



Improving Patient Outcomes Through Data

Measures 101: A Deep Dive

May 2016

Introductions

Eric Gunther

- Engineering Team Lead
- With Azara since inception
- Architect of DRVS measure calculation infrastructure
- Oversee development of new measures and features

Samuel Bar

- Sr. Implementation Specialist
- Managed new implementations and remapping projects at dozens of CHC's
- Mapped data elements for UDS, MU, HEDIS, eHIVQUAL, and P4C
- Familiar with data entry workflows across an array of EHR systems including NextGen, eClinical Works, GE Centricity, Allscripts, and EPIC

Agenda

- Defining the Measure
 - Measure specifications & logic
 - Identifying ambiguity
 - Choosing and using value sets
- Mapping & Validating
 - Components of a measure
 - Where in the workflow does that come from?
 - Common mapping issues
 - Validation core concepts
- Processing and Attribution
 - Loading data into DRVS/CPCI
 - Attribution by provider, period, or other

Making smart assumptions and judgements about areas of ambiguity

DEFINING THE MEASURE

Start with a Question

How are we doing when it comes to depression screening and follow-up for patients who screened positive?

- Need to be more specific.
- Ambiguity is one of the main reasons a measure doesn't meet your expectations or doesn't match across systems.
- Be on the lookout for ambiguity!



Choose a Specification

- **Meaningful Use eCQMs**
 - Published by CMS once a year
 - Extremely specific but high learning curve
 - What we're going to be looking at today
- **UDS**
 - Published by HRSA once a year
 - FQHC's know it well
 - Fairly accessible specification
- **HEDIS**
 - Published by NCQA once a year
 - Requires a license
 - Historically made for claims data



Meaningful Use eCQM Spec



Population criteria

- **Initial Patient Population** =
 - AND: "Patient Characteristic Birthdate: birth date" >= 12 year(s) starts before start of "Measurement Period"
 - AND: "Occurrence A of Encounter, Performed: Depression Screening Denominator Encounter Codes New" during "Measurement Period"
 - **Denominator** =
 - AND: "Initial Patient Population"
 - **Denominator Exclusions** =
 - AND:
 - OR:
 - AND: MOST RECENT: "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Depression Screening Result')" during "Measurement Period"
 - AND NOT: "Occurrence A of Diagnosis, Active: Depression diagnosis" ends before start of "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Depression Screening Result')"
 - AND: "Occurrence A of Diagnosis, Active: Depression diagnosis" starts before start of "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Depression Screening Result')"
 - OR:
 - AND: MOST RECENT: "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Depression Screening Result')" during "Measurement Period"
 - AND NOT: "Occurrence A of Diagnosis, Active: Depression diagnosis" ends before start of "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Depression Screening Result')"
 - AND: "Occurrence A of Diagnosis, Active: Depression diagnosis" starts before start of "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Depression Screening Result')"
 - OR:
 - AND: MOST RECENT: "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Depression Screening Result')" during "Measurement Period"
 - AND NOT: "Occurrence A of Diagnosis, Active: Bipolar Diagnosis" ends before start of "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Depression Screening Result')"
 - AND: "Occurrence A of Diagnosis, Active: Bipolar Diagnosis" starts before start of "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Depression Screening Result')"
 - OR:
 - AND: MOST RECENT: "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Depression Screening Result')" during "Measurement Period"
 - AND NOT: "Occurrence A of Diagnosis, Active: Bipolar Diagnosis" ends before start of "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Depression Screening Result')"
 - AND: "Occurrence A of Diagnosis, Active: Bipolar Diagnosis" starts before start of "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Depression Screening Result')"
- **Numerator** =
 - AND:
 - OR:
 - AND: MOST RECENT: "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Depression Screening Result')" during "Measurement Period"
 - AND: "Patient Characteristic Birthdate: birth date" < 18 year(s) starts before start of "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Depression Screening Result')"
 - AND:
 - OR: "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Negative Depression Screening')" during "Measurement Period"
 - OR:
 - AND: "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Positive Depression Screening')" during "Measurement Period"
 - OR: "Intervention, Performed: Additional evaluation for depression - adolescent"
 - OR: "Intervention, Order: Referral for Depression Adolescent"
 - OR: "Medication, Order: Depression medications - adolescent"
 - OR: "Intervention, Performed: Follow-up for depression - adolescent"
 - OR: "Procedure, Performed: Suicide Risk Assessment"
 - <= 1 day(s) starts after start of "Occurrence A of Risk Category Assessment: Adolescent Depression Screening (result: 'Positive Depression Screening')"
 - OR:
 - AND: MOST RECENT: "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Depression Screening Result')" during "Measurement Period"
 - AND: "Patient Characteristic Birthdate: birth date" >= 18 year(s) starts before start of "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Depression Screening Result')"
 - AND:
 - OR: "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Negative Depression Screening')" during "Measurement Period"
 - OR:
 - AND: "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Positive Depression Screening')" during "Measurement Period"
 - OR: "Intervention, Performed: Additional evaluation for depression - adult"
 - OR: "Intervention, Order: Referral for Depression Adult"
 - OR: "Medication, Order: Depression medications - adult"
 - OR: "Intervention, Performed: Follow-up for depression - adult"
 - OR: "Procedure, Performed: Suicide Risk Assessment"
 - <= 1 day(s) starts after start of "Occurrence A of Risk Category Assessment: Adult Depression Screening (result: 'Positive Depression Screening')"
- **Denominator Exceptions** =
 - AND:
 - OR: "Risk Category Assessment not done: Medical reason contraindicated" for "Adolescent Depression Screening LOINC Value Set"
 - OR: "Risk Category Assessment not done: Medical reason contraindicated" for "Adult Depression Screening LOINC Value Set"
 - OR: "Risk Category Assessment not done: Patient Reason refused" for "Adolescent Depression Screening LOINC Value Set"
 - OR: "Risk Category Assessment not done: Patient Reason refused" for "Adult Depression Screening LOINC Value Set"
 - during "Measurement Period"

Data criteria (ODM Data Elements)

