US 20180108430A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2018/0108430 A1

VO et al. (43) Pub. Date: Apr. 19, 2018

(54) METHOD AND SYSTEM FOR POPULATION HEALTH MANAGEMENT IN A CAPTIVATED HEALTHCARE SYSTEM

(71) Applicants: **Alexander H. VO**, Denver, CO (US); **Stephen Smock**, Katy, TX (US); **Anthony K. Williams**, Willis, TX (US); **Ben Raimer**, Galveston, TX (US); **Owen J. Murray**, Houston, TX (US); **Ryan S. Westberry**, Denver, CO (US); **David L. Callender**, Galveston, TX (US); **Kelly Michael Jackson**, San Antonio, TX (US)

(72) Inventors: **Alexander H. VO**, Denver, CO (US); **Stephen Smock**, Katy, TX (US); **Anthony K. Williams**, Willis, TX (US); **Ben Raimer**, Galveston, TX (US); **Owen J. Murray**, Houston, TX (US); **Ryan S. Westberry**, Denver, CO (US); **David L. Callender**, Galveston, TX (US); **Kelly Michael Jackson**, San Antonio, TX (US)

(73) Assignee: **Board of Regents, The University of Texas System**, Austin, TX (US)

(21) Appl. No.: **15/719,382**

(22) Filed: **Sep. 28, 2017**

Related U.S. Application Data

(60) Provisional application No. 62/402,493, filed on Sep. 30, 2016.

Publication Classification

(51) **Int. Cl.**

G16H 10/60	(2006.01)
G06F 17/30	(2006.01)
G09B 5/06	(2006.01)
G09B 19/00	(2006.01)
G16H 50/30	(2006.01)
G16H 40/67	(2006.01)

(52) **U.S. Cl.**

CPC ***G16H 10/60*** (2018.01); ***G06F 17/30864*** (2013.01); ***G16H 40/67*** (2018.01); ***G09B 19/00*** (2013.01); ***G16H 50/30*** (2018.01); ***G09B 5/065*** (2013.01)

(57) **ABSTRACT**

Methods and systems are provided for managing patient or patient populations within a fully integrated captivated healthcare system, which includes creating a patient profile or a patient population profile; screening, assessing and treating a patient or patient population; reviewing, analyzing, and comparing a patient or patient population to a control group or pre-treatment patient profile or patient population profile; and prioritizing, scheduling, and care coordination for a patient or patient population as part of follow-up healthcare assessment and services included in the fully integrated healthcare delivery system. Part of the methods and system includes the ability to utilize comparative patient and patient population data to assess and control healthcare access, quality, and costs.

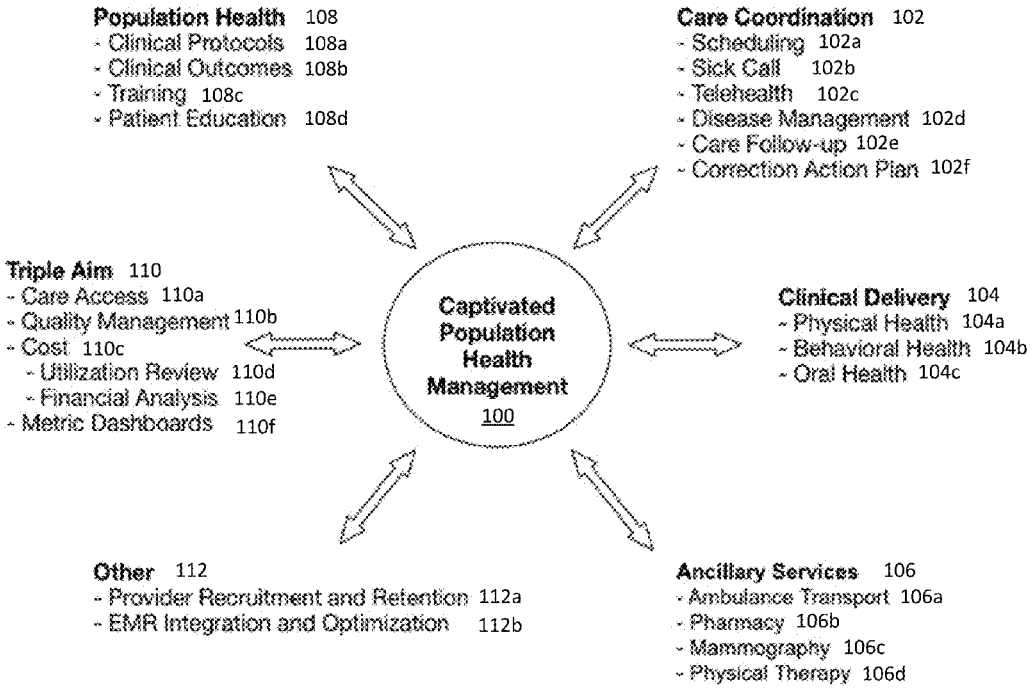

Figure 1

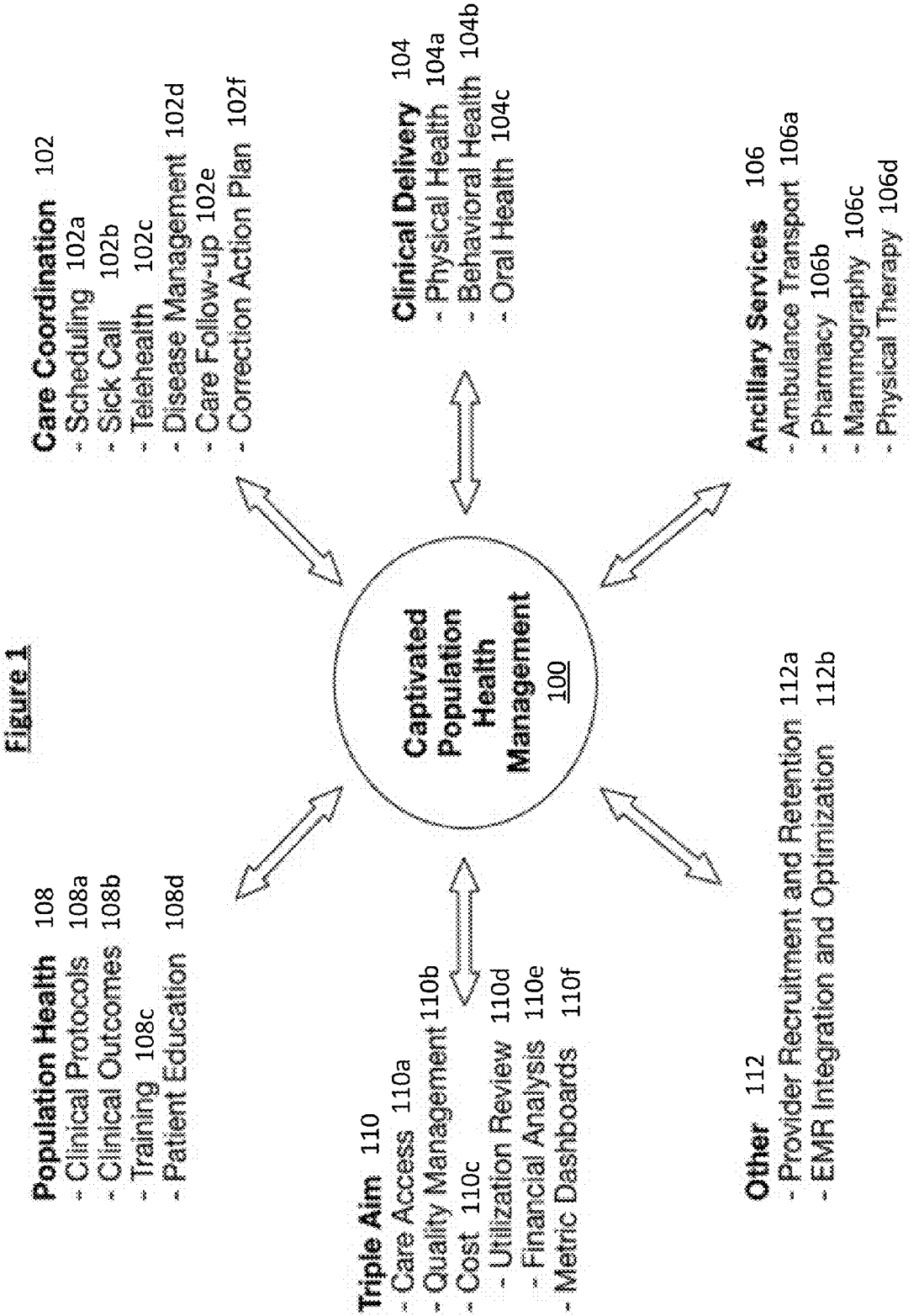
Care Coordination 102
- Scheduling 102a
- Sick Call 102b
- Telehealth 102c
- Disease Management 102d
- Care Follow-up 102e
- Correction Action Plan 102f
Clinical Delivery 104
- Physical Health 104a
- Behavioral Health 104b
- Oral Health 104c
Ancillary Services 106
- Ambulance Transport 106a
- Pharmacy 106b
- Mammography 106c
- Physical Therapy 106d
Population Health 108
- Clinical Protocols 108a
- Clinical Outcomes 108b
- Training 108c
- Patient Education 108d
Captivated Population Health Management 100
Triple Aim 110
- Care Access 110a
- Quality Management 110b
- Cost 110c
- Utilization Review 110d
- Financial Analysis 110e
- Metric Dashboards 110f
Other 112
- Provider Recruitment and Retention 112a
- EMR Integration and Optimization 112b

Figure 2

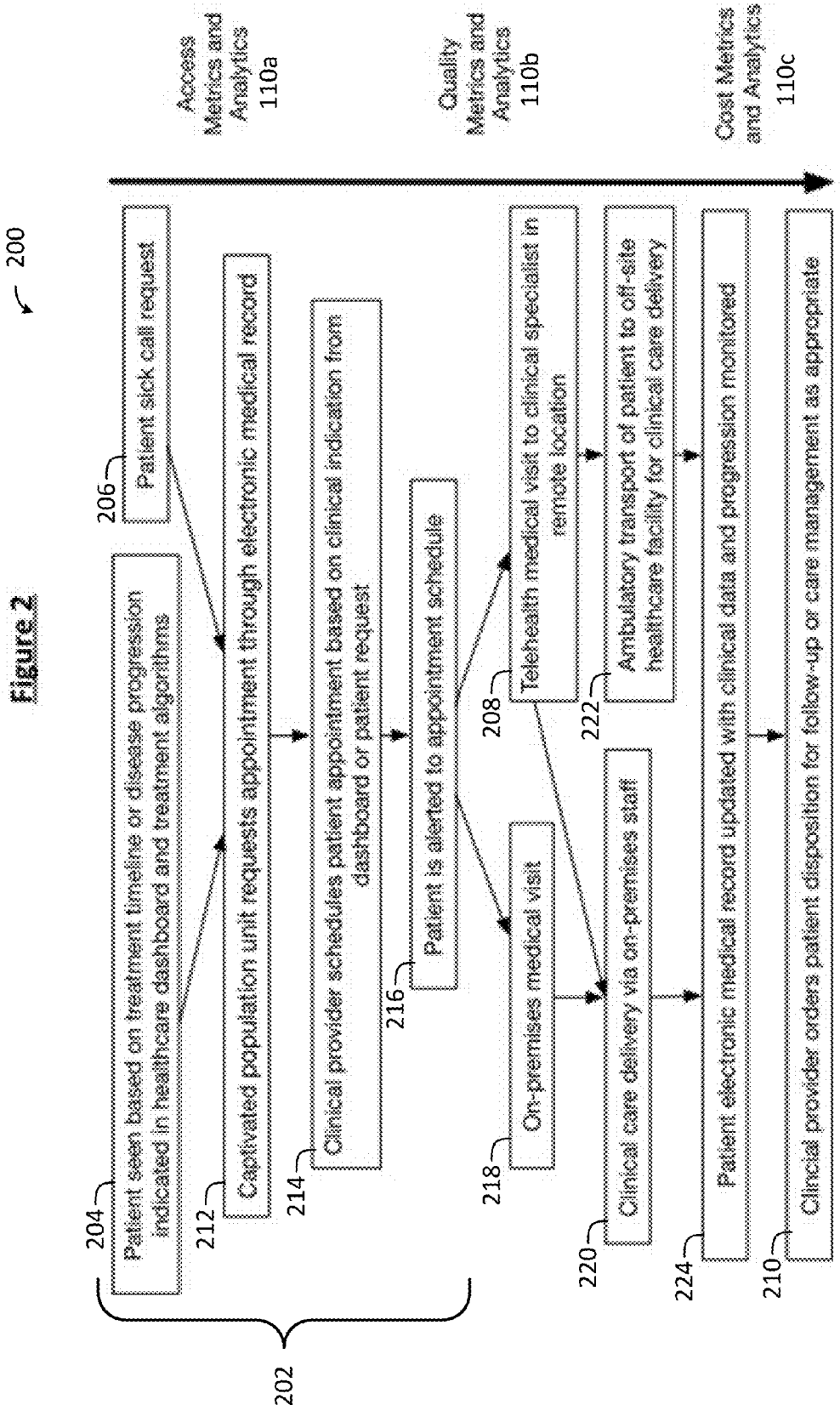
200
Access Metrics and Analytics 110a
Quality Metrics and Analytics 110b
Cost Metrics and Analytics 110c
202
204
Patient seen based on treatment timeline or disease progression indicated in healthcare dashboard and treatment algorithms
206
Patient sick call request
212
Captivated population unit requests appointment through electronic medical record
214
Clinical provider schedules patient appointment based on clinical indication from dashboard or patient request
216
Patient is alerted to appointment schedule
208
Telehealth medical visit to clinical specialist in remote location
218
On-premises medical visit
222
Ambulatory transport of patient to off-site healthcare facility for clinical care delivery
220
Clinical care delivery via on-premises staff
224
Patient electronic medical record updated with clinical data and progression monitored
210
Clinical provider orders patient disposition for follow-up or care management as appropriate

