

“A Partnership for Clinician EHR Use & Quality of Care”  
DATA ANALYSIS PROTOCOL

*Revision Date: February 14, 2011*

## DATA COLLECTED

*Note:* All data are collected at the clinician level unless noted otherwise.

### I. Medication Safety

#### A. *Timepoints & Lookback Periods*

baseline & one-year post-implementation, one-year lookback period

#### B. *Query Development*

The medication safety query is a compilation of DDIs from two sources:

1. CMS listing of potentially interacting drugs, released in 2007
2. “severe” interaction alerts encountered during preload at participating nurse-managed health centers

*Note:* “severe” refers to DDIs classified by GE Centricity as “probable or established major” interactions

#### C. *Frequency of DDIs*

DDI pairings that were prescribed with overlapping time periods for patients who had an office or refill visit within one year of the query date (baseline or one-year post-implementation).

*Note:* Many prescriptions are entered without an explicit end date; this makes it difficult to determine whether two medications were actually being taken at the same time. Medication start and stop dates, as well as diagnosis codes, are examined in order to evaluate the legitimacy of the medication safety concern.

### II. Productivity

#### A. *Timepoints & Lookback Periods*

baseline, then quarterly

#### B. *Measures*

##### 1. Office Visits

Calculated as the “# of office visits” divided by clinician FTE.

##### 2. RVUs

Calculated as the “# RVUs” divided by clinician FTE.

### III. Usage

#### A. *Timepoints & Lookback Periods*

Two sets of data:

1. quarterly with a one-quarter lookback period to track trends in usage
2. one year post-implementation with a one-year lookback period, to examine the relationship between usage and quality of care

#### B. *Measures*

1. General System Usage

| Measure/Description   | Denominator  | Numerator   |
|---|--|---|
| % of actual visits (walk in and scheduled) with a corresponding <b>clinical note</b> in the EHR | Patient visits and/or appointments that are not canceled | Visits with an associated clinical document of any type except "Append" |

2. EHR-Assisted Diabetes Care

| Measure/Description  | Denominator  | Numerator  |
|--|--|--|
| % of office visits for a patient with <b>diabetes</b> in which the diabetes disease management forms were used | Documents of Type "Office Visit"; patient with a problem code beginning with ICD-250.*; signing user is a responsible provider; date range specified by document create date; grouped by the provider who signed the document. | Documents of Type "Office Visit"; patient with a problem code of ICD-250.*; signing user is a responsible provider; date range specified by document create date; document includes one or both of the Obs Terms "FT INSPECT L" or "FT INSPECT R". |

3. EHR-Assisted Hypertension Care

| Measure/Description   | Denominator   | Numerator   |
|---|---|---|
| % of office visits for a patient with <b>hypertension</b> in which the HTN ("cardiovascular") disease management forms were used. | Documents of Type "Office Visit"; patient with one of the problem codes of ICD-401.0, 401.1, 401.9, 402.*, 403.* or 404.*; signing user is a responsible provider; date range specified by document create date; grouped by the provider who signed the document. | Documents of Type "Office Visit"; patient with one of the problem codes of ICD-401.0, 401.1, 401.9, 402.*, 403.* or 404.*; signing user is a responsible provider; date range specified by document create date; document includes one or both of the Obs Terms "ANGINA CARD" or "FUNCT STATUS", grouped by the provider who signed the document. |

*Note:* This measure is undesirable because the cardiovascular form is an ineffective and underused form for HTN care at many of the sites.

4. Use of Coding Expert

| Measure/Description   | Denominator  | Numerator   |
|---|--|---|
| % of visits at which <b>E&amp;M advisor</b> (coding expert) is used | Documents of Type "Office Visit"; signing user is a responsible provider; date range specified by document create date; grouped by the provider who signed the document. | Documents of Type "Office Visit"; signing user is a responsible provider; date range specified by document create date; document has the Obs Term "EMADVISUSED"; grouped by the provider who signed the document. |

5. Sexual Activity Screening (only measured for college-based site)

| Measure/Description | Denominator | Numerator |
|---------------------|-------------|-----------|
|---------------------|-------------|-----------|

|   |  |   |
|---|--|---|
| % of visits in which patients were <b>screened for sexual activity</b> during the measurement year ( <b>WSU Campus Health Center only</b> ) | Documents of Type "Office Visit"; patient is 18 or older; signing user is a responsible provider; date range specified by document create date; grouped by the provider who signed the document. | Documents of Type "Office Visit"; patient is 18 or older; signing user is a responsible provider; date range specified by document create date; document has the Obs Term "CONTRA METHD" grouped by the provider who signed the document. |
|---|--|---|

#### IV. Clinical Performance (Quality)

##### A. Timepoints & Lookback Periods

baseline & one-year post-implementation, lookback periods vary depending on specific measure (generally one-year lookback)

##### B. Measures

See Appendix

#### V. Computer Literacy

##### A. Timepoint

This survey is collected at baseline.

