



ELECTRONIC HEALTH RECORDS MEASURE TESTING RESULTS

Alpha and Beta Testing Summary

Submitted by Quality Insights of Pennsylvania

under the Measure Instrument Development & Support (MIDS)

HHSM 500-2008-000131 Contract

July 19, 2012



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I. Introduction

Under the Centers for Medicare & Medicaid Services (CMS) Measure & Instrument Development and Support (MIDS) HHSM -500-2008-000131, Quality Insights of Pennsylvania (Quality Insights) is tasked to develop, test and maintain clinical quality measures (CQM) reportable through an electronic health record (EHR), also known as eMeasures. In collaboration with CMS, EHR vendors and participating practices, a testing plan has been developed and executed constituting of alpha (feasibility) testing, and beta (reliability and validity) testing to determine to capability, practice burden and accuracy of EHR measure reporting. This report outlines and discusses Quality Insights eMeasures alpha and beta testing, results and analysis.

Results provided are specific and limited to three (3) EHR vendor products as implemented in the participating practices. Three vendors are not a statistical sample, so one cannot determine the percentage of all EHR vendors whose products might currently be capable of storing and calculating each element of every measure; the purpose of this test was to determine whether existing EHRs *could* store and accurately calculate these data. The quantitative & qualitative findings may assist policy development as well as progression of evolving hallmark eMeasure standards and EHR testing criteria.

The five (5) Quality Insights measures under discussion (Table 1.) are currently in the Physician Quality Reporting System (PQRS) under one or more measure reporting options (Administrative Claims, Registry, Measures Group, Group Practice Reporting Option (GPRO), and EHR).

Table 1. 2012 Physician Quality Reporting System Measures Reporting Options

PQRS #	NQF #	Measure Title	2012 PQRS Reporting Options
128	0421	Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up	Claims, Registry, Measures Group, EHR, GPRO
130	0419	Documentation of Current Medications in the Medical Record	Claims, Registry
134	0418	Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan	Claims, Registry
316	n/a	Preventive Care and Screening: Cholesterol -- Fasting Low Density Lipoprotein (LDL-C) Test Performed AND Risk-Stratified Fasting Low Density Lipoprotein (LDL-C)	EHR
317	n/a	Preventive Care and Screening: Screening for High Blood Pressure and Recommended Follow-Up Documented	Claims, Registry, Measures Group, EHR, GPRO

The process of developing existing CQMs reportable through an EHR is called *retooling*. EHR measures developed without an existing source CQMs are called *de novo* measures. This report will only discuss retooled eMeasures. The current EHR industry retooling efforts include utilization of the Measure Authoring Tool (MAT) developed in conjunction with the National Quality Forum (NQF), CMS, other industry contractors, subcontractors, EHR measure development stakeholders, and the Office of the National Coordinator (ONC) for use in ARRA HITECH meaningful use (MU) measures reporting.

Quality Insights, and its associate organization West Virginia Medical Institute (WVMI), are expertly qualified to perform EHR alpha and beta measure testing based on several strategic and developmental expertise. Quality Insights measure development team sits on the inaugural eMeasures Issues Group (eMIG) discussing the evolving development guiding eMeasure with eMeasure industry leaders and participates as a team lead for 2012 NQF's eMeasure Learning Collaborative. The team has also significantly participated in MAT user consultative to further evolve the eMeasure development tool. Quality Insights leadership has participated in the advisor group with ONC's Meaningful Use Community of Practice related to identifying and reporting barriers for vendors and practices CQM reporting and MU objectives, as well as participated in EHR Measure Collaborative, AMA, CMS for EHR CQM reporting originally convened by the AMA, NCQA & CMS to develop standard and processes for eMeasure reporting. Our collective integration of eMeasure development & testing team additionally support NQF's eMeasure standards endorsement efforts.

Adjunct to eMeasure development work, Quality Insights participates as a lead contractor to the Physician Quality Reporting System to assist participating program measure owners and developers in measure development, NQF endorsement criteria, and coding conversion efforts. Supporting programmatic support and measure development activity, Quality Insights has received extensive vocabulary standards training, including ICD-10-CM & SNOMED-CT value sets, including application for new coding SNOMED-CT concepts to the National Library of Medicine.

In addition to measure development and eMeasure testing efforts, Quality Insights of Pennsylvania & Quality Insights of Delaware is an ONC Regional Extension Centers (REC) contractor, and WVMI is an ONC REC subcontractor for the state of West Virginia. Their extensive involvement with MU attestation & implementation contributes to the EHR measure usability and collection burden for providers and practices. As core contributors in eMeasure development, testing & implementation, as well as eMeasure policy standards advancements, Quality Insights is uniquely positioned in the eMeasure testing arena.

II. *eMeasure Testing Plan*

The eMeasure Testing Plan is based on the general testing protocol Quality Insights developed for testing physician office-based CQMs in 2007, and is informed by current literature on measure testing:

- Rubin and colleagues' 2001 paper describing the measure development and testing process¹;
- The Blueprint for the CMS Measure Management System (version 8), which devotes chapter 14 to measure testing²;
- The National Quality Forum 2011 Measure Evaluation Criteria, which define the requirements for testing to achieve measure endorsement³; and
- Mathematica Policy Research's Feasibility Testing Plan for Eligible Professional Clinical Quality Measures⁴, which addresses quality measures that are respecified for EHR collection.

The eMeasure Testing Plan describes a plan for ambulatory eMeasures Testing, describing procedures, timelines, sampling, instrumentation, and work products related to two phases of testing: alpha and beta testing. In the original protocol, both test phases involved field investigation within groups of appropriate practices. For eMeasures, only alpha testing requires practice-level data collection in all measures. Beta testing reduces to demonstrating the accuracy of EHR calculations with a standard set of records and a form equivalence reliability test on abstracted records (for retooled measures) with the addition of reporting face validity and construct validity determined by the Technical Expert Panel (TEP). For de novo measures, testing includes assessment of discriminative and convergent validity.

The general plan for developing and executing tests of eMeasures consists of these steps:

- Determine whether it is practical to collect them in practitioner offices' EHRs;
- Assess the burden of measure collection and reporting;
- Measure the reliability of the collection process;
- Assure the validity of e-measures and
- Provide a standard set of test data for demonstrating whether individual EHRs accurately calculate measure scores.

Quality Insights anticipated testing each eMeasure set separately, with collection tools and instructions specific to the set. Two distinct testing cycles are described for each eMeasure set: an alpha test in which project staff determine the feasibility of e-measure collection, and a beta test in which practice staff document that the e-measure specifications and instructions, if implemented in an EHR, provided results equivalent to expert assessment of the eMeasure from the entire EHR. Future eMeasure testing results will assess the validity and reliability of eMeasures developed without prior paper record testing and experience. This report includes results and analysis of alpha (feasibility) testing.

III. Alpha Testing Methodology

The alpha or feasibility test focuses on whether the quality measure can actually be derived from practitioner EHRs, and how difficult or burdensome it would be to do so. It is a largely-

qualitative effort that seeks to determine: (1) whether data to support the measure can be observed or collected somewhere in the care process; (2) the capability of office EHRs to store data documenting measure performance in coded form; (3) how difficult and time consuming might be to collect the information pertaining to a quality measure and reduce it to a set of coded elements in an EHR. Because it is anticipated that not all practices will be able to produce measure data from existing records, it does not include a reliability test. The alpha test is intended to satisfy the feasibility components of the NQF criteria, and the Alpha Testing section (14.3) of the *MMS Blueprint*.

A. Alpha Testing Teams

The alpha testing team consists of a two (2) Quality Insights of Pennsylvania internal teams. The first team is the measure development team including the team leader, a clinical advisor, and content experts. The second team is the analytic team consisting of an epidemiologist and eMeasure analysts. The measure development team recruits and visit practices, collects data, and consults with practice staff on alternative methods for reducing clinical observations to report eMeasures. The measure development team consults with the analytic team to address issues encountered during the testing and adjust eMeasures and data specifications, as appropriate. The combination of the measure development and analytics team leads also form the expert team that performs global feasibility assessment. The analytic team drafted the testing plan, design field data collection instruments, trained staff, compiled the test results, and report findings. The measure development team reviews the test instruments for fidelity to the measure, assists in training field staff, and assists with the interpretation and response of test results. The team leader coordinates the process, schedules visits with practitioners as needed, oversees the production of deliverables, and coordinates final report writing consistent with MMS Blueprint and NQF endorsement criteria. The expert team reviewed the final results and report analysis concluding overall measure feasibility and recommends proceeding to beta testing as applicable.

B. Alpha Testing Data Sources

Although it might appear that alpha testing would require a large amount of data collection within practices, the current state of EHR implementation suggests this is not necessarily the case. To show feasibility, it is not necessary to collect case-level data in provider practices, but only to confirm that a provider *could* collect the data during the course of patient care. Similarly, it is not required to quantify the degree of difficulty for measurement collection, but only to get a qualitative estimate of burden. Thus, much of the data can be obtained by surveying a few practices and the remainder from demonstrating that one or more EHRs can store case-level data for a measure in coded and retrievable fields. The eMeasure Alpha Test Data Sources are outlined in *Table 2* below.

Table 2. Data Sources for Alpha Test Components

Alpha Test Element	Provider Office Data Source	EHR Vendor Data Source
Data available in care process	Survey providers about each data element required for measure	If vendor has test set of provider records, are appropriate fields populated?
Data can be stored in an EHR	Demonstrate presence of elements in office EHR	Identify specific locations where each element can be stored with associated code sets and values
Data collection burden	Qualitative survey of providers comparing data collection to other similar data items	N/A

C. Alpha Testing EHR Vendor and Practice Recruitment

For *vendor* recruitment, Quality Insights utilized two (2) EHR vendor products from those known to Quality Insights REC staff, as well as from the membership of the Healthcare Information Management Systems Society Electronic Health Record Association (HIMSS EHRA), the trade organization of EHR vendors, based on their willingness to respond to questions about the capability of their EHR systems to collect and store measure related data. EHR Alpha Test vendors may also be used in subsequent Beta Testing, if willing. Non-Disclosure Agreements (NDA), Statements of Work (SOW), Consultant Narratives & Consultant Agreements were sought as applicable with EHR vendors and participating practices.

A convenience sample of *provider* practices were selected in consultation with participating vendors, TEP members, and REC staff in the states WMVI serves. This test plan assesses eMeasure feasibility in practices based on diversity of characteristics, recognizing that the practices will not be a statistical sample. Practice selection was focused on demonstrated practice characteristics based reporting parallels to the listed eMeasures including specialty or subspecialty composition, degrees of sophistication of EHR system, and maneuverability of participants to modify EHR from either the vendor or practice perspective. Groups or solo practices in the relevant specialty were solicited. These included multispecialty groups having at least one provider in the appropriate specialty. Quality Insights approached participating practices (*see Table 3*) using a letter of invitation and/or personal contact emphasizing advantages of participation to each practice such as:

- Early information on quality measures that are likely to be used for payment;
- Results from alpha test practices could influence design of measures and reduce burden of collection nationwide;
- Participation may assist in the elimination or re-engineering of eMeasures potentially proved infeasible;
- Acknowledgement in publications, if any result from this effort;
- Low burden of data collection as patient level data not collected/applicable in alpha testing;

- During the process, the practice may gain insight into work-or information-flow alterations facilitating further measure reporting.

The first EHR vendor product was *Greenway Medical EHR, Solutions Series PrimeSUITE Version: 16.0.14.19, 16.0.14.20, & 16.0.14.21*. The primary contact was the team lead Executive Director of Research Services. Testing was completed with additional support of the Greenway Medical EHR development & testing team.

The second EHR vendor product was *Allscripts Professional EHR™ Clinical Module Version: 9.3 (Build 9.3.0.34)*. The primary contact was Chief Operating Officer of Gateway Medical Associates of Exton, Pennsylvania. Testing was completed with additional support of the Gateway Medical Associates IT Director & Billing Manager.

Table 3. eMeasure Testing Practice Composition

Practice Specialty	EHR Vendor Product	Practice & Location	Practice Role
Internal Medicine/Geriatrics	Greenway Medical	Dr. Falanga, FACP PC, PA	Physician & Practice Administrator
Obstetrics/Gynecology	Greenway Medical	Drs. May Grant Associates, PA	Practice Administrator & Billing Manager
Family Practice	Greenway Medical	Premier Family Practice, TX	Office Manager
Family Practice	Greenway Medical	Blackshear Family Practice, GA	Office Manager
Obstetrics/Gynecology	Greenway Medical	Genesis OB/GYN, AZ	Office Manager & Physician
Family Practice	Allscripts Professional	Colonial Family Practice, PA	Physician
Internal Medicine/Geriatrics	Allscripts Professional	Gateway Internal Medicine, PA	Physician
Internal Medicine	Allscripts Professional	Gateway Internal Medicine at Brandywine, PA	Physician

PA = Pennsylvania, TX = Texas, GA = Georgia & AZ = Arizona

D. Alpha Testing Instrumentation

Adequate testing eMeasures feasibility encompasses both EHR vendors as well as applicable provider practices using EHR vendor products. The following documents were developed for eMeasure Alpha Testing:

1. **Alpha Vendor Questionnaires** (see Appendices A through E) specific to each eMeasure to solicit information specifically from the EHR vendor product. Questions ascertained whether and where specific elements necessary for measure calculation are stored in the EHR, and sought to learn whether there are different ways of representing the same elements.
2. **Alpha Practice Questionnaires** (see Appendices F through J) specific to each eMeasure to solicit information requested from the practice perspective on collecting eMeasures elements. Questions asked how often data elements needed for measure calculation are recorded for practice patients. When they are usually not collected, the survey asked practices why they are not collected, and what barriers impeded measure element collection.

E. Alpha Testing Sampling

As noted above, the feasibility test is based on a convenience sample.

F. Alpha Testing Data Collection

Quality Insights anticipated both questionnaires could be administered by mail, by telephone, or in a Webinar-based interview. Due to the complexity of the EHR vendor questions, the need to visualize the location and clinical functionality of the eMeasure data element in the corresponding EHR, the vendor instrument was completed by interview or in person. The applicable EHR vendor interviewee was provided all measure specific information prior to feasibility testing ensued, as well as a copy of the eMeasure specifications. Quality Insights staff scheduled a convenient time with EHR vendor and practice representatives, sharing the general nature of the discussion in advance to allow participation of the most knowledgeable respondents. Because of time requirements, we also conducted the practice alpha test by in person interview.

IV. Alpha Testing Results

A. Alpha Testing Analysis

Because the number of EHR vendors and participating practices were small, the majority of the analysis is descriptive. One critical question was whether there were any eMeasure elements the EHR systems could not accommodate. Results also examined the commonality and

differences in eMeasure element value sets across EHR vendors. Inability to store critical eMeasure elements would result in alpha test failure of the eMeasure element and potential eMeasure redesign or EHR redesign.

For Alpha Testing Practices, Quality Insights summarized eMeasure elements not commonly reported in practices' EHR systems and workflows, and barriers to reporting from the survey responses. When barriers to data elements were identified as substantial, Quality Insights consulted with the EHR vendor contacts and practice sites to improve the availability of element-level data for calculation and workflow issues, respectively. Lack of availability of data elements in most practices did not necessarily mean the measure would not be feasible. Collecting measure data reliably may require a combination of EHR modification, provider education, and incentives, such as demonstrated in the Physician Quality Reporting System and ARRA HITECH CQM reporting, and practice-based incentives.