Figure 3

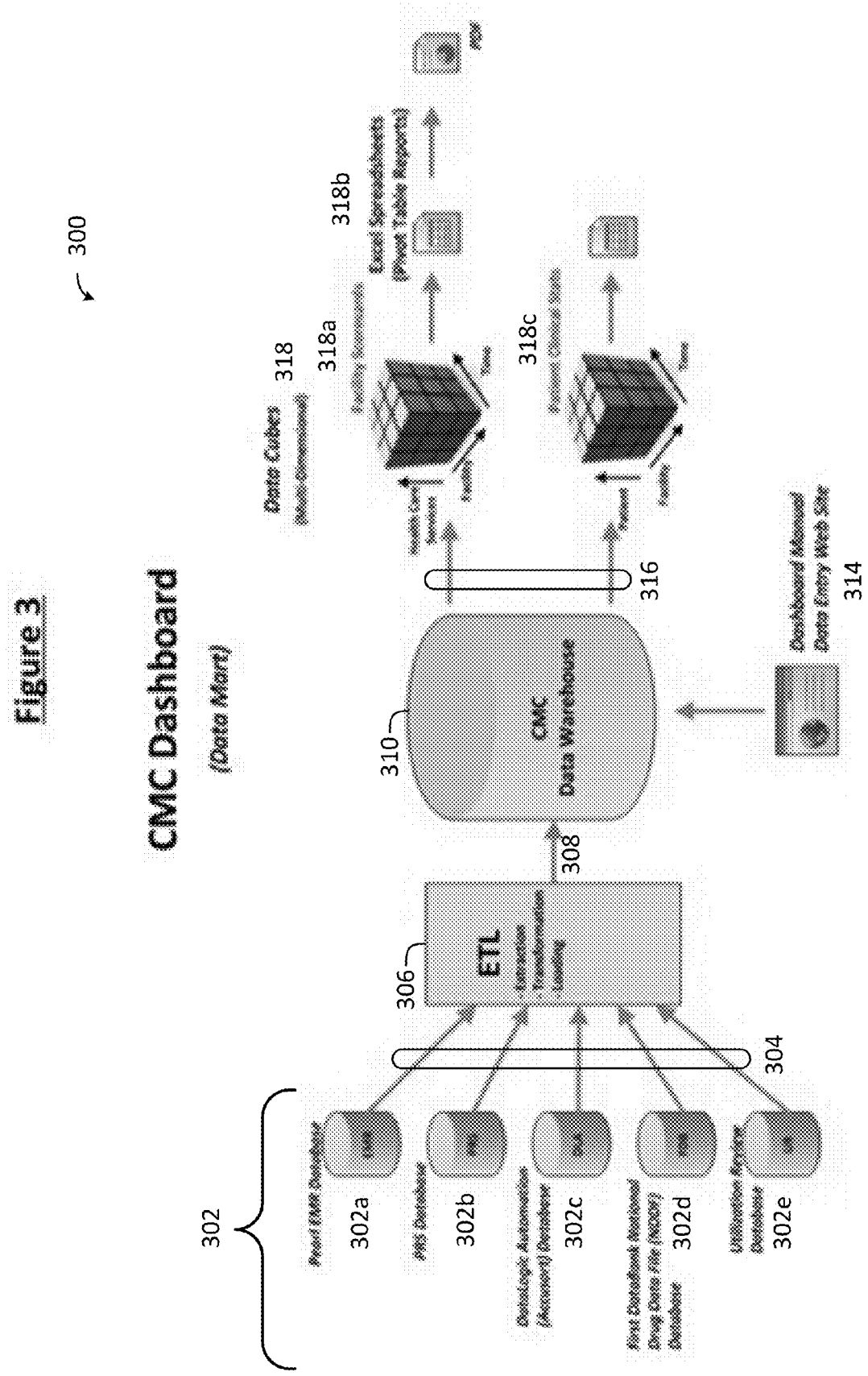
300
CMC Dashboard
(Data Mart)
302
302a
302b
302c
302d
302e
304
306
ETL
308
310
CMC
Data Warehouse
314
316
318
318a
318b
318c
Data Cubes
Excel Spreadsheets
(Pivot Table Reports)
PDF

Figure 4

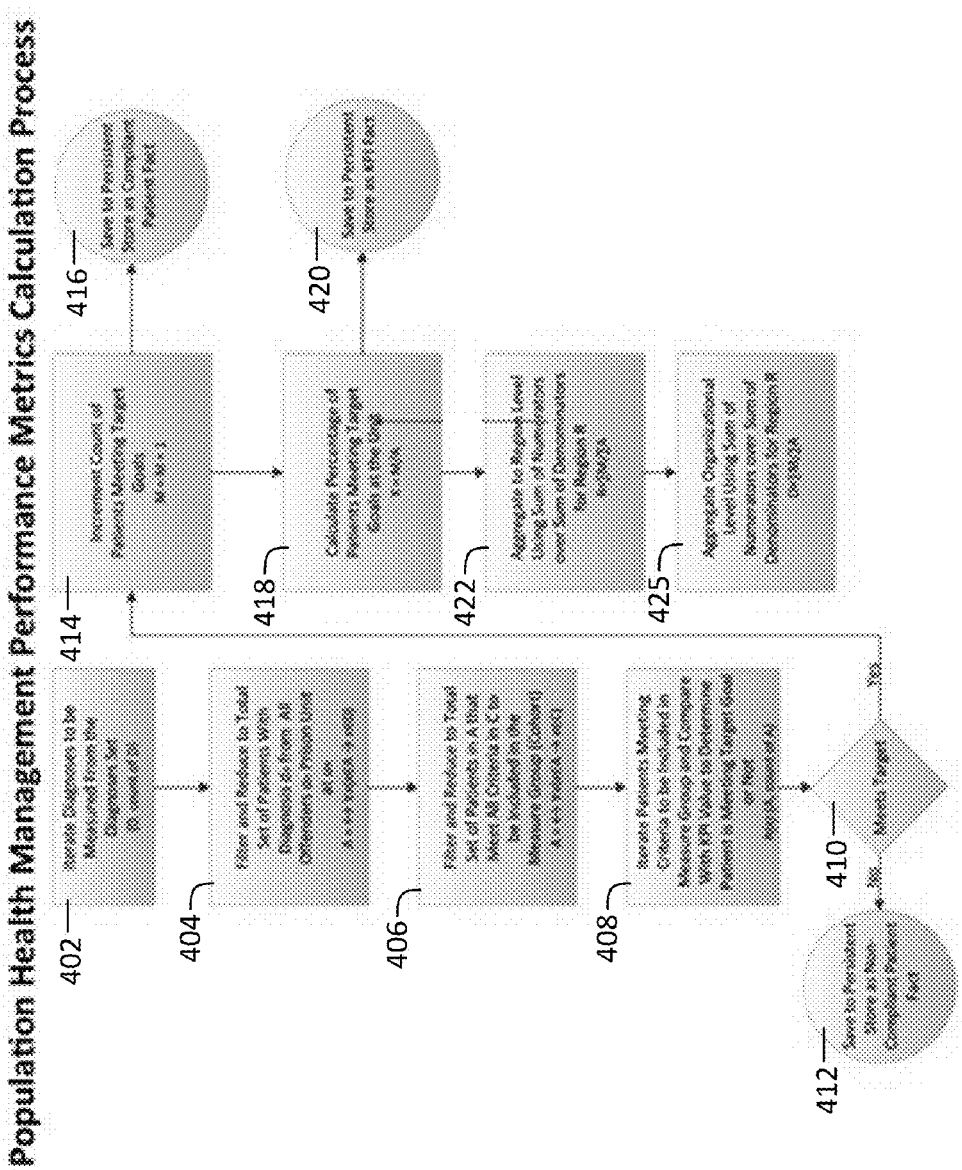
400
Population Health Management Performance Metrics Calculation Process
402
404
406
408
410
412
414
416
418
420
422
425
Yes
No

Figure 5

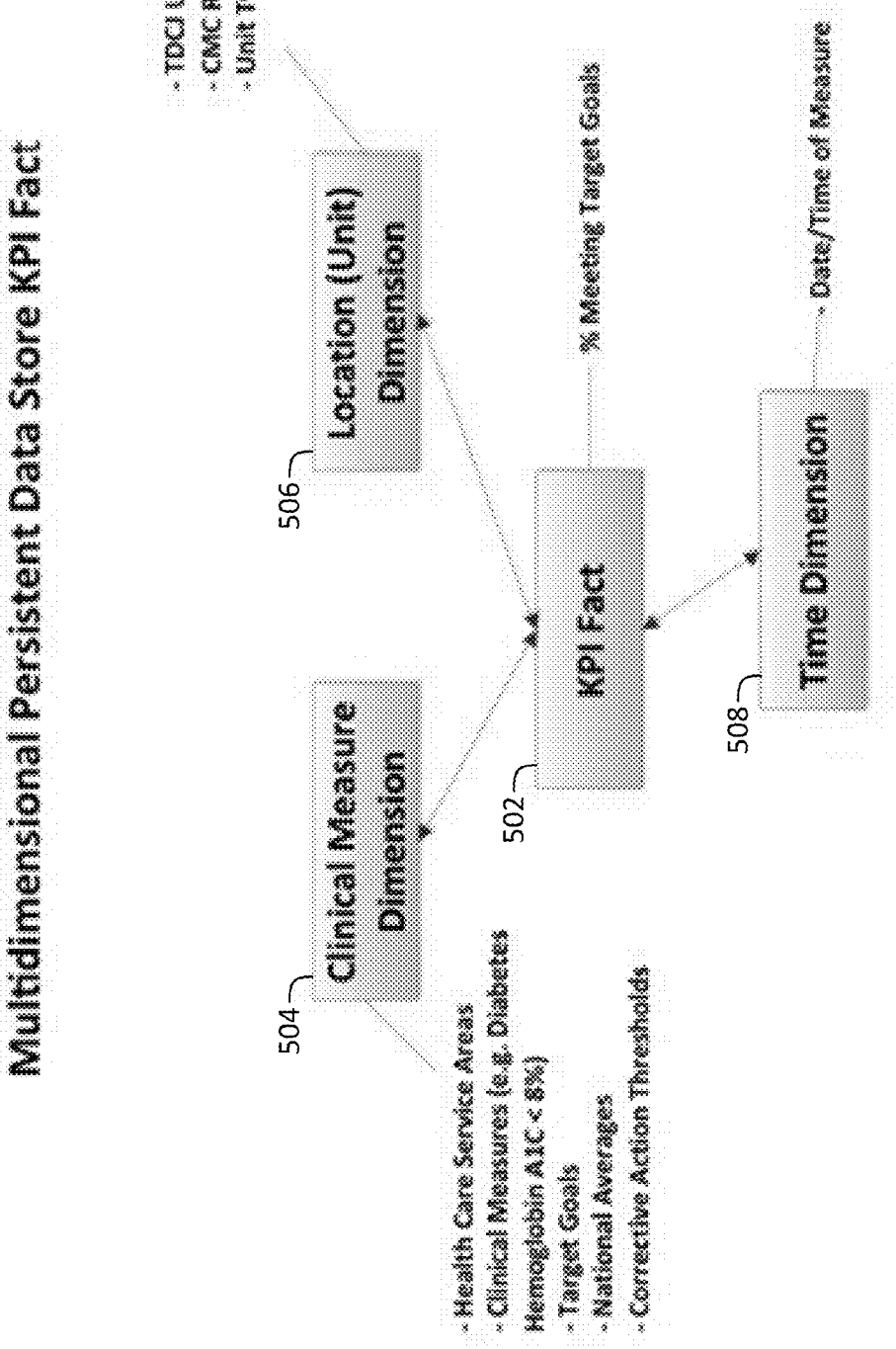
500
Multidimensional Persistent Data Store KPI Fact
- TDCJ Units
- CMC Regions
- Unit Types
Location (Unit) Dimension
506
% Meeting Target Goals
KPI Fact
502
Time Dimension
508
- Date/Time of Measure
Clinical Measure Dimension
504
- Health Care Service Areas
- Clinical Measures (e.g. Diabetes Hemoglobin A1C < 8%)
- Target Goals
- National Averages
- Corrective Action Thresholds

Figure 6

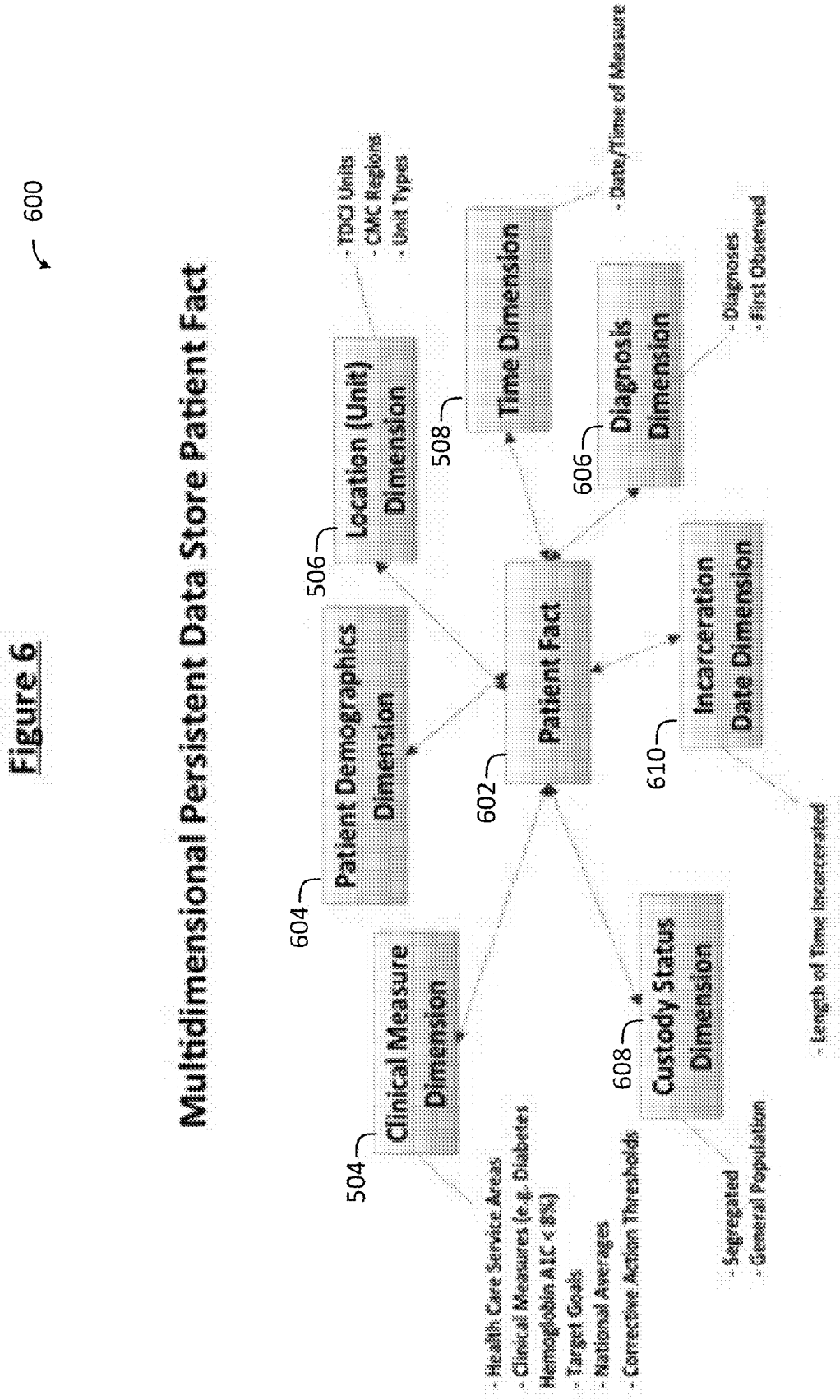
600
Multidimensional Persistent Data Store Patient Fact
Patient Fact
602
Clinical Measure Dimension
504
- Health Care Service Areas
- Clinical Measures (e.g. Diabetes Hemoglobin A1C < 8%)
- Target Goals
- National Averages
- Corrective Action Thresholds
Patient Demographics Dimension
604
Location (Unit) Dimension
506
- TDCJ Units
- CMC Regions
- Unit Types
Time Dimension
508
- Date/Time of Measure
Diagnosis Dimension
606
- Diagnoses
- First Observed
Incarceration Date Dimension
610
- Length of Time Incarcerated
Custody Status Dimension
608
- Segregated
- General Population

