improvement program in improving management of primary care practices. *Can Med Assoc J*. 2011:cmaj – 110412.
N/A	This measure assesses the dimension of "Analysis of Critical Incidents" by calculating a mean score using 5 indicators from a clinician survey.*	Structure	Szecsenyi J, Campbell S, Broge B, et al. Effectiveness of a quality-improvement program in improving management of primary care practices. *Can Med Assoc J*. 2011:cmaj – 110412.
N/A	This measure assesses the dimension of "Complaint Management" by calculating a mean score using 6 indicators from a clinician survey.*	Structure	Szecsenyi J, Campbell S, Broge B, et al. Effectiveness of a quality-improvement program in improving management of primary care practices. *Can Med Assoc J*. 2011:cmaj – 110412.
N/A	This measure assesses the dimension of "Safety of Staff and Patients, Hygiene, Infection Control" by calculating a mean score using 12 indicators from a clinician survey.*	Structure	Szecsenyi J, Campbell S, Broge B, et al. Effectiveness of a quality-improvement program in improving management of primary care practices. *Can Med Assoc J*. 2011:cmaj – 110412.

Safety Culture (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the mean number of positive responses ("agree" or "strongly agree") to seven component questions from a safety climate survey.*	Structure	McGuire MJ, Noronha G, Samal L, et al. Patient safety perceptions of primary care providers after implementation of an electronic medical record system. *J Gen Intern Med*. 2013;28(2):184-192. doi:10.1007/s11606-012-2153-y.
N/A	This measure assesses the proportion of observations that had a record of fire extinguisher inspection.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations using a sample medication log.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations using at least two ways to identify patients.*	Process	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where a temperature log was maintained for refrigerators.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where cleaning and sterilization processes were appropriate.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where cleaning supplies were stored appropriately.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where fire extinguishers were present.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.

Safety Culture (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of observations where good handwashing techniques were practiced.*	Process	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where hazardous waste materials were stored appropriately.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where hazardous waste receptacles are clearly labeled.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where medications and vaccines were stored properly.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where quality control processes performed.*	Process	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where refrigerators were appropriately labelled.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where sample medications were managed appropriately.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where sharps boxes were mounted, locked, and with safety covers.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.

Safety Culture (concepts, continued)

Measure Title	Measure Description	Measure Type	Source
N/A	This measure assesses the proportion of observations where sharps were secured.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where staff were trained and assessed on equipment and procedures.*	Process	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where vaccine information sheets were provided.*	Process	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations where vaccine information was documented.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations with appropriate storage of medications.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations with labels for sample medications.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.
N/A	This measure assesses the proportion of observations that had a record of fire extinguisher inspection.*	Structure	Marsteller JA, Hsiao C-J, Underwood WS, et al. A simple intervention promoting patient safety improvements in small internal medicine practices. *Qual Prim Care*. 2010;18(5):307-316.

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.

APPENDIX F:
Public Comments

Introduction

Agency for Healthcare Research and Quality

Barbara Bartman

My comments pertain to the Introduction section. I would suggest a more objective approach to describing the history and current status of patient safety measurement.

In the following paragraph I would remove indicators, the statement that patient safety in hospitals continues to be the focus of most research and quality improvement efforts, and the word alarming. A more practical or objective transition is suggestion and an example from a published FOA is provided (it should not be used verbatim).

Since the report, there have been marked improvements in national patient safety indicators, such as a reduction of 50,000 preventable deaths (suggest using deaths averted, rather than preventable deaths)between 2010 and 2013.1 {Can also provide more references to the reduction in hospital acquired infections (HAIs), HACS, and changes in Patient Safety Indicators (PSIs) over time (Owens PL (AHRQ), Limcangco R (AHRQ), Barrett ML (M.L. Barrett, Inc.), Heslin KC (AHRQ), Moore BJ (IBM Watson Health). Patient Safety and Adverse Events, 2011 and 2014. HCUP Statistical Brief #237. February 2018. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/sb237-Patient-Safety-Adverse-Events-2011-2014.pdf.