Lastly, Quality Insights assessed global feasibility of the measures by consensus of experts, using the feasibility grading system developed by Mathematica Policy Research (*Table 4*). The expert team reviewed Alpha Vendor Questionnaire & Alpha Practice Questionnaires results and assigned the measure's overall feasibility grade, reaching agreement on whether or not continuing to beta testing is warranted. To "pass" Alpha Testing, eMeasures must receive a minimum of moderate feasibility to proceed to Beta Testing. Quality Insights judged Mathematica's "Feasibility Grading Scheme" with the following collective considerations:

- Work Required – Practice related level of effort (LOE) related to workflow & implementation
- Data Elements by Site – # of unfeasible data elements in each EHR
- Does Not Meet Measure Criteria – # of common unfeasible data elements in both EHRs

Table 4. Alpha/Feasibility Grading Scheme

Grade of Feasibility	Definition
Grade 1: Most Feasible	No additional work required. Measure assessed by all sites as having technical feasibility and implementation feasibility.
Grade 2: Feasible	Measure requires minimal work. All measure data elements are in all EHRs and all elements in EHR found to comply with measure criteria.*
Grade 3: Moderate Feasibility	Measure requires moderate work. EHR captures all but (up to) 3 data elements and at least 1 data element cannot meet measure criteria.
Grade 4: Low Feasibility	Measure will require substantial work to implement. At least 4 data elements are not present and at least 2 data elements cannot meet measure criteria.
Grade 5: Not Feasible	Rated by all sites as lacking technical feasibility and implementation feasibility. Assessment by sites indicates existing measure cannot currently be implemented in an EHR.

B. Work Products

The alpha test results in development of a set of test instruments and a measure-specific plan, as well as a formal report of findings including:

1. Alpha Vendor Questionnaires for each of the five (5) CQMs used for collecting eMeasure Testing data for EHR vendor products as described above.
2. Alpha Practice Questionnaires for each of the five (5) CQMs used for collecting eMeasure Testing data for practices applicable EHR vendor products are implemented as described above.
3. Non-Disclosure Agreements (NDA), Statements of Work (SOW), Consultant Narratives & Consultant Agreements as required by contracting and consulting required under the Quality Insights' CMS MIDS contract.
4. eMeasure Testing Plan, consisting of identification of vendors and practices where testing will occur and timeline for carrying out the steps in this standard plan.
5. Final Electronic Health Record Measure Feasibility Testing Results report of Alpha Testing findings to CMS including:
 - Analysis of responses from vendors and practices
 - Barriers encountered in collecting the data;
 - Changes in patient flow or practice operations that might be required to collect measure data;
 - Recommendations for measure revision to improve potential for collecting the required elements using EHRs; and
 - Global assessment with recommendation as to whether to proceed to beta testing. This recommendation will principally be based on whether it is *feasible* to collect measure elements using an EHR, and not whether it is *economical* to do so.

C. Alpha Testing Results Overview

Quality Insights of Pennsylvania conducted its feasibility testing for the five (5) CQMs in spring 2012 using a convenience sample two (2) EHR vendor products and eight (8) practices implementing the corresponding EHR vendor products. This summary provides quantitative and qualitative estimates of burden and difficulty to collect the necessary data elements for each of the measures for eMeasure elements from both the EHR vendor & practice perspectives. The eMeasure Testing Results also provides overall feasibility determinations by the Quality Insights eMeasure Alpha Testing Team for each of the five (5) eMeasures as demonstrated in *Table 5*.

Table 5. eMeasure Alpha Vendor Testing Results

PQRS #	Practice Usability by Level of Effort (LOE)	# Unfeasible eMeasure elements (Greenway PrimeSUITE)	# Unfeasible eMeasure data elements (Allscripts Professional)	# Unfeasible eMeasure data elements in BOTH EHRs	Overall Measure Feasibility Grading
128	Low LOE	0	2	0	Moderate
130	Low LOE	0	1	0	Moderate
134	High LOE	1	3	0	Moderate
316	Low LOE	0	2	0	Moderate
317	Low LOE	2	3	1	Moderate

D. Alpha Vendor Testing Results by Measure

Quality Insights' tested two (2) EHR vendor systems, both are ONC meaningful use certified EHRs. We interviewed the individuals responsible for the EHR interface modification. We questioned whether the data elements needed for measure calculation were currently present within the EHR and if they were not, we asked what additional burden it would take to modify the EHR to comply with the measure needs. The goal of this testing was to identify any data elements that could not be demonstrated in the EHR utilizing the eMeasure elements outlined in the Alpha Practice Questionnaires of *Appendices A through E*.

One data element for one measure was not currently present in both EHR systems that we tested. The data element for follow-up for repeat measurement in the blood pressure measure was not present in either of the EHRs that we tested. The vendors did indicate that this modification was very low burden to add to the EHR and estimated that it would take no more than 2-hours to do so.

Generally, the data elements required for the measures are available currently in the EHR. However, system modifications would need to be done for added measure values and coding in searchable fields for elements currently stored as text. The vendors viewed the additions and

modifications to their systems to capture the measure data elements in structured fields as feasible to implement.

E. Alpha Practice Testing Results by Measure

Quality Insights' interviewed eight (8) practice providers using two (2) ONC certified EHR systems. The provider practices consisted of three (3) family practices, two (2) obstetrics/gynecology practices, one (1) internal medicine practice and two (2) internal medicine/geriatrics specialty practices. We interviewed provider practice staff most knowledgeable about the EHR and practice workflow capable of identifying eMeasure elements outlined in the Alpha Practice Questionnaires of *Appendices F through J*. The eMeasure Alpha Practice Testing participants consistently of Physicians, Practice Administrators, Office Managers and Billing Manager were mostly in attendance. Qualitative eMeasure Feasibility Testing Results are provided in chronologic order as listed by number in Physician Quality Reporting System implementation.

128: Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up

This measure would pose no or low burden to the practices to implement consistently across the patient population. Primary care practices noted for the majority of their patients, referrals are rarely done as the practice would provide BMI care in-house. Consistent documentation was a prime factor lacking in this measure reporting. Practitioners reported providing care, but not documenting it in the applicable EHR location potentially requiring modifications to documentation workflow to accommodate the additional eMeasure documentation.

130: Documentation of Current Medications in the Medical Record

Providers report documenting medications practices currently in their EHRs and do not anticipate any additional burden to report this measure.

134: Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan

Overall, provider practices indicated this measure would demonstrate moderately high burden to collect. The practices do not routinely screen patients for depression. Primary care offices stated that the reason for the visit is generally acute and that there is not enough time in the visit to do the additional screening unless indicated. Specialty providers voiced concern that the measure would not apply to a large portion of their population and that adding this screening would be a major burden on office and clinical staff time. Practices appear to be moving in the direction of making steps toward providing as care standard in their workflow, especially with the new 2012 HCPCS G0444 Annual Depression Screening, 15 minutes billable office visit.

316 a & b: Preventive Care and Screening: Cholesterol -- Fasting Low Density Lipoprotein (LDL-C) Test Performed AND Risk-Stratified Fasting Low Density Lipoprotein (LDL-C)

Overall, provider practices indicated that this measure would be low to moderate burden to collect. Additional tests ordered/evaluated by practice staff and the additional documentation required for this measure impact workflow and burden particularly in specialty settings. In addition, the EHRs are relatively new and the 4-year history required for this measure may not be realistic.

317: Preventive Care and Screening: Screening for High Blood Pressure and Recommended Follow-Up Documented

This measure would pose low burden to the practices to implement consistently across the patient population. Documentation was the main piece lacking in this measure. Providers are doing the care, but not documenting it in their system and may need to modify workflow to accommodate the additional documentation requirements. Specialty providers voiced concern that the measure would not apply to a large portion of their population and would not comply with the measure timeframes. They felt that the management of this care and follow-up belonged in the primary care setting.

F. Additional Alpha Practice Testing Observations

- Most practices were able to collect the required eMeasure data elements, with few practice barriers identified in modifying workflow for collecting the remaining eMeasure data elements.
- Palliative care was a common discussion point across the provider practices. Providers rarely order this care, but would always document if they did.
- Specialty providers voiced concern regarding the applicability of measures to their role in the care of the patient apparently more suited to primary care. Providers and practices reported follow-up would be done by the primary care physician so they would rarely comply with the measures. They also noted that some of the codes in the existing measures would exclude them from getting 'credit' for the measures (e.g., obstetrical codes for preeclampsia or hypertension with pregnancy for BP).
- Insurance was a factor for follow-up referrals and additional testing. Provider practices order the tests, but due to the limitations with the patient's insurance coverage, the patient would not get the test due to financial restrictions.
- Practices identified literacy issues for some of the measures. Creation of materials for lifestyle modification and assessments for various languages and education levels is key to accomplish the measure intent. Lack of materials was also noted for lifestyle modifications.
- Practices view the lack of community resources to care for patients diagnosed with mental health disorders as an issue for the recommended follow-up and referral.
- One important note providers practices offered was the cumulative burden for measure element data collection. Assessing the measures individually may be misleading since the provider practices are required to collect an array of measures and the cumulative burden is not known.

G. Alpha Testing Recommendations & Next Steps

Of the five (5) measures discussed, all passed feasibility as outlined by Mathematica's "Feasibility Grading Scheme" schematic having met moderate reliability. Quality Insights will move into EHR Measure Beta Testing for each measure.

The eMeasure Beta Testing plan and execution will question of whether one or more actual EHR system(s) can actually generate measures from data they house. It consists of two phases: (1) self-assessed capability of generating the calculated values and performing the logical operations necessary to report the quality measure from different vendors' EHRs; and (2) documentation of correct calculation of measures from a set of patient records, where manual determination of the measure by an expert is the standard.

The beta test addresses the remaining scientific issues questions posed in Chapter 14 of the *MMS Blueprint* that are not resolved through the design and feasibility testing stages. Most validity testing will have been completed through expert consensus during TEP deliberations, as well as during prior testing of the paper version of the measure, when applicable. The beta test includes criterion validity testing and implicitly includes form equivalence reliability assessment through comparing EHR results with manual abstraction of test cases.

V. Beta Testing Methodology

Comprehensive beta testing consisted of both validity and reliability testing. *Validity* testing sought to determine the compliance of the eMeasure to the source PQRS administrative claims measure; where *Reliability* testing sought to understand the EHRs' capability and consistent calculation of the five (5) eMeasures based on the analytic measure specifications, MAT outputs and eMeasure-specific value sets for specified data elements.

The beta test included criterion validity testing and implicitly included form equivalence reliability assessment through comparing consistency of fictitious EHR test case results with manual abstraction of test cases. The beta test addresses the remaining scientific issues questions posed in Chapter 14 of the *MMS Blueprint* that are not resolved through the design and feasibility testing stages.

A. Beta Testing Team

Similar to the alpha testing team, the beta testing team consisted of a two (2) Quality Insights internal teams. The first team was the measure development team including the team leader, a clinical advisor, and content experts. The second team was the analytic team consisting of an epidemiologist and eMeasure analysts. The team lead recruited EHR vendors and/or practices, managed deliverable timelines, collected data, consulted with EHR vendors and/or practices staff, communicated the testing and documentation requirements and testing progress to stakeholders and testing partners. The team lead also coordinated final report writing

consistent with *MMS Blueprint* and NQF endorsement criteria, as results were available. The clinical advisor interpreted clinical questions related to coding test cases, assisted with the development of standard test cases, assisted in responding to questions during the beta test period, and assisted in writing the final report. The measures specialist revised eMeasures specifications as indicated by test results.

The analytic team developed the beta testing plan, beta vendor questionnaire (Appendix C), beta test case template (Appendix D), thirty (30) test case scenarios and test case skeleton documents (Appendices E, F, G & H). Test cases represented patient-level information replicating the data elements documented in an EHR during fictitious patient visits, while the case skeleton was a summary spreadsheet of all 30 fictitious test cases needed to calculate numerators, denominators, exclusions and exceptions. Within the testing teams, the test cases were commonly called the “test question” while the case skeleton were called the “test answers”. The 30 individual test cases have not been provided in the supplementary documents, yet are available upon request. The analytic team also drafted the beta testing plan, trained staff, compiled the test results for and report findings and consulted on the final report write up.

The measure development team consulted with the analytic team to further develop the discussed beta testing documents including numerator, denominator, exclusion, exception inclusionary criteria for measure calculation, along with fictitious 30 test cases. Collaborative efforts between the internal Quality Insights teams, as well as the EHR Vendor and/or practices addressed issues encountered during the testing concluding in eMeasures specification and value set modifications, as needed.

The combination of the measure development and analytics team leads also formed the expert team coordinating beta testing execution. The expert team reviewed the test instruments for fidelity to the measure, assists in training field staff, and assists with the interpretation and response of test results. The expert team also reviewed the final results and report analysis concluding overall measure feasibility and reliability to the extent practicable to the current implementation constraints of the existing EHR systems for future (non-implemented) eMeasures, as applicable.

B. Validity Testing

Validity testing sought to determine the conformity of the eMeasure to the source PQRS administrative claims measure, as well as its accurate representation of eMeasure logic, structured data elements, the accurate representative of eMeasures clinical concepts represented in the selected value sets and the appropriate selection of the available value sets.

In the original measure development process of the retooled eMeasures, Quality Insights conducted validity testing of the eMeasures’ administrative claims source measure with an environmental scan to evaluate the most current research and evidence-based guidelines.

Throughout the measure development and annual measure maintenance processes, each measure's technical expert panel (TEP), composed of subject matter clinical specialists and technical measure experts, evaluated the results of the review and provided recommendations for measure evolution based on the scientific merits of the evidence using the Strength of Recommendation Taxonomy (SORT) (Ebell et al., 2004). The TEP also reviewed and established the measure's ability to capture what it is designed to capture measure data elements using a consensus process.

The initial measure development process included alpha-testing in the field with select providers and a public comment period. During reliability testing, Quality Insights again convened a TEP for environmental scan review, as well as a detailed analysis of beta testing results. Based on the process of multiple stakeholder input, expert panel discussion and public comment, face and content validity of CMS/Quality Insights source measures are assumed to be established.

The *MMS Blueprint* additionally outlines *Criterion Validity* as a method to test a variable or set of variables against a reference or source considered to be the 'gold standard' and checks the performance of the operationalization against criteria. An example of criterion validity would be to have an expert abstract a paper chart to abstract the data for the measure under review. This same case would then be abstracted using the EHR to verify that the elements could be located and that the same value is observed. Quality Insights execution of Criterion Validity included a consistency comparison of the source or "paper" claims measure to the retooled eMeasure's specification logic, data element representation, value set selection and MAT outputs. Noted inconsistencies were rectified in applicable outputs as needed.

Upon eMeasure development, we additionally engaged each eMeasure's TEP in review of all analytic measure specifications, MAT outputs and eMeasure-specific value sets for specified data elements to establish a "gold standard" comparison of the e-specified logic, data elements & value sets to the source administrative claims measures. The preponderance of validity testing was completed through expert consensus during TEP deliberations, as well as during prior testing of the paper version of the measure, when applicable.

