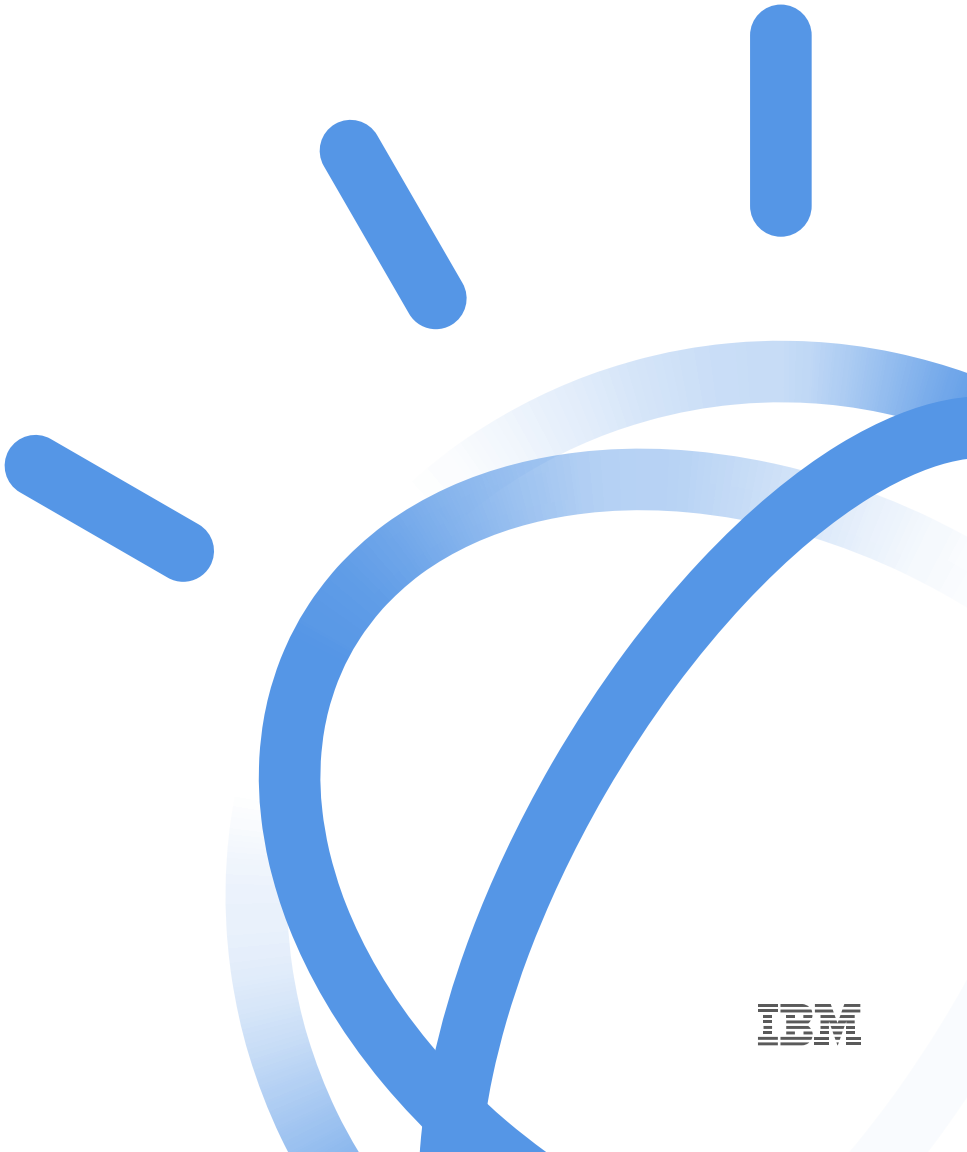
Technical
White Paper

# IBM Explorys SuperMart Cookbook

## Watson Health™ Analytics and Informatics - supporting interactive reporting and visualization of data



Watson Health™

IBM

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## Purpose of this document

The IBM® Explorys SuperMart ecosystem is an integrated platform that supports interactive reporting and visualization of data that has been processed and stored in the IBM® Explorys Platform. SuperMart allows these clinical, operational, and financial (claims and cost) datasets to be visualized or reported with many standard business intelligence reporting tools and other ODBC/JDBC compliant tools.

This document covers many possible use cases, including identifying patients with certain conditions, examining data quality, or creating reports on clinical quality measures. The use cases are organized by broad category, with each example being briefly defined and paired with a SQL query that gathers the result.

The SQL queries in the following sections can be applied to a particular schema by replacing supermart_NNN with the schema of interest. The example in Section 3.15 gives an example of how to use regular expressions to test if a string can be converted to a number. Other specifics about the particular type of SQL used in SuperMart can be found online in the Vertica documentation. For example, when working with a particular database, setting the search path variable can save some typing:

```
set search_path=SUPERMART_NNN;
```

### 1.1 How to use this document

Some queries in this document can be copied directly into your SQL database tool, but many will require changing various ID numbers for your specific use case. In the queries listed in the following sections, all customizable parameters are highlighted in blue. Queries that require advanced SQL commands are labeled and included at the end of each section, and queries to look up numerical IDs for measures, providers, attributions, etc., are provided in Appendix A.

Most queries to SuperMart follow a standard format, and understanding this flow will help reading and understanding specific examples included in this document.

```
SELECT
  variables to output to screen,
  this can be several things from different tables,
  each will be output to a new column
FROM
  the SuperMart view with that information
JOIN
  with any other SuperMart views needed
ON/USING
  the column that links the tables
  AND there can be more than one
WHERE
  measure IDs = measures wanted
  AND provider IDs = providers to investigate
  AND org unit IDs = the desired practice
  AND attribution IDs = the attribution scheme desired
  AND reference date = the date that measures were calculated
  AND some checks done to make sure the results are valid
ORDER BY the field that organizes the output;
```

### 1.2 Common usage issues

**Numerical IDs:**

- ID numbers can change, so make sure you are using the most up-to-date version by checking the look-up queries in Appendix A.
- A single measure can have multiple associated IDs due to it being included in a number of libraries and sublibraries. Lookup query A.1 will list each measure and all of the library/sublibrary pairs with which it is associated, along with the appropriate measure IDs.

**Reference dates:**

- Daily reference dates are only stored for the previous 30 days.
- Reference dates that are more than 30 days old are limited to the first of the month. For example, a query including

```
WHERE
  reference_date = '2015-05-14'
```

will return no results, while

```
WHERE
  reference_date = '2015-05-01'
```

will display the desired information.

- Historical measure calculations are only stored for the previous 23 months.

Selecting objects by name:

- Case matters when matching text values. For example, "Emergency" will be matched only by "Emergency" and not "emergency" or "EMERGENCY".
- Use the function LOWER() to convert letters to lower case if the desired values are of unknown format or the search does not depend on case. For example, if you'd like to match location_type values that are listed in SuperMart as 'Office' and 'DEPARTMENT', use

```
WHERE LOWER(location_type) IN ('office', 'department')
```

## 2 Report catalog

The queries in this section will provide the user all relevant information to generate reports and replicate the sample visualizations included below. Each query will return a data table that can be saved and imported into software like Excel; visualizations must be created separately by the user after saving the results.

### 2.1 Provider snapshot report

The provider snapshot report is targeted at providers or managers overseeing many providers. The report allows one to easily observe a provider's performance on a set of quality measures over time (in measure history plots) and compared to practice peer group (circles with colors determined by quartile). The provider in the example below is in the first quartile for 2 of 6 measures, but exhibits a striking downward trend on the diabetes measure for high blood pressure control.

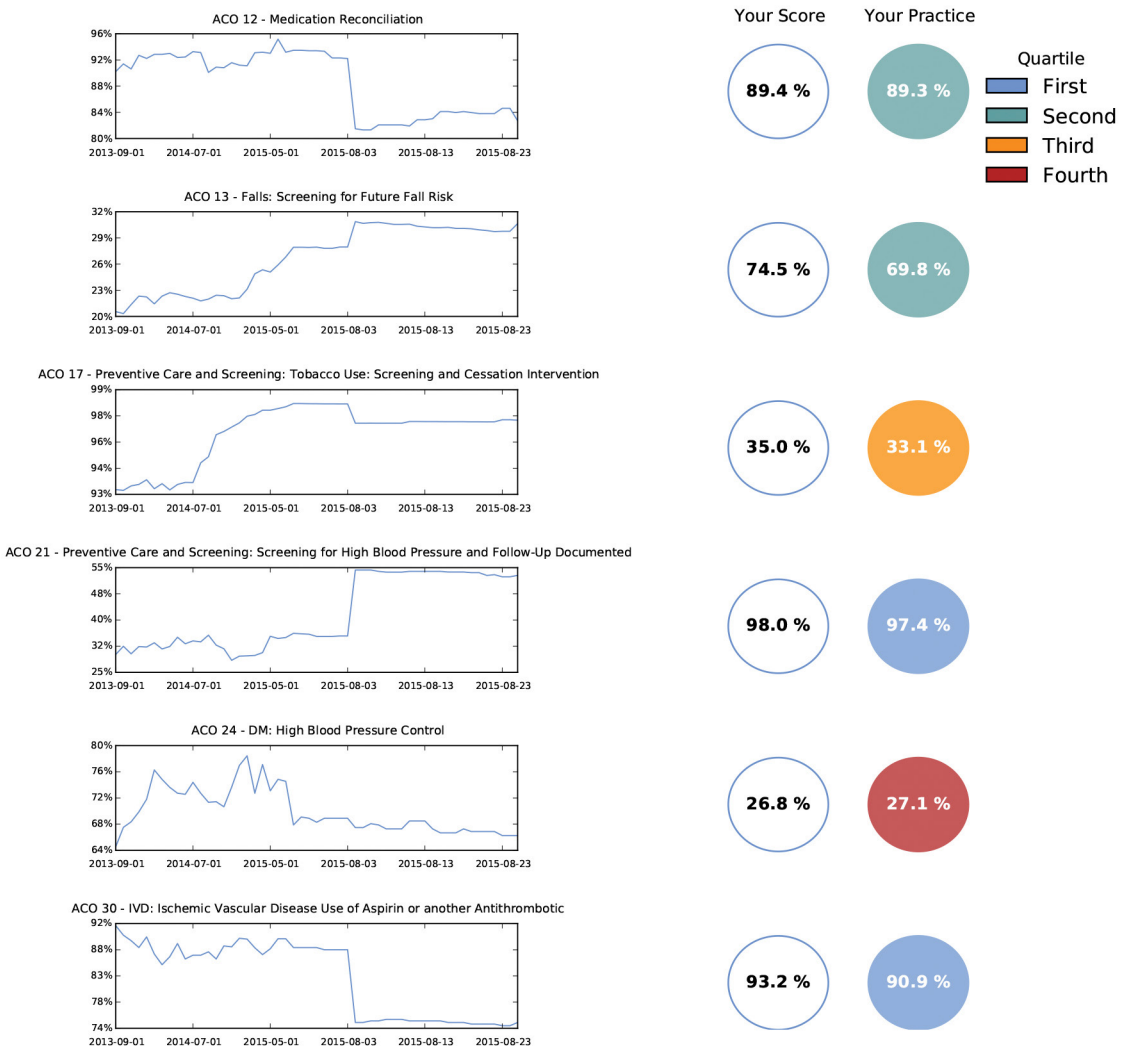



Figure 1: Example of a provider snapshot report, showing a provider in the first quartile for 2 of 6 measures, but striking downward trend on the diabetes measure for high blood pressure control

Fields that should be tailored to specific use cases are highlighted in blue.