- "Diagnosis, Active: Bipolar Diagnosis" using "Bipolar Diagnosis Grouping Value Set (2.16.840.1.113883.3.600.450)"
- "Diagnosis, Active: Depression diagnosis" using "Depression diagnosis Grouping Value Set (2.16.840.1.113883.3.600.145)"
- "Encounter, Performed: Depression Screening Denominator Encounter Codes New" using "Depression Screening Denominator Encounter Codes New Grouping Value Set (2.16.840.1.113883.3.600.1916)"
- "Intervention, Order: Referral for Depression Adolescent" using "Referral for Depression Adolescent SNOMED-CT Value Set (2.16.840.1.113883.3.600.537)"
- "Intervention, Order: Referral for Depression Adult" using "Referral for Depression Adult SNOMED-CT Value Set (2.16.840.1.113883.3.600.538)"
- "Intervention, Performed: Additional evaluation for depression - adolescent" using "Additional evaluation for depression - adolescent SNOMED-CT Value Set (2.16.840.1.113883.3.600.1542)"

Anatomy of a Measure



- **Measure logic**
 - The ANDs and ORs



- **Value sets**
 - Defining data elements
 - Lists of codes

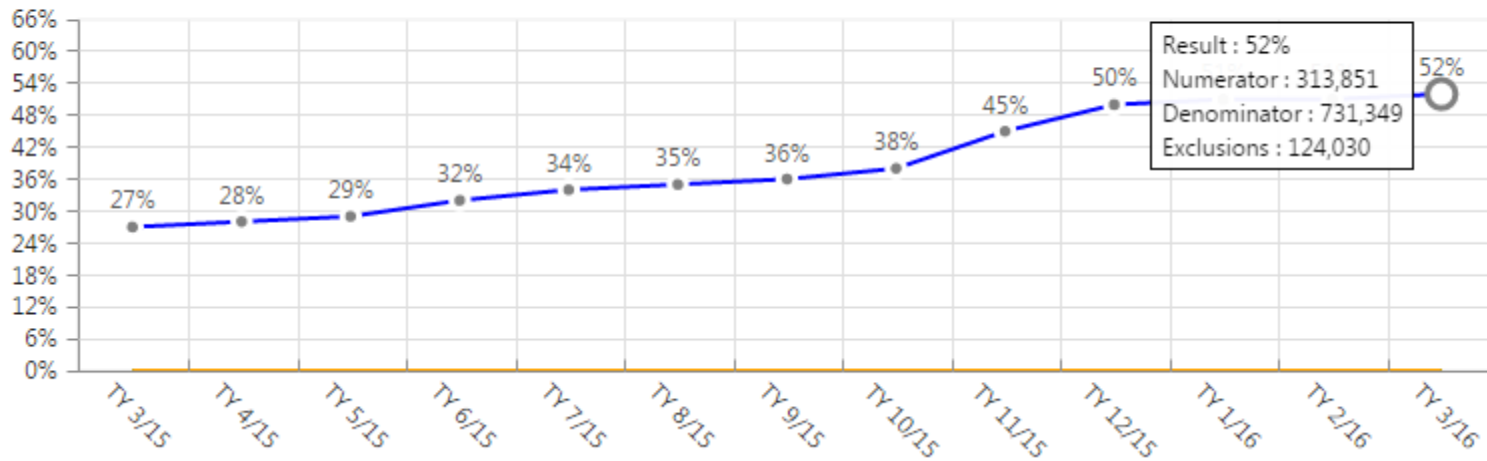


- **Attribution**
 - Running a measure by provider or location
 - Running a measure for a month or quarter
 - Putting patients into buckets

Measure Logic – Calculating the Result

$$\text{Measure Result} = \frac{\text{Numerator}}{\text{Denominator} - \text{Exclusions}}$$

TY March 2015 to TY March 2016 Trend



Measure Logic – Denominator Population

Start with the denominator

Patients who had ...

1. A qualifying visit in the past year
- AND**
2. Over 12 years old

- This is Ambiguous!
 - How about “age at beginning of reporting period \geq 12 years”

Measure Logic – Numerator Population

Patients in the denominator who had...

1. A negative result in their *most recent* depression screen
- OR**
2. A positive result in their most recent depression screen **AND** follow-up documented

- Ambiguous!
 - What counts as a positive depression screen?
 - What counts as follow-up?
 - When does the follow-up have to be documented?

Measure Logic – Numerator Population Clarified

- What is a positive depression screen?
 - PHQ-2 \geq 3
 - PHQ-9 \geq 10
 - Other standardized depression screen marked as positive
- What is follow-up?
 - Depression medications
 - Additional evaluation for depression
 - Referral for depression
 - Can be custom mapped for your health center
- When does follow-up have to be documented?
 - MU – within a day
 - UDS (2015)– before the end of the year

Measure Logic – Exclusions Population

Patients in the denominator who had...

Active depression **OR** bipolar diagnosis

See any problems with this?

Excluding people who got screened, had follow-up, and were subsequently diagnosed. Those were all numerator patients!

Measure Logic – Exclusions Population Fixed

Patients in the denominator who had...

Active depression or bipolar diagnosis **AND**
(no screen during reporting period **OR** the
diagnosis was made before the screen)

Measure Logic – “Exclusion” Confusion

Patients not in the denominator population (UDS)

Numerator	Denominator	Result
75	100	75%

$$75/100 = 75\%$$

Patients reported in the exclusions population (MU)

Numerator	Denominator	Exclusions	Result
75	120	20	75%

$$75/(120-20) = 75\%$$

Value Sets

- Lists of codes defining the data elements
- Code systems
 - CPT – procedures, office visits
 - ICD-9/10 – diagnoses
 - RxNorm – medications
 - Custom mappings
 - Takes a lot of effort compared to codified data
- Try to use standardized value sets
- Value set feedback process
 - Submit tickets through ONC's JIRA to question value set content
 - Medications example – should Abilify be in the value set?