Quality Insights engaged our partner EHR vendors and clinical practices to determine the accuracy of eMeasure specification and value set development replicating the source measure. Minimal logic or value set inconsistencies were noted and all were justified to the source claims measure. Similarly, each TEP reviewed the accuracy of eMeasure specification and value set development replicating the source measure again justifying minimal inconsistencies to the gold standard source measure as discovered.

To further establish validity, Quality Insights' selection of vocabularies as seen in *the Measure Authoring Tool 2012 Update User Guide* (NQF, 2012) Quality Data Model (QDM) Category and Code System were selected for standard (terminal) and transitional (current) value sets as prescribed by the Office of the National Coordinator's HITSC Clinical Quality Workgroup and

Vocabulary Task Force to increase accuracy of measure reporting with implementation and future EHR product iterations.

To accurately select value sets reflective of applicable measure content, all Quality Insights measure development team members attended multi-day and webinar-based value set training for emerging and established vocabularies including International Classification of Diseases, 9th Revision, Clinical Modification (I9) , International Statistical Classification of Diseases and Related Health Problems, 10th Revision (I10), Systematized Nomenclature of Medicine – Clinical Terms (SNOMED-CT), Logical Observation Identifiers Names and Codes (LOINC), Health Level 7 (HL7) & RxNorm. Quality Insights utilized an American Health Information Management Association (AHIMA) Certified RHIT coder to validate value set translation, along with the team lead and lead content expert review of standards selection and concept conformity.

Quality Insights measure development team additionally consulted with the National Library of Medicine(NLM) to apply for SNOMED-CT concept codes where applicable data element concepts were absent in established value sets, again with the intent of matching the concept to the source measure data element and conform with the vocabulary's concept and semantic intent.

C. Reliability Testing

The Reliability portion of the beta testing sought to answer the question of whether one or more actual EHR system(s) can actually generate measures from data they house. Testing consisted of two phases: (1) self-assessed capability of generating the calculated values and performing the logical operations necessary to report the quality measure from different vendors' EHRs; and, if EHR modification capabilities existed, (2) documentation of *correct* calculation of measures from a set of patient records, where manual determination of the measure by an expert is the absolute gold standard.

D. Beta Testing Recruitment

Beta testing was conducted among a convenience sample of EHR vendors or practices willing to implement the measure on test versions of their EHRs. Quality Insights identified three (3) EHR vendors or practices in the initial stages of recruitment with one (1) fulfilling the beta testing to its fullest capability.

Utilizing the Beta Vendor Testing Questionnaire, Quality Insights sought to partner with EHR vendors and practices capable of:

- Having an EHR capable of storing all of the data used in calculating the measure;
- Having or having access to an adequately large set of test cases;
- Be able to develop a script for implementing a measure rapidly; and
- Be able to generate a file in QRDA format containing all the elements needed to

calculate a measure.

Beta testing advantage talking points to applicable EHR vendors and practices meeting testing capabilities included:

- Opportunity to test measure implementation before general release of measure
- Potential marketing advantage, “We have already implemented the next generation of measures.”
- Influence on “fine tuning” the measure

i. Beta Testing Team Member 1

The first EHR vendor product was *Greenway Medical EHR, Solutions Series PrimeSUITE Version: 16.0.14.19, 16.0.14.20, & 16.0.14.21*. The primary contact was the team lead Executive Director of Research Services. Attempted testing execution was additionally supported by Greenway Medical’s EHR development & testing team.

ii. Beta Testing Team Member 2

The second EHR vendor product was *Allscripts Professional EHR™ Clinical Module Version: 9.3 (Build 9.3.0.34)*. The primary contact was Chief Operating Officer of Gateway Medical Associates of Exton, Pennsylvania. Attempted testing execution was additionally supported by Gateway Medical Associates IT Director & Billing Manager.

iii. Beta Testing Team Member 3

The third EHR Product was *Allscripts Enterprise EHR™ Version 11.2.0.374* under the auspices of TeamPraxis, LLC contracted with Allscripts to provide clinical quality measure reporting and calculation services within the Enterprise product. The primary contact was the VP, Client & Partner Initiatives supported by measure calculation and IT supports.

Quality Insights conducted preliminary beta testing on PQRS measures 128, 130, 134, 316 a&b, and 317 during June and July 2012 with the collaborating partners of two (2) EHR vendors (Greenway Medical EHR and their *Solutions Series PrimeSUITE* and *Allscripts Enterprise EHR™* through TeamPraxis, LLC), and one (1) provider practice Gateway Medical Associates using the *Allscripts Professional EHR™ Clinical Module*. Due to timing and monetary constraints to complete testing, Greenway Medical EHR and Gateway Medical Associates were unable to complete phase 1 or phase 2 of beta testing. The beta testing protocols and results represent the testing efforts of the *Allscripts Enterprise EHR™* through TeamPraxis, LLC.

E. *Beta Testing Instrumentation*

Below is a list of tools required to complete beta testing. All provided Measure-specific appendices reflect PQRS 128 (BMI). The remainder of measure documents is available upon request.

1. **Beta Vendor Questionnaires** for each eMeasure assessing the EHR's capabilities to perform the requisite calculations and logical operations (Appendix C). Each vendor questionnaire consisted of a list of calculated elements (e.g., BMI given weight and height) and logical tests (e.g., LDL cholesterol greater than 160) required for determination of a measure. In addition, we asked vendors whether their EHR could produce key reports required to provide for population health management, such lists of patients who fail to meet a measure and performance rates in defined population groups. Finally, we ask about implementation of the measure in the particular EHR, including time requirements and structural changes needed.
2. **Set of 30 Test Cases:** standard test cases encompassing each of the major decision criteria related to the measures (Appendix D). Cases include all criteria related to the measure's numerator/denominator inclusions, exclusions and exceptions. For these measures, we devised a set of 30 test cases that test the major logic branches in each measure's calculation, for example exclusions, exceptions, age dependencies, and response to specific calculated values (e.g., BMI greater than 25). For economy, we included clinical features needed to determine eligibility for and value of each measure in every case.
3. **Beta Test Case Skeleton:** a summary document of all 30 test cases eligibility for measure calculation based on inclusion in numerator, denominator, exclusion and exception measure calculation (Appendix G). It additionally contains the overall rates of the collective 30 test cases inclusion for eMeasure calculation.
4. **Abstraction Forms:** A blank Beta Test Case Skeleton serves as the abstraction form comparing test cases measure calculation in each eMeasures numerator, denominator, exclusion and exception with the vendor results. We developed a set of measure specific abstraction forms, each one of which could be used to collect data from an EHR to determine whether a case met a measure in a specified observation period. These would serve to document reliability testing of individual measures against a particular EHR. We also developed a composite abstraction instrument for use in validating data in an EHR for all six measures simultaneously, and a Microsoft Access database for storing the results of such abstraction for calculation of measures on a group of abstracted cases.

5. **Adjunct Measure Calculation Criteria Tables:** #128 – BMI Calculation Table (Appendix E), Date of Birth & Start of Measurement Period Tables (Appendix F), and Beta Test Case Measure Calculation Criteria (Appendix H).

VI. *Beta Testing Results*

A. *Beta Testing Environment and Operations*

Quality Insights of Pennsylvania selected a convenience sample of three (3) EHR vendor products to conduct the beta testing.

i. *Beta Testing Team Member 1*

The first vendor product is Greenway Medical EHR, *Solutions Series PrimeSUITE*. Quality Insights' testing team hosted several meetings with Greenway staff to discuss the testing protocol. Greenway attendees included representation from research and development, program management and analytics. All participants agreed to the testing protocol as outlined. Greenway's would modify their test EHR system, program the measure algorithms and provide Quality Insights access to the test system to enter the gold standard cases. Greenway would then generate the QRDA output using the gold standard cases to test the measure algorithm. Greenway would provide Quality Insights with printouts of the content of the EHR for each test case, and blinded Quality Insights staff would abstract the quality measures using the custom abstraction form so that we could verify calculation.

Quality Insights provided the following documents to Greenway for each of the measures:

- a. Testing plan protocol (Quality Insights' testing protocol outlining the procedures and expectations for vendor testing)
- b. MAT output – human readable measure format (HQMF), eMeasure value sets and eMeasure XML (Appendix I)
- c. Measure flowcharts – measure algorithms (Appendix J)
- d. Measure Analytic Narratives – Measure Specifications (Appendix K)
- e. Vendor questionnaire (self-assessment of measure implementation capability)
- f. Test cases (gold standard)

As testing was underway, Greenway expressed concern about the level of effort needed to conduct the testing without reimbursement. As a result, Greenway withdrew from testing.

ii. Beta Testing Team Member 2

The second vendor product is *Allscripts Professional EHR™ Clinical Module*. Gateway Medical Associates, a multi-practice corporation and super user of the Allscripts EHR agreed to participate in the beta testing. We reviewed the testing protocol with the Gateway IT Director and Billing Manager. Both individuals felt that they had the necessary skills to modify the EHR and program the algorithms to conduct the testing and generate the results per the protocol.

Quality Insights provided the following documents to Gateway for each eMeasure:

- a. Testing plan protocol (Quality Insights' testing protocol outlining the procedures and expectations for vendor testing)
- b. MAT output (measure statements, value sets and measure algorithms)
- c. Measure flowcharts (measure algorithms)
- d. Vendor questionnaire (self-assessment of measure implementation capability)

Prior to testing commencement, Gateway expressed concern about the level of effort needed to conduct the testing. As a result, Gateway withdrew from testing.

iii. Beta Testing Team Member 3

Quality Insights is working with TeamPraxis who partners with Allscripts for quality measure reporting services of their *Allscripts Enterprise EHR™* product. The data are electronically retrieved from the practitioner records and loaded to a secondary database for measure calculation. TeamPraxis could test the measures by directly entering data into its secondary database, although that would not be the same as a direct test of the capability of an EHR itself to calculate measures. TeamPraxis' secondary database does not currently contain all data elements required for testing PQRS measures 128, 130, 134, 316 a&b, and 317, for example it would not have information on depression screening results or follow-up.

Quality Insights provided the following documents to TeamPraxis for each eMeasure:

- a. Testing plan protocol (Quality Insights' testing protocol outlining the procedures and expectations for vendor testing)
- b. MAT output – human readable measure format (HQMF), eMeasure value sets and eMeasure XML (Appendix I)
- c. Measure flowcharts – measure algorithms (Appendix J)
- d. Measure Analytic Narratives – Measure Specifications (Appendix K)
- e. Vendor questionnaire (self-assessment of measure implementation capability)
- f. Test cases (gold standard)

B. Phase I Beta Testing Results Overview

Based upon the questions outlined in the Beta Testing Vendor Questionnaire, TeamPraxis provided the following phase 1 reliability results:

1. Can your EHR implement a script to calculate the measure described above in a test environment? – Yes (all measures)
2. How long would it take you to be ready to test? – 2 months (all measures)
3. Would you be willing to enter a small number of standard test cases into your EHR system to test the performance of a measure script? – Yes (all measures)
4. Do you have a collection of suitable EHR records on which you could run a script? – Yes (all measures) - # of patients = approximately 90,000 patients corresponding to approximately 1.1 million encounters
5. Can you install scripts to test measures on users' production systems? – No (all measures). TeamPraxis testing methodology would be based on data loaded to a secondary database for measure calculation

Is your EHR capable of calculating a measure score (assuming the creation of an appropriate script or installation of a minor update to the system to enable this functionality)?

1. All patients with records in the system – Yes (all measures)
2. Patients with visits between specified dates – Yes (all measures)
3. Patients with specified characteristics such as gender, race, age, provider, or payer – Yes (all measures assuming race and payer are available and entered into the EHR. These 2 values are anticipated with near future updates)

Is your EHR capable of generating a measure report on demand for use by practice staff (assuming the creation of an appropriate script or installation of a minor update to the system to enable this functionality)?

1. Percentage measure score for all patients – Yes (all measures)
2. Comparative scores for different groups of patients, such as patients of a specific provider – Yes (all measures)
3. Time trends of measure scores – Yes (all measures)
4. List of patients eligible for the measure who did not meet the numerator criteria – Yes (all measures)

C. Phase I Beta Testing Results by Measure

Quantitative results of measure incalculable measure concept by measure are listed below with individual results outlined in Table 6. *Phase 1 Beta Testing Vendor Results by Measure:*

128: Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up

Patients with specified characteristics – race & payer

130: Documentation of Current Medications in the Medical Record

Patients with specified characteristics – race & payer

134: Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan

Patients with specified characteristics – race & payer

316 a: Preventive Care and Screening: Cholesterol -- Fasting Low Density Lipoprotein (LDL-C) Test Performed

Cardiac risk factors

Family history risk factor

Patients with specified characteristics – race & payer

#316 b: Preventive Care and Screening: Cholesterol: Risk-Stratified Cholesterol – Fasting Low Density Lipoprotein (LDL-C)

Patients with specified characteristics – race & payer

317: Preventive Care and Screening: Screening for High Blood Pressure and Recommended Follow-Up Documented

Patients with specified characteristics – race & payer

Table 6. Phase 1 Beta Testing Vendor Results by Measure

Measure		Age at start of measurement period	Encounters within measurement period	Number of encounters with medication reconciliation	Blood pressure classification	Time interval to future appointment	Time interval between blood pressure measurements	Converting weight to kilograms	Converting height to meters	Calculating BMI	Calculating age at encounter	Date of encounter within range
419 (MAT id 68)	Documentation of Current Medications in the Medical Record	Yes	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
317 (MAT id 22)	Preventive Care and Screening: Screening for High Blood Pressure and Recommended Follow-Up	Yes	Yes	N/A	Yes	Yes	Yes	N/A	N/A	N/A	N/A	N/A
128 (MAT id 69)	Percentage of patients aged 18 years and older with a calculated BMI and a documented follow-up plan when the most recent BMI is outside of normal parameters in the past six months or during the	Yes	Yes	N/A	N/A	N/A	N/A	Yes	Yes	Yes	Yes	Yes
316a (MAT id 61)	Preventive Care and Screening: Cholesterol – Fasting Low Density Lipoprotein (LDL-C) Test	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
316b (MAT id 64)	Preventive Care and Screening: Risk-Stratified Cholesterol – Fasting Low Density Lipoprotein	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
134 (MAT id 2)	Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Measure		BMI outside of expected range for age	Cardiac risk factors	HDL-C risk factor	Smoking risk factor	Hypertension risk factor	Family history risk factor	Age risk factor	Appropriate testing interval	Recommended LDL goal	Patient achieved LDL goal
419 (MAT id 68)	Documentation of Current Medications in the Medical Record	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
317 (MAT id 22)	Preventive Care and Screening: Screening for High Blood Pressure and Recommended Follow-Up	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
128 (MAT id 69)	Percentage of patients aged 18 years and older with a calculated BMI and a documented follow-up plan when the most recent BMI is outside of normal parameters in the past six months or during the	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
316a (MAT id 61)	Preventive Care and Screening: Cholesterol – Fasting Low Density Lipoprotein (LDL-C) Test	N/A	No	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A
316b (MAT id 64)	Preventive Care and Screening: Risk-Stratified Cholesterol – Fasting Low Density Lipoprotein	N/A	316a	316a	316a	316a	316a	316a	316a	Yes	Yes
134 (MAT id 2)	Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

D. Phase 2 Beta Testing

As previously stated, phase 1 of the reliability portion of the beta testing sought to answer the question of whether one or more actual EHR system(s) can actually generate measures from data they house. Having completed the first phase of reliability testing with eMeasure-specific EHR vendor product testing self-assessed questionnaire to glean the EHR's capability of generating the calculated values and performing the logical operations necessary to report the quality measure from different vendors' EHRs, the next step in testing is to move to EHR modification capabilities existed as able. Modification of the EHR will quantifiably ascertain whether the EHR, based on entered scripts, queries and value sets consistently calculate the measures' numerators, denominators, exclusions & exceptions based on the calculation algorithms.