Historical data for one provider for 6 chosen measures:

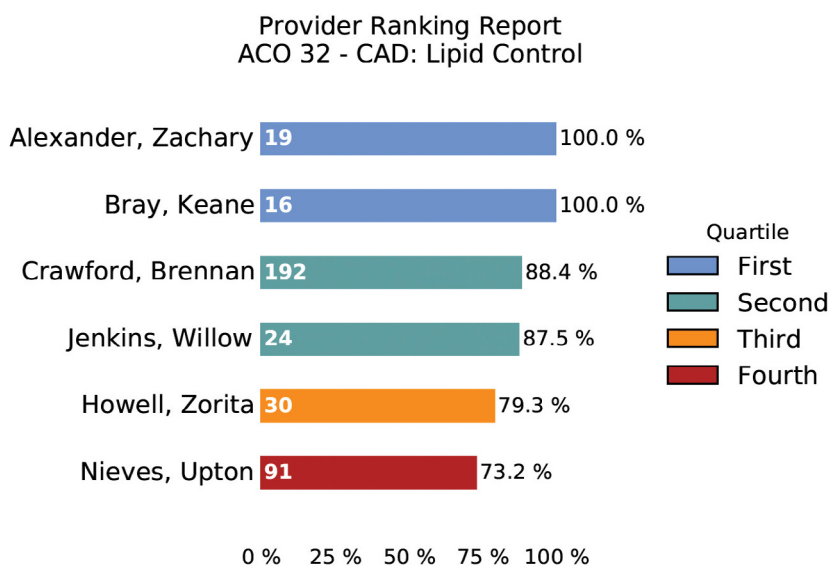
```
SELECT
  ocp.provider_name,
  md.measure_name,
  mf.reference_date,
  mf.result_value
FROM SUPERMART_NNN.v_measure_dim md
JOIN SUPERMART_NNN.v_measure_fact mf
ON md.measure_dim_id = mf.measure_dim_id
JOIN SUPERMART_NNN.v_org_chart_provider ocp
ON ocp.provider_id = mf.provider_id
WHERE
  mf.measure_dim_id IN (282592, 245379, 262183, 245369, 262204, 245180)
  AND mf.provider_id IN (SELECT provider_id FROM SUPERMART_NNN.v_provider_dim WHERE npi =
  nnnnnnn)
  AND mf.attribution_dim_id = 323
  AND mf.result_value IS NOT NULL
ORDER BY md.measure_name, mf.reference_date;
```

Provider measures today compared to the overall practice measure value with quartile ranking:

```
SELECT
  ocp.provider_name,
  md.measure_name,
  mf.result_value AS provider_result,
  mf_practice.result_value AS practice_result,
  NTILE(4) OVER(ORDER BY mf.result_value DESC) AS Quartile
FROM SUPERMART_NNN.v_measure_fact mf_practice
JOIN SUPERMART_NNN.v_measure_fact mf
USING (measure_dim_id, attribution_dim_id, reference_date)
JOIN SUPERMART_NNN.v_org_chart_provider_edge ocpe
ON ocpe.child_provider = mf.provider_id
AND ocpe.parent_orgunit = mf_practice.orgunit_id
JOIN SUPERMART_NNN.v_org_chart_provider ocp
ON ocpe.child_provider = ocp.provider_id
JOIN SUPERMART_NNN.v_measure_dim md
ON mf.measure_dim_id = md.measure_dim_id
WHERE
  mf.measure_dim_id IN (282592, 245379, 262183, 245369, 262204, 245180)
  AND ocp.provider_id = 20911829
  AND ocpe.parent_orgunit = 6966142
  AND mf.attribution_dim_id = 323
  AND ocpe.orgchart_version = 496
  AND mf.reference_date = '2015-07-01'
  AND mf.result_value IS NOT NULL
  AND mf.result_type = 'RATIO'
ORDER BY ocp.provider_name, md.measure_name;
```

## 2.2 Provider ranking report

The provider ranking report is targeted at managers overseeing many providers. This report allows the user to quickly identify high and low performers within a given practice, as well as how they compare to a given population of providers. The report can be used to identify lower performing providers that need extra assistance or training. The report below shows that "Alexander, Zachary" and "Bray, Keane" are the highest ranking providers from a specific organizational unit on a lipid control measure, with all providers ranked and assigned quartiles for the entire practice.




Note: The names and information that appear in the figures in this paper are used fictitiously for sample purposes only, and any resemblance to actual persons is entirely coincidental.

Figure 2: Example of a provider ranking report, ranking providers from a specific organizational unit on a lipid control measure

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  ocp.provider_name,
  md.measure_name,
  mf.numerator,
  mf.denominator,
  mf.result_value,
  NTILE(4) OVER(ORDER BY mf.result_value DESC) AS quartile
FROM SUPERMART_NNN.v_org_chart_provider ocp
JOIN SUPERMART_NNN.v_org_chart_provider_edge ocpe
ON ocpe.child_provider = ocp.provider_id
JOIN SUPERMART_NNN.v_measure_fact mf
ON ocp.provider_id = mf.provider_id
JOIN SUPERMART_NNN.v_measure_dim md
ON md.measure_dim_id = mf.measure_dim_id
WHERE
  mf.measure_dim_id = 245379
  AND ocpe.parent_orgunit = 6966529
  AND mf.attribution_dim_id = 323
  AND ocpe.orgchart_version = 496
  AND mf.reference_date = '2015-07-01'
  AND mf.result_type = 'RATIO'
AND mf.result_value IS NOT NULL
ORDER BY mf.result_value DESC;
```

### 2.3 Practice ranking report

The practice ranking report is targeted at managers overseeing many practices. This report allows the user to quickly identify high and low performing practices within an organization and how they compare to a given population of practices. The example below shows that “Hospital 14” is the highest performing practice with respect to the diabetes measure for controlling hemoglobin A1c.

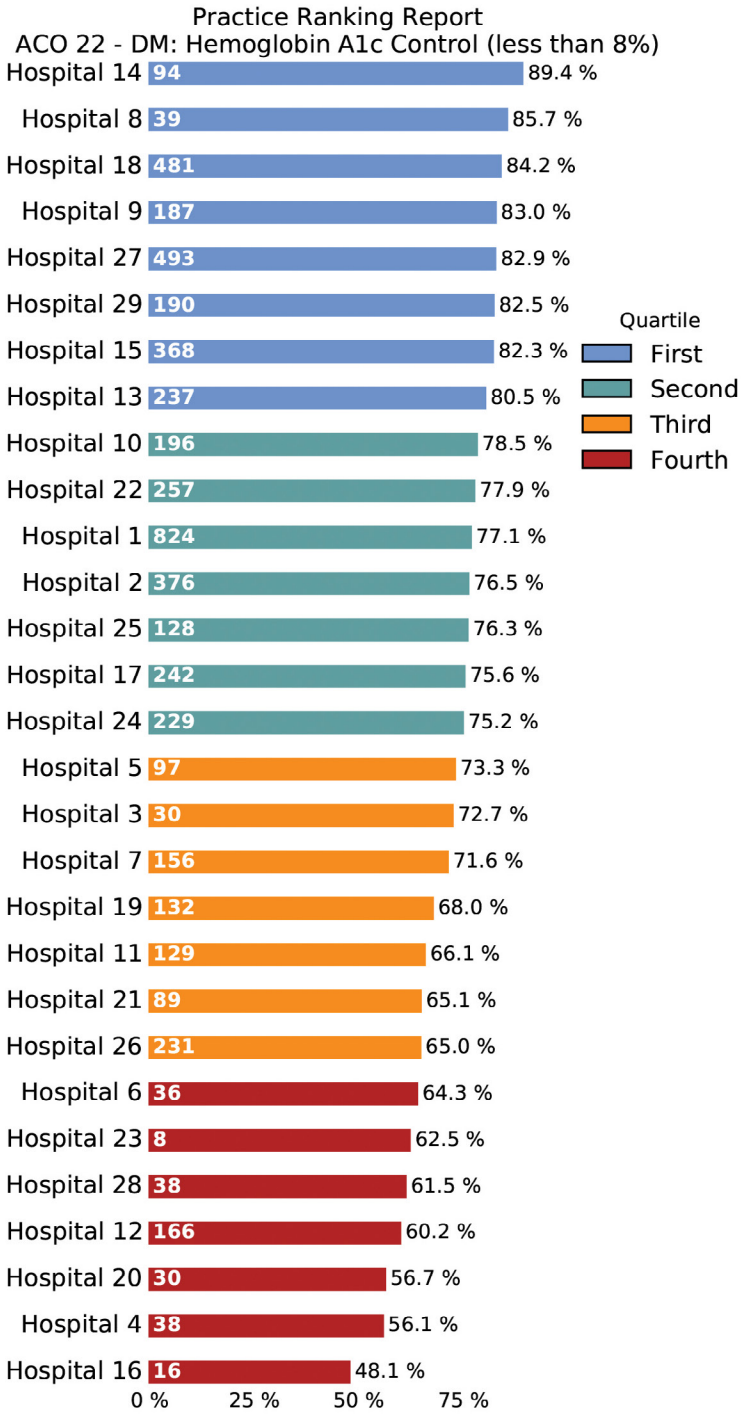



Figure 3: Example of a practice ranking report showing that “Hospital 14” is the highest performing practice with respect to the diabetes measure for controlling Hemoglobin A1c

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  org.orgunit_name,
  md.measure_name,
  mf.numerator,
  mf.denominator,
  mf.result_value,
  NTILE(4) OVER(ORDER BY mf.result_value DESC) AS quartile
FROM SUPERMART_NNN.v_org_chart_orgunit org
JOIN SUPERMART_NNN.v_measure_fact mf
ON org.orgunit_id = mf.orgunit_id
JOIN SUPERMART_NNN.v_measure_dim md
ON md.measure_dim_id = mf.measure_dim_id
WHERE
  mf.measure_dim_id = 262205
  AND org.orgunit_id <> 3140128 -- Exclude level 0 organization ID
  AND mf.attribution_dim_id = 323
  AND mf.org_chart_version_id = 496
  AND mf.reference_date = '2015-07-01'
  AND mf.measure_attribution = 'ORG_UNIT'
  AND mf.result_type = 'RATIO'
  AND mf.result_value IS NOT NULL
ORDER BY mf.result_value DESC;
```

### 2.4 Provider distribution and practice distribution

The provider distribution visualization is targeted at managers and researchers. This report allows the user to observe variations in performance across different populations of providers and can be used to identify populations with best-in-class performance characteristics for other populations to learn from or emulate. The example below shows that although “Hospital 2” has a few providers with very high scores for the adult weight screening measure, the providers at “Hospital 3” have consistently higher scores than most providers at other centers.