Value Sets - Example

Depression medication value set from VSAC (Value Set Authority Center)

Value Set Information Available Updates: Approved By Steward Expansion Versions: MU2 Update 2015-05-01 [Export Value Set Results \(Excel\)](#)

Metadata	Name: Depression medications - adult	OID: 2.16.840.1.113883.3.600.470
Description	Type: Extensional	Definition Version: 20150430
Measure	Steward: Quality Insights of Pennsylvania	Program: CMS, MU2 Update 2015-05-01 using this value set

Value Set Members

Expanded Code List

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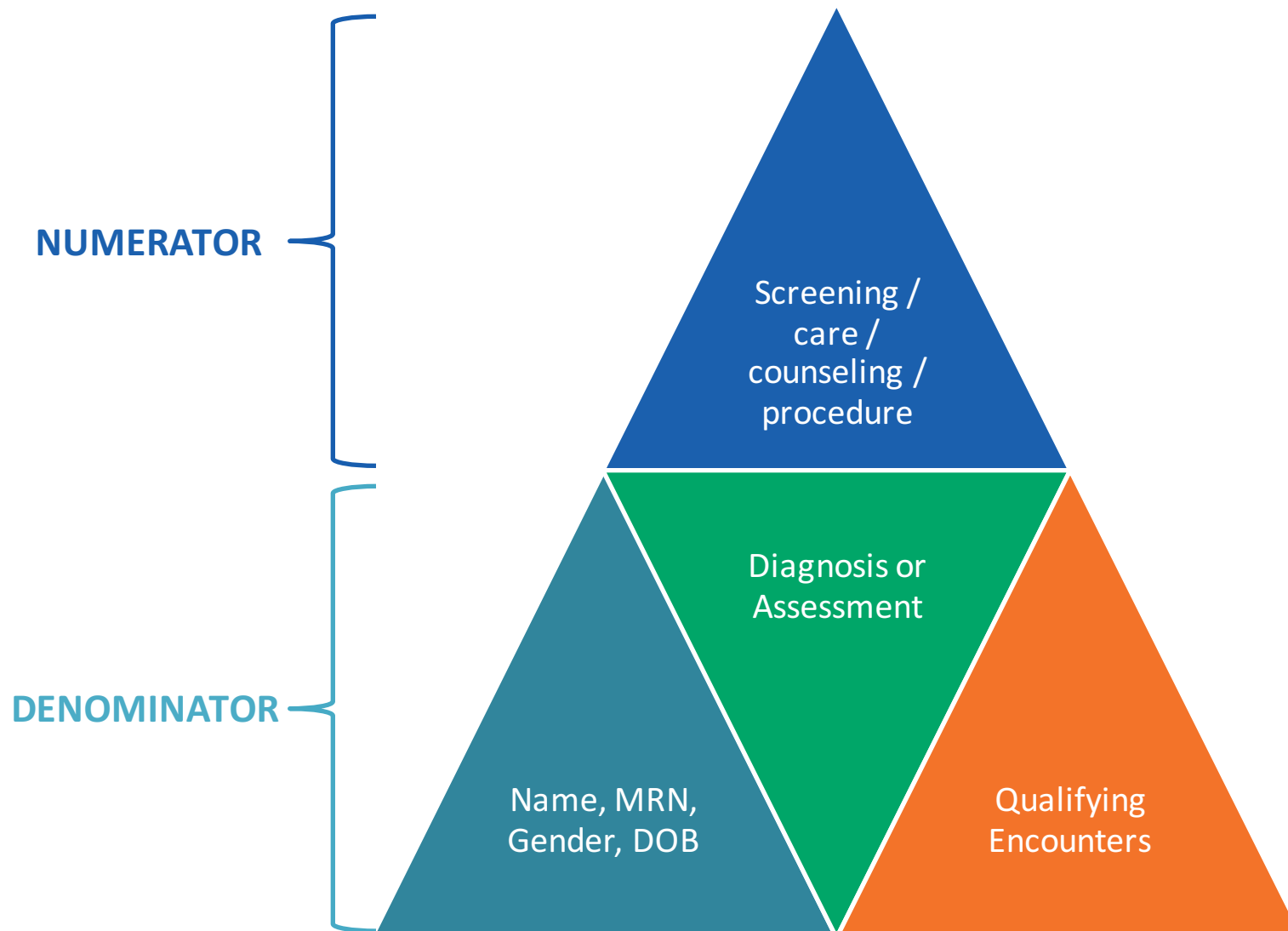
Code	Descriptor	Code System	Version	Code System OID
1000048	Doxepin Hydrochloride 10 MG Oral Capsule	RXNORM	2015-01	2.16.840.1.113883.6.88
1000054	Doxepin Hydrochloride 10 MG/ML Oral Solution	RXNORM	2015-01	2.16.840.1.113883.6.88
1000058	Doxepin Hydrochloride 100 MG Oral Capsule	RXNORM	2015-01	2.16.840.1.113883.6.88
1000064	Doxepin Hydrochloride 150 MG Oral Capsule	RXNORM	2015-01	2.16.840.1.113883.6.88
1000070	Doxepin Hydrochloride 25 MG Oral Capsule	RXNORM	2015-01	2.16.840.1.113883.6.88
1000076	Doxepin Hydrochloride 50 MG Oral Capsule	RXNORM	2015-01	2.16.840.1.113883.6.88
1000097	Doxepin Hydrochloride 75 MG Oral Capsule	RXNORM	2015-01	2.16.840.1.113883.6.88
1041790	Omega-3 Acid Ethyl Esters (USP) 1400 MG Oral Capsule	RXNORM	2015-01	2.16.840.1.113883.6.88
107078	Folic Acid 0.4 MG Oral Capsule	RXNORM	2015-01	2.16.840.1.113883.6.88
1086772	vilazodone hydrochloride 10 MG Oral Tablet	RXNORM	2015-01	2.16.840.1.113883.6.88
1086778	vilazodone hydrochloride 20 MG Oral Tablet	RXNORM	2015-01	2.16.840.1.113883.6.88
1086784	vilazodone hydrochloride 40 MG Oral Tablet	RXNORM	2015-01	2.16.840.1.113883.6.88
1086789	{7 (vilazodone hydrochloride 10 MG Oral Tablet) / 7 (vilazodone hydrochloride 20 MG Oral Tablet)}	RXNORM	2015-01	2.16.840.1.113883.6.88
1092185	Omega-3 Acid Ethyl Esters (USP) 1000 MG Delayed Release Oral Capsule	RXNORM	2015-01	2.16.840.1.113883.6.88
1098649	Nefazodone hydrochloride 100 MG Oral Tablet	RXNORM	2015-01	2.16.840.1.113883.6.88
1098666	Nefazodone hydrochloride 150 MG Oral Tablet	RXNORM	2015-01	2.16.840.1.113883.6.88
1098670	Nefazodone hydrochloride 200 MG Oral Tablet	RXNORM	2015-01	2.16.840.1.113883.6.88
1098674	Nefazodone hydrochloride 250 MG Oral Tablet	RXNORM	2015-01	2.16.840.1.113883.6.88
1098678	Nefazodone hydrochloride 50 MG Oral Tablet	RXNORM	2015-01	2.16.840.1.113883.6.88
1098710	Nefazodone hydrochloride 300 MG Oral Tablet	RXNORM	2015-01	2.16.840.1.113883.6.88