TeamPraxis, having agreed upon systems modification of the Allscripts Enterprise EHRTM, the next phase of testing, to secure NQF endorsement for the eMeasure versions of applicable eMeasures, anticipates moving into execution of "gold standard" or second phase of reliability testing determining documentation of correct calculation of measures from a set of patient records to retain the data elements in a coded form, the vendors also agree that they could calculate the measures per the algorithms provided to them.

Phase 2 reliability testing will encompass asking each vendor to develop a script for calculating the measure on its family of EHRs, and submit the script as part of the documentation of testing. Vendors will then enter test cases into their EHR systems and run the script on the test patient records. Vendors will calculate a measure performance rate on the population of test cases based on a performance measurement interval that we will specify. The vendor will report numerator, denominator, and population prevalence of denominator and numerator inclusion criteria, exclusion criteria, and exceptions. The vendor will also produce de-identified QRDA format output files for the two sets of records described above, containing all values needed to calculate the measure.

Quality Insights abstractors will review each test case independently of the clinical advisor who develops it, assigning all appropriate codes.

VII. Quality Insights of Pennsylvania eMeasure Testing Team

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VIII. References

1. Rubin HR, Pronovost P, Diette GB. From a process of care to a measure: the development and testing of a quality indicator. *Int J Qual Health Care*. 2001;13(6):489-496.
2. Health Services Advisory Group. A Blueprint for the CMS Measures Management System, Version 8. 3/5/2012; <https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/MMS/MeasuresManagementSystemBlueprint.html>. Accessed 5/9/2012, 2012.
3. National Quality Forum. Measure Evaluation Criteria. Retrieved from: http://www.qualityforum.org/docs/measure_evaluation_criteria.aspx. Accessed 5/10/2012, 2012.
4. Schmitz R, Crawford A, Esposito D, Ranshous C, Simon S, Wodarek-O'Reilly A. *ARRA HITECH Eligible Professional Clinical Quality Measures Draft Feasibility Testing Plan*. Washington, DC: Mathematica Policy Research; 2012.
5. Ebell, M.H., Siwek, J., Weiss, B.D., Woolf, S.H., Susman, J., Ewigman, B., & Bowman, M. (2004). Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. *American Family Physician*, 69 (3), 548-56.
6. National Quality Forum (2012). Measure Authoring Tool 2012 Update User Guide. Retrieved from: http://www.qualityforum.org/Calendar/2012/01/Webinar__Measure_Authoring_Tool_2012_Update.aspx

IX. Appendices

Appendix A: BMI Alpha EHR Vendor Testing Questionnaire

Vendor Alpha Testing Questionnaire for BMI Measure

Name of vendor:

Name of electronic health record (EHR) system:

Measure number 128 (MAT id 69)

Measure name Body Mass Index (BMI) Screening and Follow up

Measure description Percentage of patients aged 18 years and older with a calculated BMI and a documented follow-up plan when the most recent BMI is outside of normal parameters in the past six months or during the current visit.

Exclusions: Pregnancy

Receiving Palliative Care

Normal Parameters: Age 65 years and older BMI \Rightarrow 23 and $<$ 30

Age 18 – 64 years BMI = $>$ 18.5 and $<$ 25

Introduction

This is a brief survey to determine whether the EHR system is capable of collecting and storing data required to calculate a proposed health care quality measure adapted for EHR use (e-measure). We want to know whether each data element required for calculating the e-measure is available in the EHR, how the data are represented or coded (including whether it is calculated from other data elements), whether multiple observations of the same data element can occur in an individual patient's record (for example, values of a laboratory test that change over time), and in what discrete locations in the record (e.g., demographics, clinical encounter notes) the data element might be found.

If the element is *identified* by standard code(s), we would appreciate knowing which standard codes the EHR uses, and from which coding system (e.g., LOINC). If the *value* of the element would be determined by the presence one or more codes from a standard code list, please tell us specific code(s), the name of the code list (e.g., SNOMED) and the version currently in use. For example:

- A hemoglobin determination would be identified by the LOINC code 718-7, SNOMED code 104142005, or a code from another system, and its value would be represented by a number (percent or g/dl).

Name of element	Blood hemoglobin value	
Available in the EHR	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
	LOINC (2007)	718-7
How is the element's <i>value</i> represented?	<input checked="" type="checkbox"/> A number Unit of measure <u>g/dl</u> <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input checked="" type="checkbox"/> Allowed. Examples <u>Serial observations</u>	
Location(s) where found in the EHR	Laboratory results	

- Administration of an antidepressant drug might be represented by a SNOMED code such as 169314007, or a list of NDC codes like 0186-0606, 0186-0742, .. In such cases, the measure only requires the *presence* of a code. In this instance, codes *used in the EHR* to represent administration of an antidepressant would be listed as ones that identify the element, and "N/A" would be used to indicate that the measure only requires that the relevant code appear at the appropriate place and time in the record.

Name of element	Antidepressant drug prescribed	
Available in the EHR	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
	SNOMED	169314007
	NDC	0186-0606, 0186-0742...
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input checked="" type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR	Progress notes (SNOMED) Medication list (NDC)	

Measure analysis

To calculate the BMI measure electronically, the EHR system must be able to determine that a patient was in the specified age range at the time of most recent encounter, not pregnant, and not currently receiving palliative care. Certain situations are *exceptions*, for example a patient with BMI out of range who refuses intervention.

For each measure element listed below, please complete the response grid similar to the example. Note that some of the items represented by codes from standard code lists may be represented by more than one code. In that case, please indicate all that are known to you.

For more information on requirements for each measure element, please refer to the attached measure specification.

Name of element	Patient date of birth	
Description		
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Patient visit	
Description	Encounter in the practice setting in which the EHR is in use	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Weight	
Description	Recorded body weight (needed for calculating BMI)	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Height	
Description	Recorded height of patient (needed for BMI calculation)	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Encounter date	
Description	Date of patient encounter in the practice setting in which the EHR is implemented	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Follow-up plan	
Description	Documentation of a follow-up plan for BMI out of range, such as counseling for weight control	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Follow-up medication	
Description	Documentation drug prescribed for out of range BMI	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Follow-up referral	
Description	Documentation of referral to another practitioner such as a dietician because of BMI out of range	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Reason no follow-up	
Description	A patient or medical reason for not following up an out of range BMI is documented, e.g., patient refusal or the patient is in an urgent medical situation	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Pregnancy	
Description	Patient was pregnant on the date of the encounter	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Name of element	Palliative care	
Description	Patient was receiving palliative care on the date of the encounter	
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Data elements not currently in the EHR

If you answered “no” to any of the items above, please tell us what might be required to add the capability of capturing it to the EHR. Also, please consider if there are alternative measure capture strategies you might use (see next section).

1. How significant a change would be required? ____

Please assess on a scale of 1 to 5, where 1 is a minor revision such as adding a code to a code set and 5 is a complete revision of the EHR's data structure and the release of a new version incompatible with the current one.

2. How long would it take to make the change(s): _____
3. What barriers do you foresee to adding the missing element(s)?

Alternative measure capture strategies

Does the EHR capture data from which this measure could be calculated in some alternative way? For example, could a clinician document that a calculated element has a particular value or lies within a given range without recording all of the individual values needed to calculate it explicitly? ☐ Yes

☐ No

If yes, please list the alternative strategies and the codes used to implement them in the response grids below. Please copy the next page and use additional pages as needed.

Name of element		
Description		
Available in the EHR	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Code(s) <i>identifying</i> the element in the EHR, if any	Coding system/version	Code values
How is the element's <i>value</i> represented?	<input type="checkbox"/> A number Unit of measure _____ <input type="checkbox"/> Date/time <input type="checkbox"/> Text field <input type="checkbox"/> N/A (measure requires only presence of a code)	
Multiple values in the EHR	<input type="checkbox"/> Not allowed <input type="checkbox"/> Allowed. Examples _____	
Location(s) where found in the EHR		

Appendix B: BMI Alpha Practice Testing Questionnaire

Practice Alpha Testing Questionnaire for BMI Measure

Practice

Location:

Name of electronic health record (EHR) system:

Introduction

Quality Insights is attempting to assess the feasibility of collecting the quality measure described below in practices like yours. In the questionnaire below, we ask a few short questions about your patients, your practice, and your record system that will help us in this effort. Responding to these questions is voluntary, and should require no more than ten minutes.

Measure we are testing

Measure number 128 (MAT id 69)

Measure name Body Mass Index (BMI) Screening and Follow up

Measure description Percentage of patients aged 18 years and older with a calculated BMI and a documented follow-up plan when the most recent BMI is outside of normal parameters in the past six months or during the current visit.

Exclusions: Pregnancy

Patient receiving palliative care

Normal Parameters: Age 65 years and older BMI \Rightarrow 23 and $<$ 30

Age 18 – 64 years BMI = $>$ 18.5 and $<$ 25

Questions about the feasibility of obtaining data for this measure in your practice are on the next two pages. Most are simple check boxes for your best answer. A few request additional information, for example, a description of how you might have to change patient flow to collect this information.

Thank you for your help in this project.

1. Key data required to calculate the measure

Please tell us in what proportion of eligible patients (as defined in the measure description) you would expect to find each of the data elements listed below. Please check the box that most closely reflects your practice. For the question below:

“Always” means all the time or nearly all the time;

“Usually” means not always, but at least half of the time;

“Sometimes” means less than half of the time but in more than 10% of cases;

“Rarely” means less than 10% of the time, but still reported occasionally; and

“Never” means none of the time, or nearly so.

Data element	Always	Usually	Sometimes	Rarely	Never
Patient date of birth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Date of patient encounter in the practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient height <i>recorded at least once in the record</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient weight <i>recorded at most recent encounter or within the past 6 months</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pregnancy <i>recorded at most recent encounter in female patients</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Order for palliative care <i>at most recent encounter</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Calculated body mass index <i>recorded at most recent encounter or within the past 6 months</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation of provider recognition of high or low BMI values as defined in the measure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation of a referral <i>for BMI values recognized as high or low</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation drug therapy <i>when BMI values recognized as high or low</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation of a follow-up plan <i>for BMI values recognized as high or low</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Documentation of medical or patient reasons for not following up a high or low BMI value such as patient refusal or medical contraindication	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
----------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------

2. For data elements that your practice records sometimes, rarely, or never, please tell us why they are not recorded more frequently.

- ☐ These data elements do not reflect usual care. Our patients generally do not undergo clinical evaluation or testing in our practice or elsewhere that would allow us to document abnormal BMI values and/or a follow-up plan for them.
- ☐ We do not view them as important in managing our patients.
- ☐ Collecting some of them uniformly would increase the burden of recordkeeping in our practice.

Which data elements?

Which practice staff would be impacted, and how much additional time would it take?

- ☐ Collecting some of them uniformly would require us to change patient flow through our practice.

Which data elements?

How would your practice have to restructure patient flow?

- ☐ We don't know if we can record some of them in our current EHR.

Which data elements?

- ☐ Our patients are generally not interested in counseling, treatment, or referral for over- or underweight
- ☐ We do not have time or resources for lifestyle modification counseling
- ☐ We have very low success rates with lifestyle modification counseling
- ☐ Some other reasons not listed above? Please explain below.

3. Do you have other comments regarding the feasibility of routinely collecting data to support calculation of this measure on appropriate patients in your practice?

☐ Yes ☐ No

If yes, please list them here.

Appendix C: BMI Beta Vendor Testing Questionnaire

Vendor Capability to Calculate BMI Screening and Follow-up Quality Measure

Name of vendor:

Name of electronic health record (EHR) system:

Measure number 128 (MAT id 69)

Measure name Body Mass Index (BMI) Screening and Follow up

Measure description Percentage of patients aged 18 years and older with a calculated BMI and a documented follow-up plan when the most recent BMI is outside of normal parameters in the past six months or during the current visit.

Exclusions: Pregnancy

Receiving Palliative Care

Normal Parameters: Age 65 years and older BMI ≥ 23 and < 30

Age 18 – 64 years BMI ≥ 18.5 and < 25

Introduction

This questionnaire is to assess your EHR's capability of calculating and reporting the electronic quality measure described above. It is based on the assumption that the EHR has the capacity to store the data elements needed for the calculation. Please respond to the following questions, referring to the attached list of data elements used in the measure if necessary.

Calculated elements

1. Is the EHR capable of calculating each of the following calculated values from the elements listed above?

Calculated element	Description or when used	Response
Age at start of measurement period	Date of start of MP – date of birth, rounded down to year	<input type="checkbox"/> Yes <input type="checkbox"/> No
Encounter within measurement period	Determine that a patient encounter makes patient eligible for measure	<input type="checkbox"/> Yes <input type="checkbox"/> No
Converting weight to kilograms	(if recorded in different units)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Converting height to meters	(if recorded in different units)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Calculating BMI	weight/height ² , expressed as kg/m ²	<input type="checkbox"/> Yes <input type="checkbox"/> No
Calculating age at encounter	Encounter date – date of birth, rounded down to year	<input type="checkbox"/> Yes <input type="checkbox"/> No
Date of encounter within range	Report date – date of encounter <= 6 months	<input type="checkbox"/> Yes <input type="checkbox"/> No
BMI outside of expected range for age	Age 18-64: BMI < 18.5 or BMI ≥ 25 Age 65+ BMI <23 or BMI ≥ 30	<input type="checkbox"/> Yes <input type="checkbox"/> No

Calculating a measure score

2. Based on the measure description above, is your EHR capable of calculating a measure score (assuming the creation of an appropriate script or installation of a minor update to the system to enable this functionality)? Please assess for each patient group listed.

Patient Group	Response
All patients with records in the system	<input type="checkbox"/> Yes <input type="checkbox"/> No
Patients with visits between specified dates	<input type="checkbox"/> Yes <input type="checkbox"/> No
Patients with specified characteristics such as gender, race, age, provider, or payer	<input type="checkbox"/> Yes <input type="checkbox"/> No

Reporting a measure score to practice staff

3. Based on the measure description above, is your EHR capable of generating a measure report on demand for use by practice staff (assuming the creation of an appropriate script or installation of a minor update to the system to enable this functionality)? Please assess for each report type listed.

Report Type	Response
Percentage measure score for all patients	<input type="checkbox"/> Yes <input type="checkbox"/> No
Comparative scores for different groups of patients, such as patients of a specific provider	<input type="checkbox"/> Yes <input type="checkbox"/> No
Time trends of measure scores	<input type="checkbox"/> Yes <input type="checkbox"/> No
List of patients eligible for the measure who did not meet the numerator criteria	<input type="checkbox"/> Yes <input type="checkbox"/> No

Reporting a measure to CMS or other payers

4. Is your EHR capable of generating a report in electronic form, meeting the requirements of the most recent Centers for Medicare & Medicaid Services (CMS) *Data Submission Specifications Utilizing HL7 QRDA* containing all of the elements needed to calculate the above measure?