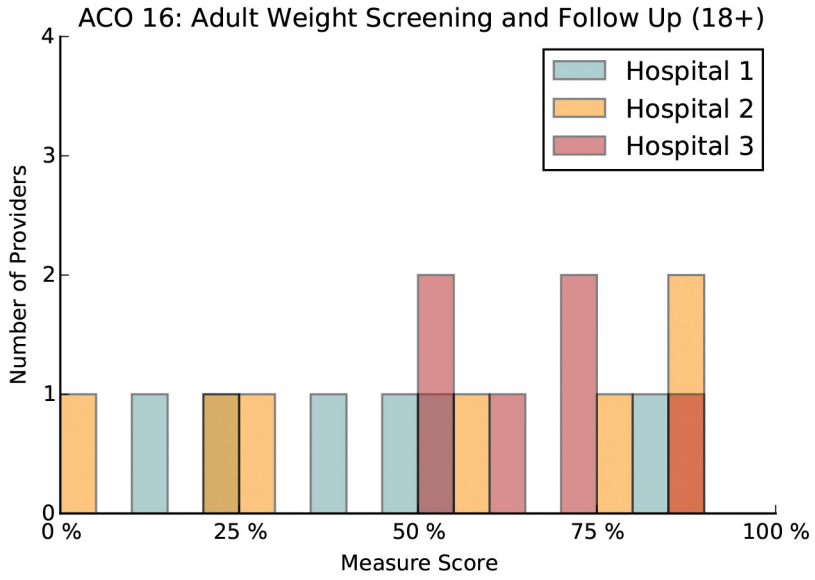



Figure 4: Example of a provider distribution visualization report, showing that although “Hospital 2” has a few providers with very high scores for the adult weight screening measure, the providers at “Hospital 3” have consistently higher scores than most providers at other centers

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  org.orgunit_name,
  mf.result_value
FROM SUPERMART_NNN.v_org_chart_orgunit org
JOIN SUPERMART_NNN.v_org_chart_provider_edge ocpe
ON org.orgunit_id = ocpe.parent_orgunit
JOIN SUPERMART_NNN.v_measure_fact mf
ON ocpe.child_provider = mf.provider_id
WHERE
  mf.measure_dim_id = 245290
  AND org.orgunit_id IN (6966165, 6966142, 6966144)
  AND mf.attribution_dim_id = 323
  AND ocpe.orgchart_version = 496
  AND mf.reference_date = '2015-07-01'
  AND mf.result_type = 'RATIO'
  AND mf.result_value IS NOT NULL
  ORDER BY org.orgunit_name;
```

The output is organized into groups by practice name, and each practice will have several result values.

### 2.5 Process measure vs. outcome measure by practice

The measure vs. measure report is targeted at managers and researchers. This report allows the user to observe correlations between process and outcome measures, to show whether process oriented measures have a positive effect on outcome measures. For the example below, measuring hemoglobin A1c appropriately correlates well with controlled HbA1c values.

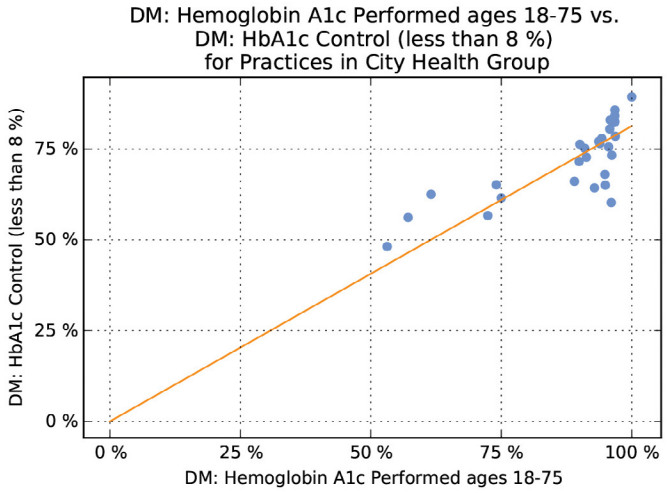



Figure 5: Example of a process measure vs. outcomes measure report (by practice) that demonstrates measuring hemoglobin A1c appropriately correlates well with controlled HbA1c values

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  org.orgunit_name,
  pmd.measure_name AS process_measure,
  pm.result_value AS process_result,
  omd.measure_name AS outcome_measure,
  om.result_value AS outcome_result
FROM SUPERMART_NNN.v_org_chart_orgunit org
JOIN SUPERMART_NNN.v_measure_fact pm
ON org.orgunit_id = pm.orgunit_id
JOIN SUPERMART_NNN.v_measure_fact om
ON org.orgunit_id = om.orgunit_id
  AND pm.reference_date = om.reference_date
  AND pm.org_chart_version_id = om.org_chart_version_id
  AND pm.attribution_dim_id = om.attribution_dim_id
  AND pm.measure_attribution = om.measure_attribution
JOIN SUPERMART_NNN.v_measure_dim pmd
ON pmd.measure_dim_id = pm.measure_dim_id
JOIN SUPERMART_NNN.v_measure_dim omd
ON omd.measure_dim_id = om.measure_dim_id
WHERE
  pm.measure_dim_id = 245130
  AND om.measure_dim_id = 245290
  AND org.orgunit_id <> 3140128 -- Exclude level 0 organization ID
  AND om.attribution_dim_id = 323
  AND om.org_chart_version_id = 496
  AND om.reference_date = '2015-07-01'
  AND om.measure_attribution = 'ORG_UNIT'
  AND pm.result_value IS NOT NULL
  AND om.result_value IS NOT NULL
ORDER BY outcome_result DESC;
```

### 2.6 Process measure vs. outcome measure by provider

The measure vs. measure report is targeted at managers and researchers. This report allows the user to observe correlations between process and outcome measures. For the example below, one provider is a potentially interesting outlier for the process and outcome diabetes measures for hemoglobin A1c.

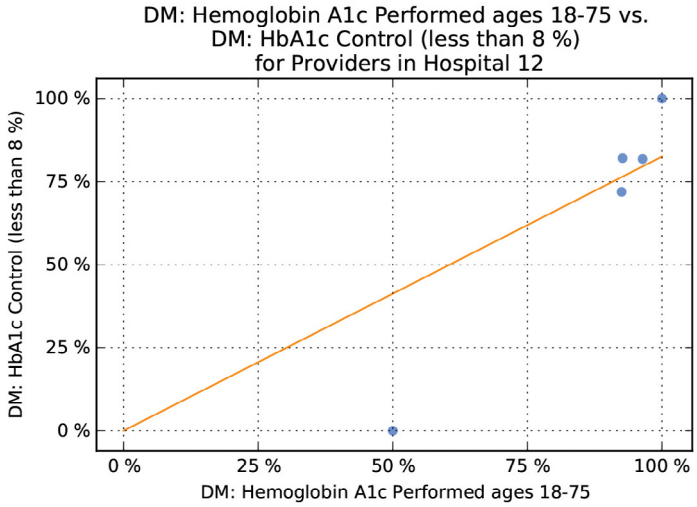



Figure 6: Example of a process measure vs. outcomes measure report (by provider)showing that one provider is a potentially interesting outlier for the process and outcome diabetes measures for Hemoglobin A1c

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  ocp.provider_name,
  pmd.measure_name AS process_measure,
  pm.result_value AS process_result,
  omd.measure_name AS outcome_measure,
  om.result_value AS outcome_result
FROM SUPERMART_NNN.v_org_chart_provider ocp
JOIN SUPERMART_NNN.v_org_chart_provider_edge ocpe
ON ocpe.child_provider = ocp.provider_id
JOIN SUPERMART_NNN.v_measure_fact pm
ON ocp.provider_id = pm.provider_id
JOIN SUPERMART_NNN.v_measure_fact om
ON
  ocp.provider_id = om.provider_id AND
  pm.attribution_dim_id = om.attribution_dim_id AND
  pm.org_chart_version_id = om.org_chart_version_id AND
  pm.reference_date = om.reference_date
JOIN SUPERMART_NNN.v_measure_dim pmd
ON pmd.measure_dim_id = pm.measure_dim_id
JOIN SUPERMART_NNN.v_measure_dim omd
ON omd.measure_dim_id = om.measure_dim_id
WHERE
  pm.measure_dim_id = 245290
  AND om.measure_dim_id = 245130
  AND ocpe.parent_orgunit = 6966142
  AND om.attribution_dim_id = 323
  AND ocpe.orgchart_version = 496
  AND om.reference_date = '2015-07-01'
  AND om.result_value IS NOT NULL
  AND pm.result_value IS NOT NULL
ORDER BY om.result_value DESC;
```

### 2.7 Practice care gap ranking for all measures

The care gap visualizations are targeted at managers and administrators. These visualizations allow the user to quickly identify which practices or providers have the most opportunities to improve patient care. The data can be used to target practices or providers where improvement initiatives will have the most immediate impact. The example below shows that the largest number of opportunities to improve upon all ACO measures are at "Hospital 13."

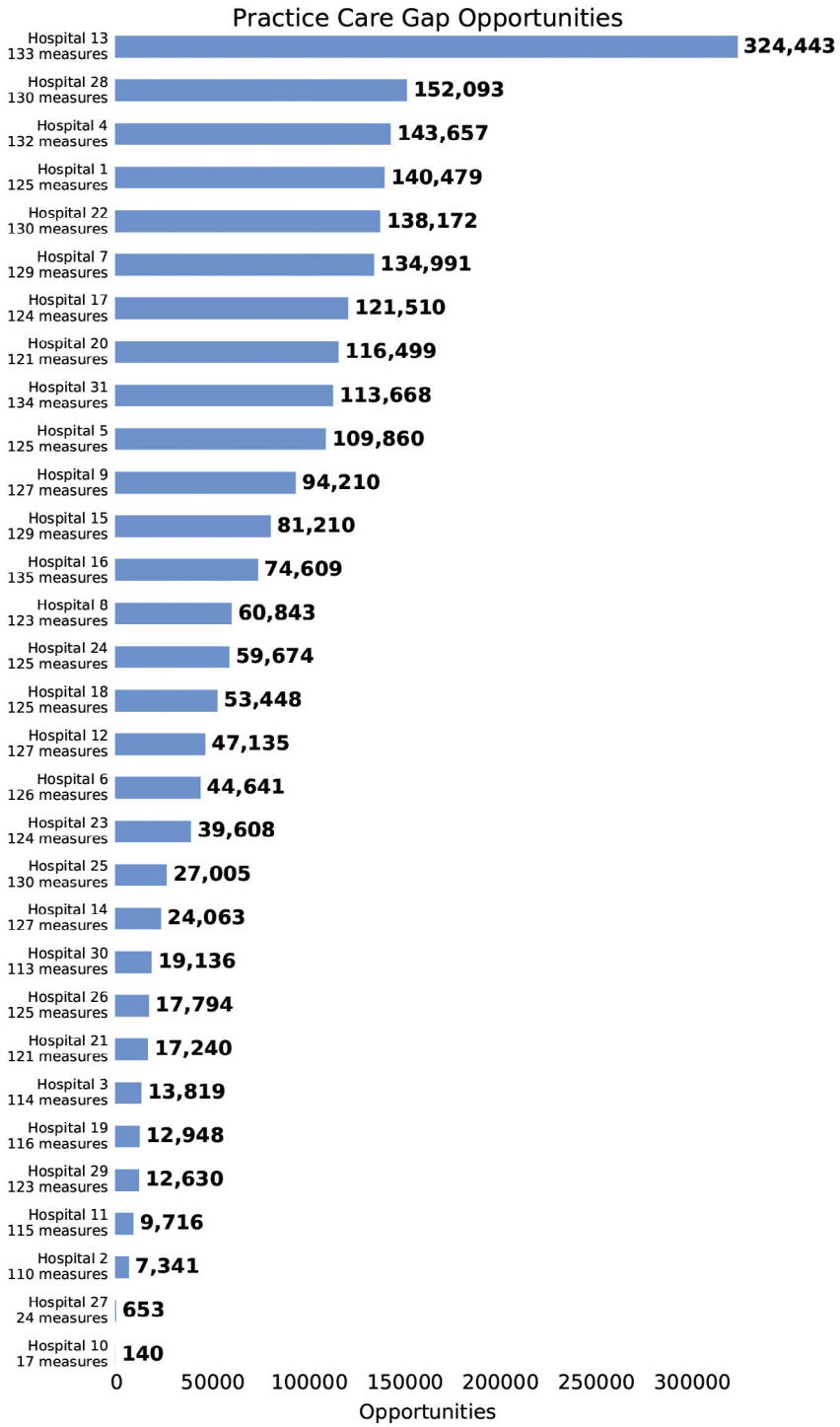


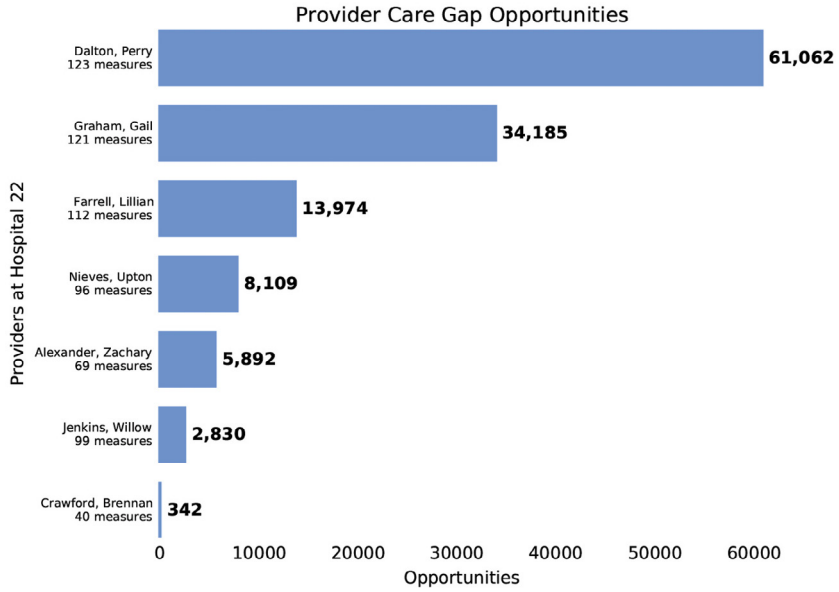

Figure 7: Example of a practice care gap ranking report, showing that the greatest number of opportunities to improve upon all ACO measures are at "Hospital 13"

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  org.orgunit_name,
  round(sum(mf.denominator - mf.numerator)) AS total_gap,
  round(sum(mf.numerator)) AS total_numerator,
  round(sum(mf.denominator)) AS total_denominator,
  count(mf.measure_dim_id) AS number_of_measures
FROM SUPERMART_NNN.v_measure_fact mf
JOIN SUPERMART_NNN.v_org_chart_orgunit org
ON mf.orgunit_id = org.orgunit_id
WHERE
  mf.org_unit_dim_id <> 3140128 -- (Exclude level 0 organization ID)
  AND mf.attribution_dim_id = 323
  AND mf.org_chart_version_id = 496
  AND mf.reference_date = '2015-07-01'
  AND mf.result_type = 'RATIO'
  AND mf.measure_attribution = 'ORG_UNIT'
  AND mf.numerator IS NOT NULL
  AND mf.denominator IS NOT NULL
GROUP BY org.orgunit_name
ORDER BY total_gap DESC;
```