##### B. Measures

###### 1. Age

Currently grouped into 4 categories for reporting:

- <35
- >=35 && <40
- >=40 && <50
- >=50

###### 2. Years in Practice

Currently grouped into 4 categories for reporting (unit normalized to years):

- <2
- >=2 & <5
- >=5 & < 10
- >=10

###### 3. Computer Experience

A composite score of variable 20-29. The questionnaire scale is 5. The score is currently grouped into 4 categories for reporting:

- Non-User <2
- Limited Use >=2 && <3
- Regular Use >=4 && <4
- Expensive Use >=4

###### 4. Computer Knowledge

A composite score of variable 44-97. The questionnaire scale is 3. The score is currently grouped into 4 categories for reporting:

- Novice <1.5
- Basic Skill >=1.5 && <2
- Knowledgeable >=2 && <2.5

- Expert  $\geq 2.5$

5. Computer Optimism

A composite score of variable 98-115. The questionnaire scale is 5. The score is currently grouped into 4 categories for reporting:

- Pessimistic  $< 2$
- With Reservation  $\geq 2$  &&  $< 3$
- Optimistic  $\geq 3$  &&  $< 4$
- Enthusiastic  $\geq 4$

6. At-Work Environment Evaluation

A composite score of variable 116-127. The questionnaire scale is binary (1-Yes or 2-No). The score is currently grouped into 4 categories for reporting:

- Negative  $< 1.75$
- Somewhat Negative  $> 1.5$  &&  $\leq 1.75$
- Somewhat Positive  $> 1.25$  &&  $\leq 1.5$
- Positive  $\leq 1.25$

## VI. End-User Evaluation of EHR

A. *Timepoints*

This survey is collected during implementation (1-3 months after go-live) and post implementation (6 or more months after go-live).

B. *Measures*

1. Quality of Implementation

A composite score of variable 22-34. The questionnaire scale is 4 plus “I don’t know”. The score is currently grouped into 4 categories for reporting:

- Strong Disagree  $< 1.75$
- Disagree  $\geq 1.75$  &&  $< 2.5$
- Agree  $\geq 2.5$  &&  $< 3.25$
- Strong Agree  $\geq 3.25$

*Note:* “I don’t know” will be coded as missing.

2. Paper Persistence

A composite score of variable 37-41. The questionnaire scale is 5. The score is currently grouped into 4 categories for reporting:

- Strong Disagree  $< 2$
- Disagree  $\geq 2$  &&  $< 3$
- Agree  $\geq 3$  &&  $< 4$
- Strong Agree  $\geq 4$

3. Compared with Previous Paper Experience

Variable 16. The questionnaire scale is 5. The score is currently grouped into 4 categories for reporting:

- Strong Disagree  $< 2$
- Disagree  $\geq 2$  &&  $< 3$

- Agree  $\geq 3$  &&  $< 4$
- Strong Agree  $\geq 4$

4. Compared with Previous EHR Experience

Variable 19. The questionnaire scale is 5. The score is currently grouped into 4 categories for reporting:

- Strong Disagree  $< 2$
- Disagree  $\geq 2$  &&  $< 3$
- Agree  $\geq 3$  &&  $< 4$
- Strong Agree  $\geq 4$

5. Perceived Usefulness

A composite score of variable 42-57. The questionnaire scale is 5. The score is currently grouped into 4 categories for reporting:

- Strong Disagree  $< 2$
- Disagree  $\geq 2$  &&  $< 3$
- Agree  $\geq 3$  &&  $< 4$
- Strong Agree  $\geq 4$

6. Perceived Ease of Use

A composite score of variable 58-59. The questionnaire scale is 4. The score is currently grouped into 4 categories for reporting:

- Strong Disagree  $< 1.75$
- Disagree  $\geq 1.75$  &&  $< 2.5$
- Agree  $\geq 2.5$  &&  $< 3.25$
- Strong Agree  $\geq 3.25$

7. Overall Satisfaction

Variable 61. The questionnaire scale is 4. The score is currently grouped into 4 categories for reporting:

- Strong Disagree  $< 1.75$
- Disagree  $\geq 1.75$  &&  $< 2.5$
- Agree  $\geq 2.5$  &&  $< 3.25$
- Strong Agree  $\geq 3.25$

8. Overall Evaluation of the EHR

A composite score of variable 62-66. The questionnaire scale is 4. The score is currently grouped into 4 categories for reporting:

- Strong Disagree  $< 1.75$
- Disagree  $\geq 1.75$  &&  $< 2.5$
- Agree  $\geq 2.5$  &&  $< 3.25$
- Strong Agree  $\geq 3.25$

*Note:* Variable 63, 64, 65, and 66 are negatively worded.