Figure 7

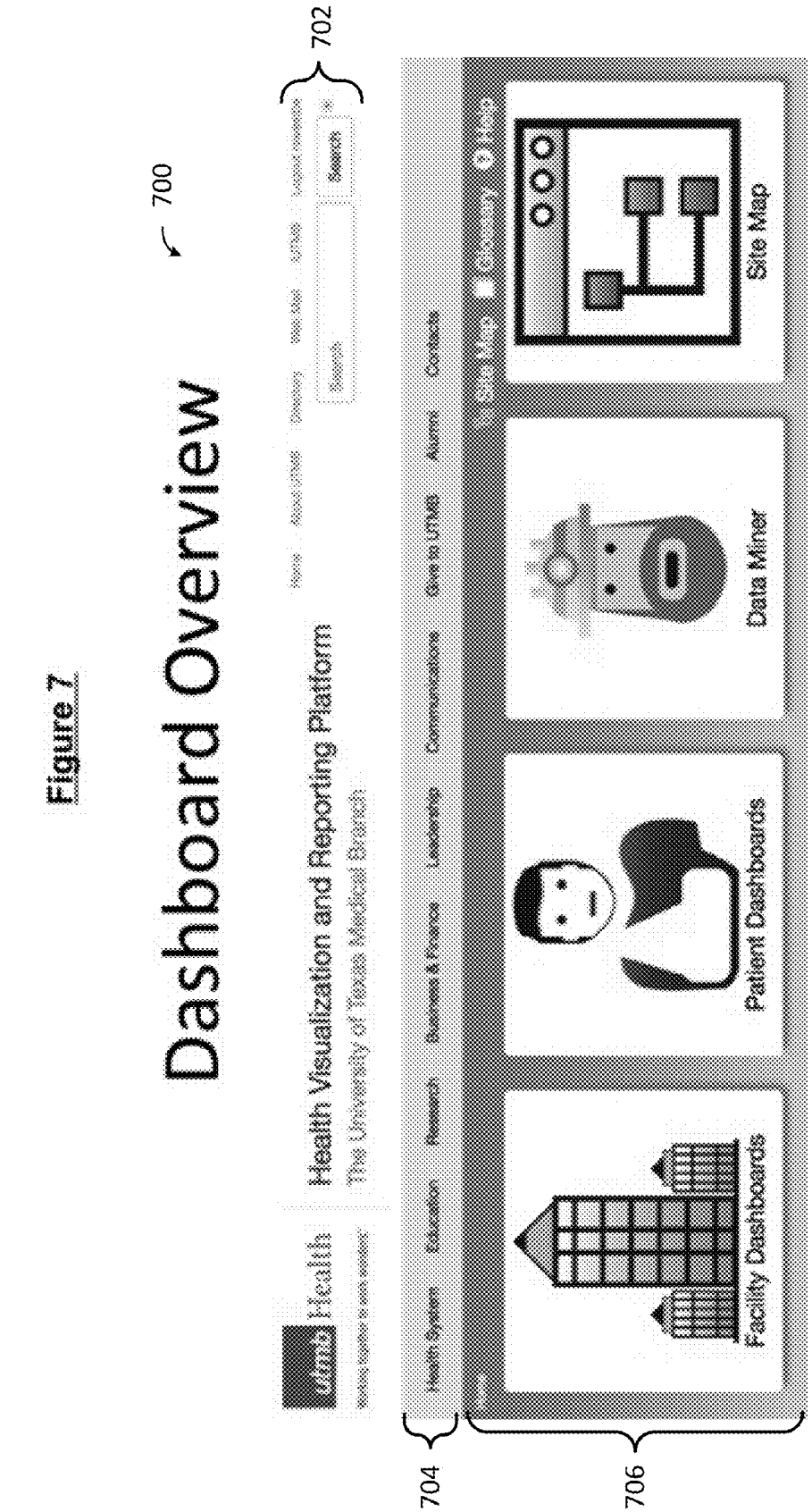
Dashboard Overview
700
702
Health Visualization and Reporting Platform
The University of Texas Medical Branch
Search
Facility Dashboards
Patient Dashboards
Data Miner
Site Map
704
706

Figure 8

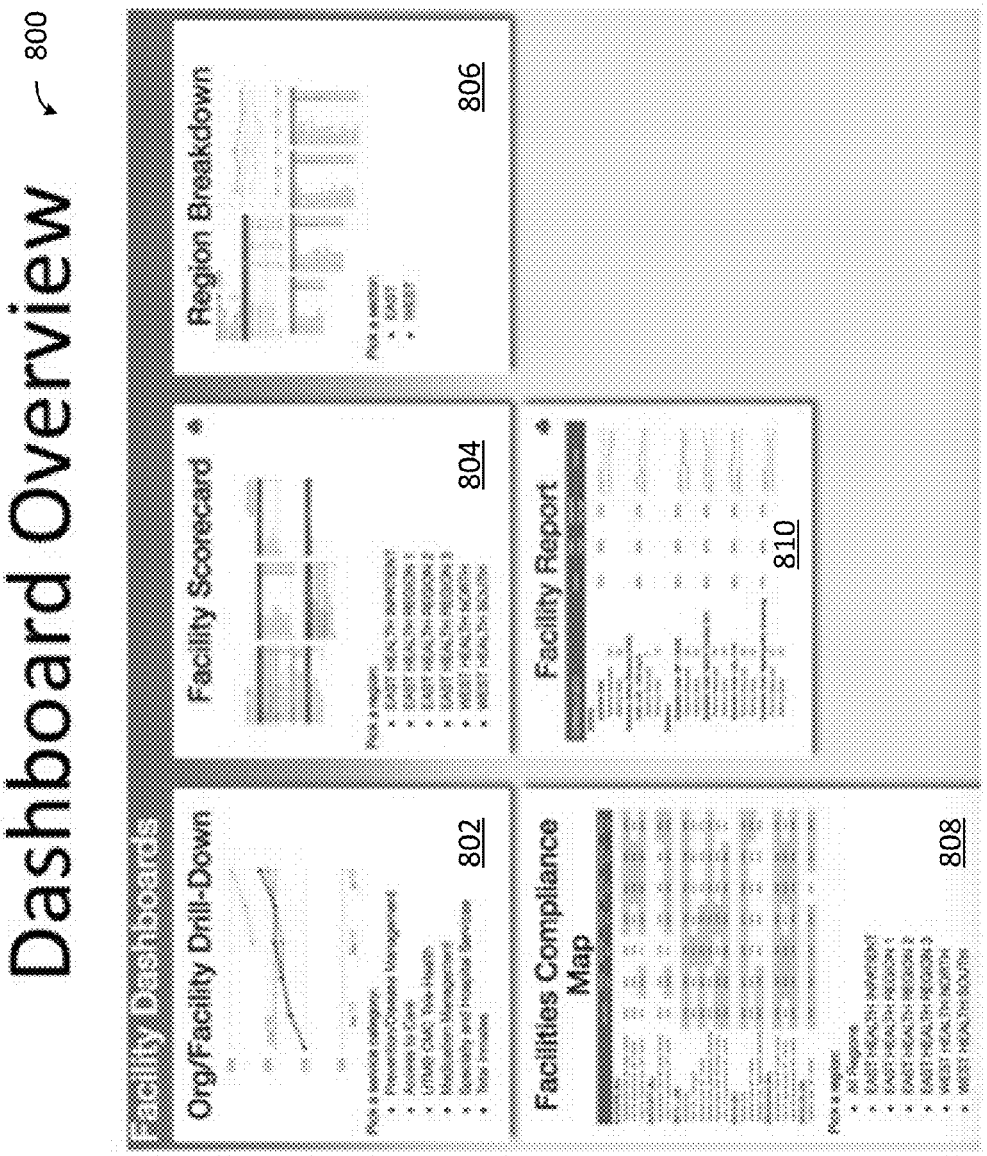
Dashboard Overview
800
Facility Dashboard
Org/Facility Drill-Down
802
Facility Scorecard
804
Region Breakdown
806
Facilities Compliance Map
808
Facility Report
810

Figure 9

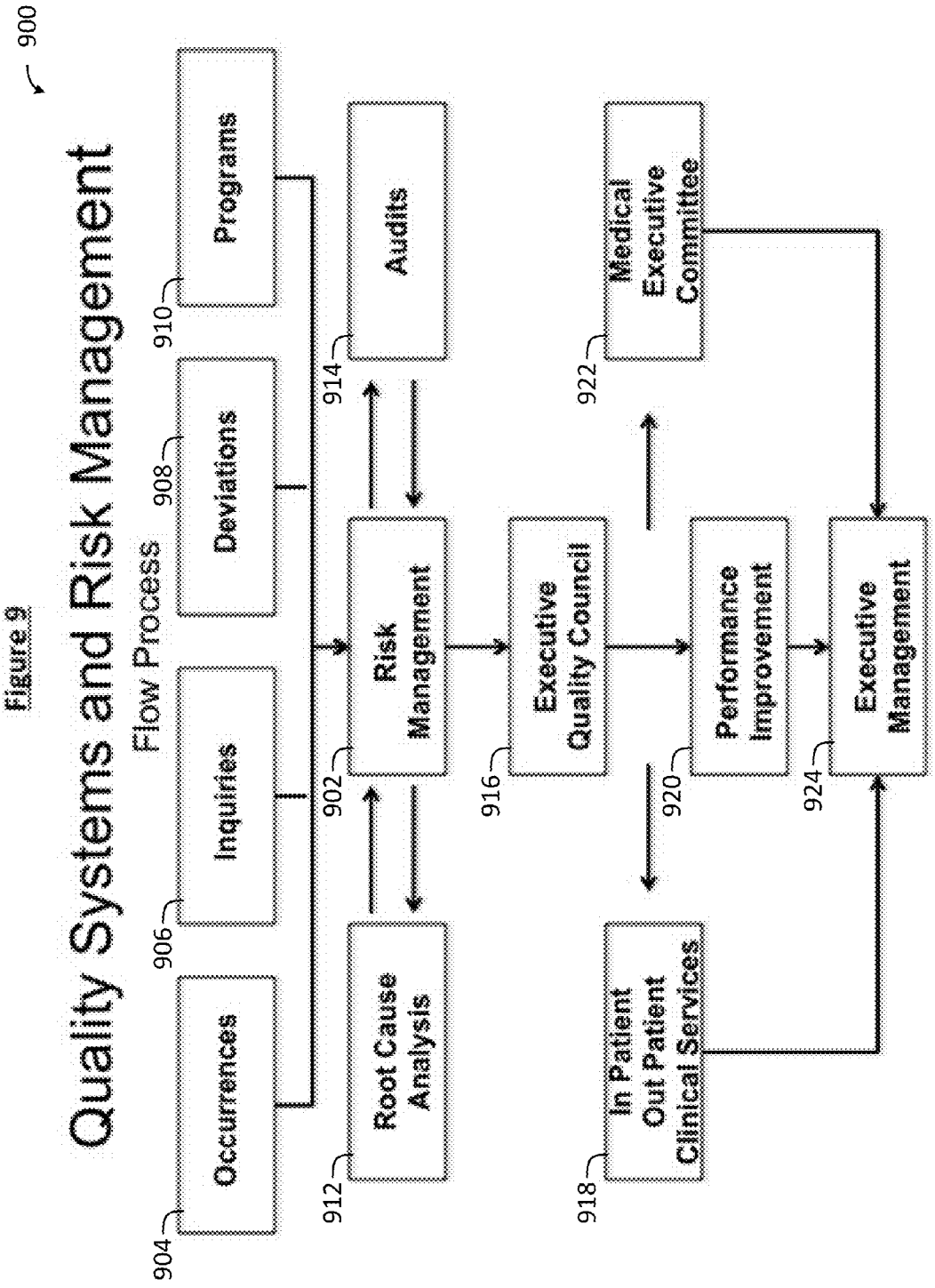
900
Quality Systems and Risk Management
Flow Process
Occurrences
904
Inquiries
906
Deviations
908
Programs
910
Root Cause Analysis
912
Risk Management
902
Audits
914
Executive Quality Council
916
Performance Improvement
920
Executive Management
924
In Patient Out Patient Clinical Services
918
Medical Executive Committee
922

Figure 10

Scheduling Medical Sick Call

- Every patient to be scheduled will have a Reminder created in the EHR.

Figure 11

Scheduling Medical Sick Call

- The Reminder is now available on the patient's Current Reminder screen. This is done for each patient scheduled.

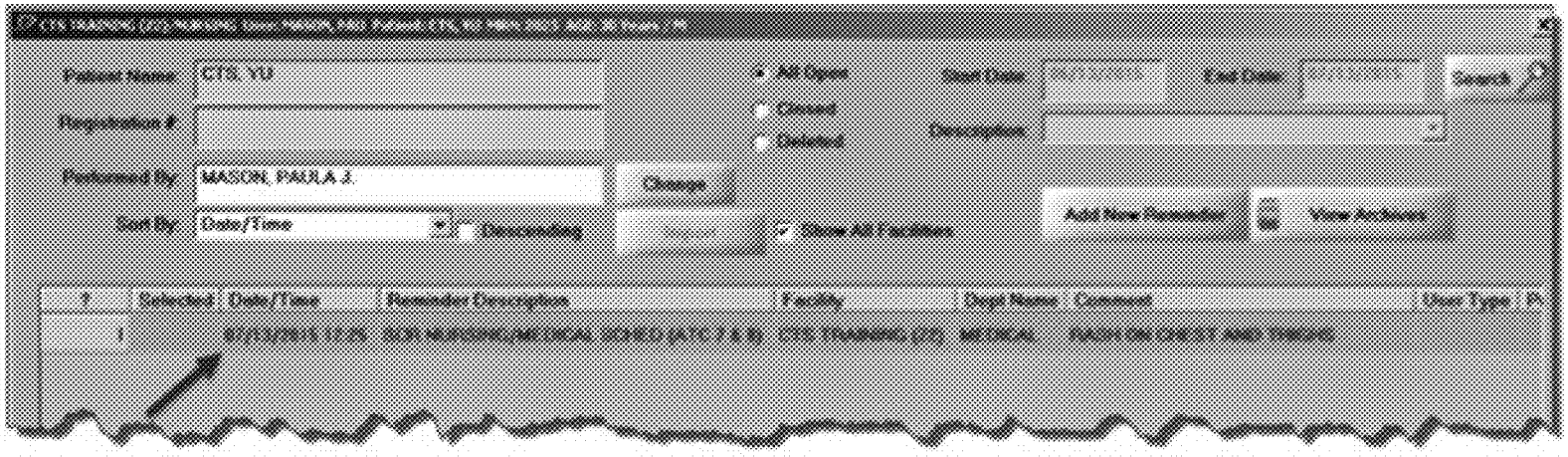

Figure 12

Scheduling Medical Sick Call

- The Admin Reminder Screen allows viewing/modifying/printing the list of patients scheduled to be seen by a specific provider or all providers at that facility.