### 2.8 Provider care gap ranking for all measures

The care gap visualizations are targeted at managers and administrators. These visualizations allow the user to quickly identify which providers within a practice have the most opportunities to improve patient care. The data can be used to target providers where improvement initiatives will have immediate impact. The example below shows that the largest number of opportunities to improve upon ACO measures at “Hospital 22” are with provider “Dalton, Perry.”




Note: The names and information that appear in the figures in this paper are used fictitiously for sample purposes only, and any resemblance to actual persons is entirely coincidental.

Figure 8: Example of provider care gap ranking, showing that the largest number of opportunities to improve upon ACO measures at “Hospital 22” are with provider “Dalton, Perry”

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  ocp.provider_name,
  round(sum(mf.denominator - mf.numerator)) AS total_gap,
  round(sum(mf.numerator)) AS total_numerator,
  round(sum(mf.denominator)) AS total_denominator,
  count(mf.measure_dim_id) AS number_of_measures
FROM SUPERMART_NNN.v_measure_fact mf
JOIN SUPERMART_NNN.v_org_chart_provider ocp
ON mf.provider_id = ocp.provider_id
JOIN SUPERMART_NNN.v_org_chart_provider_edge ocpe
ON ocpe.child_provider = ocp.provider_id
WHERE
  ocpe.parent_orgunit = 6966142
  AND mf.attribution_dim_id = 323
  AND ocpe.orgchart_version = 496
  AND mf.reference_date = '2015-07-01'
  AND mf.result_type = 'RATIO'
  AND mf.measure_attribution = 'PROVIDER'
  AND ocp.provider_name <> 'NO FAMILY DOCTOR'
  AND ocp.provider_name <> 'OUT OF AREA, PROVIDER'
  AND ocp.provider_name <> 'UNKNOWN, PROVIDER'
  AND mf.numerator IS NOT NULL
  AND mf.denominator IS NOT NULL
GROUP BY ocp.provider_name
ORDER BY total_gap DESC;
```

### 2.9 Patient care gap ranking and scoreboard

The patient care gap visualizations are targeted at healthcare providers and their managers. These graphics allow the user to quickly identify which patients need additional attention during future office visits or a reminder to make an appointment. The examples below show "Risa Heath's" patients with the largest wellness measure opportunities and the measures to which these patients are non-adherent.

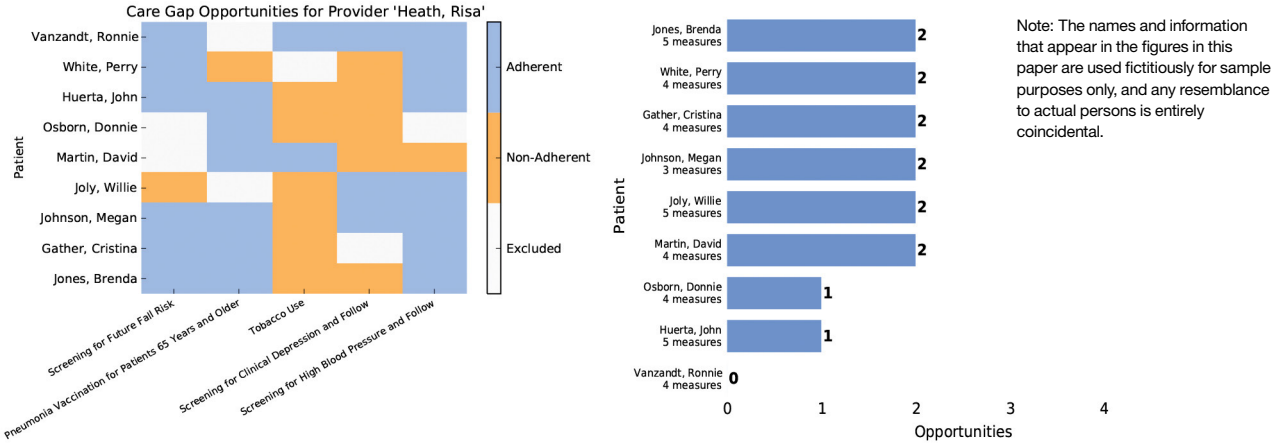



Figure 9: Example of care gap ranking and scoreboard showing "Risa Health's" patients with the largest wellness measure opportunities

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  patient.first_name,
  patient.last_name,
  md.measure_name,
  p2m.adherent_flag,
  p2m.exception_flag,
  p2m.exclusion_flag
FROM SUPERMART_NNN.v_patient patient
JOIN SUPERMART_NNN.v_patient_to_measure p2m
USING (intraorg_patient_id)
JOIN SUPERMART_NNN.v_measure_dim md
USING (measure_dim_id)
JOIN SUPERMART_NNN.v_patient_to_provider p2p
USING (intraorg_patient_id)
WHERE
  md.measure_dim_id IN (262196, 245180, 262202, 262204, 245369)
  AND p2p.provider_id = 20911829
  AND p2p.attribution_id = 323
  AND p2m.reference_date = '2015-07-01'
  AND p2p.reference_date = '2015-07-01'
ORDER BY patient.last_name, patient.first_name, md.measure_name;
```

The flags take the value of '0' for 'No' and '1' for 'Yes'. The adherent flag takes the additional value of '<null>' if the patient has either an exception or exclusion flag of '1'.

### 2.10 Population care gap

The population care gap visualization is targeted at administrators and managers. This report allows the user to quickly identify which populations of patients have the most care gap opportunities and can be used to target improvement efforts at specific processes. The example below highlights the fact that measures at “Hospital 1” and “Hospital 3” have the largest numbers of non-adherent patients, while the “Wellness” measure has the most opportunities across practices.

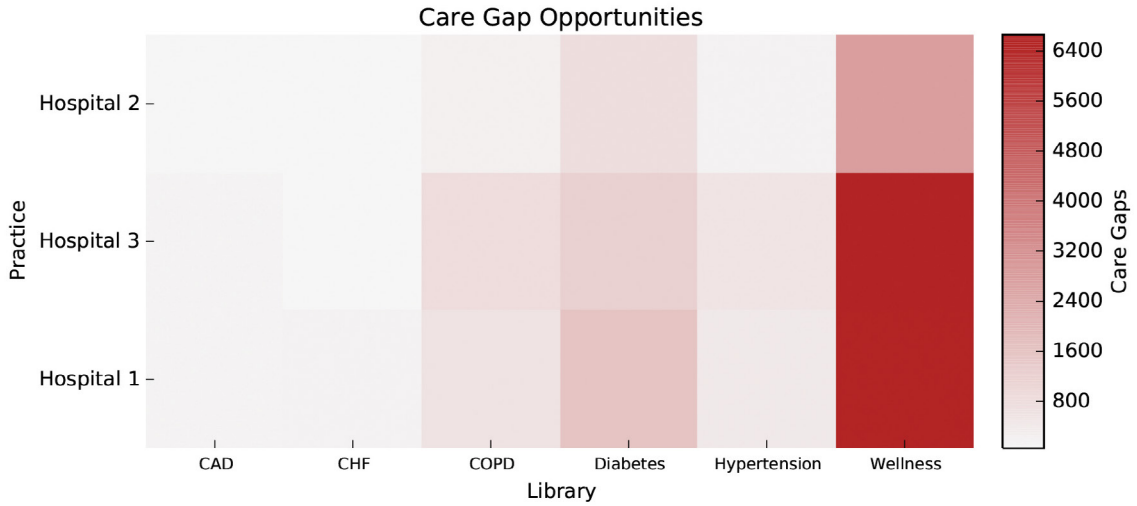



Figure 10: Example of a population care gap visualization, showing that measures at “Hospital 1” and “Hospital 3” have the largest numbers of non-adherent patients, while the “Wellness” measure has the most opportunities across practices.