9. Perceived Functionality Comprehensiveness

A composite score of variable 67-80. The questionnaire scale is 4 plus “Does not apply”. The score is currently grouped into 4 categories for reporting:

- Strong Disagree  $< 1.75$

- Disagree  $\geq 1.75$  &&  $< 2.5$
- Agree  $\geq 2.5$  &&  $< 3.25$
- Strong Agree  $\geq 3.25$

*Note:* “Does not apply” will be coded as missing.

## VII. Center-wide Patient Safety Practices

### A. Timepoints & Lookback Periods

baseline & post implementation (6 or more months after go-live)

### B. Survey Tool

The Physician Practice Patient Safety Assessment (PPPSA) was developed and tested by the Medical Group Management Association (MGMA, 2006). The PPPSA is a center self-assessment tool to be completed in a group setting of clinical and administrative staff. It consists of 79 items in six domains that are directly related to increasing quality of care and patient safety, including 1) medication management, 2) handoffs and transitions, 3) surgery/anesthesia & sedation/invasive procedures, 4) personnel/qualifications/competency, 5) practice management/culture, and 6) patient education/communication. This tool also includes questions related to practice demographics and the current level of information technology adoption. Since some of the items are designed to be more applicable to certain types of practices (i.e., primary care, surgical, etc.), these items allow for a “not applicable” response.

## VIII. Patient Satisfaction

### A. Timepoints & Lookback Periods

baseline & post implementation (6 or more months after go-live)

### B. Survey Tool

The survey tool consists of 23 questions and was made available in multiple languages for patients to complete during visits at participating centers.

## IX. Qualitative Interviews

Interviews were transcribed then coded in nVivo. Major themes include:

- End User’s pre-disposing personal factors (anything that would influence EHR adoption/use)
- Implementation Topics
- Organizational system
- Outcomes (expected & observed, both positive and negative)
- Support (internal & external/partner)
- Technology

## STATISTICAL ANALYSIS

***Goal 1) Testing the links between clinician use of EHR, quality of preventive care, chronic disease management and medication safety***

***a) How does clinician use of EHR impact patient outcomes for hypertension, diabetes and preventive care (tobacco use and advice, cervical cancer screening, alcohol use, HIV and depression screening, and adult immunizations).***

Analysis is designed to test 2 main hypotheses: 1) use of EHR leads to performance improvements; and 2) use of EHR leads to patient outcome gains. Each of the preventive care or chronic disease areas will be analyzed separately. Each quality measure may be individually analyzed and/or aggregated for protocol-level analysis. Quality indicator measurements are assumed to follow a binomial distribution (whether a patient receives proper treatment/test or not, whether medication error occurs or not, etc.). The primary unit of analysis will be the clinician.

Prior to the formal data analysis, clinicians will be compared on outcomes by demographic categories (e.g., age, gender, and clinician type). When differences are found, the factors that are different will be controlled for and will be included as covariates in further analyses (research question 1.b, below). We will also include three health centers where implementation of EHR has been accomplished to examine patterns of EHR use where they are expected to have stabilized.

Post-implementation measurements will be compared with the baseline measurements at one and two years post implementation to detect changes in quality of care over time. The paired *t* test or non-parametric tests, as appropriate, will be used to identify significant differences in clinician performance and patient outcome measurements pre- and post-EHR implementation.