☐ Yes ☐ No

Measure testing

5. Can your EHR implement a script to calculate the measure described above in a test environment?

☐ Yes ☐ No

If yes, about how long would it take for you to be ready to test? _____

If no, *stop here. The rest of the questions only apply to vendors capable of implementing scripts for quality measure testing.*

6. Would you be willing to enter a small number of standard test cases into your EHR system to test the performance of a measure script?

☐ Yes ☐ No

7. Do you have a collection of suitable EHR records on which you could run a script?

☐ Yes ☐ No

If yes, about how many patients and how many encounters are represented?

_____ (patients) _____ (encounters)

8. Can you install scripts to test measures on users' production systems?

☐ Yes ☐ No

If yes, do you know of users who would be willing to allow a script test on live data?

☐ Yes ☐ No

If yes, about how many patients and how many encounters are represented?

_____ (patients) _____ (encounters)

Appendix D: BMI eMeasure Beta Test Case Template

Measurement Period 01/01/2011 through 12/31/2011

Case number	1			
Demographics	Date of Birth	Race	Sex	Marital status
	3/1/1985		F	
Past medical history	LDL-C 120			
Social history	Non-smoker, Runner			
Family history				
Allergies				
Active Problems (start of MP)				
Visit date	02/30/2011			
Encounter Code	99213			
Medication List Documented	(blank)			
Reason for visit				

Vital signs	BP	Weight	Height	BMI		
	mmHg	lb	in	(20.8)		
	110/78	125	65			
Physical exam						
Labs, x-ray						
Assessment	Negative Adult Depression Screening					
Plan of Care/ Disposition						
Visit date	08/13/2009					
Reason for visit						
Vital signs	Temp	HR	Resp	BP	Weight	Height
	°F	/min	/min	mmHg	lb	in
Physical exam						
Labs, x-ray	LDL-C 120mg/dL					
Disposition						

Appendix E: BMI Calculation Table

Weight in Pounds	Height in Inches																		
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78
100	19.5	18.9	18.3	17.7	17.2	16.6	16.1	15.7	15.2	14.8	14.3	13.9	13.6	13.2	12.8	12.5	12.2	11.9	11.6
105	20.5	19.8	19.2	18.6	18.0	17.5	16.9	16.4	16.0	15.5	15.1	14.6	14.2	13.9	13.5	13.1	12.8	12.4	12.1
110	21.5	20.8	20.1	19.5	18.9	18.3	17.8	17.2	16.7	16.2	15.8	15.3	14.9	14.5	14.1	13.7	13.4	13.0	12.7
115	22.5	21.7	21.0	20.4	19.7	19.1	18.6	18.0	17.5	17.0	16.5	16.0	15.6	15.2	14.8	14.4	14.0	13.6	13.3
120	23.4	22.7	21.9	21.3	20.6	20.0	19.4	18.8	18.2	17.7	17.2	16.7	16.3	15.8	15.4	15.0	14.6	14.2	13.9
125	24.4	23.6	22.9	22.1	21.5	20.8	20.2	19.6	19.0	18.5	17.9	17.4	17.0	16.5	16.0	15.6	15.2	14.8	14.4
130	25.4	24.6	23.8	23.0	22.3	21.6	21.0	20.4	19.8	19.2	18.7	18.1	17.6	17.1	16.7	16.2	15.8	15.4	15.0
135	26.4	25.5	24.7	23.9	23.2	22.5	21.8	21.1	20.5	19.9	19.4	18.8	18.3	17.8	17.3	16.9	16.4	16.0	15.6
140	27.3	26.4	25.6	24.8	24.0	23.3	22.6	21.9	21.3	20.7	20.1	19.5	19.0	18.5	18.0	17.5	17.0	16.6	16.2
145	28.3	27.4	26.5	25.7	24.9	24.1	23.4	22.7	22.0	21.4	20.8	20.2	19.7	19.1	18.6	18.1	17.6	17.2	16.8
150	29.3	28.3	27.4	26.6	25.7	25.0	24.2	23.5	22.8	22.1	21.5	20.9	20.3	19.8	19.3	18.7	18.3	17.8	17.3
155	30.3	29.3	28.3	27.5	26.6	25.8	25.0	24.3	23.6	22.9	22.2	21.6	21.0	20.4	19.9	19.4	18.9	18.4	17.9
160	31.2	30.2	29.3	28.3	27.5	26.6	25.8	25.1	24.3	23.6	23.0	22.3	21.7	21.1	20.5	20.0	19.5	19.0	18.5
165	32.2	31.2	30.2	29.2	28.3	27.5	26.6	25.8	25.1	24.4	23.7	23.0	22.4	21.8	21.2	20.6	20.1	19.6	19.1
170	33.2	32.1	31.1	30.1	29.2	28.3	27.4	26.6	25.8	25.1	24.4	23.7	23.1	22.4	21.8	21.2	20.7	20.2	19.6
175	34.2	33.1	32.0	31.0	30.0	29.1	28.2	27.4	26.6	25.8	25.1	24.4	23.7	23.1	22.5	21.9	21.3	20.7	20.2
180	35.2	34.0	32.9	31.9	30.9	30.0	29.0	28.2	27.4	26.6	25.8	25.1	24.4	23.7	23.1	22.5	21.9	21.3	20.8
185	36.1	35.0	33.8	32.8	31.8	30.8	29.9	29.0	28.1	27.3	26.5	25.8	25.1	24.4	23.8	23.1	22.5	21.9	21.4
190	37.1	35.9	34.7	33.7	32.6	31.6	30.7	29.8	28.9	28.1	27.3	26.5	25.8	25.1	24.4	23.7	23.1	22.5	22.0
195	38.1	36.8	35.7	34.5	33.5	32.4	31.5	30.5	29.6	28.8	28.0	27.2	26.4	25.7	25.0	24.4	23.7	23.1	22.5
200	39.1	37.8	36.6	35.4	34.3	33.3	32.3	31.3	30.4	29.5	28.7	27.9	27.1	26.4	25.7	25.0	24.3	23.7	23.1
205	40.0	38.7	37.5	36.3	35.2	34.1	33.1	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.6	25.0	24.3	23.7
210	41.0	39.7	38.4	37.2	36.0	34.9	33.9	32.9	31.9	31.0	30.1	29.3	28.5	27.7	27.0	26.2	25.6	24.9	24.3
215	42.0	40.6	39.3	38.1	36.9	35.8	34.7	33.7	32.7	31.7	30.8	30.0	29.2	28.4	27.6	26.9	26.2	25.5	24.8
220	43.0	41.6	40.2	39.0	37.8	36.6	35.5	34.5	33.4	32.5	31.6	30.7	29.8	29.0	28.2	27.5	26.8	26.1	25.4
225	43.9	42.5	41.1	39.9	38.6	37.4	36.3	35.2	34.2	33.2	32.3	31.4	30.5	29.7	28.9	28.1	27.4	26.7	26.0
230	44.9	43.5	42.1	40.7	39.5	38.3	37.1	36.0	35.0	34.0	33.0	32.1	31.2	30.3	29.5	28.7	28.0	27.3	26.6
235	45.9	44.4	43.0	41.6	40.3	39.1	37.9	36.8	35.7	34.7	33.7	32.8	31.9	31.0	30.2	29.4	28.6	27.9	27.2
240	46.9	45.3	43.9	42.5	41.2	39.9	38.7	37.6	36.5	35.4	34.4	33.5	32.5	31.7	30.8	30.0	29.2	28.5	27.7
245	47.8	46.3	44.8	43.4	42.0	40.8	39.5	38.4	37.2	36.2	35.2	34.2	33.2	32.3	31.5	30.6	29.8	29.0	28.3
250	48.8	47.2	45.7	44.3	42.9	41.6	40.3	39.2	38.0	36.9	35.9	34.9	33.9	33.0	32.1	31.2	30.4	29.6	28.9
255	49.8	48.2	46.6	45.2	43.8	42.4	41.2	39.9	38.8	37.7	36.6	35.6	34.6	33.6	32.7	31.9	31.0	30.2	29.5
260	50.8	49.1	47.5	46.1	44.6	43.3	42.0	40.7	39.5	38.4	37.3	36.3	35.3	34.3	33.4	32.5	31.6	30.8	30.0
265	51.7	50.1	48.5	46.9	45.5	44.1	42.8	41.5	40.3	39.1	38.0	37.0	35.9	35.0	34.0	33.1	32.3	31.4	30.6
270	52.7	51.0	49.4	47.8	46.3	44.9	43.6	42.3	41.0	39.9	38.7	37.7	36.6	35.6	34.7	33.7	32.9	32.0	31.2
275	53.7	52.0	50.3	48.7	47.2	45.8	44.4	43.1	41.8	40.6	39.5	38.4	37.3	36.3	35.3	34.4	33.5	32.6	31.8
280	54.7	52.9	51.2	49.6	48.1	46.6	45.2	43.8	42.6	41.3	40.2	39.0	38.0	36.9	35.9	35.0	34.1	33.2	32.4
285	55.7	53.8	52.1	50.5	48.9	47.4	46.0	44.6	43.3	42.1	40.9	39.7	38.6	37.6	36.6	35.6	34.7	33.8	32.9
290	56.6	54.8	53.0	51.4	49.8	48.3	46.8	45.4	44.1	42.8	41.6	40.4	39.3	38.3	37.2	36.2	35.3	34.4	33.5
295	57.6	55.7	54.0	52.3	50.6	49.1	47.6	46.2	44.8	43.6	42.3	41.1	40.0	38.9	37.9	36.9	35.9	35.0	34.1
300	58.6	56.7	54.9	53.1	51.5	49.9	48.4	47.0	45.6	44.3	43.0	41.8	40.7	39.6	38.5	37.5	36.5	35.6	34.7

Appendix F: Date of Birth & Start of Measurement Period Tables

Age	Female	Male	Age	Female	Male
10	9/22/2000	8/6/2000	50	8/4/1960	5/6/1960
11	11/5/1999	12/18/1999	51	12/6/1959	6/22/1959
12	4/28/1998	11/21/1998	52	4/12/1958	6/25/1958
13	11/19/1997	2/7/1997	53	6/26/1957	10/31/1957
14	5/7/1996	3/25/1996	54	1/25/1956	8/16/1956
15	7/13/1995	3/16/1995	55	10/7/1955	7/29/1955
16	1/9/1994	2/2/1994	56	9/25/1954	11/29/1954
17	1/3/1993	12/12/1993	57	5/8/1953	8/8/1953
18	4/18/1992	5/18/1992	58	12/5/1952	11/19/1952
19	3/31/1991	6/15/1991	59	4/1/1951	6/1/1951
20	2/2/1990	5/13/1990	60	12/29/1950	5/20/1950
21	10/3/1989	2/28/1989	61	7/31/1949	4/3/1949
22	11/6/1988	5/21/1988	62	6/24/1948	9/21/1948
23	4/26/1987	8/10/1987	63	5/26/1947	7/4/1947
24	9/15/1986	6/1/1986	64	10/20/1946	3/8/1946
25	7/3/1985	8/2/1985	65	2/22/1945	6/15/1945
26	4/9/1984	6/9/1984	66	10/27/1944	1/8/1944
27	3/7/1983	7/1/1983	67	8/8/1943	9/6/1943
28	5/25/1982	5/30/1982	68	8/7/1942	8/4/1942
29	3/27/1981	4/26/1981	69	5/10/1941	1/3/1941
30	10/13/1980	7/12/1980	70	5/15/1940	6/19/1940
31	1/11/1979	10/29/1979	71	8/15/1939	3/2/1939
32	9/1/1978	1/4/1978	72	10/16/1938	9/28/1938
33	3/25/1977	1/26/1977	73	8/6/1937	3/28/1937
34	7/31/1976	3/13/1976	74	6/30/1936	8/9/1936
35	7/14/1975	10/17/1975	75	4/27/1935	12/18/1935
36	11/7/1974	6/8/1974	76	3/30/1934	11/20/1934
37	9/1/1973	6/21/1973	77	5/25/1933	3/19/1933
38	7/29/1972	1/23/1972	78	12/24/1932	3/31/1932
39	2/25/1971	8/29/1971	79	3/17/1931	7/31/1931
40	5/16/1970	8/26/1970	80	9/25/1930	12/31/1930
41	11/7/1969	10/26/1969	81	8/20/1929	8/2/1929
42	4/7/1968	2/4/1968	82	3/3/1928	5/24/1928
43	3/19/1967	10/10/1967	83	6/24/1927	2/24/1927
44	11/10/1966	3/20/1966	84	5/28/1926	8/19/1926
45	6/19/1965	3/22/1965	85	10/30/1925	7/14/1925
46	8/9/1964	6/5/1964	86	9/1/1924	8/4/1924
47	3/13/1963	1/7/1963	87	8/19/1923	11/8/1923
48	3/18/1962	8/29/1962	88	12/5/1922	11/22/1922
49	11/1/1961	4/6/1961	89	3/26/1921	9/5/1921

Start of measurement period
1/1/2011

Appendix G: Beta Test Case Skeleton

Case ID	Age / Sex	Encounter	Comment	BMI					Blood Pressure					Med Management					Depression					Cholesterol A					Cholesterol B				
				18-64; 65+ (>1 encounter)					18+					18+ (every encounter)					12+					20-79					20-79				
				Num	Den	Excl	Excp	Meas	Num	Den	Excl	Excp	Meas	Num	Den	Excl	Excp	Meas	Num	Den	Excl	Excp	Meas	Num	Den	Excl	Excp	Meas	Num	Den	Excl	Excp	Meas
1	25F	99213	Nonsmoker, runner, LDL 2 years ago=120, none more recent	1	1			1	1	1			1	0	1			0	1	1			1	1	1			1	1	1			1
2	47M	99213	Nonsmoker, hyperlipidemia, not on treatment; overweight advised wt loss exercise	1	1			1	1	1			1	1	1			1	0	1			0	1	1			1	0	1			0
3	49F	99213	Obese, smoker, hyperlipidemia. 4 lipid panels over past 2 years with differing results. Most recent LDL=120. At most recent encounter, refused to participate in med reconciliation.	1	1			1	1	1			1	1	1			1	1	1			1	1	1			1	1	1			1

4	10 M	99213	Immunization visit (late)		0				0					0				0					0			
5	13F	99213	Negative depression screen		0				0					0			1	1			1		0			0
6	15F	99213	STD screening		0				0					0			0	1			0		0			
7	19 M	99213	Normal BP, weight not recorded	0	1			0	1	1			1	0	1			0	0	1			0		0	
8	30F	99213	Postpartum depression; overweight	1	1			1	1	1			1	1	1			1		1	1			0		0
9	55 M	99213	Overweight, smoker, new 2 consecutive hypertensive BP, EKG ordered, counseling diet, salt, exercise; labs for hypertension and lipids (ldl=110). Father died AMI age 40. Refused depression screen.	1	1			1	1	1			1	1	1			1	0	1		1		1	0	1
10	40F	99213	Obesity, type 2 diabetes; hypertension on treatment; hyperlipidemia LDL=140. 2 year history of MDD, on	1	1			1					1	1			1	0	1	1			1	0	1	