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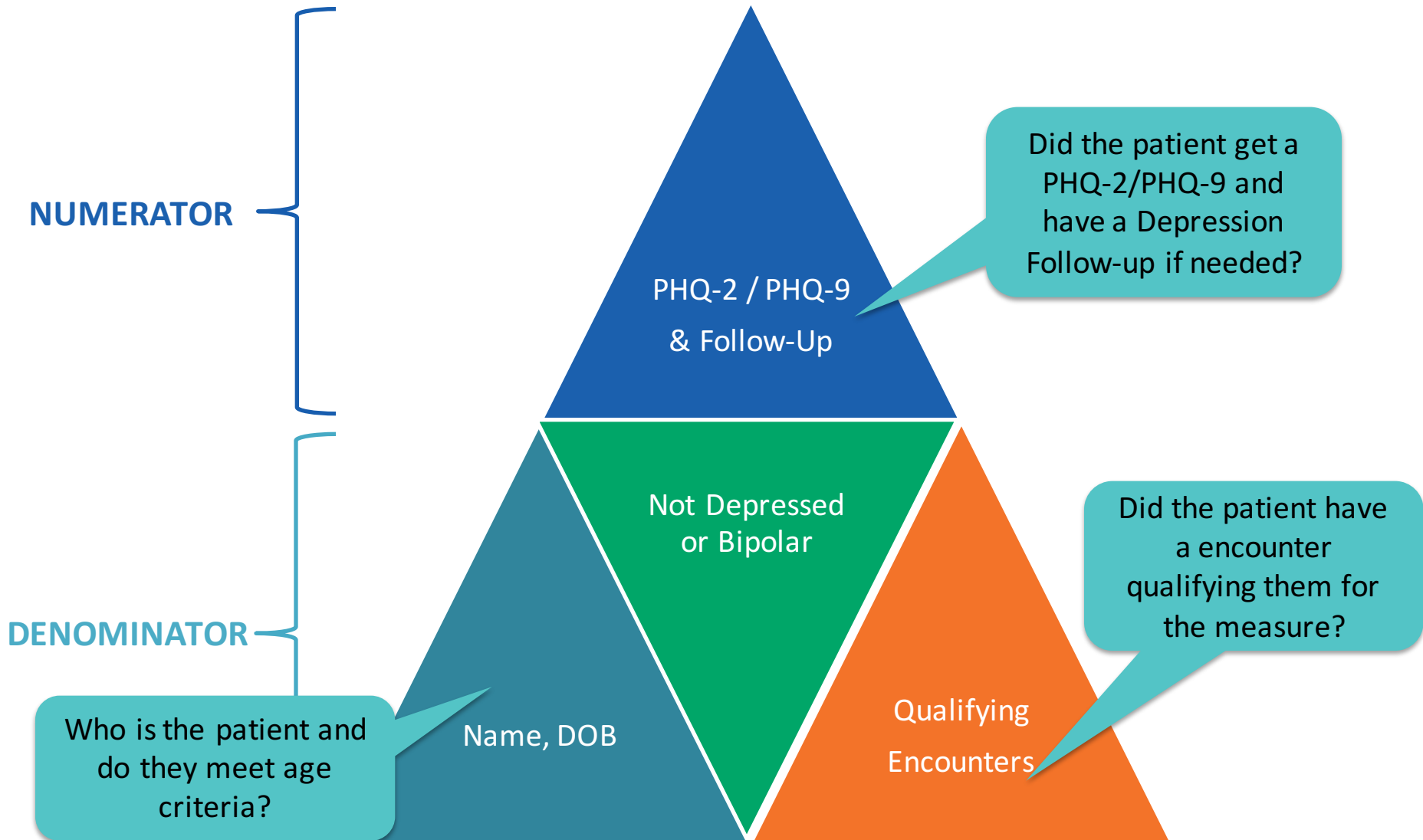
What do your clinicians need to do to satisfy the measure

MAPPING & VALIDATING

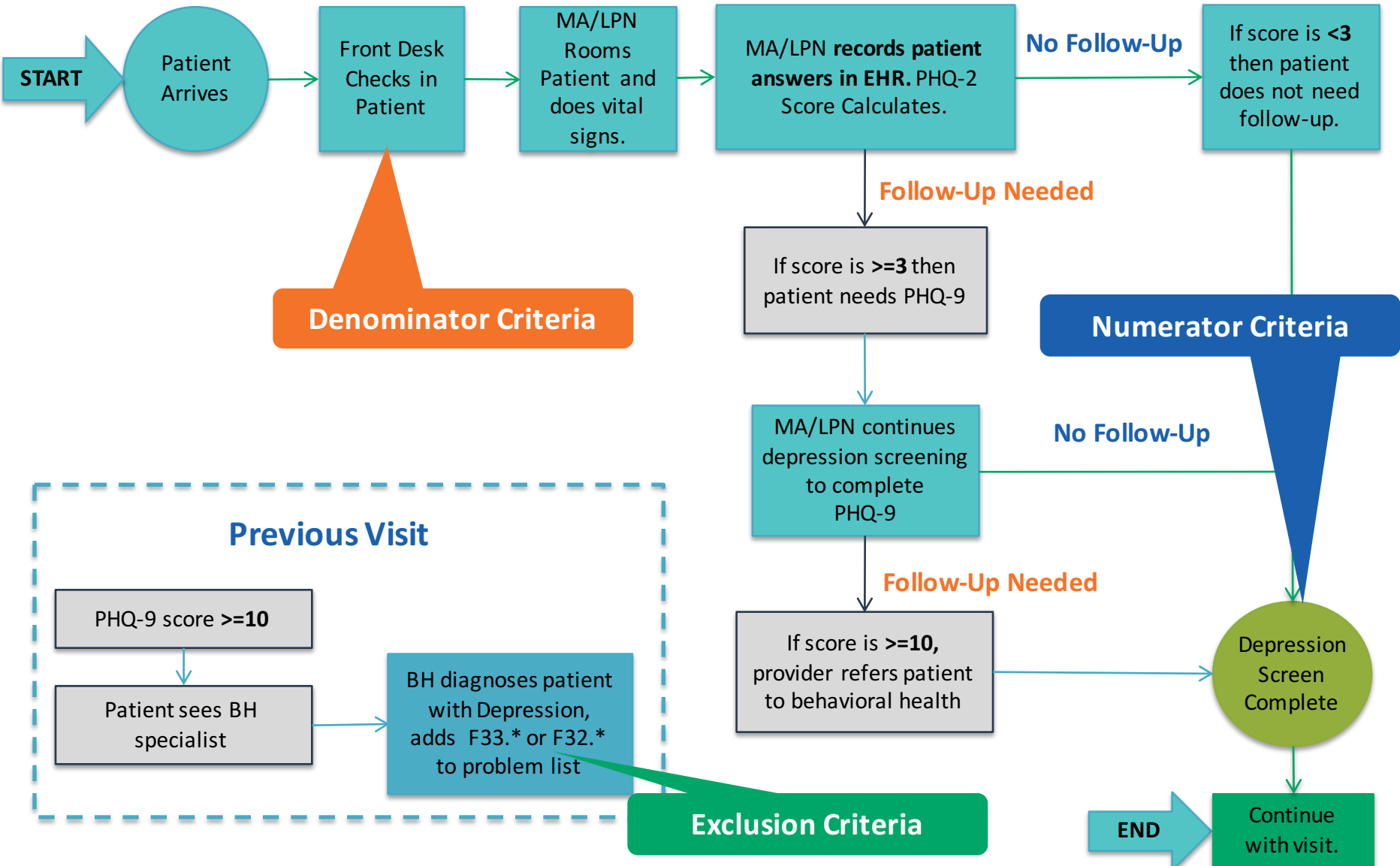
Data Elements are the Building Blocks of Measures