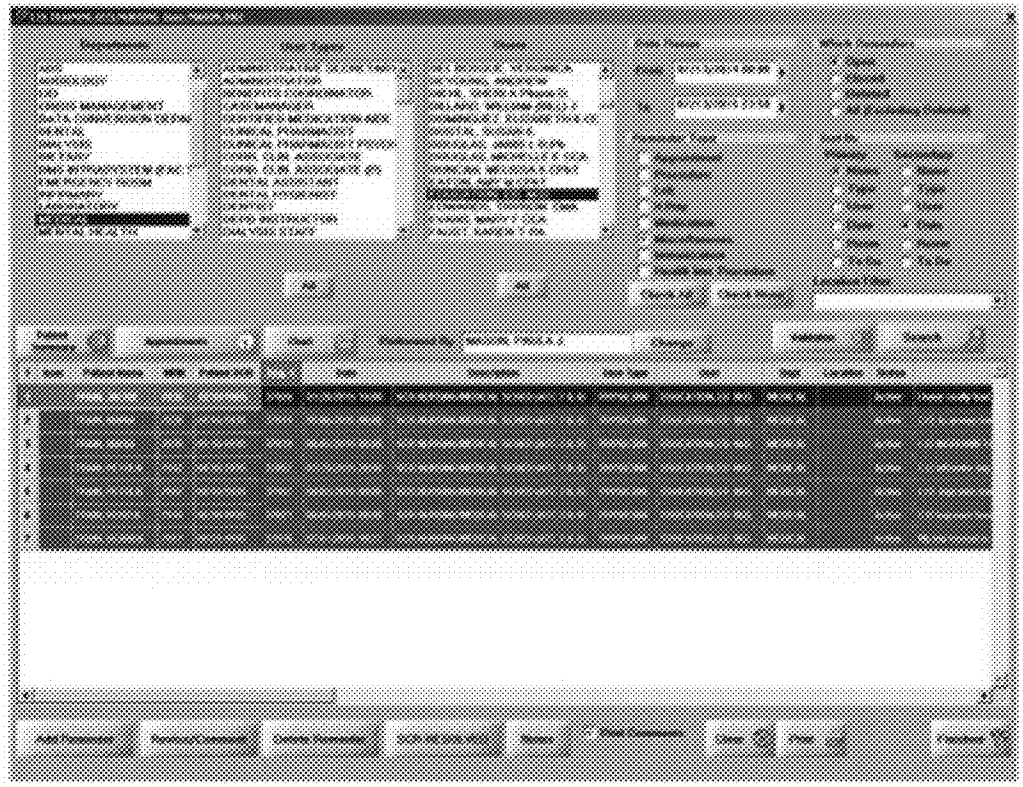

Figure 13

Scheduling Medical Sick Call

- The printed Reminder List.