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14	40 M	99213	Smoker, normal BP, mother had heart attack age 48. LDL=110, HDL=62.	1	1			1	1	1			1	1	1			0	1	1			1	1	1			1
15	45 M	99213	Overweight, new 2 consecutive hypertensive BP, EKG ordered; lipid screen LDL=145.	0	1			0	1	1			1	1	1			0	1	1			1	1	1			1
16	24 M	99213	Overweight, no plan	0	1			0	1	1			1	0	1			0	0	1			0	0	0			
17	33F	99213	Overweight, dietary counseling, LDL=110; smoker; bp 140/100 last visit no plan	1	1			1	0	1			0	0	1			0	1	1			1	0	0			
18	29F	99213	Overweight, pregnant		1	1			1	1			1	1	1			1	0	1	1				0			
19	59 M	99213	Overweight, refused intervention and lipid screen		1		1		1	1			1	0	1			0	0	1			0		0		1	
20	73F	99213	Underweight , nutritional advice	1	1			1	0	1			0	1	1			1	1	1			1		0			
21	55 M	99213	Overweight, BP 135/80 x 1, diet and exercise advice	1	1			1	1	1			1	0	1			0	0	1			0	1	1			1

22	27F	99213	No encounter in MP; earlier BP screen, but not depression or cholesterol		0				1	1		1				0	1		0	0	1			0		0				
23	23 M	99213	Only encounter in MP for laceration (dog bite); sent to emergency department		1		1			1		1		0	1		1		1		0	1			0		0			
24	79 M	99213	Underweight ; dementia, COPD, receiving hospice care		1	1			1	1		1		1	1		1		1		0	1				0	1			
25	62F	99213	Established hypertension on meds (no hyperlipidemia); BMI not assessed at most recent visit but measured within 6 months of end of MP	1	1			1			1		1	1		1	1		1		1	1			1	1	1			1

26	32 M	99213	2 new consecutive hypertensive BP readings. Hypertension workup and started blood pressure meds.	1	1			1	1	1			1	1	1			1	1	1			1	1	1				1
27	29F	99213	One BP reading in hypertensive range. Pregnant		1	1			1	1			1	1	1			1	0	1	1						0		
28	81F	99213	Patient recently had fall and refuses B/P reading. Is currently normal weight, Has a documented follow up plan for positive depression screening	1	1			1		1			1	1			1	1	1			1			1				

TOTALS

Appendix H: Beta Test Case Skeleton Measure Calculation Criteria

Case ID	Total Chol	HDL	LDL	BP Sys	BP Dia	BP TX	Smoker	F3	LDL goal
1				110	78			3	160
2	305	40	170	140		0	0		160
3				109	72			3	160
4									
5									
6									
7				100	65				
8				129	80				
9	270	31	110	170	89	0	1		100
10								1	100
11				105	75			1	100
12	290	35	175	125	70	0	0	1	100
13				105	62			1	100
14	205	62	110	108		0	1	2	130
15	240	41	145	150	79	0	0		100
16				118	72				
17	230	37	110	140		0	1		100
18				105	68				
19				125	65				
20									
21				135	80				
22				110	75				
23									
24				92	44				
25									
26				150	92				
27				130	93				
28									
29									
30									

Appendix I: Human Readable Measure Format - BMI

	Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up		
eMeasure Identifier (Measure Authoring Tool)	69	eMeasure Version number	0
NQF Number	0421	GUID	9a031bb8-3d9b-11e1-8634-00237d5bf174
Measurement Period	January 1, 20xx through December 31, 20xx		
Measure Steward	Centers for Medicare & Medicaid Services		
Measure Developer	Quality Insights of Pennsylvania		
Endorsed By	National Quality Forum		
Description	<p>Percentage of patients aged 18 years and older with a calculated BMI in the past six months or during the current visit documented in the medical record AND if the most recent BMI is outside of normal parameters, a follow-up plan is documented</p> <p>Normal Parameters: Age 65 years and older BMI => 23 and < 30 Age 18 – 64 years BMI => 18.5 and < 25</p>		
Copyright	<p>Limited proprietary coding is contained in the measure specifications for convenience. Users of the proprietary code sets should obtain all necessary licenses from the owners of these code sets. Quality Insights of Pennsylvania disclaims all liability for use or accuracy of any Current Procedural Terminology (CPT [R]) or other coding contained in the specifications.</p> <p>CPT (R) contained in the Measure specifications is copyright 2007-2011 American Medical Association.</p>		

	<p>LOINC (R) copyright 2004-2011 Regenstrief Institute, Inc. This material contains SNOMED Clinical Terms (R) (SNOMED CT [R]) copyright 2004-2011 International Health Terminology Standards Development Organization. All Rights Reserved.</p> <p>Due to technical limitations, registered trademarks are indicated by (R) or [R] and unregistered trademarks are indicated by (TM) or [TM].</p>
Disclaimer	<p>These performance measures are not clinical guidelines and do not establish a standard of medical care, and have not been tested for all potential applications.</p> <p>THE MEASURES AND SPECIFICATIONS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND.</p>
Measure Scoring	Proportion
Measure Type	Process
Stratification	None
Risk Adjustment	None
Rate Aggregation	None
Rationale	<p>BMI Above Upper Parameter</p> <p>"In 2009, no state met the healthy people 2012 obesity target of 15 percent, and the self reported overall prevalence of obesity among U.S. adults had increased 1.1 percentage points from 2007. Overall self-reported obesity prevalence in the U.S. was 26.7 percent" (CDC, 2010).</p> <p>Obesity continues to be a public health concern in the United States and throughout the world. In the United States, obesity prevalence doubled among adults between 1980 and 2004 (Flegal et al., 2002; Ogden et al., 2006). Obesity is associated with increased risk of a number of conditions, including diabetes mellitus, cardiovascular disease, hypertension, and certain cancers, and with increased risk of</p>

disability and a modestly elevated risk of all-cause mortality. "Obesity is associated with an increased risk of death, particularly in adults younger than age 65 years. Obesity has been shown to reduce life expectancy by 6 to 20 years depending on age and race. Ischemic heart disease, diabetes, cancer (especially liver, kidney, breast, endometrial, prostate and colon), and respiratory diseases are the leading causes of death in persons who are obese" (AHRQ, 2011).

Results from the 2009-2010 National Health and Nutrition Examination Survey (NHANES) indicate that an estimated 35.7 percent of adults are obese (NCHS, CDC, 2012). Although the prevalence of adults in the U.S. who are obese is still high with about one-third of adults obese in 2007-2008, data suggest that the rate of increase for obesity in the U.S. in recent decades may be slowing (Flegal et al., 2010).

Finkelstein et al. (2009) found that across all payers, per capita medical spending for the obese is \$1,429 higher per year, or roughly 42 percent higher than for someone of normal weight. In aggregate, the annual medical burden of obesity has increased from 6.5 percent to 9.1 percent of annual medical spending and could be as high as \$147 billion per year (in 2008 dollars). A study by Tsai et al., (2010) estimated cost for obesity to be even higher. A recent study by Cawley et al., (2012) reported findings that indicate that the effect of obesity of medical care cost is much greater than previously appreciated.

Ma et al., (2009) performed a retrospective, cross-sectional analysis of ambulatory visits in the National Ambulatory Medical Care Survey from 2005 and 2006. The study findings on obesity and office-based quality of care concluded the evidence is compelling that obesity is underappreciated in office-based physician practices across the United States. Many opportunities are missed for obesity screening and diagnosis, as well as for the prevention and treatment of obesity and related health risks, regardless of patient and provider characteristics.

BMI Below Normal Parameter

Poor nutrition or underlying health conditions can result in underweight. Results from the 2007-2008 National Health and Nutrition Examination Survey (NHANES, 2010), using measured heights and weights, indicate an estimated 1.6% of U.S. adults are underweight with women more likely to be underweight than men.

	<p>Huffman (2002) states elderly patients with unintentional weight loss are at higher risk for infection, depression and death. The leading causes of involuntary weight loss are depression (especially in residents of long-term care facilities), cancer (lung and gastrointestinal malignancies), cardiac disorders and benign gastrointestinal diseases. Medications that may cause nausea and vomiting, dysphagia, dysgeusia and anorexia have been implicated. Polypharmacy can cause unintended weight loss, as can psychotropic medication reduction (e.g., by unmasking problems such as anxiety). In an observational study, Ranhoff et al. (2005) identified using a BMI < 23, resulted in a positive screen for malnutrition (sensitivity 0.86, specificity 0.71), giving 0.75 correctly classified subjects, thus leading to the recommendation that a score of BMI < 23 should be followed by MNA-SF when the aim is to identify poor nutritional status in elderly.</p>
Clinical Recommendation Statement	<p>Although multiple clinical recommendations addressing obesity have been developed by professional organizations, societies and associations, two recommendations, which exemplify the intent of the measure and address the numerator and denominator, have been identified.</p> <p>The US Preventive Health Services Task Force (USPSTF) The Guide to Clinical Preventive Services, 2010-2011 recommends that clinicians screen all adult patients for obesity and offer intensive counseling and behavioral interventions to promote sustained weight loss for obese adults (Level Evidence B).</p> <p>Institute for Clinical Systems Improvement (ICSI, 2011 Prevention and Management of Obesity (Mature Adolescents and Adults) provides the following guidance:</p> <ul style="list-style-type: none"> • Calculate the body mass index; classify the individual based on the body mass index categories. Educate patients about their body mass index and their associated risks. • Weight management requires a team approach. Be aware of clinical and community resources. The patient needs to have an ongoing therapeutic relationship and follow-up with a health care team. • Weight control is a lifelong commitment, and the health care team can assist with setting specific goals with the patient.

Improvement Notation	Higher score indicates better quality
Reference	Centers for Disease Control and Prevention (2010). Healthy People 2010. Retrieved from http://www.cdc.gov/nchs/data/hpdata2010/hp2010_final_review.pdf
Reference	Flegal, K.M., Carroll, M.D., Ogden, C.L., Johnson, C.L. (2002). Prevalence and trends in obesity among US adults, 1999-2000. Journal of the American Medical Association, 288: 1723-7
Reference	Ogden, C.L., Carroll, M.D., Curtin, L.R., McDowell, M.A., Tabak, C.J., Flegal, K.M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. Journal of the American Medical Association, 295(13): 1549-1555
Reference	Reference Agency for Healthcare Research and Quality (2011). Screening for and Management of Obesity and Overweight in Adults. Evidence Synthesis Number 89. Retrieved from http://www.uspreventiveservicestaskforce.org/uspstf11/obeseadult/obesees.pdf
Reference	Centers for Disease Control and Prevention, National Center for Health Statistics (2012). Prevalence of Obesity in the United States, 2009-2010. NCHS Data Brief, No. 82. Retrieved from http://www.cdc.gov/nchs/data/databriefs/db82.pdf
Reference	Flegal, K.M., Graubard, B.L., Williamson, D.F., Mitchell, H. G. (2010). Excess Deaths Associated With Underweight, Overweight, and Obesity. Journal of the American Medical Association, Vol 293, No 15. pp.1861-1867
Reference	Finkelstein, E.A., Trogon, J.G., Cohen, J.W., & Dietz, W. (2009). Annual Medical Spending Attributable To Obesity: Payer-And Service-Specific Estimates. Health Affairs, 28(5), w822-w831. doi: 10.1377/hlthaff.28.5.w822
Reference	Tsai, A.G., Williamson, D.F., & Glick, H.A. (2009). Direct medical cost of overweight and obesity in the USA: a quantitative systematic review. Retrieved from http://www3.interscience.wiley.com/journal/123233768/abstract?CRETTRY=1&SRETRY=0
Reference	Cawley, J., Meyerhoefer, C. (2012). The medical care costs of obesity: An instrumental variables approach. Journal of Health Economics, 31:

	219-213
Reference	Ma, J., Xiao, L., & Stafford, R.S. (2009). Adult Obesity and Office-Based of Care in the United States. <i>Obesity</i> , 17(5): 1077-1085
Reference	Centers for Disease Control and Prevention (2010). Prevalence of Underweight Among Adults Aged 20 Years and Over: United States, 2007-2008. Retrieved from http://www.cdc.gov/nchs/data/hestat/underweight_adult_07_08/underweight_adult_07_08.pdf
Reference	Huffman, G.B. (2002). Evaluating and Treating Unintentional Weight Loss in the Elderly. <i>American Family Physician</i> . Volume 65, Issue 4. Retrieved from http://www.mdconsult.com
Reference	Ranhoff, A.H., Gjoen, A.U., Mowe, M. (2005). Screening for Malnutrition in Elderly Acute Medical Patients: The Usefulness of MNA-SF. <i>The Journal of Nutrition, Health & Aging</i> . 9(4): 221-225
Reference	Agency for Healthcare Research and Quality. The Guide to Clinical Preventive Services 2010-2011: Recommendations of the U.S. Preventive Services Task Force. Retrieved from http://www.ahrq.gov/clinic/pocketgd1011/pocketgd1011.pdf
Reference	Institute for Clinical Systems Improvement (2011). Health Care Guideline: Prevention and Management of Obesity (Mature Adolescents and Adults). Fifth Edition. Retrieved From http://www.icsi.org/obesity/obesity_3398.html
Definition	<p>BMI – Body mass index (BMI), expressed as weight/height (BMI; kg/m²), is commonly used to classify weight categories.</p> <p>Calculated BMI – Requires that both the height and weight are actually measured by an eligible professional or by their staff. Self-reported values cannot be used. BMI is calculated either as weight in pounds divided by height in inches squared multiplied by 703, or as weight in kilograms divided by height in meters squared.</p> <p>Follow-Up Plan – Proposed outline of treatment to be conducted as a result of a BMI measurement out of normal parameters. Such follow-up may include, but is not limited to: documentation of a future appointment, education, referral (such as, a registered dietician, nutritionist, occupational therapist, physical therapist, primary care providers, exercise physiologist, mental health professional, or</p>

	surgeon), pharmacological interventions, dietary supplements,, exercise counseling or nutrition counseling.
Guidance	BMI measured and documented in the medical record may be reported if done in the provider's office/facility or if BMI calculation within the past six months is documented in outside medical records obtained by the provider.
Transmission Format	TBD
Initial Patient Population	All patients 18 through 64 years and 65 years of age and older at the beginning of the measurement period
Denominator	<p>Denominator 1: All Patients greater and or equal to 65 years of age at the beginning of the measurement period with at least one encounter with the eligible professional during the measurement period.</p> <p>Denominator 2: All patients between 18 and 64 years of age at the beginning of the measurement period with at least one encounter with the eligible professional during the measurement period.</p>
Denominator Exclusions	Patients receiving palliative care or patients who are pregnant.
Numerator	Patients with BMI calculated within the past six months or during the current visit and a follow-up plan is documented if the most recent BMI is outside of normal parameters
Numerator Exclusions	Not Applicable
Denominator Exceptions	<p>Patient Reason(s): The patient refuses BMI measurement</p> <p>Medical or Other Reason(s): If there is any other reason documented in the medical record by the provider explaining why BMI measurement was not appropriate</p> <p>OR</p> <p>If the patient is in an urgent or emergent medical situation where time is of the essence and to delay treatment would jeopardize the patient's</p>

	health status
Measure Population	Not Applicable
Measure Observations	Not Applicable
Supplemental Data Elements	For every patient evaluated by this measure also identify payer, race, ethnicity and gender.