Transition – the following paragraph is from a recently published AHRQ FOA. It should not be repeated verbatim or cut and pasted in this report, but it provides an example of how to practically discuss the history of patient safety research and measure development moving from hospital and ER settings to include ambulatory care and other settings:

"Improving safety in all healthcare settings is a priority for AHRQ, and a comprehensive strategy is in place to reduce adverse events in all settings so that people can expect safe care whenever and wherever they receive it, including health care that occurs between and across settings. As the most significant investments in improving patient safety had originally been made in the inpatient and emergency room settings, AHRQ launched a multi-year initiative to expand the scientific evidence, strategies, and tools that are available for improving patient safety in all health care settings. Specifically, in 2015 AHRQ published two Funding Opportunity Announcements that were focused on improving patient safety in ambulatory care settings and long term care facilities. These settings have unique challenges and barriers inherent in improving safety including the assurance of coordination, continuity, communication, and follow-up of care that is often spread among a number of providers....."

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 (delete this previous sentence, as the focus has expanded)

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. (delete or rephrase to rationalize the need for more ambulatory measures without judgement, i.e. avoid use of the word alarming)

American Academy of Pediatrics

Judith Dolins

The American Academy of Pediatrics (AAP) acknowledges that the "Ambulatory setting" is difficult to define.

The AAP recommends that any discussion about ambulatory safety start with the question of whether "ambulatory care is safe for patients, including

children, in this setting?" The AAP would define safe and quality care as all infants, children, and adolescents receiving the right care, in the right place, at the right time.

Centers for Medicare & Medicaid Services

Brendan Loughran

Page 4 states, "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."

However, Appendix B does not appear to have further details about what measures repositories and literature was reviewed. CMS recommends detailing more clearly and specifically the measures repositories and literature that were reviewed.

Project Purpose and Approach

American Academy of Pediatrics

Judith Dolins

The American Academy of Pediatrics recognizes that payers, health plans, ACOs, consumers, and physicians are utilizing quality measures in various forms to improve the overall quality of care; therefore, we are working to promote quality measures that are meaningful to child health and can used for value-based payment. We encourage NQF to be cautious when promoting measures that lack a clear clinical significance or safety benefit. We also encourage NQF to consider providing strategies for support of patient safety for all ambulatory settings, including smaller practices and dental practices. The AAP suggests that NQF promote measures that meet the following criteria when addressing safety in the ambulatory care setting:

Impact on Child Health - Measures should represent what pediatricians can do to promote the health of every child.

Evidence-based or evidence informed – Measures should promote child health and be evidence based or evidence informed.

Feasible – Measures should be feasible for pediatricians and those who care for children to collect.

Reflect the diversity of pediatric care – Measures should cover the broad range and complexity of pediatrics within a social determinants of health context

American Medical Association

Koryn Rubin

The measures and concepts must focus on structures, processes, and outcomes that will be useful for performance measurement and not just become a documentation burden. Many of the proposed concepts would be better suited to be implemented in quality improvement initiatives and would not need to be captured as performance measures. It is critical that the measures and concepts included in this report are evidence-based, are clearly linked to improving outcomes and their value outweighs the resources required to collect and report the information. We are also concerned that it will be difficult for developers and others to be truly selective in what concepts should be prioritized given the large number of concepts included in this report. As a result, the AMA requests that the advisory group refine the measures and concepts identified in this report to those that have the strongest evidence that measuring the outcome, process or structure will drive improvements and be feasible to collect.

Next Steps

American Academy of Pediatrics

Judith Dolins

The American Academy of Pediatrics agrees with NQF's recommendation to develop a measurement framework for ambulatory care and urges NQF to consider the following concepts for further development that represent a significant impact on pediatric safety:

Continuity of care is a positive factor for patient safety which often results in fewer missed diagnosis and improved transitions.

Measure of access to child specific subspecialty care and therapies.

Pediatric developmental screening.

In examining the well visit "system" we urge NQF to expand the measure concept to reflect a course of care, not a discrete measure completed each time a well visit occurs. For example, a missed well-child visit may increase the risk of having late diagnosed, unrecognized or untreated developmental delays.