***b) What are the longitudinal patterns of clinician use of an EHR related to these outcomes?***

Measuring the impact of an EHR requires full integration of the application into routine settings as well as a longitudinal data collection strategy to allow clinicians to achieve stability in usage. To delineate the longitudinal patterns of EHR use and its temporal association with the identified quality measures, a generalized linear regression model will be fitted to the data, where the quality indicators are the outcome measure as a function of time periods ( $T_0$ ,  $T_1$ - $T_2$ ), EHR usage ( $U$ ), and time interaction with  $U$  are included as the independent measures. ( $T_0$  represents the baseline,  $T_1$ — $T_2$  represent the 1<sup>st</sup> and 2<sup>nd</sup> years post-EHR implementation.) Covariates will be included to account for differences in clinician types and centers. Further, we also plan to model separately the changing EHR usage over time. The longitudinal usage trajectories thus identified, as shown in a hypothetical diagram in Figure 2, will help depict distinct phases of user adoption: from initial adaptation towards full EHR use (as an integral part of their routine). Moreover, we will be able to identify whether longitudinal EHR usage patterns of individual clinicians vary by health center

***c) What are the medication errors that occur in ambulatory settings? How does clinician use of an EHR impact medication errors?***

An initial contribution of this analysis is to describe the types and frequencies of errors that occur and are identified during preloading of charts into the EHR. Baseline measurements of medication error will then be compared with the post-implementation measurements to detect changes over time. The data will be examined to determine the frequency of these types of events and appropriate methods will be planned. It is likely that non-parametric tests, will be used to detect significant differences in the number of medication safety threatening events, pre- and post-EHR implementation by center and by provider. If the distribution of the data support it, change scores will be calculated as percent of error reduction from baseline to post implementation. Depending on the distribution of the data, analysis will compare change scores with clinician EHR usage as a predictor variable.

***d) How does the use of an EHR affect clinician productivity over time?***

Productivity measures are calculated based on data found in the practice management system – and therefore are available for the period prior to EHR implementation for the NMHCs. Productivity at baseline, implementation, and post implementation will be compared and tested for statistical significance using appropriate non-parametric tests. Then, longitudinal statistical models described above will be applied to test the relationship between clinician use of the EHR and productivity measures over time, controlling for clinician type. We hypothesize that full use of EHR for documentation and clinical decision support is associated with greater productivity than partial use of EHR. Moreover, the relationship between productivity and quality of care can be tested statistically to determine whether there is an empirical sacrifice of productivity for quality.

***e) How do clinician's characteristics (gender, age, clinician type, computer literacy) impact the use of EHRs?***

A developmental trajectory analysis (DTA) will be used to study longitudinal developmental adoption behavior of clinician use of EHR. DTA is a semi-parametric, group-based approach for identifying distinctive groups of individual trajectories within the population and for profiling the characteristics of group members (Nagin, 1999). This method has provided valuable insights into studying physical aggression among youth criminal careers (Nagin & Tremblay, 2001), and web utilization and saturation patterns (Christ, Nagin, Kraut, & G'ONther, 2001). In a preliminary study, DTA is used to delineate three types of clinicians, "Light", "Moderate", and "Heavy", who demonstrated distinct usage patterns of a clinical decision support system (Zheng, Padman, Johnson, Engberg, & Diamond, 2004).

In DTA, a *developmental trajectory* describes the course of a developmental behavior over age or time. Other available tools, such as hierarchical modeling and latent curve analysis, model variation in the parameters of developmental trajectories using continuous multivariate density function. By contrast, this method uses a multinomial logit model and is designed to identify relatively homogeneous clusters of developmental trajectories and to relate those probabilities to covariates of interest. Another distinctive advantage is that DTA uses a *Bayes* factor for comparing models, that is, to determine the optimal number of clusters as well as appropriate order of the polynomial used to model each group's developmental trajectory.

Computer literacy of clinicians will be assessed at baseline using Cork's instrument for measuring clinicians' use of, knowledge about, and attitudes towards computers (Cork, Detmer, & Freidman, 1998). This instrument has been widely adopted in HIT evaluation studies. An adapted version of the instrument, which replaces obsolete computer terminologies with more recent ones, will be used (Appendix 6). This adapted version has been validated and applied in a preliminary study (Zheng et al., 2004).

***f) How does the use of EHR impact clinician satisfaction?***

The tool to evaluate clinician satisfaction with EHR will be developed by our team and preliminary analysis will include reliability and validity tests using common psychometric tools, such as calculation of Cronbach's alpha and factor analysis. Once the tool is validated, clinician satisfaction with the EHR will be summarized using descriptive statistics. Moreover, bivariate analysis will test the relationships between full use of EHR and satisfaction on the clinician level.

***Goal 2): Understanding organizational processes in the implementation and full utilization of an EHR in relationship to care delivery and outcomes***

***a) Do center practices around patient safety improve over time with increasing clinician use of an EHR?***

Each participating NMHC will be required to complete the PPPSA at baseline and post-implementation according to the process outlined above. CHCs will be asked to complete the tool only once. Analyses will begin with descriptive statistics for the participating centers at the item level and a summary domain score. Areas which showed change from baseline to post-implementation will be identified. Similarly any variability across centers in scores and the amount of change between baseline and post-implementation will be identified. This information provides contextual understanding and interpretation of any observed differences in clinician EHR use or quality improvements by center. Moreover, results will be compared to national benchmarks available from MGMA – to see how participating centers compare at baseline and post-implementation.