B. Table of Contents

- [Population criteria](#)
- [Data criteria \(QDM Data Elements\)](#)
- [Reporting Stratification](#)
- [Supplemental Data Elements](#)

1. [Population criteria](#)

----- Population Criteria 1 -----

- **Initial Patient Population 1 =**
 - AND: "Patient Characteristic Birthdate: birth date" \geq 65 year(s) starts before start of "Measurement Period"
 - AND: "Occurrence A of Encounter, Performed: BMI Encounter Code Set" during "Measurement Period"
- **Denominator 1 =**
 - AND: "Initial Patient Population 1"
- **Denominator Exclusions 1 =**
 - AND:
 - OR: "Diagnosis, Active: Pregnancy Dx" during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
 - OR: "Procedure, Order: Palliative Care" starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
- **Numerator 1 =**
 - AND:
 - OR:
 - AND: MOST RECENT: "Physical Exam, Finding: BMI Finding Code Set (result \geq 23 kg/m²)" \leq 6 month(s) starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"

- AND: MOST RECENT: "Physical Exam, Finding: BMI Finding Code Set (result < 30 kg/m²)" <= 6 month(s) starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
- OR:
 - AND: MOST RECENT: "Physical Exam, Finding: BMI Finding Code Set (result >= 30 kg/m²)" <= 6 month(s) starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
 - AND:
 - OR: "Intervention, Order: Above Normal Follow-up" during "Measurement Period"
 - OR: "Intervention, Order: Above Normal Referrals" during "Measurement Period"
 - OR: "Medication, Order: Above Normal Medications" during "Measurement Period"
- OR:
 - AND: MOST RECENT: "Physical Exam, Finding: BMI Finding Code Set (result < 23 kg/m²)" <= 6 month(s) starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
 - AND:
 - OR: "Intervention, Order: Below Normal Follow up" during "Measurement Period"
 - OR: "Intervention, Order: Below Normal Referrals" during "Measurement Period"
 - OR: "Medication, Order: Below Normal Medications" during "Measurement Period"
- **Denominator Exceptions 1 =**
 - AND:
 - OR: "Laboratory Test, Performed not done: Medical or Other reason not done" for "BMI LOINC calculation LOINC Value Set" during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
 - OR: "Laboratory Test, Performed not done: Patient Reason Refused" for "BMI LOINC calculation LOINC Value Set" during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"

----- Population Criteria 2 -----

- **Initial Patient Population 2 =**
 - AND: "Patient Characteristic Birthdate: birth date" >= 18 year(s) starts before start of "Measurement Period"
 - AND: "Patient Characteristic Birthdate: birth date" <= 64 year(s) starts before start of "Measurement Period"
 - AND: "Occurrence A of Encounter, Performed: BMI Encounter Code Set" during "Measurement Period"
- **Denominator 2 =**
 - AND: "Initial Patient Population 2"
- **Denominator Exclusions 2 =**
 - AND:
 - OR: "Diagnosis, Active: Pregnancy Dx" during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"

- OR: "Procedure, Order: Palliative Care" starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
- **Numerator 2 =**
 - AND:
 - OR:
 - AND: MOST RECENT: "Physical Exam, Finding: BMI Finding Code Set (result ≥ 18.5 kg/m²)" ≤ 6 month(s) starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
 - AND: MOST RECENT: "Physical Exam, Finding: BMI Finding Code Set (result < 25 kg/m²)" ≤ 6 month(s) starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
 - OR:
 - AND: MOST RECENT: "Physical Exam, Finding: BMI Finding Code Set (result ≥ 25 kg/m²)" ≤ 6 month(s) starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
 - AND:
 - OR: "Intervention, Order: Above Normal Follow-up" during "Measurement Period"
 - OR: "Intervention, Order: Above Normal Referrals" during "Measurement Period"
 - OR: "Medication, Order: Above Normal Medications" during "Measurement Period"
 - OR:
 - AND: MOST RECENT: "Physical Exam, Finding: BMI Finding Code Set (result < 18.5 kg/m²)" ≤ 6 month(s) starts before or during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
 - AND:
 - OR: "Intervention, Order: Below Normal Follow up" during "Measurement Period"
 - OR: "Intervention, Order: Below Normal Referrals" during "Measurement Period"
 - OR: "Medication, Order: Below Normal Medications" during "Measurement Period"
- **Denominator Exceptions 2 =**
 - AND:
 - OR: "Laboratory Test, Performed not done: Medical or Other reason not done" for "BMI LOINC calculation LOINC Value Set" during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"
 - OR: "Laboratory Test, Performed not done: Patient Reason Refused" for "BMI LOINC calculation LOINC Value Set" during "Occurrence A of Encounter, Performed: BMI Encounter Code Set"

2. Data criteria (QDM Data Elements)

- "Diagnosis, Active: Pregnancy Dx" using "Pregnancy Dx Grouping Value Set (2.16.840.1.113883.3.600.0001.1623)"
- "Encounter, Performed: BMI Encounter Code Set" using "BMI Encounter Code Set Grouping Value Set (2.16.840.1.113883.3.600.0001.1751)"

- "Intervention, Order: Above Normal Follow-up" using "Above Normal Follow-up Grouping Value Set (2.16.840.1.113883.3.600.0001.1525)"
- "Intervention, Order: Above Normal Referrals" using "Above Normal Referrals Grouping Value Set (2.16.840.1.113883.3.600.0001.1527)"
- "Intervention, Order: Below Normal Follow up" using "Below Normal Follow up Grouping Value Set (2.16.840.1.113883.3.600.0001.1528)"
- "Intervention, Order: Below Normal Referrals" using "Below Normal Referrals Grouping Value Set (2.16.840.1.113883.3.600.0001.1529)"
- "Laboratory Test, Performed: BMI LOINC calculation" using "BMI LOINC calculation LOINC Value Set (2.16.840.1.113883.3.600.0001.1500)"
- "Laboratory Test, Performed not done: Medical or Other reason not done" using "Medical or Other reason not done SNOMED-CT Value Set (2.16.840.1.113883.3.600.0001.1502)"
- "Laboratory Test, Performed not done: Patient Reason Refused" using "Patient Reason Refused SNOMED-CT Value Set (2.16.840.1.113883.3.600.0001.1503)"
- "Medication, Order: Above Normal Medications" using "Above Normal Medications RxNorm Value Set (2.16.840.1.113883.3.600.0001.1498)"
- "Medication, Order: Below Normal Medications" using "Below Normal Medications RxNorm Value Set (2.16.840.1.113883.3.600.0001.1499)"
- "Patient Characteristic Birthdate: birth date" using "birth date LOINC Value Set (2.16.840.1.113883.3.560.100.4)"
- "Physical Exam, Finding: BMI Finding Code Set" using "BMI Finding Code Set Grouping Value Set (2.16.840.1.113883.3.600.0001.890)"
- "Procedure, Order: Palliative Care" using "Palliative Care Grouping Value Set (2.16.840.1.113883.3.600.0001.1579)"