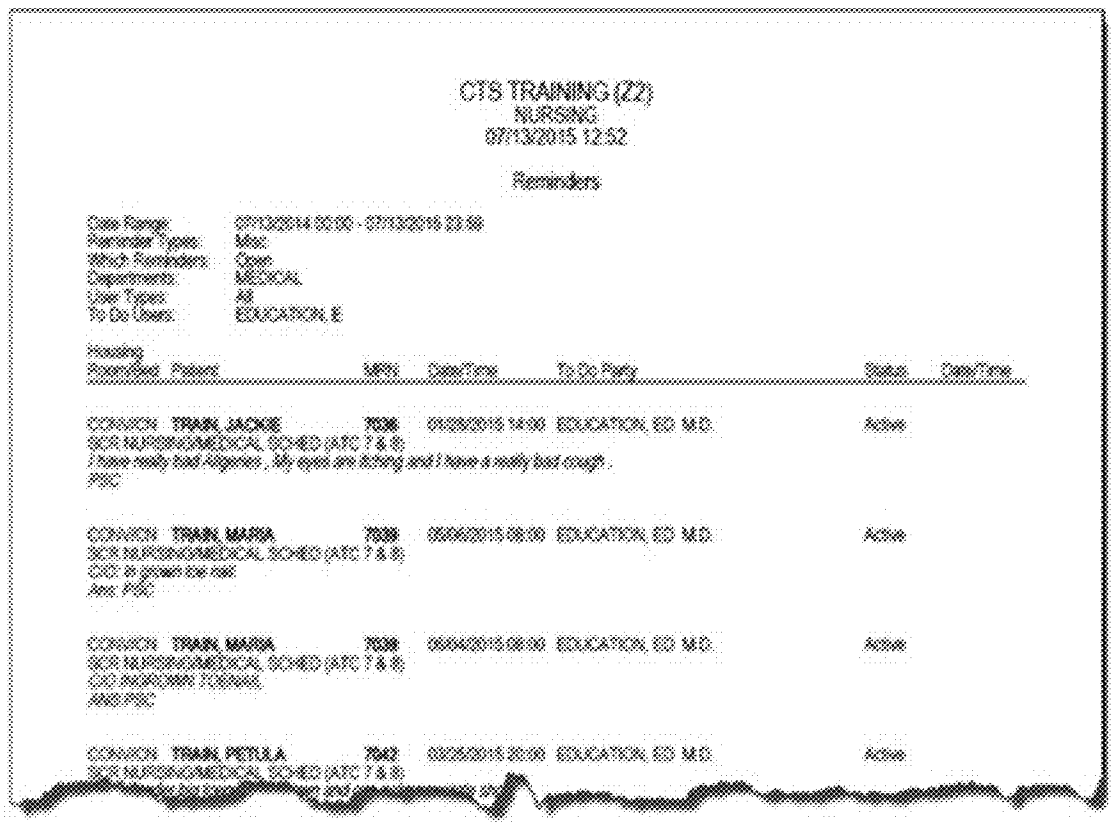

Figure 14

Detailed Disease Measure Worksheets

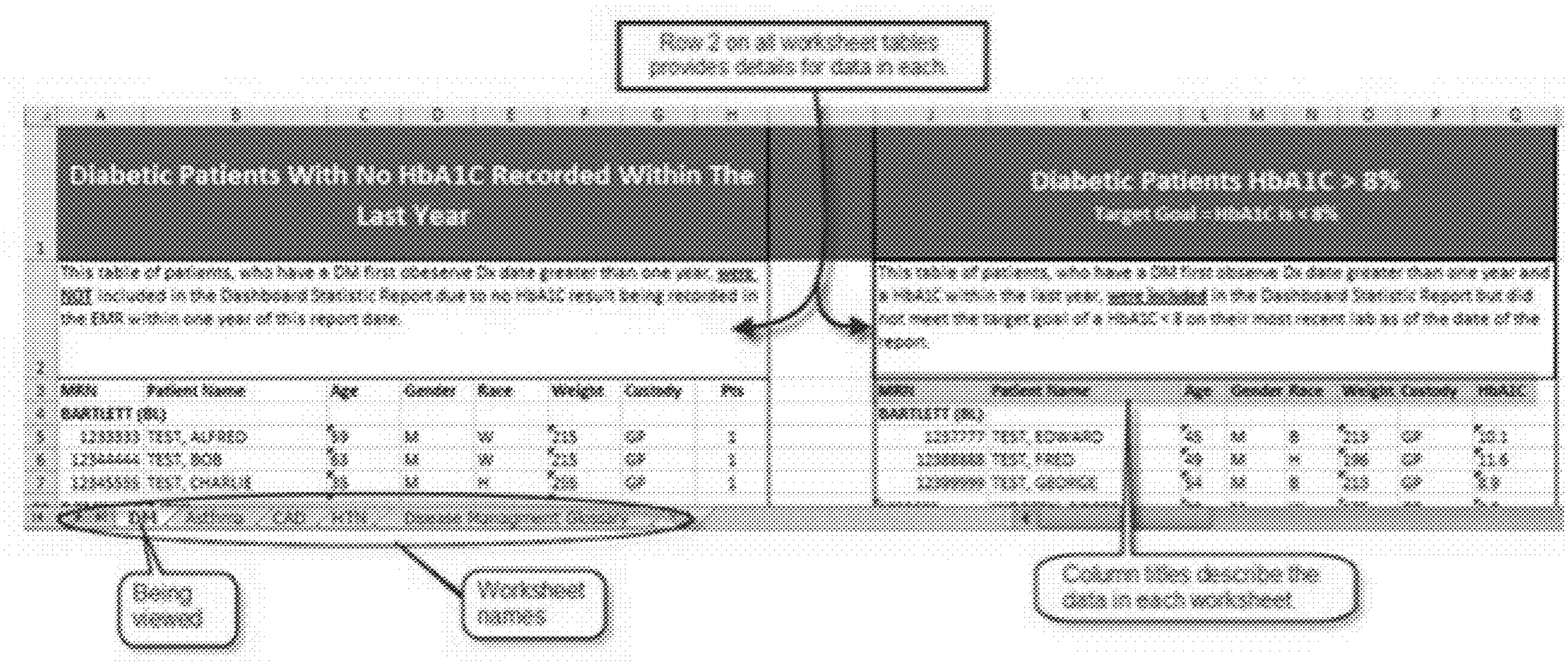

Figure 15

Corrective Action Plan (CAP)Format

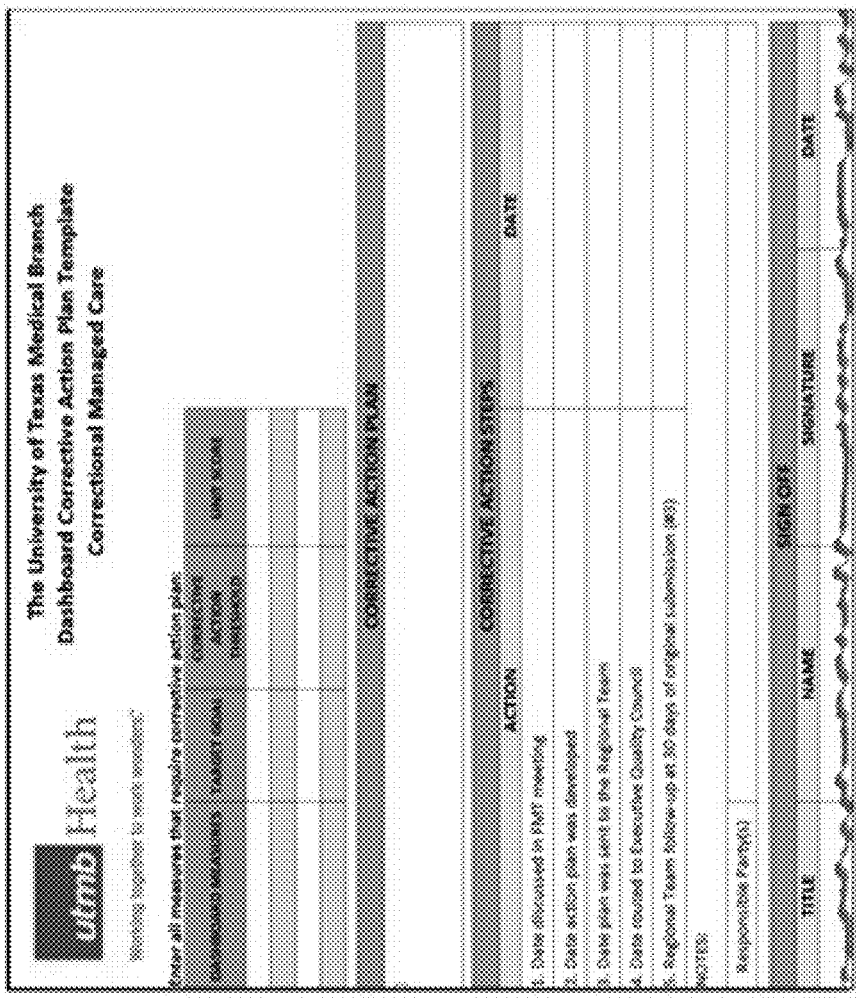

Figure 16

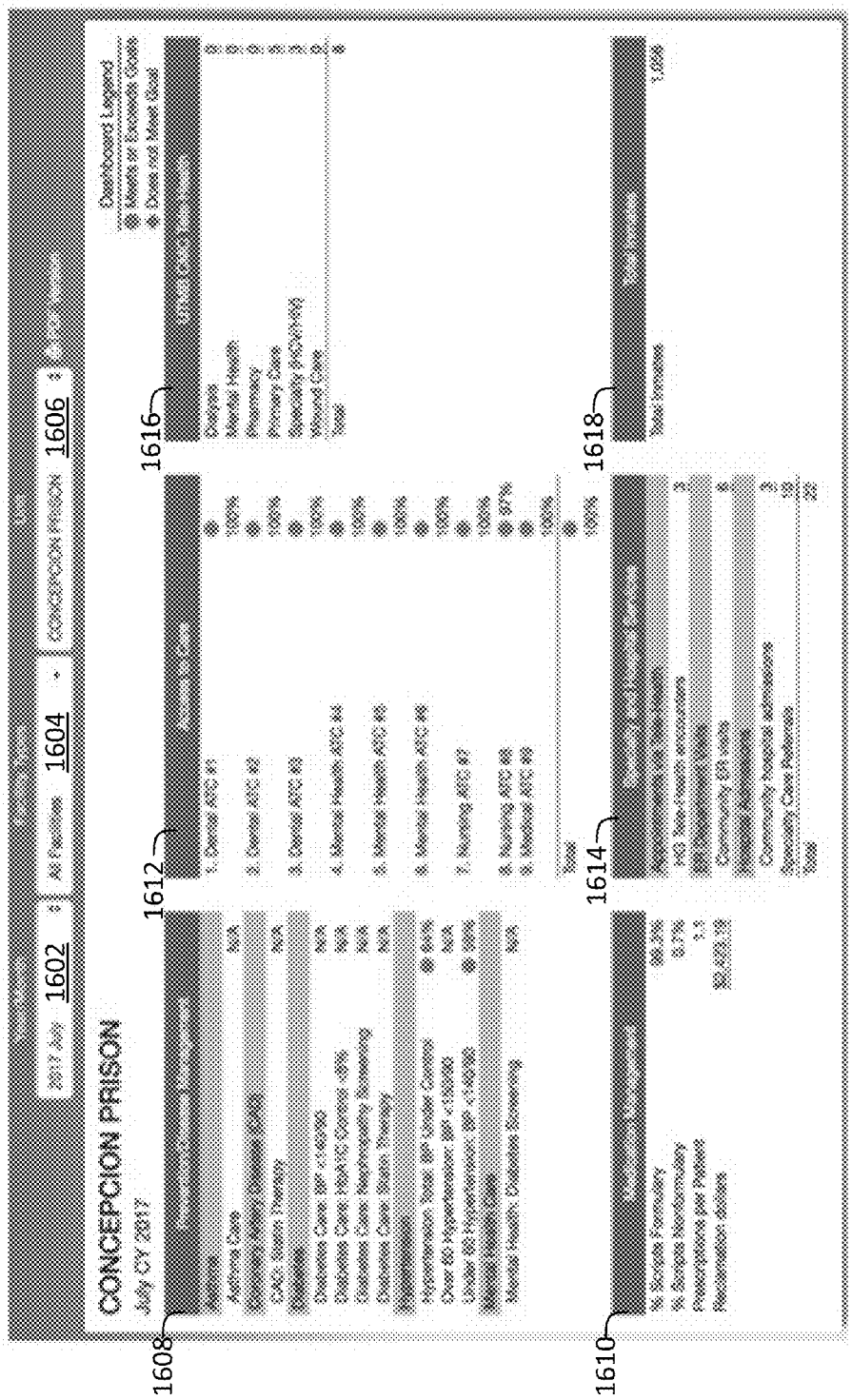
Facility Dashboard Example
1600
CONCEPCION PRISON
July CY 2017
1602
1604
1606
1608
1610
1612
1614
1616
1618

Figure 17

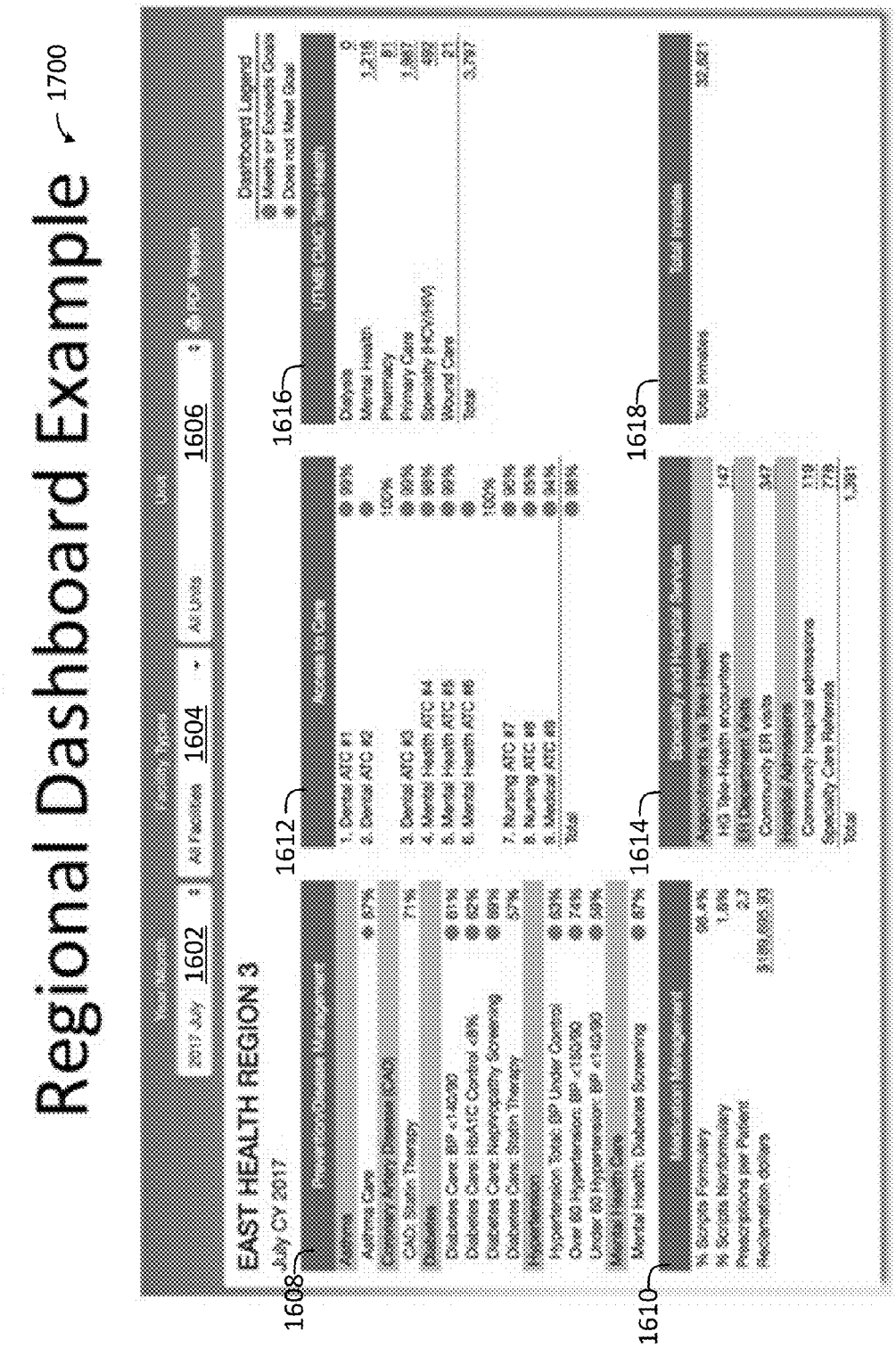
Regional Dashboard Example
1700
EAST HEALTH REGION 3
July CY 2017
1602
1604
1606
1608
1610
1612
1614
1616
1618
Dashboard Legend
Meets or Exceeds Goals
Does not Meet Goals

Figure 18

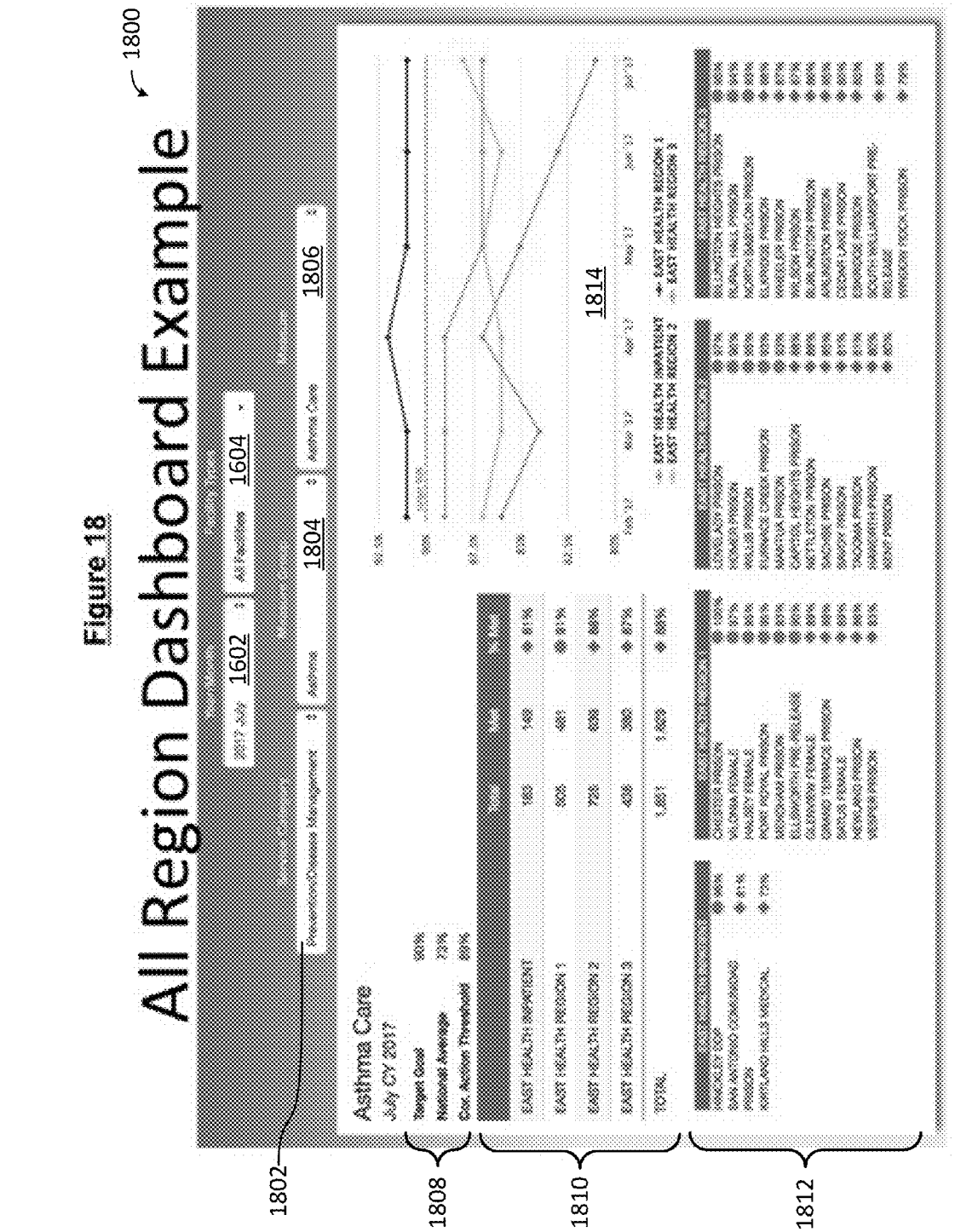
1800
All Region Dashboard Example
1602
1604
1804
1806
Asthma Care
July CY 2017
1814
1802
1808
1810
1812

Figure 19

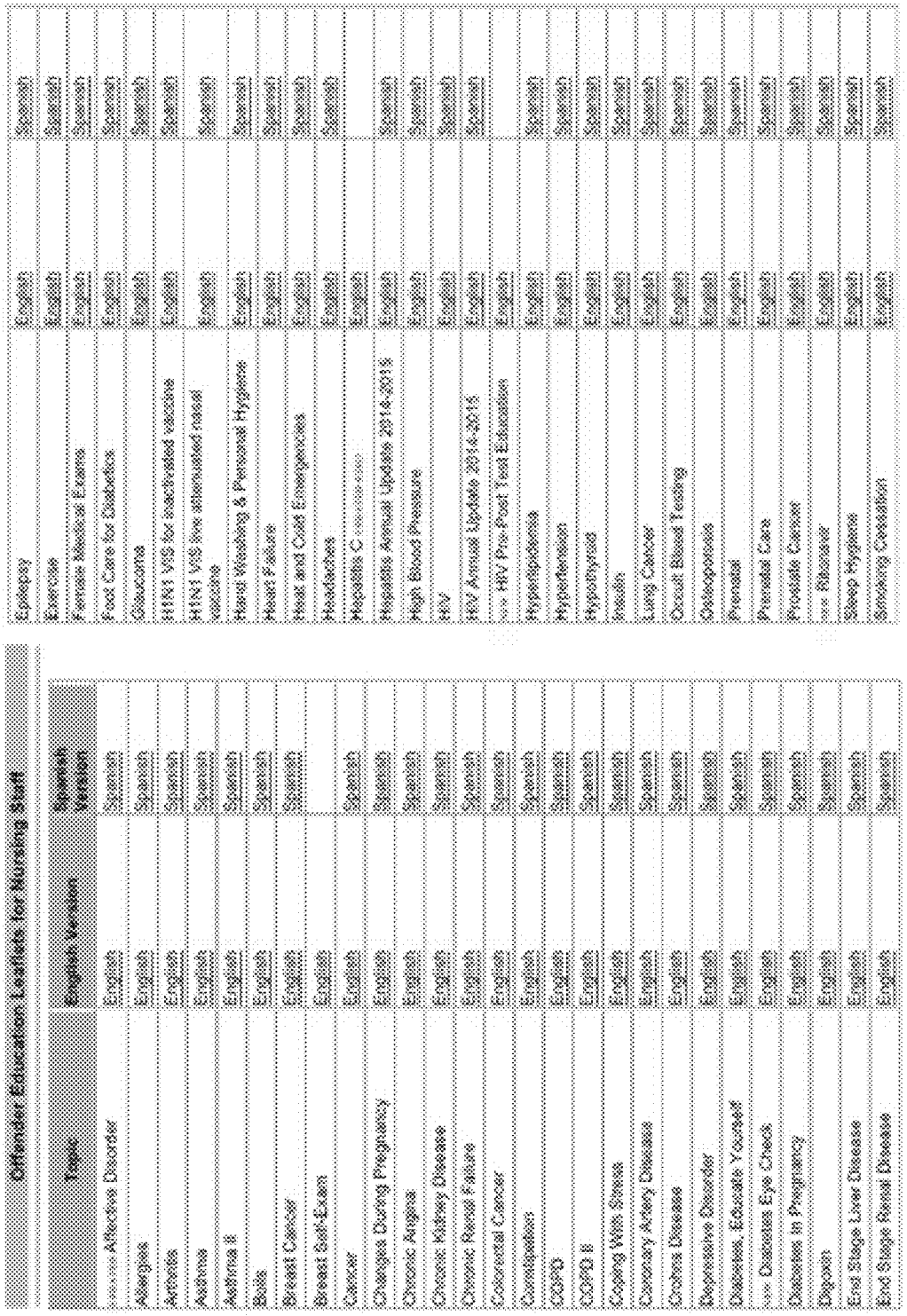
Offender Education Leaflet for Nursing Staff
Topic
English Version
Spanish Version
--- Affective Disorder
English
Spanish
Allergies
English
Spanish
Arthritis
English
Spanish
Asthma
English
Spanish
Asthma II
English
Spanish
Bells
English
Spanish
Breast Cancer
English
Spanish
Breast Self-Exam
English
Spanish
Cancer
English
Spanish
Changes During Pregnancy
English
Spanish
Chronic Angina
English
Spanish
Chronic Kidney Disease
English
Spanish
Chronic Renal Failure
English
Spanish
Colorectal Cancer
English
Spanish
Constipation
English
Spanish
COPD
English
Spanish
COPD II
English
Spanish
Coping With Stress
English
Spanish
Coronary Artery Disease
English
Spanish
Crohns Disease
English
Spanish
Depressive Disorder
English
Spanish
Diabetes, Educate Yourself
English
Spanish
--- Diabetes Eye Check
English
Spanish
Diabetes in Pregnancy
English
Spanish
Digoxin
English
Spanish
End Stage Liver Disease
English
Spanish
End Stage Renal Disease
English
Spanish
Epilepsy
English
Spanish
Exercise
English
Spanish
Female Medical Exams
English
Spanish
Foot Care for Diabetics
English
Spanish
Glaucoma
English
Spanish
H1N1 VIS for inactivated vaccine
English
Spanish
H1N1 VIS live attenuated nasal vaccine
English
Spanish
Hand Washing & Personal Hygiene
English
Spanish
Heart Failure
English
Spanish
Heat and Cold Emergencies
English
Spanish
Hemorrhoids
English
Spanish
Hepatitis C
English
Hepatitis Annual Update 2014-2015
English
Spanish
High Blood Pressure
English
Spanish
HIV
English
Spanish
HIV Annual Update 2014-2015
English
Spanish
--- HIV Pre-Post Test Education
English
Hypertriglyceridemia
English
Spanish
HyperVersion
English
Spanish
Hypothyroid
English
Spanish
Insulin
English
Spanish
Lung Cancer
English
Spanish
Occult Blood Testing
English
Spanish
Osteoporosis
English
Spanish
Prenatal
English
Spanish
Prenatal Care
English
Spanish
Prostate Cancer
English
Spanish
--- Rhinovirus
English
Spanish
Sleep Hygiene
English
Spanish
Smoking Cessation
English
Spanish

Figure 20

Overview of CMC Dashboard Report

1. Defines the Region being reviewed.
2. Defines the date of the report.
3. The legend defines the meaning of the green light, yellow light, and red light seen in the report.