***b) What contextual factors (i.e., leadership, vision, skills, incentives, resources, and planning for change management) impact clinician use of EHRs?***

Qualitative research methods allow for the observation of organizational context and obtaining interview information from the stakeholders that further develops the understanding of the elements essential to successful implementation. Interviews should be semi-structured and individualized. Observation should be participant in nature. This methodology encourages data analysis in parallel with data collection. In this way the researcher develops a complete and comprehensive understanding since one is free to explore working propositions as they become evident as data is collected (Gerrish & Lacey, 2006).

Semi-structured interviews will be conducted with stakeholders at each clinical site. These stakeholders

are considered integral to the implementation process: CEO or Center Director, the clinician leader or EHR champion, the implementation team, and additional clinical and other staff (e.g., medical assistants, nurses, front desk staff). The interviews at the 3 NMHCs where EHR is not yet live will be conducted once at baseline, during implementation, and post implementation. The interviews will be completed in person with the researcher traveling to the site implementing the EHR. For the three comparison sites already live on the EHR, the interviews will be conducted in the first 90 days of the study.

At each center the CEO and/or the physician or nurse practitioner champion will be interviewed using the questions found in Appendix 6. A “snowball” sampling method will be used to select the members of the guiding team and front line staff group to be interviewed. Key people believed to be integral to the process will be interviewed first. Each will be asked to identify others they believe to be important to the process. Interviewing will stop when themes are repeated and no new information is gathered. As data are collected and analyzed it may be necessary to add participants or participant groups.

Data analysis will be circular; the researcher will explore and dissect the data in an iterative fashion performing constant comparison as the data are collected and analyzed. Interview data will be analyzed in relation to the leadership survey data for example. Constant comparison will be employed whereby the data is compared internally to itself as well as to relevant literature. Data gathered from interviews with leadership and staff will be compared with data gathered through observation and subsequently it will be compared with literature. The researcher will compare and contrast; exploring differences, similarities, patterns and themes (Gerrish & Lacey, 2006:199).

Looking at the data line by line the researcher will identify and code concepts and themes beginning with the Lippitt (2002) and Kotter (2002) models as a framework and adjusting if additional concepts or themes are identified. Subsequently, the researcher will categorize the names and concepts. The next step involves finding the patterns among the codes and the code categories. Once the patterns have been identified the intent is to discover a set of core categories and from those categories, substantiate accepted theories or discover new theories (Gerrish & Lacey, 2006).

***c) What is the variation in how centers use/take advantage of partnership support during implementation, workflow redesign, and ongoing support for clinician use of CDS and medication management features?***

This research question regarding partnership support for organizational change is being posed as a process evaluation question that will be measured qualitatively. A key purpose of qualitative analysis is to identify hypotheses that can be subjected to rigorous quantitative measurement in future studies. The anticipated result of the following analysis is a clear conceptual framework that can guide subsequent experimentation, documentation, and research on an innovative way to overcome many of the barriers to EHR implementation faced by numerous practices – but especially those serving vulnerable populations.

While a full cost benefit analysis is beyond the scope of this proposal, it is important that we carefully document and disseminate the components of the current model of EHR implementation to provide a framework for evaluating the business case for other partnership approaches to EHR implementation in the future. It is also important to note that this evaluation is being conducted in time 10 years after the Alliance network was established. Much of the work in creating the partnership, and developing the EHR and data warehouse has been completed - and historical data on resources used may not be available. Rather, this proposal argues the importance of documenting the ongoing operations of the partnership, and the resources brought to bear in maintenance and expansion of what was built. Moreover, we believe that the partnership model of EHR implementation may be especially helpful for CHCs, NMHCs, and other centers providing services to vulnerable populations. Careful documentation of how individual centers draw on these partnership resources will provide practical information for this and other partnerships to use in designing business plans for sustainability and expansion.