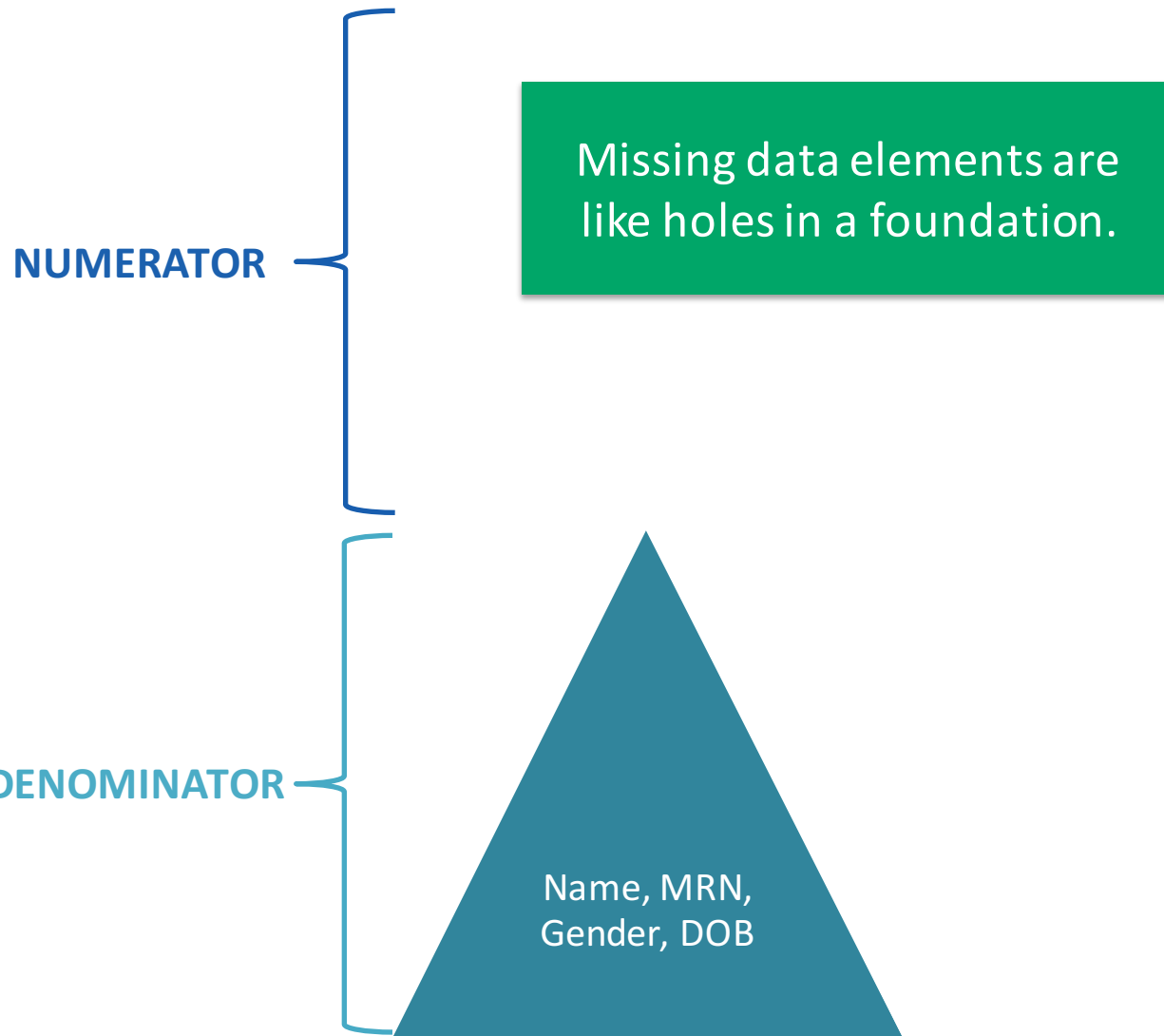
Depression Screening Data Elements



Depression Screening and Follow-Up



Missing Data



PHQ-2 done by patient on **paper**, never in EHR

Free text Comments:
Patient is depressed

Patient is billed with custom CPT codes

Common Mapping Issues

Denominator

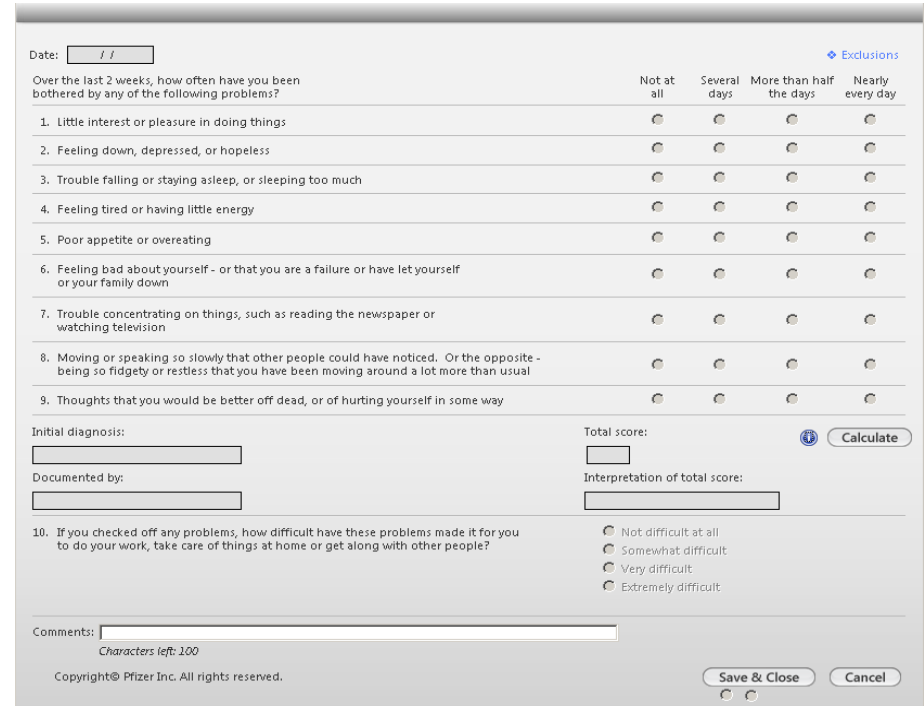
- Use of custom CPT codes, addition of modifiers

Numerator

- Depression screening done outside EHR
- Unstructured PHQ-2 & PHQ-9 results
- Use of alternative screenings (Edinburgh Depression Scale, DUKE-AD)
- No clear follow-up workflow
- Medications dispensed without structured data

Exclusions

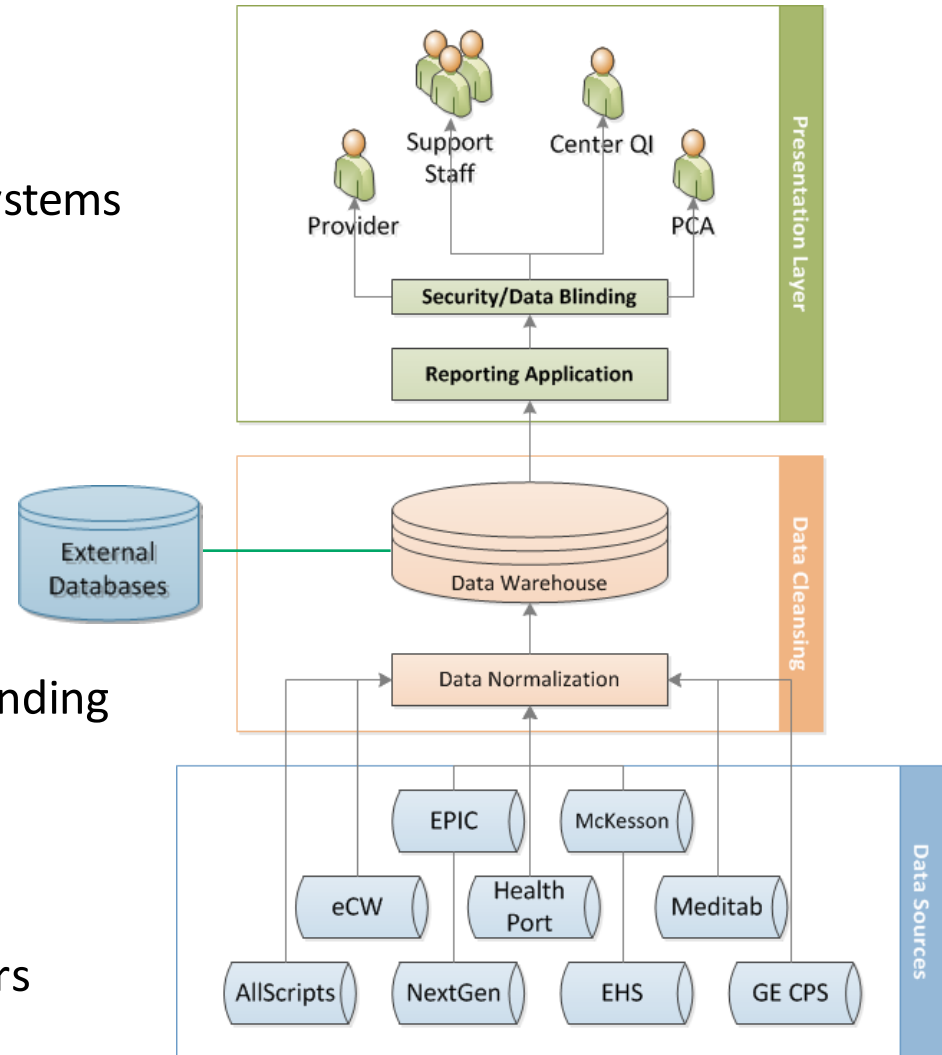
- Behavioral Health does not use EHR
- Depression diagnosis not entered using correct ICD9/ICD10/SNOMED`



The screenshot shows a digital form for a PHQ-9 depression screening. At the top, there is a 'Date' field with a dropdown menu. Below this is a question: 'Over the last 2 weeks, how often have you been bothered by any of the following problems?'. The form contains a table with 9 rows of symptoms and 4 columns of frequency options: 'Not at all', 'Several days', 'More than half the days', and 'Nearly every day'. Each cell in the table contains a radio button. The symptoms listed are: 1. Little interest or pleasure in doing things; 2. Feeling down, depressed, or hopeless; 3. Trouble falling or staying asleep, or sleeping too much; 4. Feeling tired or having little energy; 5. Poor appetite or overeating; 6. Feeling bad about yourself - or that you are a failure or have let yourself or your family down; 7. Trouble concentrating on things, such as reading the newspaper or watching television; 8. Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual; 9. Thoughts that you would be better off dead, or of hurting yourself in some way. Below the table, there are fields for 'Initial diagnosis:' and 'Documented by:'. To the right, there is a 'Total score:' field, an 'Interpretation of total score:' field, and a 'Calculate' button. At the bottom, there is a 'Comments:' field with a character count of 100. The footer includes 'Copyright © Pfizer Inc. All rights reserved.' and 'Save & Close' and 'Cancel' buttons.