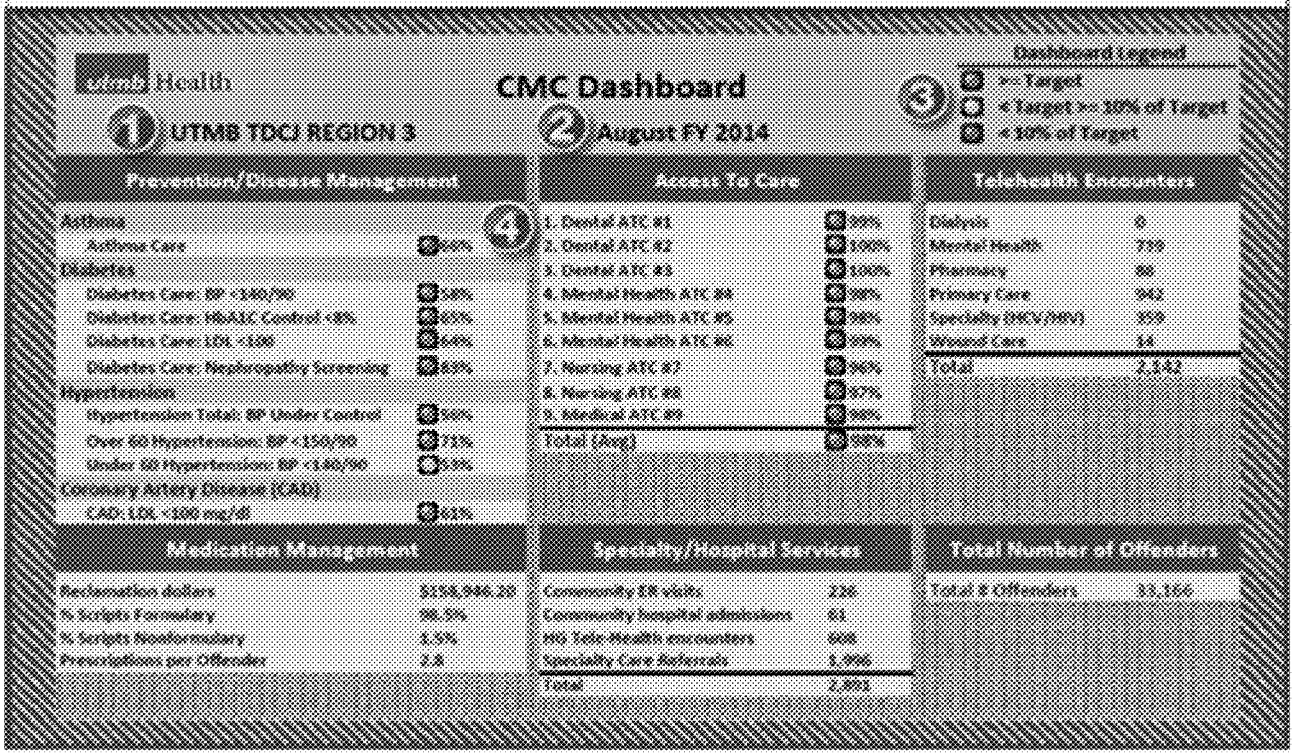

Figure 21

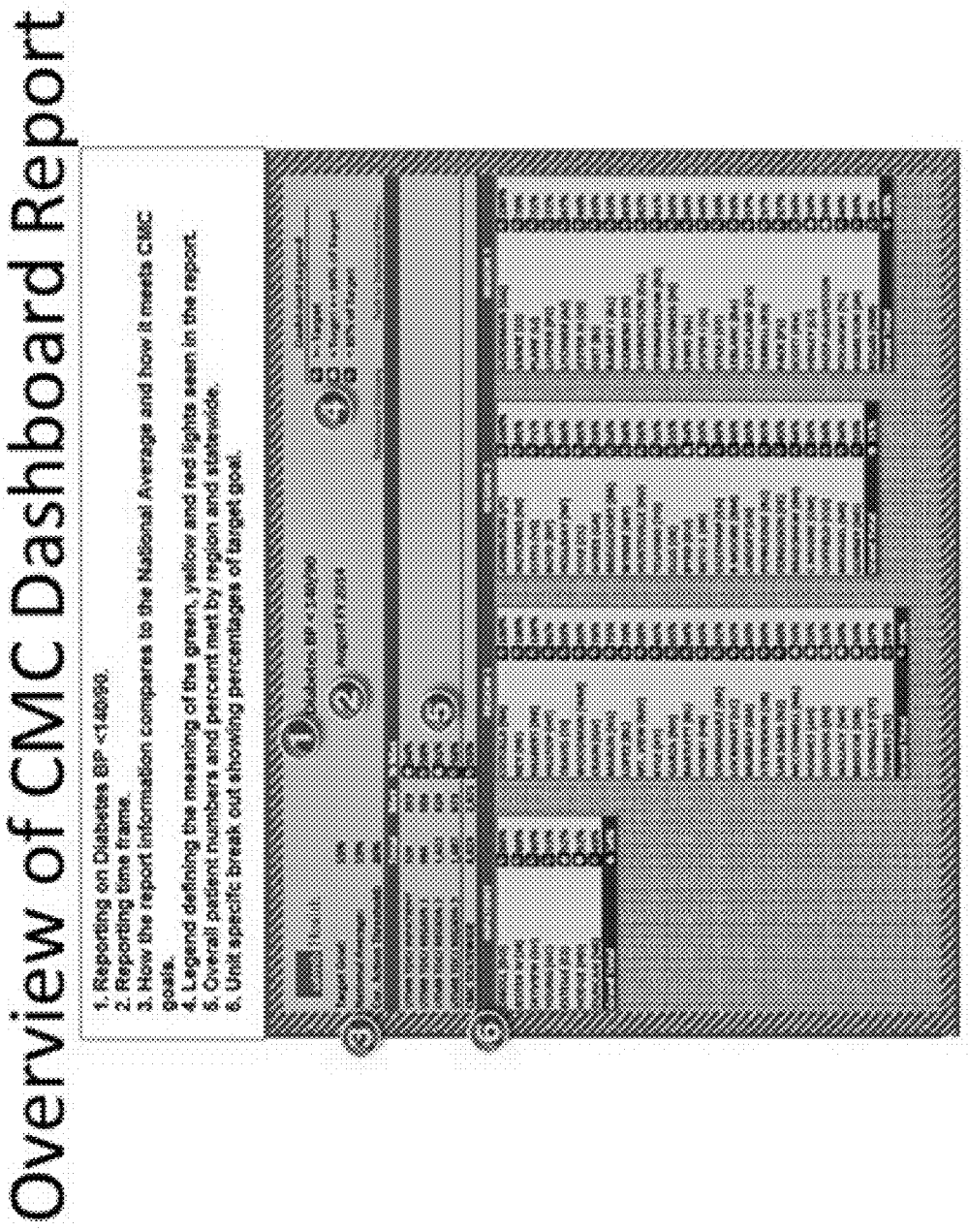
Overview of CMC Dashboard Report
1. Reporting on Diabetes BP <140/90.
2. Reporting time frame.
3. How the report information compares to the National Average and how it meets CMC goals.
4. Legend defining the meaning of the green, yellow and red lights seen in the report.
5. Overall patient numbers and percent met by region and statewide.
6. Unit specific break out showing percentages of target goal.

Figure 22

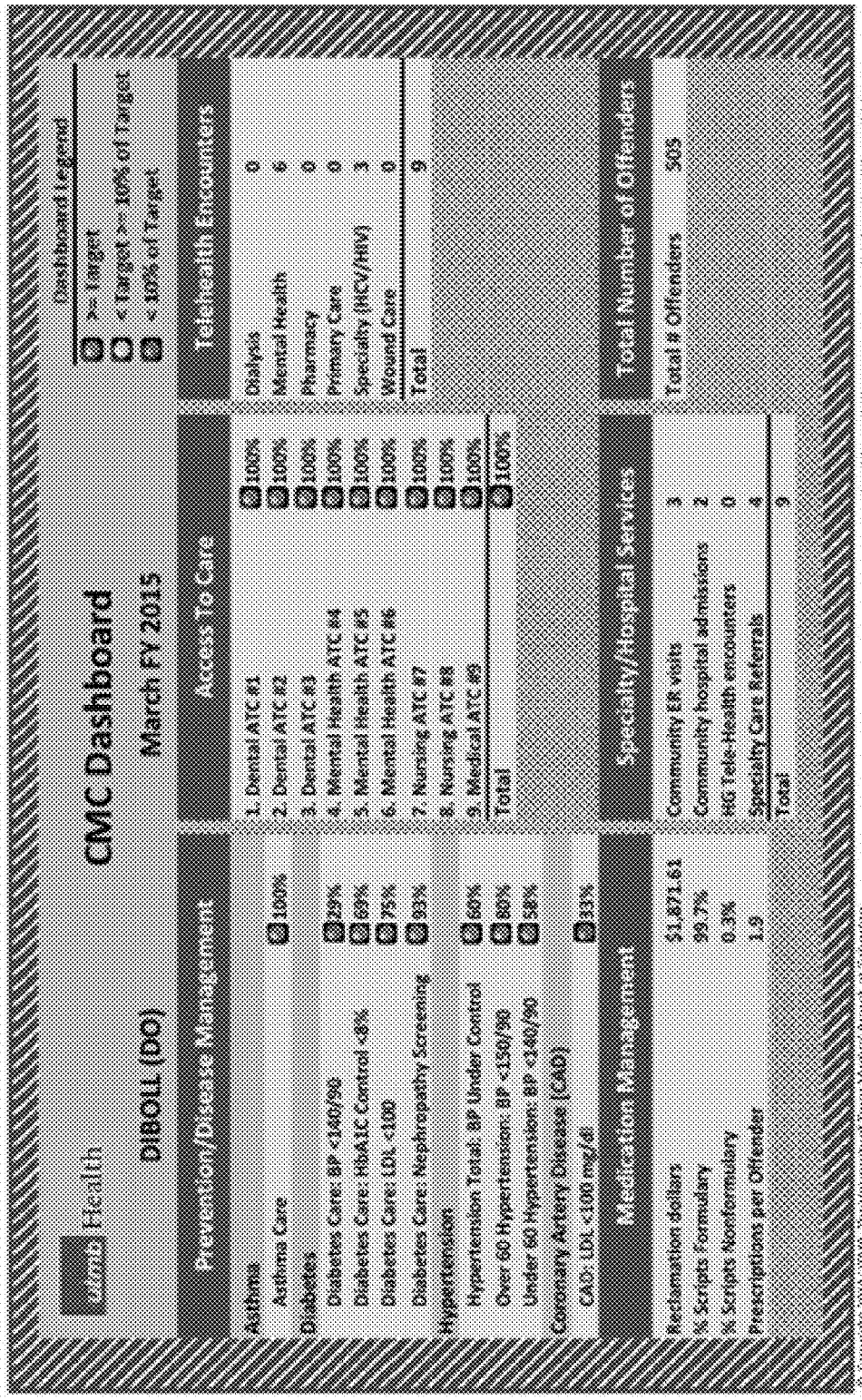
Health
CMC Dashboard
March FY 2015
DIBOLL (DO)
Dashboard Legend
>= Target
< Target >= 10% of Target
< 10% of Target
Prevention/Disease Management
Asthma
Asthma Care
100%
Diabetes
Diabetes Care: BP <140/90
89%
Diabetes Care: HbA1C Control <8%
69%
Diabetes Care: LDL <100
75%
Diabetes Care: Nephropathy Screening
92%
Hypertension
Hypertension Total: BP Under Control
80%
Over 60 Hypertension: BP <150/90
80%
Under 60 Hypertension: BP <140/90
58%
Coronary Artery Disease (CAD)
CAD: LDL <100 mg/dl
33%
Access To Care
1. Dental ATC #1
100%
2. Dental ATC #2
100%
3. Dental ATC #3
100%
4. Mental Health ATC #4
100%
5. Mental Health ATC #5
100%
6. Mental Health ATC #6
100%
7. Nursing ATC #7
100%
8. Nursing ATC #8
100%
9. Medical ATC #9
100%
Total
100%
Telehealth Encounters
Dialysis
0
Mental Health
6
Pharmacy
0
Primary Care
0
Specialty (HCV/HIV)
3
Wound Care
0
Total
9
Medication Management
Reclamation dollars
$1,871.61
% Scripts Formulary
99.7%
% Scripts Nonformulary
0.3%
Prescriptions per Offender
1.9
Specialty/Hospital Services
Community ER visits
3
Community hospital admissions
2
HS Tele-Health encounters
0
Specialty Care Referrals
4
Total
9
Total Number of Offenders
Total # Offenders
503
Dashboard Glossary
Back to Dashboard Menu