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  org.orgunit_name,
  md.library_name,
  md.sublibrary_name,
  round(sum(mf.denominator - mf.numerator)) AS care_gap
FROM SUPERMART_NNN.v_measure_fact mf
JOIN SUPERMART_NNN.v_org_chart_orgunit org
ON mf.orgunit_id = org.orgunit_id
JOIN SUPERMART_NNN.v_measure_dim md
ON md.measure_dim_id = mf.measure_dim_id
JOIN SUPERMART_NNN.v_measure_collection mc
ON mc.collection_name_0 = md.library_name
AND mc.collection_name_1 = md.sublibrary_name
WHERE
  mc.collection_0 = 33137
  AND mc.collection_1 IN (33152, 33144, 33146, 33154, 33140, 33138)
  AND org.orgunit_id IN (6966165, 6966144, 6966142)
  AND mf.orgunit_id <> 3140128 -- (Exclude level 0 organization ID)
  AND mf.attribution_dim_id = 323
  AND mf.org_chart_version_id = 496
  AND mf.reference_date = '2015-07-01'
  AND mf.result_type = 'RATIO'
  AND mf.measure_attribution = 'ORG_UNIT'
  AND mf.numerator IS NOT NULL
  AND mf.denominator IS NOT NULL
GROUP BY org.orgunit_name, md.library_name, md.sublibrary_name
ORDER BY org.orgunit_name;
```

### 2.11 Savings opportunity and savings realization

The savings opportunity and saving realization visualizations are targeted at administrators. A savings report allows the user to quickly identify which areas are costing the health system the most money and can be used to target the areas that offer the greatest savings potential. The example below is using estimates for overall savings-per-patient when cancer screening is performed correctly to show that colorectal cancer screenings at “Hospital 2” and “Hospital 3” have the largest saving opportunities.

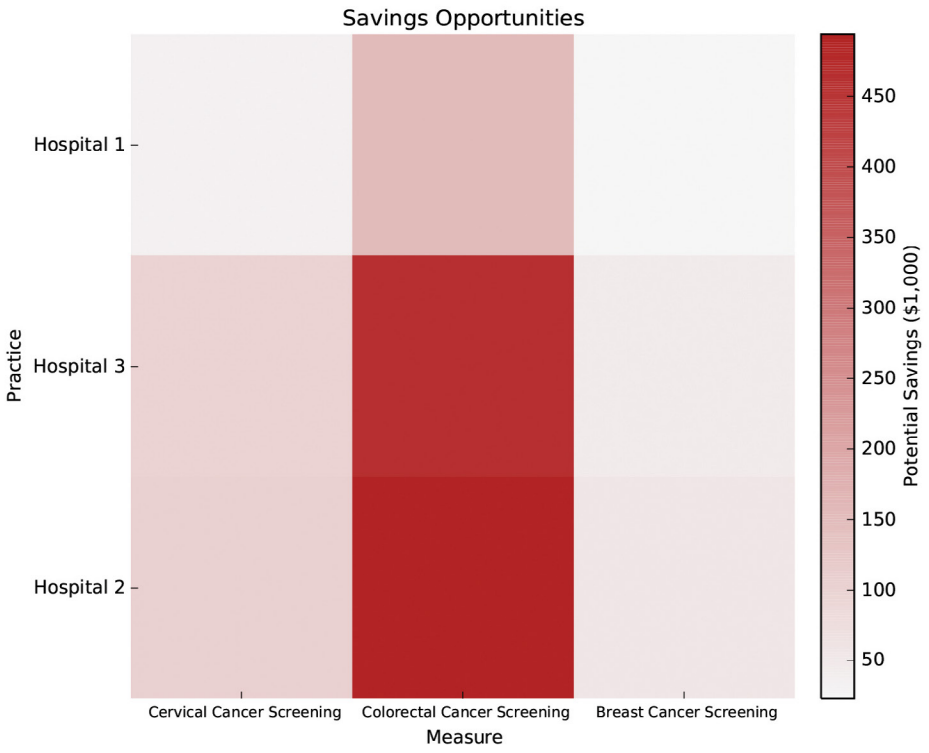



Figure 11: Example of a savings opportunity visualization using estimates for overall savings-per-patient when cancer screening is performed correctly to show that colorectal cancer screenings at “Hospital 2” and “Hospital 3” have the largest savings opportunities

For the purposes of this visualization, savings estimates were calculated using the values in Table 1 and the actual savings will vary. The savings value was calculated using TOTAL SAVINGS = GAPS X ESTIMATED SAVINGS.

| Measure | Estimated Savings |
|---|---|
| Breast Cancer Screening | $300 |
| Cervical Cancer Screening | $150 |
| Colorectal Cancer Screening | $700 |

Table 1: Estimated savings for certain preventative measures

Fields that should be tailored to specific use cases are highlighted in blue.

```
SELECT
  org.orgunit_name,
  md.measure_name,
  md.measure_description,
  mf.denominator - mf.numerator AS gap,
  mf.numerator,
  mf.denominator
FROM SUPERMART_NNN.v_measure_fact mf
JOIN SUPERMART_NNN.v_measure_dim md
USING (measure_dim_id)
JOIN SUPERMART_NNN.v_org_chart_orgunit org
ON mf.orgunit_id = org.orgunit_id
WHERE
  mf.measure_dim_id IN (245132, 245393, 245062)
  AND org.orgunit_id IN (6966165, 6966144, 6966142)
  AND mf.orgunit_id <> 3140128 -- (Exclude level 0 organization ID)
  AND mf.attribution_dim_id = 323
  AND mf.org_chart_version_id = 496
  AND mf.reference_date = '2015-07-01'
  AND mf.denominator IS NOT NULL
  AND mf.numerator IS NOT NULL
  AND mf.result_type = 'RATIO'
  AND mf.measure_attribution = 'ORG_UNIT'
ORDER BY mf.measure_dim_id, gap DESC;
```

## 3 Patient identification

The use cases in this section demonstrate some ways of identifying and quantifying patient populations.

### 3.1 Patient count

Count the number of patients in the system, and verify that each row of the patient view represents a unique patient.

```
SELECT
  COUNT(*),
  COUNT(DISTINCT(intraorg_patient_id))
FROM
  SUPERMART_NNN.v_patient
```

### 3.2 Deceased patient count

Count the number of patients in the system who are flagged as deceased.

```
SELECT
  COUNT(DISTINCT(intraorg_patient_id))
FROM
  SUPERMART_NNN.v_demographic
WHERE
  is_deceased = TRUE
```

### 3.3 Active patient count

Count the number of patients in the system who have had an encounter this year.

```
SELECT
  COUNT(DISTINCT(intraorg_patient_id))
FROM
  SUPERMART_NNN.v_encounter
WHERE
  encounter_date >= '2016-01-01'
  AND std_encounter_status = 'COMPLETED'
```

### 3.4 Diabetic patient count

Count the number of patients with Diabetes mellitus without mention of complication (ICD-9 250.00).

```
SELECT
  COUNT(DISTINCT(dx.intraorg_patient_id))
FROM
  SUPERMART_NNN.v_diagnosis dx
WHERE
  dx.icd_code = '250.00'
  AND dx.icd_version = 'ICD9'
```

### 3.5 Diabetic patients with medication controlled A1c value

A simple and fast approach for this query is to define and export a cohort using the IBM® Explorys EPM: Explore, then join to that cohort. An advanced version of this query that does not use the EPM: Explore is listed in 3.18.

```
SELECT
  COUNT(DISTINCT(intraorg_patient_id))
FROM
  SUPERMART_NNN.v_cohort_patients
WHERE
  cohort_id=1234
```

### 3.6 Identify patients with more than 3 ED visits in one year

Identify patients with many Emergency Department (ED) visits.

```
SELECT intraorg_patient_id
FROM
  SUPERMART_NNN.v_encounter
WHERE
  std_encounter_type = 'HOSPITAL_EMERGENCY_ROOM_VISIT'
  AND encounter_date between '2014-01-01' and '2015-01-01'
GROUP BY
  intraorg_patient_id
HAVING
  count(distinct encounter_date) > 3
```

### 3.7 Patients that are part of a group, like Medicare Shared Savings Program (MSSP)

Identify patients in a particular group list.

```
SELECT
  distinct(intraorg_patient_id)
FROM
  SUPERMART_NNN.v_group_list
WHERE
  group_name = 'MSSP'
```

Identify patients attributed to a provider in the org chart under a particular group list based attribution scheme.

```
SELECT
  distinct(intraorg_patient_id)
FROM
  SUPERMART_NNN.v_patient_to_provider
WHERE
  attribution_id = 149
```

### 3.8 Risk scores from patients that are part of MSSP

Create reports for Charleson Deyo and 3M APR-DRG risk models for patients in a particular group list.

```
SELECT
  gl.intraorg_patient_id,
  rs.risk_index,
  rs.record_id
FROM
  SUPERMART_NNN.v_group_list gl
JOIN
  SUPERMART_NNN.v_risk_score_charlson_deyo rs
ON
  gl.intraorg_patient_id = rs.intraorg_patient_id
WHERE
  gl.group_name = 'MSSP'
ORDER BY
  gl.intraorg_patient_id
```

```
SELECT
  gl.intraorg_patient_id,
  rs.drg,
  rs.record_id
FROM
  SUPERMART_NNN.v_group_list gl
JOIN
  SUPERMART_NNN.v_risk_score_837_apr_risk_adjustment rs
ON
  gl.intraorg_patient_id = rs.intraorg_patient_id
WHERE
  gl.group_name = 'MSSP'
ORDER BY
  gl.intraorg_patient_id
```

### 3.9 Patients that have charge amounts above $50,000

Identify patients that have total charge amounts above $50,000 for one calendar year.

```
SELECT
  SUM(charge_amount),
  intraorg_patient_id
FROM
  SUPERMART_NNN.v_service_line
WHERE
  service_date between '2014-01-01' and '2015-01-01'
GROUP BY
  intraorg_patient_id
HAVING
  SUM(charge_amount) > 50000
```

### 3.10 Explore cohorts

Counts from cohorts built using EPM: Explore.

```
SELECT
  cohort_id,
  cohort_name,
  count(intraorg_patient_id),
  count(distinct(intraorg_patient_id))
FROM
  SUPERMART_NNN.v_cohort_patients
GROUP BY
  cohort_id,cohort_name
```

### 3.11 Count diagnosis records by source system

Data from many different sources is aggregated in SuperMart, but the field “source_system_id” allows queries that focus on particular data sources when needed. The SQL query for this example counts diagnosis records (and number of patients with those records) for each of the various source systems at your organization.

```
SELECT
  source_system_id,
  COUNT(*)                          AS record_count,
  COUNT(DISTINCT (intraorg_patient_id)) AS patient_count
FROM
  SUPERMART_NNN.v_diagnosis
WHERE
  diagnosis_date >= '2013-01-01'
GROUP BY
  source_system_id
```

### 3.12 Count office visits with blood pressure values

```
SELECT
  COUNT(DISTINCT ve.record_id)      AS visit_count,
  COUNT(DISTINCT ve.intraorg_patient_id) AS patient_count
FROM SUPERMART_NNN.v_encounter ve
  JOIN SUPERMART_NNN.v_observation vo
    ON ve.encounter_join_id = vo.encounter_join_id
WHERE
  vo.loinc_test_id IN ('8462-4', '8480-6')
  AND std_encounter_type = 'OFFICE_VISIT'
```

### 3.13 SNOMED Codes for Diabetes Type 2

Systematized Nomenclature of Medicine (SNOMED) is the ontology that Watson Health uses to standardize diagnoses and procedures. This is a hierarchical ontology, which can be useful when looking at groups of records, when a higher-level code for general diabetes can be used to also include more specific diagnoses and complications of diabetes. The example query below demonstrates how to query the snomed_descendants table in the cross-reference schema, which was designed to simplify traversing the hierarchical SNOMED tree, returning the parent concept and all descendants of that concept.