DRVS Architectural Overview

- PCA and PCMH focused solution
- Data from disparate EHR and EPM systems
- Daily data refresh
- Data unified in EHR-agnostic Data Warehouse for apples to apples comparison
- Web-based reporting platform accessible from any major browser
- User role differentiation and data blinding
- Graphical and text based depictions of datasets
- External data links geographic characteristics to patients & providers

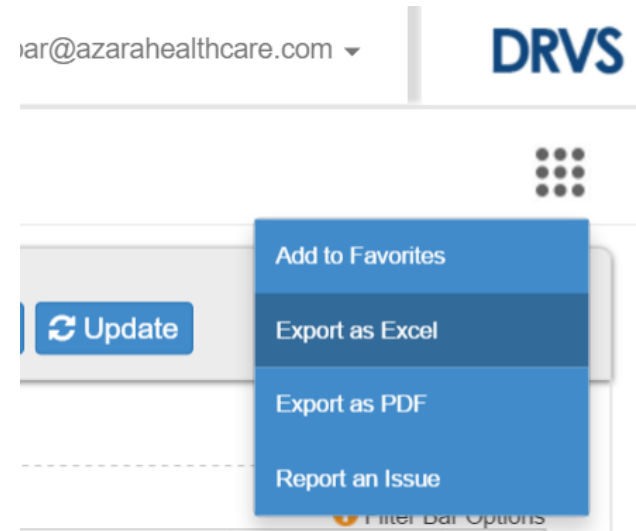


Validation Core Concepts

- Latency is to be expected:
 - Quality Measures (MU, UDS, HEDIS) get updated weekly
 - Registries and the Visit Planning reports get updated nightly
- Pick and stick with a period type and a measure specification
- Inconsistent workflows = Inconsistent data capture
- Start with a small number of patients, add patients until you find a problem
- Pick a variety of patients
 - Numerator = Y/N, Exclusions = Y/N
 - Different providers and locations (usual & rendering)
 - Indications of different workflows/tests

Using Aggregated Patient Detail

- DRVS allows you to view patient level detail in the application, or as excel export
- HIPAA: When exporting, keep in mind where the PHI ends up (downloads folder, email, public computer)
- Keep track of which patients are incorrectly part of numerator/denominator/exclusions by using a validation workbook
- Once you've found missing data screenshots! screenshots! screenshots!



ominator = Y. Paste here.

Language	Phone	Gender	Date of Birth	Usual Provider	Inactive	Denominator	Numerator	Exclusion	Depression Screen	Screen Res
Unmapped	249-601-769	F	18505	Lowry, Zach	N	Y	Y	N	42142	4.0
no Unmapped	994-610-48	F	25797	Fay, Tom	N	Y	Y	N	42100	5.8
no Unmapped	354-560-46	M	11770	Rabbit, Jes	N	Y	Y	N	42115	2.8
no English	685-127-13	M	26192	Cranston, E	N	Y	Y	N	42383	1.8
English	243-994-66	M	16310	Decelles, Lt	N	Y	Y	N	42103	-0.3

ominator = Y. Paste here.

Language	Phone	Gender	Date of Birth	Usual Provider	Inactive	Denominator	Numerator	Exclusion	Depression Screen	Screen Res
to R Unmapped	389-207-31	F	32716	Crowley, Pat	N	Y	N	N		
no English	431-920-26	F	36012	Fritz, Renat	N	Y	N	N		
ed to English	854-160-87	F	32384	Rabbit, Jes	N	Y	N	N		
English	436-132-75	F	15712	Gunther, E	N	Y	N	N		
no English	719-119-39	M	18075	Gunther, E	N	Y	N	N		

ominator = Y. Paste here.

Language	Phone	Gender	Date of Birth	Usual Provider	Inactive	Denominator	Numerator	Exclusion	Depression Screen	Screen Res
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How data elements from your EHR gets transformed into measure results

PROCESSING AND ATTRIBUTION

DRVS Data Processing

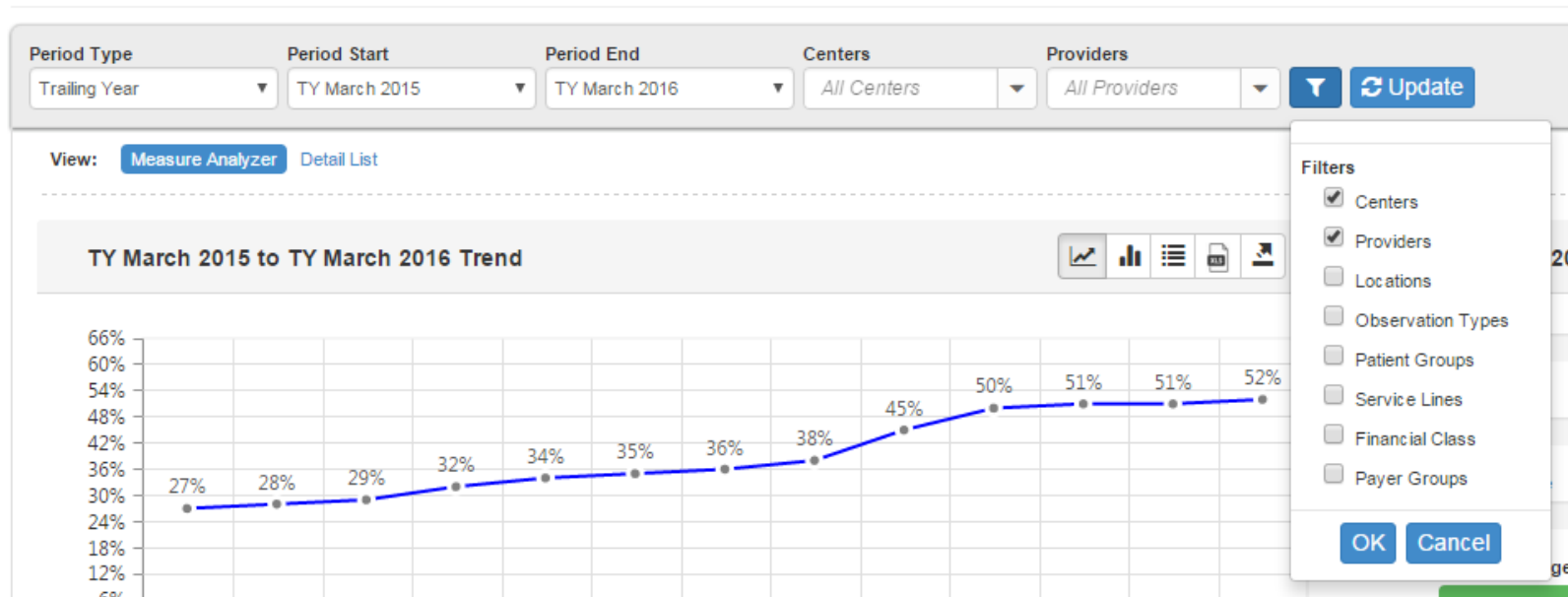
- Loading (ETL)
 - Nightly
 - Normalization and “scrubbing”
- Measure calculation
 - Weekly
 - All patients, all measures, “current” periods
 - Historical processing upon request
- Attribution
 - Run-time (when you use a report)
 - Aggregate measure results