Figure 23

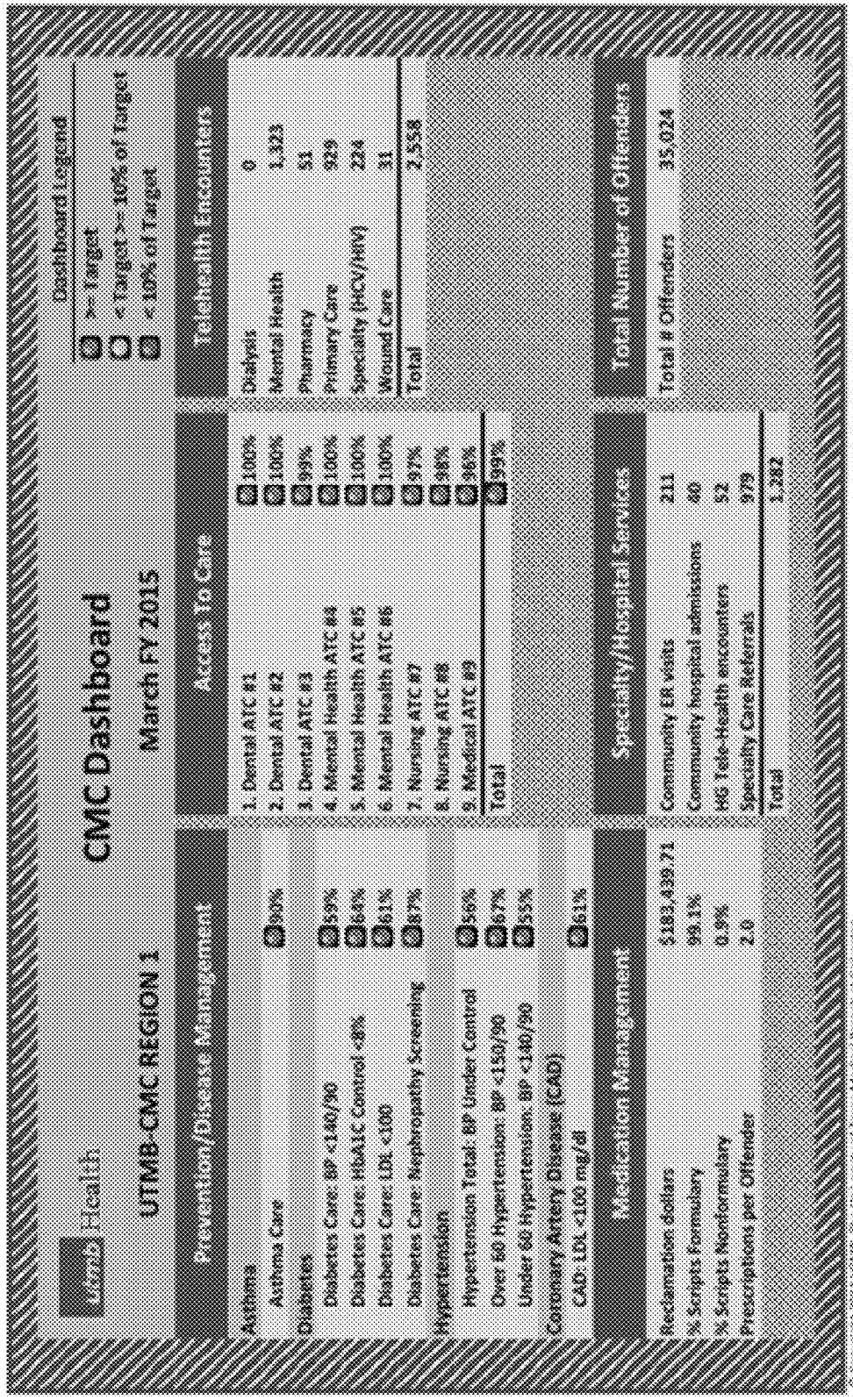
Health
CMC Dashboard
UTMB-CMC REGION 1
March FY 2015
Dashboard Legend
>= Target
< Target >= 10% of Target
< 10% of Target
Prevention/Disease Management
Asthma
Asthma Care
96%
Diabetes
Diabetes Care: BP <140/80
59%
Diabetes Care: HbA1C Control <8%
84%
Diabetes Care: LDL <100
61%
Diabetes Care: Nephropathy Screening
87%
Hypertension
Hypertension Total: BP Under Control
56%
Over 60 Hypertension: BP <150/90
67%
Under 60 Hypertension: BP <140/90
55%
Coronary Artery Disease (CAD)
CAD: LDL <100 mg/dl
61%
Access To Care
1. Dental ATC #1
100%
2. Dental ATC #2
100%
3. Dental ATC #3
99%
4. Mental Health ATC #4
100%
5. Mental Health ATC #5
100%
6. Mental Health ATC #6
100%
7. Nursing ATC #7
97%
8. Nursing ATC #8
98%
9. Medical ATC #9
96%
Total
99%
Telehealth Encounters
Dialysis
0
Mental Health
1,323
Pharmacy
51
Primary Care
929
Specialty (HCV/HIV)
224
Wound Care
31
Total
2,558
Medication Management
Reclamation dollars
$183,439.71
% Scripts Formulary
99.1%
% Scripts Nonformulary
0.9%
Prescriptions per Offender
2.0
Specialty/Hospital Services
Community ER visits
211
Community hospital admissions
40
HG Tele-Health encounters
52
Specialty Care Referrals
979
Total
1,282
Total Number of Offenders
Total # Offenders
35,024
© Copyright 2014 UTMB, The University of Texas Medical Branch at Galveston
Dashboard Glossary
Back to Dashboard Menu

Figure 24

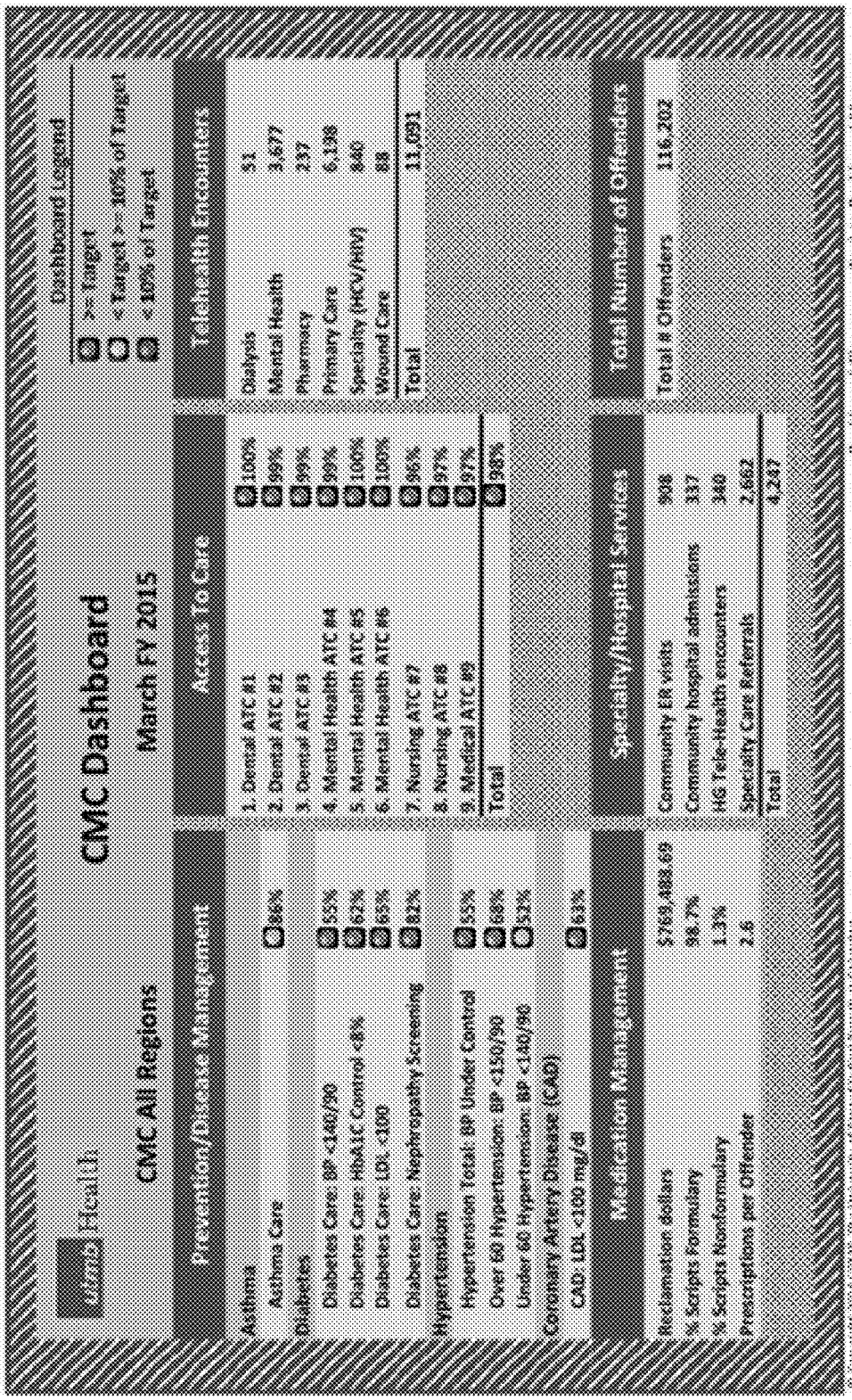
Health
CMC Dashboard
CMC All Regions
March FY 2015
Dashboard Legend
>= Target
< Target >= 80% of Target
< 80% of Target
Prevention/Disease Management
Asthma
Asthma Care 88%
Diabetes
Diabetes Care: BP <140/90 55%
Diabetes Care: HbA1C Control <8% 82%
Diabetes Care: LDL <100 65%
Diabetes Care: Nephropathy Screening 82%
Hypertension
Hypertension Total: BP Under Control 55%
Over 60 Hypertension: BP <150/90 88%
Under 60 Hypertension: BP <140/90 33%
Coronary Artery Disease (CAD)
CAD: LDL <100 mg/dl 63%
Access To Care
1. Dental ATC #1 100%
2. Dental ATC #2 99%
3. Dental ATC #3 99%
4. Mental Health ATC #4 99%
5. Mental Health ATC #5 100%
6. Mental Health ATC #6 100%
7. Nursing ATC #7 96%
8. Nursing ATC #8 97%
9. Medical ATC #9 97%
Total 98%
Telehealth Encounters
Dialysis 51
Mental Health 2,677
Pharmacy 237
Primary Care 6,138
Specialty (HCV/HIV) 840
Wound Care 88
Total 11,031
Medication Management
Reclamation Dollars $769,488.69
% Scripts Formulary 98.7%
% Scripts Nonformulary 1.3%
Prescriptions per Offender 2.5
Specialty/Hospital Services
Community ER visits 308
Community hospital admissions 337
HG Tele-Health encounters 340
Specialty Care Referrals 2,662
Total 4,247
Total Number of Offenders
Total # Offenders 116,202
Dashboard Glossary
Back to Dashboard Menu