```
SELECT
  DISTINCT descendant_snomed_id
FROM
  xref.snomed_descendants
WHERE
  snomed_id = '44054006'
```

### 3.14 LOINC specific test id's for lymphocyte tests

The Logical Observation Identifiers Names and Codes (LOINC) ontology is used by Watson Health to standardize laboratory observation records. This ontology has two parts, a specific test LOINC identifier and a hierarchical LOINC category identifier. A descendants table in the XREF schema can be used to gather all codes in the lymphocyte test category.

```
SELECT
  count(*),
  count(DISTINCT descendant_loinc_id)
FROM
  xref.loinc_descendants
WHERE
  loinc_id = 'LP32772-3'
```

### 3.15 Advanced: Diabetic patients with high A1c value

Count the number of patients with Diabetes Type II without mention of other complication and an A1c value above 9% (LOINC 4548-4). The REGEXP_LIKE statement restricts the considered records to those with a numeric value in the field v_observation. std_value.

```
SELECT
  COUNT(DISTINCT(dx.intraorg_patient_id))
FROM
    SUPERMART_NNN.v_diagnosis dx
  JOIN
    SUPERMART_NNN.v_observation o
  ON
    dx.intraorg_patient_id = o.intraorg_patient_id
WHERE
  dx.icd_code = '250.00'
  AND o.loinc_test_id='4548-4'
  and dx.icd_version = 'ICD9'
  AND REGEXP_LIKE(o.std_value,'^[-]?[0-9]+([.][0-9]+)$')
  (NO = 1 with regexp_like)
  AND CAST(o.std_value AS float) >= 9.0
```

### 3.16 Advanced: Diabetic patients with high A1c value, including edge cases

Count the number of patients with Diabetes Type II (ICD-9 250.00) and an A1c value above 9% (LOINC 4548-4), being very careful with old records with ">XX" formatting. The regexp_like functions here restrict the results to consider only those records that are numeric, or are a numeric preceded by a greater-than sign.

```
SELECT
  COUNT(DISTINCT(dx.intraorg_patient_id))
FROM
    SUPERMART_NNN.v_diagnosis dx
  JOIN
    SUPERMART_NNN.v_observation o
  ON
    dx.intraorg_patient_id = o.intraorg_patient_id
WHERE
  dx.icd_code = '250.00'
  AND o.loinc_test_id='4548-4'
  AND dx.icd_version = 'ICD9'
  (
    (
     REGEXP_LIKE(o.std_value,'^[-]?[0-9]+([.][0-9]+)$') AND
     CAST(o.std_value AS float) >= 9.0
    )
    OR
    (
     REGEXP_LIKE(o.std_value,'^[>][-]?[0-9]([.][0-9]+)?$') AND
     CAST(SUBSTR(o.std_value,2) AS float) >= 9.0
    )
  )
```

### 3.17 Advanced: Diabetic patients with medication

Count the number of patients with diabetes type II without mention of other complication (ICD9-250.00), an A1c value above 9% (LOINC 4548-4), and a prescription for metformin (RxCUI 6809). The REGEXP_LIKE function restricts the records considered to only those with numeric values.

```
SELECT
  COUNT(DISTINCT(dx.intraorg_patient_id))
  FROM
    SUPERMART_NNN.v_diagnosis dx
JOIN
    SUPERMART_NNN.v_observation o
ON
    dx.intraorg_patient_id = o.intraorg_patient_id
JOIN
    SUPERMART_NNN.v_drug d
ON
    d.intraorg_patient_id = dx.intraorg_patient_id
WHERE
  dx.icd_code = '250.00'
  AND o.loinc_test_id='4548-4'
  and dx.icd_version = 'ICD9'
  AND REGEXP_LIKE(o.std_value,'^[-]?[0-9]+([.][0-9]+)?$')
  AND CAST(o.std_value AS float) >= 8.0
  AND d.ingredient_rx_cuis = '6809'
```

### 3.18 Advanced: Diabetic patients with medication controlled A1c value

Count the number of patients with a diagnosis of diabetes type II without mention of other complication (ICD-9 250.00), who had an A1c > 9% (LOINC 4548-4) and were then prescribed metformin (RxCUI 6809), and after the metformin prescription had an A1c < 7%. The REGEXP_LIKE functions restrict the records considered to only those with numeric values.

```
SELECT
  COUNT(DISTINCT(dx.intraorg_patient_id))
FROM
    SUPERMART_NNN.v_diagnosis dx
JOIN
    SUPERMART_NNN.v_observation o
ON
    dx.intraorg_patient_id = o.intraorg_patient_id
JOIN
    SUPERMART_NNN.v_drug d
ON
    d.intraorg_patient_id = dx.intraorg_patient_id
JOIN
    SUPERMART_NNN.v_observation o2
ON
    o2.intraorg_patient_id = d.intraorg_patient_id
WHERE
  dx.icd_code = '250.00'
  AND o.loinc_test_id='4548-4'
  and dx.icd_version = 'ICD9'
  AND REGEXP_LIKE(o.std_value,'^[-]?[0-9]*([.][0-9]+)?')
  AND CAST(o.std_value AS float) >= 9.0
  AND d.ingredient_rx_cuis = '6809'
  AND REGEXP_LIKE(o2.std_value,'^[-]?[0-9]*([.][0-9]+)?')
  AND CAST(o2.std_value AS float) < 8.0
  AND o2.observation_date > d.prescription_date
  AND d.prescription_date > o.observation_date
```

### 3.19 Advanced: Identify the region for patients that have charge amounts above $50,000

Identify the region for patients that have total charge amounts above $50,000.

```
SELECT
  SUM(charge_amount),
  sl.intraorg_patient_id,
  p2p.provider_id,
  provider_name,
  org_unit_name,
  level_2_name
FROM
  SUPERMART_NNN.v_service_line sl
JOIN
  SUPERMART_NNN.v_patient_to_provider p2p
ON
  sl.intraorg_patient_id=p2p.intraorg_patient_id
```

```
JOIN
  (
  SELECT
    p.provider_id,
    provider_name,
    org_unit_name,
    level_2_name
  FROM
    SUPERMART_NNN.v_provider_dim p
  JOIN
    SUPERMART_NNN.v_org_chart_provider_edge e
  ON
    p.provider_id = e.child_provider
  JOIN
    SUPERMART_NNN.v_org_unit_hierarchy ou
  ON
    ou.orgunit_id = e.parent_orgunit
  WHERE
    e.orgchart_version = 135
  ) temp
ON
  p2p.provider_id=temp.provider_id
WHERE
  attribution_id = 148
GROUP BY
  sl.intraorg_patient_id,
  p2p.provider_id,
  provider_name,
  org_unit_name,
  level_2_name
HAVING
  SUM(charge_amount) > 50000
```

---

### 3.20 Advanced: Count by region for patients that have charge amounts above $50,000

Count of patients, by region, with total charges above $50,000.

---

```
SELECT
  level_2_name,
  count(distinct(intraorg_patient_id))
FROM
(
```

```
SELECT
  SUM(charge_amount),
  sl.intraorg_patient_id,
  p2p.provider_id,
  provider_name,
  org_unit_name,
  level_2_name
FROM
  SUPERMART_NNN.v_service_line sl
JOIN
  SUPERMART_NNN.v_patient_to_provider p2p
ON
  sl.intraorg_patient_id=p2p.intraorg_patient_id
JOIN
  (
  SELECT
    provider_id,
    provider_name,
    org_unit_name,
    level_2_name
  FROM
    SUPERMART_NNN.v_provider_dim p
  JOIN
    SUPERMART_NNN.v_org_chart_provider_edge e
  ON
    p.provider_id = e.child_provider
  JOIN
    SUPERMART_NNN.v_org_unit_hierarchy ou
  ON
    ou.orgunit_id = e.parent_orgunit
  WHERE
    e.orgchart_version = 135
  ) temp
ON
  p2p.provider_id = temp.provider_id
WHERE
  attribution_id = 148
GROUP BY
  sl.intraorg_patient_id,
  p2p.provider_id,
  provider_name,
  orgunit_name,
  level_2_name
HAVING
  SUM(charge_amount) > 50000
) temp2
GROUP BY
level_2_name
```

---

### 3.21 Advanced: Laboratory results for those patients with total charge amounts above $50,000 in one calendar year

Examine the laboratory results (observation records) for those patients with charge amounts above $50,000 in one calendar year.

```
SELECT
  sl.intraorg_patient_id,
  sl.sumCosts,
  ob.loinc_test_id,
  ob.std_value,
  ob.observation_date
FROM
  (SELECT
    SUM(charge_amount) as sumCosts,
    intraorg_patient_id
  FROM
    SUPERMART_NNN.v_service_line
  WHERE
    service_date between '2014-01-01' and '2015-01-01'
  GROUP BY
    intraorg_patient_id
  HAVING
    SUM(charge_amount) > 50000) sl
  JOIN
    SUPERMART_NNN.v_observation ob
  ON
    sl.intraorg_patient_id = ob.intraorg_patient_id
ORDER BY
  sl.intraorg_patient_id
```

# 4 Providers and practices

The use cases in this section demonstrate how information about providers, practices, and organizational structure can be gathered in SuperMart.

### 4.1 Provider specialty lookup

```
SELECT
  specialty_code,
  specialty_name
FROM
  xref.provider_specialty
ORDER BY
  specialty_name
```

### 4.2 Providers with particular specialty

Identify providers with a specialty of Internal Medicine (IBM Explorys Platform specialty code 1170000).

```
SELECT
  p.provider_id,
  p.provider_name,
  p.provider_title
FROM
    SUPERMART_NNN.v_org_chart_provider_specialty s
  JOIN
    SUPERMART_NNN.v_org_chart_provider p
  ON
    s.provider_id=p.provider_id
WHERE
  std_specialty_code = '1170000'
```

### 4.3 Providers and specialties

List the specialties of all providers.

```
SELECT
  p.provider_id,
  p.provider_name,
  s.std_specialty_code,
  ps.specialty_name
FROM
    SUPERMART_NNN.v_org_chart_provider p
  JOIN
    SUPERMART_NNN.v_org_chart_provider_specialty s
  ON
    p.provider_id=s.provider_id
  JOIN
    xref.provider_specialty ps
  ON
    s.std_specialty_code=ps.specialty_code
```

### 4.4 Measure results for each provider

Generate a report by physician of the measures in the ACO library.

```
SELECT
  MAX(md.measure_dim_id) as measure_dim_id,
  mf.attribution_dim_id,
  mf.provider_id,
  md.measure_name,
  mf.numerator,
  mf.denominator,
  mf.result_value
FROM
  SUPERMART_NNN.v_measure_fact mf
JOIN
  SUPERMART_NNN.v_org_chart_provider p
ON
  p.provider_id = mf.provider_id
JOIN
  SUPERMART_NNN.v_measure_dim md
ON
  md.measure_dim_id = mf.measure_dim_id
WHERE
  md.library_name = 'ACO 2014'
  AND md.sublibrary_name = 'ACO 22 Submission'
  AND mf.measure_attribution = 'PROVIDER'
  AND mf.reference_date = '2015-01-01'
GROUP BY
  mf.provider_id,
  mf.attribution_dim_id,
  md.measure_name,
  mf.numerator,
  mf.denominator,
  mf.result_value
ORDER BY
  mf.provider_id
```

### 4.5 PCP on record

Count patients with and without a primary care physician (PCP) on record.

```
SELECT
  CASE WHEN
    pcp_provider_id IS NULL
  THEN
    'NULL_PCP'
  ELSE
    'NON_NULL_PCP'
  END null_flag,
  COUNT(DISTINCT(intraorg_patient_id))
FROM
  SUPERMART_NNN.v_demographic
GROUP BY
  null_flag
ORDER BY
  COUNT(*) DESC
```

### 4.6 Count ambulatory encounters by provider

Count the number of ambulatory encounters that include an observation of Body Mass Index (BMI) (encoded by LOINC test id 39156-5), grouped by the provider associated with that encounter.