**Appendix: Clinical Performance (Quality)**

| <b>Part A. Preventive Care Measures (mostly DOQ-IT measures - adapted from chronic condition population to general population)</b> |  |   |   |   |
|--|--|---|---|---|
| 1  | Cervical Cancer Screening                          | Crystal Reports (based on HRSA Core measure)    | Female Patients ages 24-66 (at end date) who do not have Hysterectomy or Hystcrmy* on their charts who have had two or more office visit in the past 12 months.   | Female Patients ages 24-66 (at end date) who do not have Hysterectomy or Hystcrmy* on their charts who have had two or more office visits in the past 12 months. One of the following Obs Terms in previous three years: LAST PAP DAT, PAP SMEAR, PAP THIN SMEAR.   |
| 2  | Depression Screening                               | Crystal Reports (adapted from HDC diabetes set) | Patients with one office visit (Document type "Office Visit") who have at least one visit in the past 12 months and are greater than 18 years old at the end date.  | Patients with one office visit (Document type "Office Visit") who have at least one visit in the past 12 months and are greater than 18 years old at the end date wit any Obs Term during the past 12 months PHQ*.  |
| 3  | TD vaccination                                     | Crystal Reports (based on CDC)                  | Patients over 18 years old at the stop date who have at least 2 visits in the measurement year.   | Patients 18 years old at the start date who have at least 2 visits in the measurement year and have an Obs Term on their chart in the past 10 years beginning with TD* (includes booster and declining).  |
| 4  | Percentage Of Visits With Blood Pressure           | MQIC Data Warehouse (DOQ-IT)                    | Office visits of all patients aged 18 and older at the start of the measurement year who have had at least two face-to-face office visits in the measurement year.  | Office Visits of adult patients during the measurement period, where the patient's blood pressure is recorded on the same day as the office visit. (BP measurement should include valid values of Systolic BP and Diastolic BP)   |
| 5  | Percentage Women Aged 50-69 With A Mammogram       | MQIC Data Warehouse (DOQ-IT)                    | All <b>female</b> patients <b>aged 50-69</b> at the start of the <b>24-month measurement period</b> who have had at least two face-to-face office visits in the measurement period <b>Exclusions:</b> Patients who have undergone bilateral mastectomy during the measurement period. | Patients from the denominator who have had Mammogram during the 24-month measurement period.  |
| 6  | Percentage Aged 50+ Screened For Colorectal Cancer | MQIC Data Warehouse (DOQ-IT)                    | All patients aged <b>50 and older</b> at the start of the measurement year who have had at least two face-to-face office visits in the measurement year. <b>Exclusions:</b> Patients with colectomy are excluded  | Patients from the denominator who have undergone at least one of the four Colorectal Cancer screening tests: FOBT - must have been conducted within 365 days (one year) from the last date of data extraction<br>FLEX SIG - must have been conducted within 1825 days (five years) from the last date of data extraction<br>BARIUM ENEMA - must have been conducted within 1825 days (five years) from the last date of data extraction<br>COLONOSCOPY - must have been conducted within 3650 days (ten years) from the last date of data extraction. (The valid values for the above tests can be any value other than 'unmappable', 'unevaluated', 'refused') |

|    |   |                              |   |  |
|----|---|------------------------------|---|--|
| 7  | Percentage Aged 50+ with Influenza Vaccination                    | MQIC Data Warehouse (DOQ-IT) | All patients aged <b>50 and older</b> at the start of the measurement year who have had at least two face-to-face office visits in the measurement year. <b>Exclusions:</b> Patients with the following conditions are excluded: Allergy to Egg OR Allergy to Influenza Vaccination   | Patients from the denominator who have received the Influenza Vaccination during the measurement period, in the month of September, October, November, December, January or February. (Valid values for Flu Vax can be any value other than refused, unmappable, unevaluated.) |
| 8  | Percentage Aged 65+ with Pneumococcal Vaccination                 | MQIC Data Warehouse (DOQ-IT) | All patients aged <b>65 and older</b> at the start of the measurement year who have had at least two face-to-face office visits in the measurement year. <b>Exclusions:</b> Patient exclusions based on medical reasons:<br>(i) If the patient has had any previous adverse effects or anaphylactic reaction to the vaccine or any of its components.<br>OR<br>(ii) Physician's reason for the refusal of the vaccination | Patients from the denominator who have had a pneumonia vaccination any time (ever).  |
| 9  | Percentage With LDL   | MQIC Data Warehouse (DOQ-IT) | All patients aged 18 and older at the start of the measurement year who have had at least two face-to-face office visits in the measurement year. <b>Exclusions:</b> Medical reasons - Other reasons as documented by physician; Patient Reasons - Applies only if the patient did not have the LDL cholesterol test  | Patients from the denominator with valid LDL value recorded during the measurement period  |
| 10 | Percentage Of Those With LDL whose most recent LDL-C is <130 mg/d | MQIC Data Warehouse (DOQ-IT) | All patients aged 18 and older at the start of the measurement year who have had at least two face-to-face office visits in the measurement year AND with <b>at least one valid LDL test</b> during the measurement period.   | Patients from the denominator with the most recent LDL value lesser than 130 mg/dl during the measurement period.  |
| 11 | Percentage with Smoking Status                                    | MQIC Data Warehouse (DOQ-IT) | All patients aged 18 and older at the start of the measurement year who have had at least two face-to-face office visits in the measurement year.   | Patients with documentation of smoking status in patient record.   |