Use of a recall/reminder system.

Adolescent privacy. No standard method exists to transmit sensitive information between physician colleagues and be assured it will also be handled and maintained appropriately.

Pediatric specific electronic health record functionality. Pediatricians are trained to diagnose and treat the health care needs of children and need fully functional health IT systems that facilitate the collection of unique data points for newborns, infants, children, adolescents and young adults.

A safety promotion measure that includes complex care coordination for a set of high risk diagnoses. For example, all children diagnosed with sickle cell disease should have a certain number of hours per year of billing codes submitted for Care management.

Post discharge phone calls after a pediatric hospitalization occurs or transition of care

We also encourage NQF to consider including patient/parent health literacy and limited English Proficiency as a risk factor for several different types of adverse events, for example medication and diagnostic errors.

Endocrine Society

Stephanie Kutler

The workgroup identified Medication Management and Safety as an important area of measurement in the ambulatory care setting as medication errors are the most common and significant safety problem in ambulatory care. Diabetes agents that cause hypoglycemia are identified as one of the top three priorities in the National Action Plan for Adverse Drug Event Prevention.

While there are several ways to capture patient-reported hypoglycemic events, there are currently zero metrics or standards around doing so in the outpatient setting. Specific to diabetes medication complications, there was one existing measure and one measure concept that addressed hypoglycemic events in the measure repository:

Proportion of Diabetes patients that have Potentially Avoidable Complications (PACs) (Health Care Incentives Improvement Institute; Not NQF endorsed)

Serious Hypoglycemic Events Requiring Hospital Admission or ED Visit Associated with Anti- Diabetic Medications (Pharmacy Quality Alliance; Under Development):

While these measures represent an important step in the documentation of hypoglycemic events after they have occurred, they capture only a small fraction of the problem and do not incentivize primary care providers to alter the care of their patients to avoid future episodes. Recent guidance has indicated that a provider should ask patients about their experience with hypoglycemia at every visit (ADA 2018, ADA/ES 2013). By asking the patient directly about their experience with low blood sugar, the provider can learn how often the patient is experiencing symptomatic and asymptomatic hypoglycemia and ensure the patient is appropriately educated on how to identify and appropriately treat hypoglycemia.

We urge NQF to include development of measures specific to hypoglycemia in the outpatient setting on the list of priorities in the final report.

Appendix D

American Academy of Pediatrics

Judith Dolins

Comments on behalf of the American Academy of Pediatrics,

Some conditions (for example Type 1 diabetes care) do not make sense to address within the entire ambulatory care environment. When looking specifically at ambulatory pediatric care, the AAP encourages NQF to include topics that are more meaningful to pediatrics. Examples include ADHD, appropriate use of medications following therapy, use of codeine in children.

The list of complications for the measure on the Proportion of Pediatric Asthma patients that have Potentially Avoidable Complications (PACs) are primarily adult conditions. The AAP recommends that this list be expanded to include pediatric conditions.

When examining the pediatric Diabetes, Short-Term Complication Rate it is important to highlight that children may be admitted for inpatient following diagnosis for comprehensive teaching and prevention of adverse outcomes.

General

American Medical Association

Koryn Rubin

The American Medical Association (AMA) appreciates the opportunity to comment on this draft report. Understanding and addressing factors that ensure that care in the ambulatory setting is provided in the safest manner possible is critical and we appreciate the work of the advisory group. However, it is essential that only measures and concepts are recommended for which there is clear evidence that the structure or process can impact patient outcomes, are appropriate for performance measurement, and are feasible to collect and report. Currently, there is limited evidence to precisely define and accurately quantify defects in care in the ambulatory setting and there are many challenges to measurement across diverse settings as noted in the report. Except in a few instances, it will be very hard (and is premature) to develop outcome measures intended to foster improvement. Measures for Quality Indicators (QI) and process measures may be all that is possible at this point, and depending on the topic, will likely be very limited due to the lack of available evidence and data collection challenges.