```
SELECT
  p.provider_name,
  COUNT(DISTINCT(e.encounter_record_id))
FROM
    SUPERMART_NNN.v_encounter e
JOIN
    SUPERMART_NNN.v_encounter_provider p
ON
    e.encounter_join_id = p.encounter_join_id
JOIN
    SUPERMART_NNN.v_observation o
ON
    e.encounter_join_id = o.encounter_join_id
WHERE
  e.std_encounter_type = 'OFFICE_VISIT'
  AND o.loinc_test_id = '39156-5'
GROUP BY
  p.provider_name
ORDER BY
  count DESC
```

### 4.7 Count encounters with particular diagnosis

Count the number of encounters that included a diagnosis of diabetes type II without mention of other complication (ICD-9 250.00), by type.

```
SELECT
  e.std_encounter_type,
  COUNT(DISTINCT(e.encounter_record_id))
FROM
    SUPERMART_NNN.v_encounter e
  JOIN
    SUPERMART_NNN.v_diagnosis d
  ON
    e.encounter_join_id = d.encounter_join_id
WHERE
  d.icd_code = '250.00'
  and d.icd_version = 'ICD9'
GROUP BY
  e.std_encounter_type
ORDER BY
  count DESC
```

### 4.8 Advanced: Explore cohorts measures

Subset an Explore cohort to only those patients attributed to providers in a particular region in the organization.

```
SELECT
  c.intraorg_patient_id,
  p2p.provider_id,
  provider_name,
  org_unit_name,
  level_2_name
FROM
  SUPERMART_NNN.v_cohort_patients c
JOIN
  SUPERMART_NNN.v_patient_to_provider p2p
ON
  c.intraorg_patient_id=p2p.intraorg_patient_id
JOIN
  (
  SELECT
    p.provider_id,
    provider_name,
    org_unit_name,
    level_2_name
  FROM
    SUPERMART_NNN.v_provider_dim p
  JOIN
    SUPERMART_NNN.v_org_chart_provider_edge e
  ON
    p.provider_id = e.child_provider
  JOIN
    SUPERMART_NNN.v_org_unit_hierarchy ou
  ON
    ou.orgunit_id = e.parent_orgunit
  WHERE
    e.orgchart_version = 135
  ) temp
ON
  p2p.provider_id=temp.provider_id
WHERE
  cohort_id=14110
  AND level_2_name = 'GENERIC REGION HERE'
  AND attribution_id = 148
```

# 5 Data mapping

This section contains use cases that help with understanding how incoming data elements are standardized and curated for use in the IBM Explorys Platform.

### 5.1 Diagnosis map

Reproduce the diagnosis record map by showing all source diagnosis codes and descriptions with the resulting SNOMED target codes, stratified by source system.

```
SELECT
  source_system_id,
  disorder_code,
  diagnosis_description,
  snomed_ids,
  COUNT(*)
FROM
  SUPERMART_NNN.v_diagnosis
GROUP BY
  source_system_id,
  disorder_code,
  diagnosis_description,
  snomed_ids
ORDER BY
  count DESC
```

### 5.2 Procedure map

Reproduce the procedure record map by showing all source procedure codes and descriptions with the resulting SNOMED target codes, stratified by source system.

```
SELECT
  source_system_id,
  proc_code,
  proc_desc,
  snomed_id,
  COUNT(*)
FROM
  SUPERMART_NNN.v_procedure
GROUP BY
  source_system_id,
  proc_code,
  proc_desc,
  snomed_id
ORDER BY
  count DESC
```

### 5.3 Drug map

Reproduce the procedure record map by showing all source drug codes and descriptions with the resulting SNOMED drug concept, National Drug Code (NDC) and RxNorm target codes, stratified by source system.

```
SELECT
  source_system_id,
  drug_code,
  drug_desc,
  ndc_code,
  all_ndc_codes,
  rx_cui,
  snomed_drug_ids,
  snomed_drug_descriptions,
  COUNT(*)
FROM
  SUPERMART_NNN.v_drug
GROUP BY
  source_system_id,
  drug_code,
  drug_desc,
  ndc_code,
  all_ndc_codes,
  rx_cui,
  snomed_drug_ids,
  snomed_drug_descriptions
ORDER BY
  count DESC
```

### 5.4 Drug ordering mode map

Reproduce the drug ordering mode standardization map, stratified by source system.

```
SELECT
  source_system_id,
  ordering_mode,
  std_ordering_mode,
  COUNT(*)
FROM
  SUPERMART_NNN.v_drug
GROUP BY
  source_system_id,
  ordering_mode,
  std_ordering_mode
ORDER BY
  count DESC
```

### 5.5 Drug order status map

Reproduce the drug ordering status standardization map, stratified by source system.

```
SELECT
  source_system_id,
  ordering_status,
  std_order_status,
  COUNT(*)
FROM
  SUPERMART_NNN.v_drug
GROUP BY
  source_system_id,
  ordering_status,
  std_order_status
ORDER BY
  count DESC
```

### 5.6 Gender Map

Reproduce the gender standardization map, stratified by source system.

```
SELECT
  source_system_id,
  gender,
  std_gender,
  COUNT(*)
FROM
  SUPERMART_NNN.v_demographic
GROUP BY
  source_system_id,
  gender,
  std_gender
ORDER BY
  count DESC
```

### 5.7 Language map

Reproduce the language standardization map, stratified by source system.

```
SELECT
  source_system_id,
  language,
  std_language,
  COUNT(*)
FROM
  SUPERMART_NNN.v_demographic
GROUP BY
  source_system_id,
  language,
  std_language
ORDER BY
  count DESC
```

### 5.8 Ethnicity map

Reproduce the ethnicity standardization map, stratified by source system.

```
SELECT
  source_system_id,
  ethnicity,
  std_ethnicity,
  COUNT(*)
FROM
  SUPERMART_NNN.v_demographic
GROUP BY
  source_system_id,
  ethnicity,
  std_ethnicity
ORDER BY
  count DESC
```

### 5.9 Race map

Reproduce the race standardization map, stratified by source system.

```
SELECT
  source_system_id,
  race,
  std_race,
  COUNT(*)
FROM
  SUPERMART_NNN.v_demographic
GROUP BY
  source_system_id,
  race,
  std_race
ORDER BY
  count DESC
```

### 5.10 Religion map

Reproduce the religion standardization map, stratified by source system.

```
SELECT
  source_system_id,
  religion,
  std_religion,
  COUNT(*)
FROM
  SUPERMART_NNN.v_demographic
GROUP BY
  source_system_id,
  religion,
  std_religion
ORDER BY
  count DESC
```

### 5.11 Insurance type map

Reproduce the insurance standardization map, stratified by source system.

```
SELECT
  insurance_type,
  std_insurance_type,
  COUNT(*)
FROM
  SUPERMART_NNN.v_demographic_insurance
GROUP BY
  insurance_type,
  std_insurance_type
ORDER BY
  count DESC
```

### 5.12 Encounter status map

Reproduce the encounter status standardization map, stratified by source system.

```
SELECT
  source_system_id,
  encounter_status,
  std_encounter_status,
  COUNT(*)
FROM
  SUPERMART_NNN.v_encounter
GROUP BY
  source_system_id,
  encounter_status,
  std_encounter_status
ORDER BY
  count DESC
```

### 5.13 Encounter type map

Reproduce the encounter type standardization map, stratified by source system.

```
SELECT
  source_system_id,
  encounter_type,
  std_encounter_type,
  COUNT(*)
FROM
  SUPERMART_NNN.v_encounter
GROUP BY
  source_system_id,
  encounter_type,
  std_encounter_type
ORDER BY
  count DESC
```

### 5.14 Admission source map

Reproduce the admission source standardization map, stratified by source system.

```
SELECT
  source_system_id,
  admission_source,
  std_admission_source,
  COUNT(*)
FROM
  SUPERMART_NNN.v_admission
GROUP BY
  source_system_id,
  admission_source,
  std_admission_source
ORDER BY
  count DESC
```

### 5.15 Admission type map

Reproduce the admission type standardization map, stratified by source system.

```
SELECT
  source_system_id,
  admission_type,
  std_admission_type,
  COUNT(*)
FROM
  SUPERMART_NNN.v_admission
GROUP BY
  source_system_id,
  admission_type,
  std_admission_type
ORDER BY
  count DESC
```

### 5.16 Discharge disposition map

Reproduce the discharge disposition standardization map, stratified by source system.

```
SELECT
  source_system_id,
  discharge_disposition,
  std_discharge_disposition,
  COUNT(*)
FROM
  SUPERMART_NNN.v_admission
GROUP BY
  source_system_id,
  discharge_disposition,
  std_discharge_disposition
ORDER BY
  count DESC
```

# 6 Data quality

This section contains use cases that uncover suspicious data elements and errors in the data mapping and standardization process.

### 6.1 Suspicious age

Show the list of patients with an age greater than 110 who are not deceased.

```
select
  intraorg_patient_id,
  first_name,
  last_name,
  birth_date
from
  SUPERMART_NNN.v_patient
where
  age_in_years(getdate(),birth_date) > 110
  and std_status <> 20
```

### 6.2 Suspicious gender

Show a count of pregnant males (ICD-9 V22.*).

```
SELECT
  p.gender,
  p.std_gender,
  COUNT(*)
FROM
  SUPERMART_NNN.v_demographic p
JOIN
  SUPERMART_NNN.v_diagnosis d
ON
  p.intraorg_patient_id=d.intraorg_patient_id
WHERE
  upper(d.icd_code) like ‘V22.%
  and d.icd_version = ‘ICD9
GROUP BY
  p.gender,
  p.std_gender
ORDER BY
  p.std_gender
```

### 6.3 Unmapped observations

Show the list of unmapped observation codes segmented by source system.

```
SELECT
  source_system_id,
  observation_code,
  observation_desc
  COUNT(*)
FROM
  SUPERMART_NNN.v_observation
where
  loinc_test_id IS NULL
GROUP BY
  source_system_id,
  observation_code,
  observation_desc
ORDER BY
  count DESC
```

### 6.4 Unmapped procedures

Show a list of unmapped procedures segmented by source system.

```
SELECT
  source_system_id,
  proc_code,
  proc_desc,
  COUNT(*)
FROM
  SUPERMART_NNN.v_procedure
WHERE
  snomed_id IS NULL
GROUP BY
  source_system_id,
  proc_code,
  proc_desc
ORDER BY
  count DESC
```

### 6.5 Unmapped diagnoses

Show a list of unmapped diagnoses segmented by source system.

```
SELECT
  source_system_id,
  disorder_code,
  diagnosis_description,
  COUNT(*)
FROM
  SUPERMART_NNN.v_diagnosis
WHERE
  snomed_ids IS NULL
GROUP BY
  source_system_id,
  disorder_code,
  diagnosis_description
ORDER BY
  count DESC
```

### 6.6 Unmapped encounter status

Show a list of unmapped encounter status standardization segmented by source system.

```
SELECT
  source_system_id,
  encounter_status,
  std_encounter_status,
  COUNT(*)
FROM
  SUPERMART_NNN.v_encounter
WHERE
  std_encounter_status IS NULL
GROUP BY
  source_system_id,
  encounter_status,
  std_encounter_status
ORDER BY
  count DESC
```

### 6.7 Unmapped encounter type

Show a list of unmapped encounter type standardization segmented by source system.