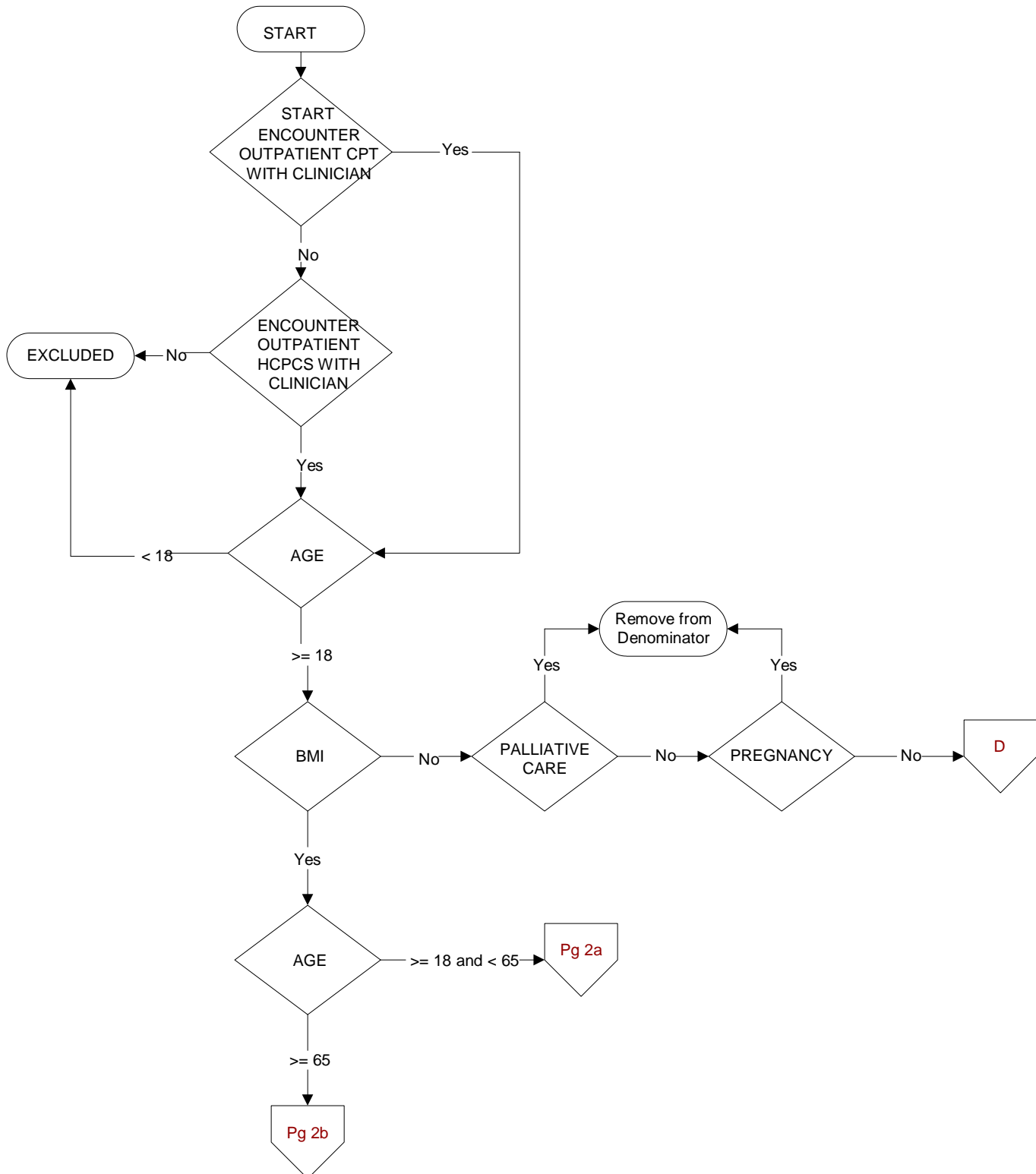
3. Reporting Stratification

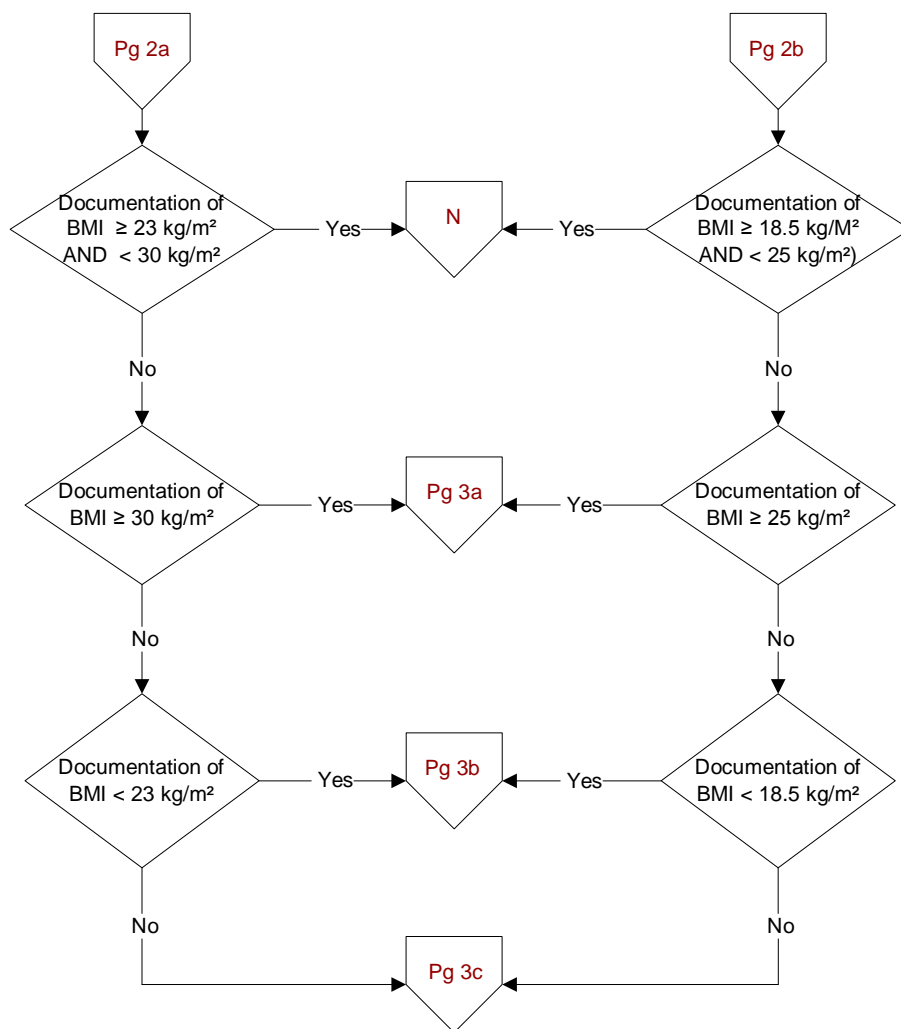
- None

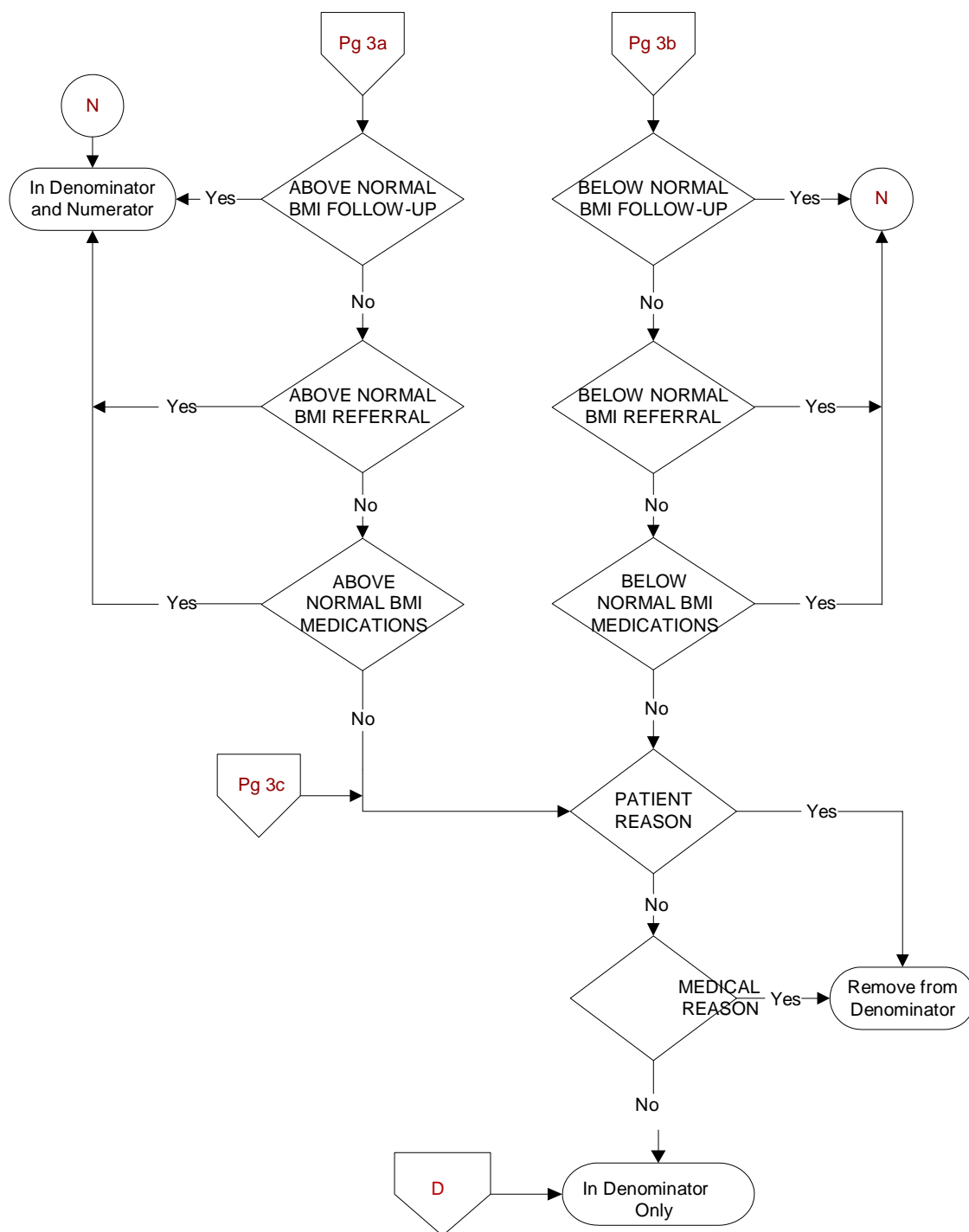
4. Supplemental Data Elements

- "Patient Characteristic Ethnicity: Ethnicity" using "Ethnicity CDC Value Set (2.16.840.1.114222.4.11.837)"
- "Patient Characteristic Gender: Gender" using "Gender HL7 (2.16.840.1.113883.5.1) Value Set (2.16.840.1.113883.1.11.1)"
- "Patient Characteristic Payer: Payer" using "Payer Source of Payment Typology Value Set (2.16.840.1.113883.221.5)"
- "Patient Characteristic Race: Race" using "Race CDC Value Set (2.16.840.1.114222.4.11.836)"

Measure Set

Appendix J: BMI Measure Flowchart





Appendix K: BMI Analytic Narrative

• Measure #128: Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up

Description: Percentage of patients aged 18 years and older with a calculated BMI in the past six months or during the current visit documented in the medical record AND if the most recent BMI is outside of normal parameters, a follow-up, plan is documented

Normal Parameters: Age 65 years and older BMI ≥ 23 and < 30
Age 18 – 64 years BMI ≥ 18.5 and < 25

Denominator 1: All patients aged 65 years and older

Denominator Inclusions – Population 1: (Patients aged 65 years and older)

All patients greater than or equal to 65 years of age at the beginning of the measurement period. To be eligible for performance calculations, patients must have at least one encounter with the eligible professional during the measurement period.

NOTE: BMI measured and documented in the medical record can be reported if done in the eligible professional’s office/facility or if BMI calculation within the past six months is documented in outside medical records obtained by the eligible professional. The documentation of a follow-up plan should be based on the most recently calculated BMI.

ENCOUNTERS tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

ENCOUNTER OUTPATIENT CPT WITH CLINICIAN
OR
ENCOUNTER OUTPATIENT HCPCS WITH CLINICIAN

Numerator 1: Patients aged 18 years and older with a calculated BMI and a documented follow-up plan when the most recent BMI is outside of normal parameters during the current visit or within the past six months.

Numerator Inclusions – Population 1: Normal BMI (≥ 23 kg/m² and < 30 kg/m²)

Patients with most recent Body Mass Index (BMI) calculated during the current visit or within the last six months with a normal BMI (greater than or equal to 23 kg/m² AND less than 30 kg/m²) during the measurement period.

VITAL SIGNS tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

BMI
WITH
Documentation of BMI ≥ 23 kg/m² AND < 30 kg/m²

OR

Population 1: Above Normal BMI (≥ 30 kg/m²)

Patients with most recent BMI calculated during the current visit or within the past six months with an above normal BMI (greater than or equal to 30 kg/m²) and a follow-up plan documented during the measurement period.

NOTE: Follow-up Plan- Proposed outline of treatment to be conducted as a result of a BMI measurement out of normal parameters. Such follow-up may include, but is not limited to: documentation of a future appointment, education, referral (such as, a registered dietician, nutritionist, occupational therapist, primary care physician, exercise physiologist, mental health professional, or surgeon), pharmacological or dietary supplement orders, exercise counseling or nutrition counseling.

PROBLEMS, PROCEDURES, VITAL SIGNS, MEDICATIONS and PLAN OF CARE tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

BMI
WITH
Documentation of BMI ≥ 30 kg/m²

AND

ABOVE NORMAL BMI FOLLOW-UP
OR
ABOVE NORMAL BMI REFERRAL
OR
ABOVE NORMAL BMI MEDICATIONS

OR

Population 1: Below Normal BMI ($< 23 \text{ kg/m}^2$)

Patients with most recent BMI calculated during the current visit or within the past six months with a below normal BMI (less than 23 kg/m^2) and a follow-up plan documented during the measurement period.

NOTE: *Follow-up Plan- Proposed outline of treatment to be conducted as a result of a BMI measurement out of normal parameters. Such follow-up may include, but is not limited to: documentation of a future appointment, education, referral (such as, a registered dietician, nutritionist, occupational therapist, physical therapist, primary care provider, exercise physiologist, mental health professional), pharmacological interventions, dietary supplements, exercise counseling or nutrition counseling.*

PROBLEMS, PROCEDURES, VITAL SIGNS, MEDICATIONS and PLAN OF CARE tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

BMI
WITH

Documentation of BMI $< 23 \text{ kg/m}^2$

AND

BELOW NORMAL BMI FOLLOW-UP

OR

BELOW NORMAL BMI REFERRAL

OR

BELOW NORMAL BMI MEDICATIONS

Denominator 2: All patients aged 18 through 64 years**Denominator Inclusions – Population 2: (Patients aged 18-64 years)**

All patients between 18 and 64 years of age at the beginning of the measurement period. To be eligible for performance calculations, patients must have at least one encounter with the eligible professional during the measurement period.

NOTE: BMI measured and documented in the medical record can be reported if done in the eligible professional's office/facility or if BMI calculation within the past six months is documented in outside medical records obtained by the eligible professional. The documentation of a follow-up plan should be based on the most recently calculated BMI.

ENCOUNTERS tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

ENCOUNTER OUTPATIENT CPT WITH CLINICIAN

OR

ENCOUNTER OUTPATIENT HCPCS WITH CLINICIAN

Numerator 2: Patients 18 through 64 years of age with a calculated BMI and a documented follow-up

plan when the most recent BMI is outside of normal parameters during the current visit or within the past six months

Numerator Inclusions – Population 2: Normal BMI ($\geq 18.5 \text{ kg/m}^2$ AND $< 25 \text{ kg/m}^2$)

Patients with most recent Body Mass Index (BMI) calculated during the current visit or within the past six months with a normal BMI (greater than or equal to 18.5 kg/m^2 AND less than 25 kg/m^2) during the measurement period.

VITAL SIGNS tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

BMI
WITH

Documentation of BMI $\geq 18.5 \text{ kg/M}^2$ AND $< 25 \text{ kg/m}^2$

OR

Population 2: Above Normal BMI ($\geq 25 \text{ kg/m}^2$)

Patients with most recent BMI calculated during the current visit or within the past six months with an above normal BMI (greater than or equal to 25 kg/m^2) and a follow-up plan documented during the measurement period.

NOTE: Follow-up Plan: Proposed outline of treatment to be conducted as a result of a BMI measurement out of normal parameters. Such follow-up may include, but is not limited to: documentation of a future appointment, education, referral (such as, a registered dietician, nutritionist, occupational therapist, physical therapist, primary care provider, exercise physiologist, mental health professional, or surgeon), pharmacological interventions, dietary supplements, exercise counseling or nutrition counseling.

PROBLEMS, PROCEDURES, VITAL SIGN, MEDICATIONS and PLAN OF CARE tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

BMI
WITH
Documentation of BMI $\geq 25 \text{ kg/m}^2$

AND

ABOVE NORMAL BMI FOLLOW-UP
OR
ABOVE NORMAL BMI REFERRAL
OR
ABOVE NORMAL BMI MEDICATIONS

OR

Population 2: Below Normal BMI ($<18.5 \text{ kg/m}^2$)

Patients with most recent BMI calculated during the current visit or within the past six months with a low BMI (less than 18.5 kg/m^2) and a follow-up plan documented during the measurement period.

NOTE: Follow-up Plan: Proposed outline of treatment to be conducted as a result of a BMI measurement out of normal parameters. Such follow-up may include, but is not limited to: documentation of a future appointment, education, referral (such as, a registered dietician, nutritionist, occupational therapist, physical therapist, primary care provider, exercise physiologist, mental health professional), pharmacological interventions, dietary supplements, exercise counseling or nutrition counseling.

PROBLEMS, PROCEDURES, VITAL SIGNS, MEDICATIONS and PLAN OF CARE tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

BMI
WITH
Documentation of BMI $< 18.5 \text{ kg/m}^2$

AND

BELOW NORMAL BMI FOLLOW-UP
OR
BELOW NORMAL BMI REFERRAL
OR
BELOW NORMAL BMI MEDICATIONS

Denominator Exclusions:

Patients who have are receiving palliative care or who are pregnant during the qualifying visit are excluded.

PROBLEMS tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

PALLIATIVE CARE

OR

PREGNANCY

OR

Denominator Exceptions:

When a BMI measurement is not performed for a valid patient or medical reason, the BMI measurement that would have been performed should be submitted along with a negation code to indicate the reason the BMI measurement was not performed during a qualifying encounter in the measurement period.

VITAL SIGNS and VITAL SIGNS(negation) tab(s) in the Downloadable Resource table list applicable codes in this measure and are associated with the following data element(s):

BMI

AND

PATIENT REASON

OR

MEDICAL REASON

RATIONALE:**BMI Above Upper Parameter**

“In 2009, no state met the healthy people 2012 obesity target of 15 percent, and the self reported overall prevalence of obesity among U.S. adults had increased 1.1 percentage points from 2007. Overall self -reported obesity prevalence in the U.S. was 26.7 percent” (CDC, 2010).

Obesity continues to be a public health concern in the United States and throughout the world. In the United States, obesity prevalence doubled among adults between 1980 and 2004 (Flegal, et al, 2002; Ogden, et al, 2006). Obesity is associated with increased risk of a number of conditions, including diabetes mellitus, cardiovascular disease, hypertension, and certain cancers, and with increased risk of disability and a modestly elevated risk of all-cause mortality. “Obesity is associated with an increased risk of death, particularly in adults younger than age 65 years. Obesity has been shown to reduce life expectancy by 6 to 20 years depending on age and race. Ischemic heart disease, diabetes, cancer (especially liver, kidney, breast,

endometrial, prostate and colon), and respiratory diseases are the leading causes of death in persons who are obese” (AHRQ, 2011).

Results from the 2009-2010 National Health and Nutrition Examination Survey (NHANES) indicate that an estimated 35.7 percent of adults are obese (NCHS, CDC, 2012). Although the prevalence of adults in the U.S. who are obese is still high with about one-third of adults obese in 2007-2008, data suggest that the rate of increase for obesity in the U.S. in recent decades may be slowing (Flegal, et al., 2010).

Finkelstein, et al. (2009), found that across all payers, per capita medical spending for the obese is \$1,429 higher per year, or roughly 42 percent higher than for someone of normal weight. In aggregate, the annual medical burden of obesity has increased from 6.5 percent to 9.1 percent of annual medical spending and could be as high as \$147 billion per year (in 2008 dollars). A study by Tsai et. al., (2010) estimated cost for obesity to be even higher, A recent study by Cawley et al., (2012) reported findings that indicate that the effect of obesity of medical care cost is much greater than previously appreciated.

Ma, et al (2009) performed a retrospective, cross-sectional analysis of ambulatory visits in the National Ambulatory Medical Care Survey from 2005 and 2006. The study findings on obesity and office-based quality of care concluded the evidence is compelling that obesity is underappreciated in office-based physician practices across the United States. Many opportunities are missed for obesity screening and diagnosis, as well as for the prevention and treatment of obesity and related health risks, regardless of patient and provider characteristics.

BMI Below Normal Parameter

Poor nutrition or underlying health conditions can result in underweight. Results from the 2007-2008 National Health and Nutrition Examination Survey (NHANES, 2010, using measured heights and weights, indicate an estimated 1.6% of U.S. adults are underweight with women more likely to be underweight than men.

Huffman (2002) states elderly patients with unintentional weight loss are at higher risk for infection, depression and death. The leading causes of involuntary weight loss are depression (especially in residents of long-term care facilities), cancer (lung and gastrointestinal malignancies), cardiac disorders and benign gastrointestinal diseases. Medications that may cause nausea and vomiting, dysphagia, dysgeusia and anorexia have been implicated. Polypharmacy can cause unintended weight loss, as can psychotropic medication reduction (e.g., by unmasking problems such as anxiety). In an observational study, Ranhoff, et al. (2005) identified using a BMI < 23, resulted in a positive screen for malnutrition (sensitivity 0.86, specificity 0.71), giving 0.75 correctly classified subjects, thus leading to the recommendation that a score of BMI < 23 should be followed by MNA-SF when the aim is to identify poor nutritional status in elderly.

CLINICAL RECOMMENDATION STATEMENTS:

Although multiple clinical recommendations addressing obesity have been developed by professional organizations, societies and associations, two recommendations, which exemplify the intent of the measure and address the numerator and denominator, have been identified.

The US Preventive Health Services Task Force (USPSTF) The Guide to Clinical Preventive Services, 2010-2011 recommends that clinicians screen all adult patients for obesity and offer intensive counseling and behavioral interventions to promote sustained weight loss for obese adults (Level Evidence B).

Institute for Clinical Systems Improvement (ICSI, 2011 Prevention and Management of Obesity (Mature Adolescents and Adults) provides the following guidance:

- Calculate the body mass index; classify the individual based on the body mass index categories. Educate patients about their body mass index and their associated risks.
- Weight management requires a team approach. Be aware of clinical and community resources. The patient needs to have an ongoing therapeutic relationship and follow-up with a health care team.
- Weight control is a lifelong commitment, and the health care team can assist with setting specific goals with the patient