Information around the underlying evidence that is available for each of the proposed measures, concepts and discussion on the barriers to the development and implementation of each with potential solutions is needed. It is not clear to what degree the evidence to support each measure or concept was considered in the prioritization completed by the advisory group. This step is critical since it is one of the biggest challenges that developers encounter when submitting measures to NQF for potential endorsement.

For example, we are intrigued by the inclusion of physician burnout as a potential area for measure development given the recent work by Christine Sinsky and colleagues (2017). Physicians from every specialty identified burnout as a key reason to reduce clinical work hours in the upcoming year or leave clinical practice in the next 24 months and it is estimated that system factors serve as a large driver of burnout (approximately 80%) (Berg, 2017). Unfortunately, there is scarce evidence of proven strategies for reducing burnout and the development of measures may be premature.

The AMA does not disagree with the recommendation to prioritize measures to address antibiotic overuse, hand hygiene, opioid prescription patterns, safety culture, and pediatrics. However, additional semi-structured interviews beyond the five individuals and further analysis of existing data and trends are needed since several of these topics are rapidly evolving. For example, understanding the true extent of the issue with opioid prescription patterns now that prescription drug monitoring programs are more widely used would be helpful to understand prior to finalizing the concepts.

We would also note that the measures and concepts must focus on structures, processes, and outcomes that will be useful for performance measurement and not just become a documentation burden. Many of the proposed concepts would be better suited to be implemented in quality improvement initiatives and would not need to be captured as performance measures. It is critical that the measures and concepts included in this report are evidence-based, are clearly linked to improving outcomes and their value outweighs the resources required to collect and report the information. We are also concerned that it will be difficult for developers and others to be truly selective in what concepts should be prioritized given the large number of concepts included in this report. As a result, the AMA requests that the advisory group refine the measures and concepts identified in this report to those that have the strongest evidence that measuring the outcome, process or structure will drive improvements and be feasible to collect.

References:

Berg S. To address burnout's underlying causes, look to team-based care. AMA Wire. November 2, 2017. Available at: https://wire.ama-assn.org/life-career/address-burnout-s-underlying-causes-look-team-based-care. Accessed on April 11, 2018.

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Tufts University School of Medicine

Saul Weingart

Overall, I believe the report would benefit from an executive summary up front. It should identify the major measure categories and call out the measurement "gaps" identified at the end of the report. In the body of the report, I suggest being more explicit about the scope of the project (primary care in, ambulatory specialty out, amb sugery out, ED out, etc). Rating the various measures -- to identify the 10 or 20 that are most valid, most valuable, or most promising -- would be helpful to the potential audience and inform future efforts. Finally, could we identify organizations that have developed ambulatory patient safety dashboards? The metrics incorporated in clinic or hospital dashboards may reflect the measures that are most useful, accessible, or mature at this point.

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Urmimala Sarkar

I think this has good information, but my overall concern is that this feels more like a list than a conceptually organized report.

General comments

- some measures capture only a very small slice of the ambulatory setting- like monitoring for a specific high-risk medication- and others capture a broadly applicable health system activity- like closing the loop on referrals. You have not included this concept of breadth in the report, and I think it is very important to the usefulness of measures.
- The report would benefit from use of a figure connecting the themes- can use one of the existing ambulatory safety conceptual models
- Key informant interviews need to be analyzed in greater depth. Again, a framework would help.

Specific comments

- Executive summary needed
- The "project purpose and approach" should include the definitions of the ambulatory environment and of patient safety that were used.
- Environmental scan

tables of measure sources is not helpful- need to organize conceptually

- Next steps section- when you describe what should be prioritized, you don't fit it into a theme like medication safety or diagnosis. Saying "pediatrics" should be prioritized does not give sufficient direction to the field, for example. Are we talking about pediatric medication safety? pediatric antibiotic overuse? Pediatrics is a care setting, not an area of safety, and you should make distinction between safety areas (med safety, diagnosis, transitions), approaches (health IT, safety culture, measurement), and care settings (pediatrics, ambulatory subspecialties). The AHRQ ambulatory technical report from 2016 that you reference in the introduction has a figure that may help.

Finally, I am including a recently published paper on prioritizing ambulatory safety metrics from our group that adds to the evidence base in this area.

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