Attribution

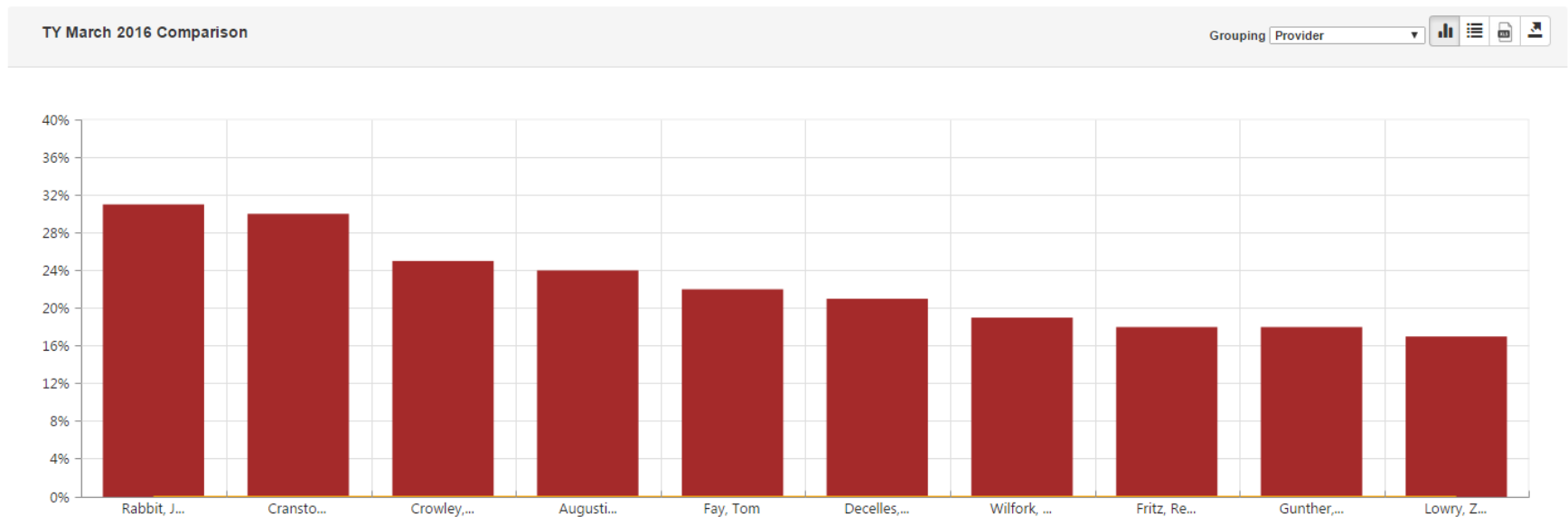
- “Slicing and dicing” the measures
- Measures are calculated per patient, attribution is how we sum up the measure results by placing patients into buckets

Screening for Clinical Depression and Follow-Up Plan (NQF 0418) ⓘ



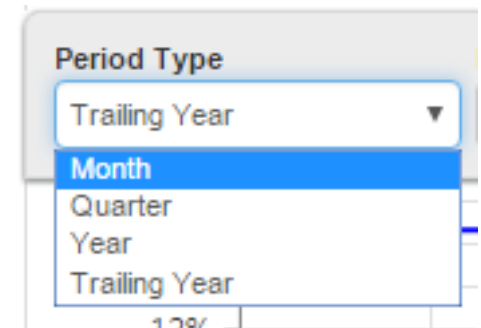
Attribution - Provider

- Sum up patient results into provider buckets
 - Rendering provider – patient had to have a visit with the provider
 - Patients can contribute to multiple buckets, you can't add up all the buckets to get your center's total
 - Usual provider – patient must be in the provider's panel



Attribution - Period

- Most measure specs assume a year long period, so how can we run them for smaller periods like month or quarter?
- Running a measure for “March 2016”
 - Uses Trailing Year (TY) March 2016 measure results
 - Only return patients who had a visit in March 2016
- Why not just calculate measure for smaller period?
 - Don’t want to change compliance standard. Requiring depression screen in the past month, as opposed to past year, would bring down the numerator.
 - The drilldown becomes meaningless!



Attribution – Choosing a Period

- Trailing Year / Calendar Year
 - Most compliance reporting is trailing year
 - If we had to report this month, what is our result?
- Month/Quarter
 - Better for tracking progression and monitoring PDSA cycle
 - How did we do this month?

Additional Resources

- Azara Resources
 - https://www.youtube.com/channel/UC5-tw1KC6utBG8wT_fZJ-bg
 - <http://www.azarahealthcare.com/blog/>
- CMS eCQM Library
 - https://www.cms.gov/regulations-and-guidance/legislation/ehrincentiveprograms/ecqm_library.html
- UDS 2015 manual
 - <http://bphc.hrsa.gov/datareporting/reporting/2015udsmanual.pdf>
- Value Set Authority Center (VSAC)
 - <https://vsac.nlm.nih.gov/>
 - Requires free UMLS license
- USHIK (great display of measure logic & value sets)
 - <https://ushik.ahrq.gov/mdr/portals/mu?system=mu&enableAsynchronousLoading=true>
- eCQI Resource Center
 - <https://ecqi.healthit.gov/>
- eCQM Issue Tracking
 - <https://jira.oncprojectracking.org>

Questions