```
SELECT
  source_system_id,
  encounter_type,
  std_encounter_type,
  COUNT(*)
FROM
  SUPERMART_NNN.v_encounter
WHERE
  std_encounter_type IS NULL
GROUP BY
  source_system_id,
  encounter_type,
  std_encounter_type
ORDER BY
  count DESC
```

# 7 Measure results and procedures

This section contains use cases that demonstrate how to gather information on patient procedures and quality measures that have been calculated in the IBM Explorys Platform.

### 7.1 Provider measures

Show the measure results for Dr. X (ACO 32 - Coronary Artery Disease (CAD): Lipid Control).

```
SELECT
  f.provider_id
  provider_name,
  reference_date,
  numerator,
  denominator,
  result_value
FROM
  SUPERMART_NNN.v_measure_fact f
JOIN
  SUPERMART_NNN.v_org_chart_provider p
ON
  f.provider_id = p.provider_id
WHERE
  measure_dim_id = 67680 AND
  attribution_dim_id = 323 AND
  f.provider_id = 9290000 AND
  reference_date = '2015-09-01'
ORDER BY
  provider_name
```

### 7.2 Compare provider measures

Show the measure results for all providers (ACO 32 - CAD: Lipid Control).

```
SELECT
  f.provider_id,
  provider_name,
  reference_date,
  numerator,
  denominator,
  result_value
FROM
  SUPERMART_NNN.v_measure_fact f
JOIN
  SUPERMART_NNN.v_org_chart_provider p
ON
  f.provider_id = p.provider_id
WHERE
  measure_dim_id = 67680
  AND attribution_dim_id = 114
  AND f.provider_id > 0
  AND reference_date = '2015-09-01'
ORDER BY
  provider_name
```

### 7.3 Practice measures

CAD: Lipid Control for Org Unit Z (perform org unit roll-up).

```
SELECT
  orgunit_id,
  reference_date,
  numerator,
  denominator,
  result_value
FROM
  SUPERMART_NNN.v_measure_fact f
WHERE
  measure_dim_id = 67680
  AND attribution_dim_id = 114
  AND orgunit_id = 440611
  AND reference_date = '2015-09-01'
ORDER BY
  reference_date
```

### 7.4 Measures over time

CAD: Lipid Control for Dr. X over 4 quarters (ACO 32 - CAD: Lipid Control).

```
SELECT
  reference_date,
  numerator,
  denominator,
  result_value
FROM
  SUPERMART_NNN.v_measure_fact f
WHERE
  measure_id = 67680
  AND attribution_dim_id = 114
  AND provider_dim_id = 9290000
  AND reference_date IN ('2015-07-01','2015-04-01','2015-01-01','2014-10-01')
ORDER BY
  reference_date
```

### 7.5 Stratify measures

List the provider scores for ACO 32 and group the results by the providers' specialties.

```
SELECT
  specialty_name,
  reference_date,
  SUM(numerator) numerator,
  SUM(denominator) denominator,
  SUM(numerator)/SUM(denominator) result_value
FROM
  SUPERMART_NNN.v_measure_fact f
JOIN
  SUPERMART_NNN.v_org_chart_provider p
ON
  f.provider_id = p.provider_id
```

```
JOIN
  SUPERMART_NNN.v_org_chart_provider_specialty s
ON
  s.provider_id = p.provider_id
JOIN
  xref.provider_specialty ps
ON
  s.std_specialty_code = ps.specialty_code
WHERE
  measure_dim_id = 67680
  AND attribution_dim_id = 114
  AND provider_id > 0
  AND reference_date = '2015-09-01'
GROUP BY
  specialty_name,
  reference_date
ORDER BY
  reference_date,
  specialty_name
```

---

### 7.6 Identify BMI for patients

Gather BMI values for all patients.

---

```
SELECT
  intraorg_patient_id,
  std_value
FROM
  SUPERMART_NNN.v_observation
WHERE
  loinc_test_id = '39156-5'
```

---

### 7.7 Identify BMI for patients where BMI > 29

Gather BMI values for all patients whose value is greater than 29.

---

```
SELECT
  intraorg_patient_id,
  std_value
FROM
  SUPERMART_NNN.v_observation
WHERE
loinc_test_id = '39156-5'
and std_value > 29
and REGEXP_LIKE(o.std_value,'^[-]?[0-9]*([.][0-9]+)?')
```

---

### 7.8 Identify the procedures with the greatest average cost

Identify the procedure codes and average charges for the most costly procedures for one calendar year.

```
SELECT
  AVG(charge_amount),
  procedure_code
FROM
  SUPERMART_NNN.v_service_line
WHERE
  service_date between '2014-01-01' and '2015-01-01'
  and charge_amount is not null
GROUP BY
  procedure_code
ORDER BY
  AVG(charge_amount) DESC
```

### 7.9 Advanced: Measure results for each provider from three measures that are located in three different libraries

Generate a report by physician that combines two measures each from three separate libraries, mixing and matching measures as desired.

```
SELECT
  MAX(md.measure_dim_id) as measure_dim_id,
  mf.attribution_dim_id,
  mf.provider_id,
  md.measure_name,
  mf.numerator,
  mf.denominator,
  mf.result_value
FROM
  SUPERMART_NNN.v_measure_fact mf
JOIN
  SUPERMART_NNN.v_org_chart_provider p
ON
  p.provider_id = mf.provider_dim_id
JOIN
  SUPERMART_NNN.v_measure_dim md
ON
  md.measure_dim_id = mf.provider_id
WHERE
  mf.measure_attribution = 'PROVIDER' AND
  mf.reference_date = '2015-01-01' AND
  (
    (md.library_name = 'ACO 2014' AND
     md.sublibrary_name = 'ACO 22 Submission' AND
     md.measure_name = 'ACO 13 – Falls – Screening for Fall Risk ' )
    OR
    (md.library_name = 'Risk and Utilization Adjustment' AND
     md.sublibrary_name = 'Risk Adjustment' AND
     md.measure_name = 'ACO 10 – Ambulatory Sensitive Conditions Admissions Heart Failure
                        (3M APR–DRG Risk Adjusted)' )
```

```
    OR
     (md.library_name = 'Measures' AND
      md.sublibrary_name = 'Performance Compensation and ACO Measures' AND
      md.measure_name = 'ACO 14 – Influenza Immunization')
  )
GROUP BY
  mf.provider_id,
  mf.attribution_dim_id,
  md.measure_name,
  mf.numerator,
  mf.denominator,
  mf.result_value
ORDER BY
  mf.provider_id
```

---

### 7.10 Advanced: Measure results for patients with more than 3 ED visits in one year

Create a report based on patients in the ED.

---

```
SELECT
  MAX(md .measure_dim_id) as measure_dim_id,
  mf.attribution_dim_id,
  mf.provider_id,
  md.measure_name,
  mf.numerator,
  mf.denominator,
  mf.result_value
FROM
    SUPERMART_NNN.v_measure_fact mf
JOIN
    SUPERMART_NNN.v_patient_to_provider pp
ON
    pp.provider_id = mf.provider_id
JOIN
    SUPERMART_NNN.v_measure_dim md
ON
    md.measure_dim_id = mf.measure_dim_id
JOIN
    (SELECT intraorg_patient_id
     FROM
       SUPERMART_NNN.v_encounter
     WHERE
       std_encounter_type = 'HOSPITAL_EMERGENCY_ROOM_VISIT' AND
       encounter_date between '2014-01-01' and '2015-01-01'
     GROUP BY intraorg_patient_id
     HAVING COUNT(encounter_date) > 3) er
ON
    pp.intraorg_patient_id = er.intraorg_patient_id
```

---

```
WHERE
  mf.measure_attribution = 'PROVIDER'
  AND mf.reference_date = '2015-01-01'
  AND md.library_name = 'ACO 2014'
  AND md.sublibrary_name = 'ACO 22 Submission'
  AND mf.measure_attribution = 'PROVIDER'
GROUP BY
  mf.provider_id, mf.attribution_dim_id, md.measure_name,
  mf.numerator, mf.denominator, mf.result_value
ORDER BY
  mf.provider_id
```

---

### 7.11 Advanced: Number of days since admission

Calculate the number of days since the last admission for all patients with at least one admission record in 2015.

---

```
SELECT
  intraorg_patient_id,
  admission_date,
  days_elapsed
FROM (
  SELECT
    row_number() over (PARTITION BY intraorg_patient_id ORDER BY admission_date DESC) as
rownum,
    intraorg_patient_id,
    admission_date,
    datediff(dd,admission_date,NOW()) days_elapsed
  FROM
    SUPERMART_NNN.v_admission
  WHERE
    admission_date IS NOT NULL
    AND admission_date > '2015-01-01'
  ORDER BY
    intraorg_patient_id,
    admission_date,
    days_elapsed
  ) temp
WHERE
  rownum = 1
```

---

# A ID Lookup queries

### A.1 Measure ID table

List the quality measures that are being computed in the IBM Explorys Platform (a measure can have multiple IDs, each corresponding to a specific library, sublibrary pair where the measure is included):

```
SELECT
  measure_dim_id,
  measure_name,
  library_name,
  sublibrary_name,
  measure_description
FROM SUPERMART_NNN.v_measure_dim
ORDER BY
  measure_name
```

### A.2 Measure library and sublibrary ID table

List all of the quality measure libraries and sublibraries:

```
SELECT DISTINCT
  collection_0 AS library_id,
  collection_name_0 AS library_name,
  collection_1 AS sublibrary_id,
  collection_name_1 AS sublibrary_name
FROM SUPERMART_NNN.v_measure_collection
```

### A.3 Attribution ID table

List the attribution schemes used when calculating quality measures:

```
SELECT
  attribution_dim_id,
  attribution_name
FROM SUPERMART_NNN.v_attribution_dim
ORDER BY
  attribution_name
```

### A.4 Org chart version ID table

List all org charts for the level 0 organization:

```
SELECT
  org_chart_version_id,
  org_chart_name
FROM SUPERMART_NNN.v_org_chart_version;
```

### A.5 Practice ID table

List all practices associated with the level 0 organization:

```
SELECT
  orgunit_id,
  orgunit_name
FROM SUPERMART_NNN.v_org_chart_orgunit
```

List all practices associated with the level 0 organization that include 'Pediatric' in the name (capitalization matters):

```
SELECT
  orgunit_id,
  orgunit_name
FROM SUPERMART_NNN.v_org_chart_orgunit
WHERE orgunit_name LIKE '%Pediatric%'
```

### A.6 Provider ID table

List all providers in a practice (this requires an org chart version ID and a practice ID, which can be looked up using the queries in sections A.4 and A.5):

```
SELECT
  ocp.provider_id,
  ocp.provider_name
FROM SUPERMART_NNN.v_org_chart_provider ocp
JOIN SUPERMART_NNN.v_org_chart_provider_edge ocpe
ON ocpe.child_provider = ocp.provider_id
WHERE
  ocpe.parent_orgunit = 6966142
  AND ocpe.orgchart_version = 496
```

## About IBM Watson Health

In April 2015, IBM launched IBM Watson Health and the Watson Health Cloud platform. The new unit will work with doctors, researchers and insurers to help them innovate by surfacing insights from the massive amount of personal health data being created and shared daily. The Watson Health Cloud can mask patient identities and allow for information to be shared and combined with a dynamic and constantly growing aggregated view of clinical, research and social health data.

For more information on IBM Watson Health, visit: ibm.com/watsonhealth.

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