|    |   |                              |  |  |
|----|---|------------------------------|--|--|
| 12 | Percentage Of Smokers With Cessation Intervention | MQIC Data Warehouse (DOQ-IT) | All patients aged 18 and older at the start of the measurement year who have had at least two face-to-face office visits in the measurement year AND have smoking status documented as 'smoker'. | Patients from the denominator who have been advised to quit smoking or are on anti-smoking medicines. The patient must have received the advice to quit smoking or has been on anti-smoking medicines during the 24-months period (730 days) prior to the last data extraction date. The anti-smoking medicines need to be on the active list or the start date or stop date of anti-smoking medicines has to be within the 24-month period (730 days) prior to the last data extraction date. |
|----|---|------------------------------|--|--|

| <b>Part B. Diabetes Management (DM) Measures (mostly HDC measures - DPRP measures are specified)</b> |  |                            |   |  |
|--|--|----------------------------|---|--|
| 13   | Patients with 2 HbA1c's in last year (3+ months apart) | MQIC Data Warehouse (HDC)  | Active Diabetes Patients (see HDC Diabetes tab) with a minimum of two visits in the reporting year  | Active Diabetes Patients having 2 or more HbA1c tests (that are at least 91 days apart) during the measurement period.   |
| 14   | Percentage with HbA1c                                  | MQIC Data Warehouse (HDC)  | Active Diabetes Patients (see HDC Diabetes tab)   | Active Diabetes Patients with HbA1c test during the measurement period   |
| 15   | Average HbA1c  | MQIC Data Warehouse (HDC)  | We want to report the percentage of patients with HbA1c test during the measurement period to ensure that average is meaningful and not for a small population. Only valid values of HbA1c are considered in computation of this measure. | Average of Most Recent HbA1c Value for the Active Diabetes Patients (see HDC Diabetes tab) that have HbA1c Test during the measurement period. No numerator or denominator applicable for this measure.  |
| 16   | Percentage with Last HbA1c > 9.0                       | MQIC Data Warehouse (DPRP) | Adult Diabetes Patients (see DPRP Diabetes tab)   | Searches for the last glycosylated hemoglobin test and determines whether the result is greater than 9.0%. (Requires either Observation HDID 2550, Glyco-Hgb or HDID 28, HgbA1C. The date of the Observation result must be less than 12 months plus 60 days prior to the most recent office visit.) |
| 17   | Percentage with Last HbA1c < 7.0                       | MQIC Data Warehouse (DPRP) | Adult Diabetes Patients (see DPRP Diabetes tab)   | Searches for the last glycosylated hemoglobin test and determines whether the result is less than 7.0%. (Requires either Observation HDID 2550, Glyco-Hgb or HDID 28, HgbA1C. The date of the Observation result must be less than 12 months plus 60 days prior to the most recent office visit.)    |
| 18   | Self Management Goal (%)                               | MQIC Data Warehouse        | Active Diabetes Patients (see HDC Diabetes tab)   | Active Diabetes Patients with Self Management Goal setting observation during the measurement period.  |
| 19   | ACE Inhibitor or ARB (%)                               | MQIC Data Warehouse        | Active Diabetes Patients age >= 55 years (see HDC Diabetes tab)   | Active Diabetes Patients Age >= 55 years that are currently taking ACE inhibitors or ARBs  |
| 20   | Percentage of Patients on Statins                      | MQIC Data Warehouse        | Active Diabetes Patients age >= 40 years (see HDC Diabetes tab)   | Active Diabetes Patients Age >= 40 years that are currently taking Statins   |
| 21   | Blood Pressure Value (%)                               | MQIC Data Warehouse        | All office visits for Active Diabetes Patients (see HDC Diabetes tab)   | Patient visits with BP recorded  |
| 22   | Blood Pressure less than 130/80 (%)                    | MQIC Data Warehouse        | Active Diabetes Patients (see HDC Diabetes tab) with documented BP during measurement period .  | Active Diabetes Patients with most recent BP Systolic < 130 and most recent BP Diastolic < 80 during the measurement period.   |

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| 23 | Cholesterol Test (LDL<100)  | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab) with recent LDL test.  | Active Diabetes Patients with most recent LDL < 100 during the measurement year.  |
| 24 | Aspirin or Antithrombotic (%)   | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab) age >= 40 years  | Active Diabetes Patients Age >= 40 years that are currently taking Aspirin Or Active Diabetes Patients Age >= 40 years that are currently taking Antithrombotic agents  |
| 25 | Percentage of patients assessed for smoking status (DPRP)                 | MQIC Data Warehouse | Adult Diabetes Patients (see DPRP Diabetes tab)  | Adult Diabetes Patients assessed for smoking status. A patient qualifies for this measure if their last smoking assessment was "never", "former", or "not current", OR one of the advising to quit obs has a value of "done". Patient is on a smoking deterrent medication within the last 12 months. The date of the Observation result or medication documentation must be less than 12 months prior to the most recent office visit. |
| 26 | Documented as current Smokers (%)   | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab) that have documented smoking status during the measurement period.   | Active Diabetes Patients that are documented as current smokers during the measurement period.  |
| 27 | % of smokers recommended or offered an intervention for smoking cessation | MQIC Data Warehouse | All patients who are smokers 18-75 years of age  | Patients who were recommended or offered an intervention for smoking cessation (ie: counseling or pharmacologic therapy)  |
| 28 | Eye Exam  | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab)  | Patients who received a dilated retinal eye exam by an ophthalmologist or optometrist Documentation in the medical record must include: A note or letter from an ophthalmologist, optometrist or other health care professional summarizing the date on which the procedure was performed and the results of a retinal evaluation performed by an eyecare professional Or A chart or photograph of retinal abnormalities.               |
| 29 | Foot Exam   | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab)<br><b>Exclusions</b><br>Patients with bilateral foot/leg amputation (ICD-9-CM exclusion codes for 2.9 Foot Exam: 896.2, 896.3, 897.6, 897) | Active Diabetes Patients with documented foot exams for all three components (visual inspection, sensory exam with monofilament, and pulse exam), for both feet, during the measurement period (All of them need not be on the same day).   |
| 30 | Microalbumin Test (%)   | MQIC Data Warehouse | Active Diabetes Patients that are between 12 and 70 years that are not currently taking ACE or ARB.  | Active Diabetes Patients between 12 and 70 years that are not currently taking ACE or ARB and have had Microalbuminuria test during the measurement period.   |

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| 31  | Influenza Vaccine (%)                                | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab)<br><b>Exclusion:</b> AMA exclusions (both patient and medical reason to exclude)  | Active Diabetes Patients who received an immunization for influenza during the measurement year.   |
| 32  | Pneumococcal Vaccine (%)                             | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab)<br><b>Exclusion:</b> AMA exclusions (both patient and medical reason to exclude)  | Active Diabetes Patients who received an immunization for pneumonia, ever.   |
| 33  | Dental Exam (%)                                      | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab)   | Active Diabetes Patients who are documented as having dental exam in the measurement year.   |
| 34  | Depression Screening (%)                             | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab)   | Active Diabetes Patients who are documented as having depression screening in the measurement year.  |
| 35  | Exercise Freq 3 per week (%)                         | MQIC Data Warehouse | Active Diabetes Patients (see HDC Diabetes tab)   | Active Diabetes Patients who are documented as doing exercise 3xweek@20 minutes minimum, during the measurement period.  |
| <b>Part C. Hypertension (HTN) Measures [DOQ-IT]</b> |  |                     |   |  |
| 36  | Percentage Of Visits With BP (HTN-1)                 | MQIC Data Warehouse | All office visits for Adult Hypertension Patients (see DOQ-IT HTN tab) during the measurement period. <b>Exclusion:</b> Patients who have declined blood pressure measurement because of personal (patient) reasons are excluded  | Patient visits with valid blood pressure measurement values (both systolic and diastolic) recorded on the office visit during the measurement period.  |
| 37  | Percentage Of Patients With Last BP < 140/90 (HTN-2) | MQIC Data Warehouse | All Adult Hypertension Patients (see DOQ-IT HTN tab) with blood pressure value recorded on or after the last (most recent) office visit during the measurement period. <b>Exclusion:</b> Patients who have declined blood pressure measurement because of personal (patient) reasons are excluded | Patients from the denominator with last (most recent) blood pressure value less than 140/90 (Systolic blood pressure < 140, Diastolic blood pressure < 90). Both systolic and diastolic blood pressure values must be recorded on the office visit day |