Figure 25

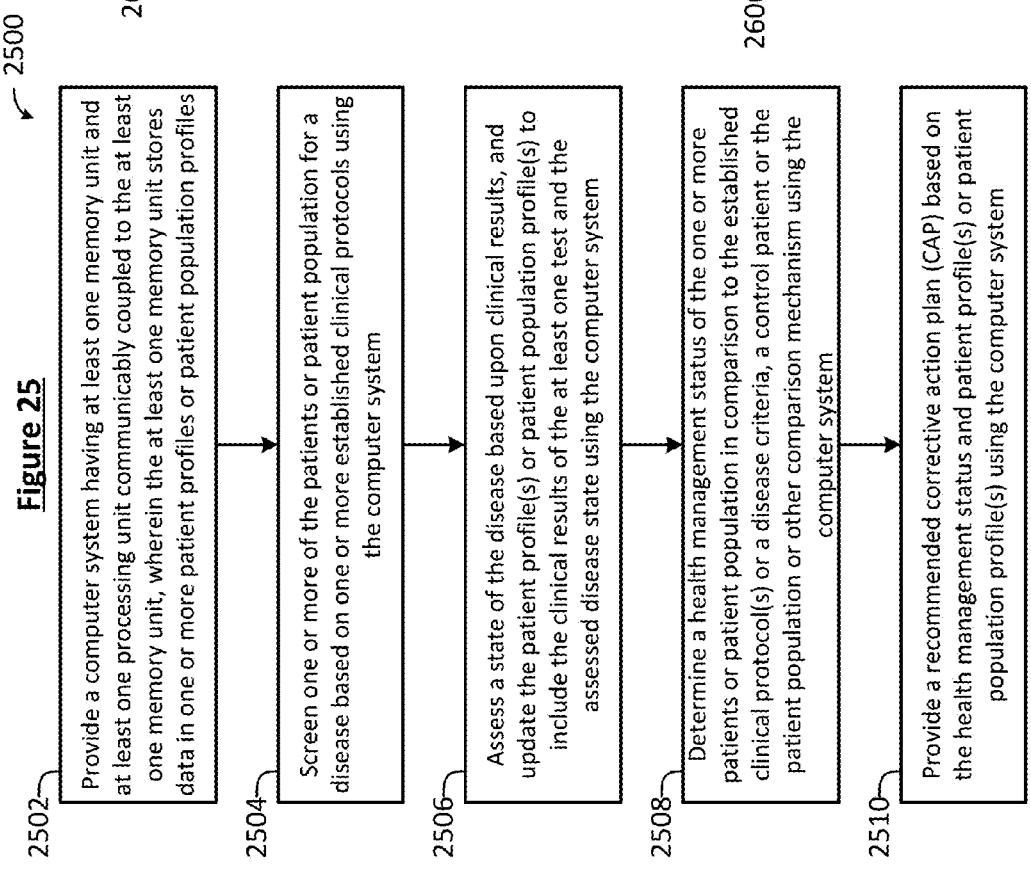

Figure 26

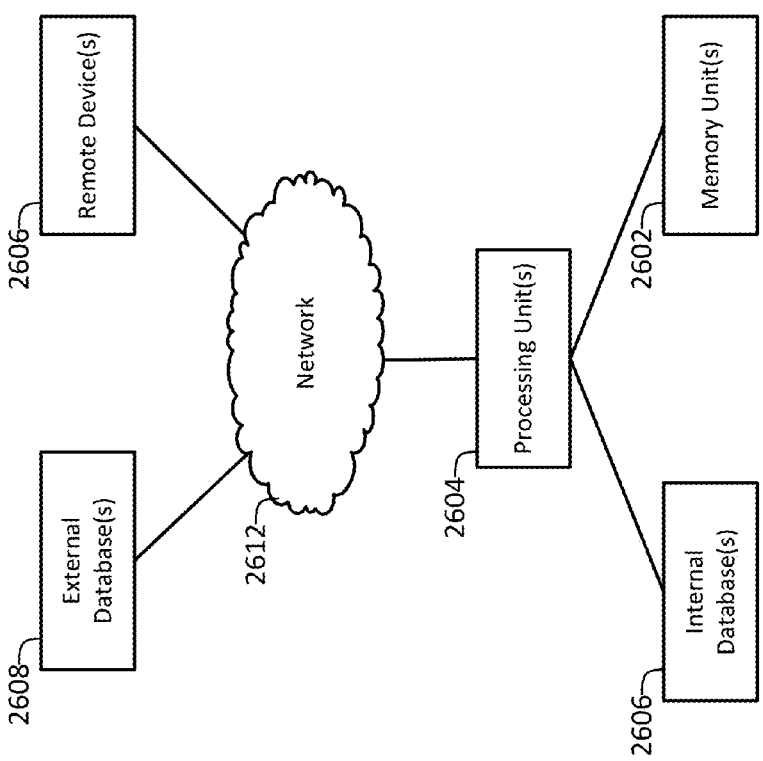

Figure 27A

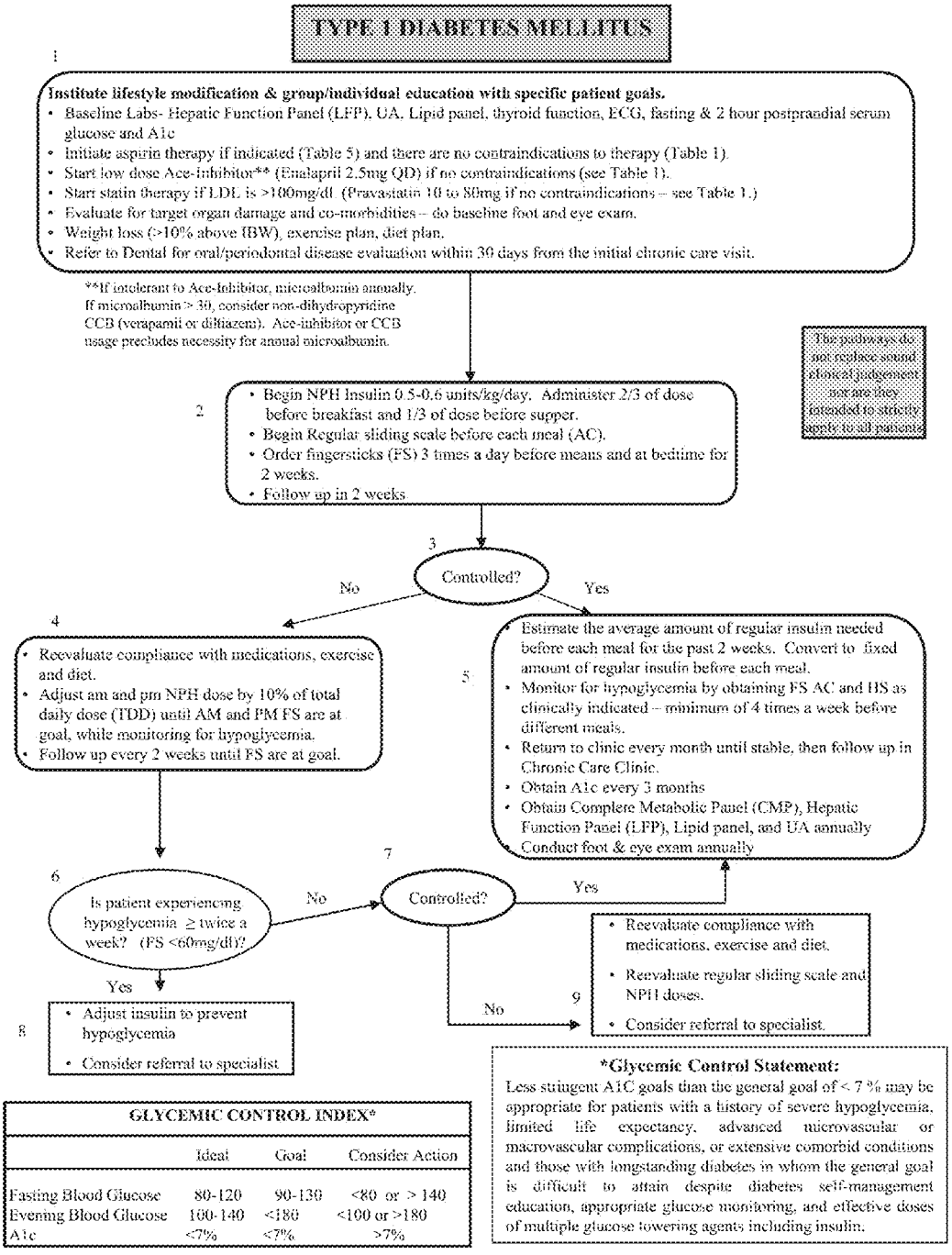
TYPE 1 DIABETES MELLITUS
1
Institute lifestyle modification & group/individual education with specific patient goals.
• Baseline Labs- Hepatic Function Panel (LFP), UA, Lipid panel, thyroid function, ECG, fasting & 2 hour postprandial serum glucose and A1c
• Initiate aspirin therapy if indicated (Table 5) and there are no contraindications to therapy (Table 1).
• Start low dose Ace-Inhibitor** (Enalapril 2.5mg QD) if no contraindications (see Table 1).
• Start statin therapy if LDL is >100mg/dl (Pravastatin 10 to 80mg if no contraindications – see Table 1.)
• Evaluate for target organ damage and co-morbidities – do baseline foot and eye exam.
• Weight loss (>10% above IBW), exercise plan, diet plan.
• Refer to Dental for oral/periodontal disease evaluation within 30 days from the initial chronic care visit.
**If intolerant to Ace-Inhibitor, microalbumin annually. If microalbumin > 30, consider non-dihydropyridine CCB (verapamil or diltiazem). Ace-inhibitor or CCB usage precludes necessity for annual microalbumin.
The pathways do not replace sound clinical judgement nor are they intended to strictly apply to all patients.
2
• Begin NPH Insulin 0.5-0.6 units/kg/day. Administer 2/3 of dose before breakfast and 1/3 of dose before supper.
• Begin Regular sliding scale before each meal (AC).
• Order fingersticks (FS) 3 times a day before means and at bedtime for 2 weeks.
• Follow up in 2 weeks
3
Controlled?
No
Yes
4
• Reevaluate compliance with medications, exercise and diet.
• Adjust am and pm NPH dose by 10% of total daily dose (TDD) until AM and PM FS are at goal, while monitoring for hypoglycemia.
• Follow up every 2 weeks until FS are at goal.
5
• Estimate the average amount of regular insulin needed before each meal for the past 2 weeks. Convert to fixed amount of regular insulin before each meal.
• Monitor for hypoglycemia by obtaining FS AC and HS as clinically indicated – minimum of 4 times a week before different meals.
• Return to clinic every month until stable, then follow up in Chronic Care Clinic.
• Obtain A1c every 3 months
• Obtain Complete Metabolic Panel (CMP), Hepatic Function Panel (LFP), Lipid panel, and UA annually
• Conduct foot & eye exam annually
6
Is patient experiencing hypoglycemia ≥ twice a week? (FS <60mg/dl)?
No
7
Controlled?
Yes
Yes
8
• Adjust insulin to prevent hypoglycemia
• Consider referral to specialist
No
9
• Reevaluate compliance with medications, exercise and diet.
• Reevaluate regular sliding scale and NPH doses.
• Consider referral to specialist.
GLYCEMIC CONTROL INDEX*
Ideal Goal Consider Action
Fasting Blood Glucose 80-120 90-130 <80 or > 140
Evening Blood Glucose 100-140 <180 <100 or >180
A1c <7% <7% >7%
*Glycemic Control Statement:
Less stringent A1C goals than the general goal of < 7 % may be appropriate for patients with a history of severe hypoglycemia, limited life expectancy, advanced microvascular or macrovascular complications, or extensive comorbid conditions and those with longstanding diabetes in whom the general goal is difficult to attain despite diabetes self-management education, appropriate glucose monitoring, and effective doses of multiple glucose lowering agents including insulin.

Figure 27B

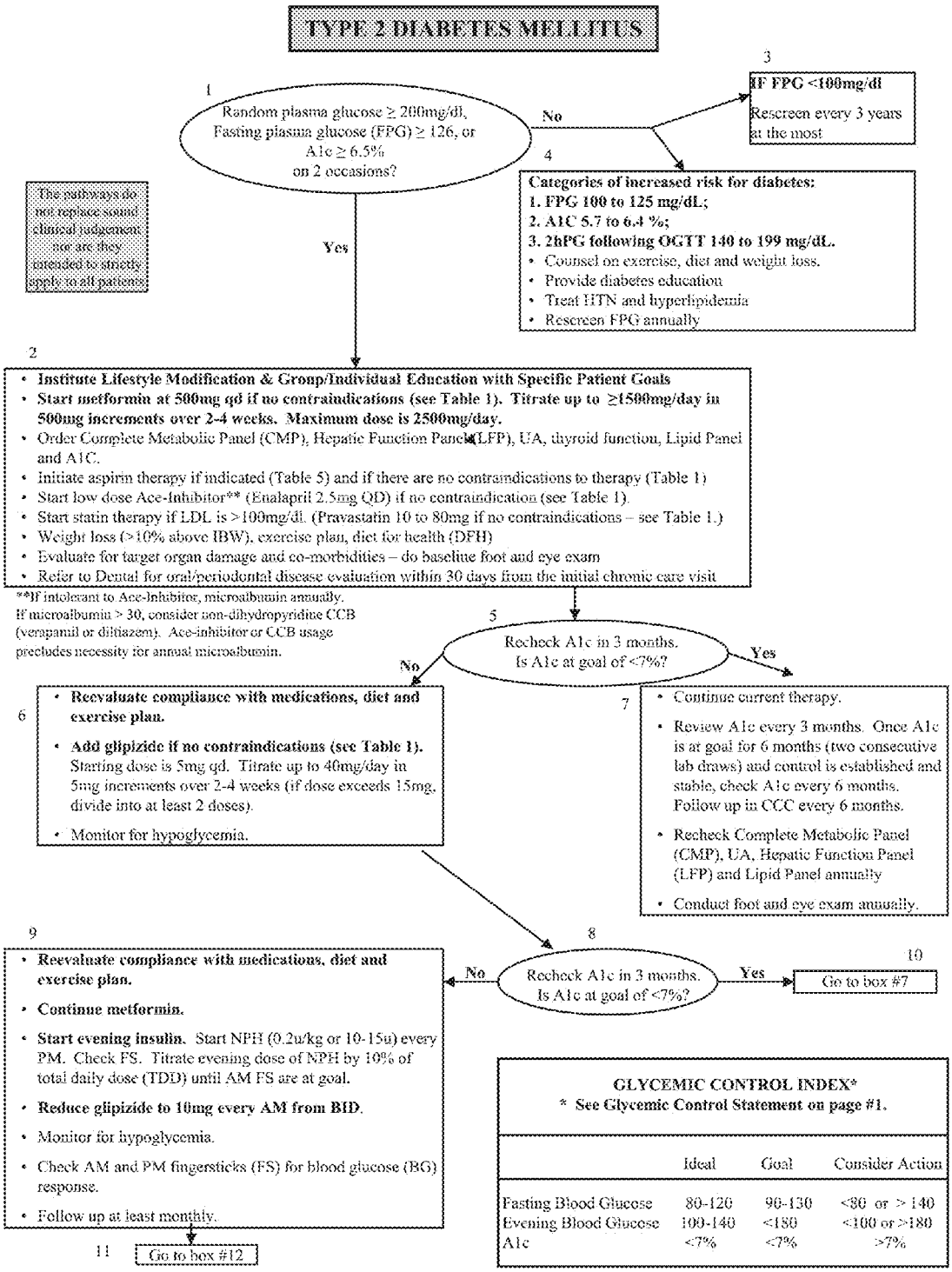
TYPE 2 DIABETES MELLITUS
1
Random plasma glucose ≥ 200mg/dl, Fasting plasma glucose (FPG) ≥ 126, or A1c ≥ 6.5% on 2 occasions?
No
3
IF FPG <100mg/dl
Rescreen every 3 years at the most
4
Categories of increased risk for diabetes:
1. FPG 100 to 125 mg/dL;
2. A1C 5.7 to 6.4 %;
3. 2hPG following OGTT 140 to 199 mg/dL.
• Counsel on exercise, diet and weight loss.
• Provide diabetes education
• Treat HTN and hyperlipidemia
• Rescreen FPG annually
The pathways do not replace sound clinical judgement nor are they intended to strictly apply to all patients
Yes
2
• Institute Lifestyle Modification & Group/Individual Education with Specific Patient Goals
• Start metformin at 500mg qd if no contraindications (see Table 1). Titrate up to ≥1500mg/day in 500mg increments over 2-4 weeks. Maximum dose is 2500mg/day.
• Order Complete Metabolic Panel (CMP), Hepatic Function Panel (LFP), UA, thyroid function, Lipid Panel and A1C.
• Initiate aspirin therapy if indicated (Table 5) and if there are no contraindications to therapy (Table 1)
• Start low dose Ace-Inhibitor** (Enalapril 2.5mg QD) if no contraindication (see Table 1).
• Start statin therapy if LDL is >100mg/dl. (Pravastatin 10 to 80mg if no contraindications – see Table 1.)
• Weight loss (>10% above IBW), exercise plan, diet for health (DFH)
• Evaluate for target organ damage and co-morbidities – do baseline foot and eye exam
• Refer to Dental for oral/periodontal disease evaluation within 30 days from the initial chronic care visit
**If intolerant to Ace-Inhibitor, microalbumin annually.
If microalbumin > 30, consider non-dihydropyridine CCB (verapamil or diltiazem). Ace-inhibitor or CCB usage precludes necessity for annual microalbumin.
5
Recheck A1c in 3 months. Is A1c at goal of <7%?
No
Yes
6
• Reevaluate compliance with medications, diet and exercise plan.
• Add glipizide if no contraindications (see Table 1). Starting dose is 5mg qd. Titrate up to 40mg/day in 5mg increments over 2-4 weeks (if dose exceeds 15mg, divide into at least 2 doses).
• Monitor for hypoglycemia.
7
• Continue current therapy.
• Review A1c every 3 months. Once A1c is at goal for 6 months (two consecutive lab draws) and control is established and stable, check A1c every 6 months. Follow up in CCC every 6 months.
• Recheck Complete Metabolic Panel (CMP), UA, Hepatic Function Panel (LFP) and Lipid Panel annually
• Conduct foot and eye exam annually.
8
Recheck A1c in 3 months. Is A1c at goal of <7%?
No
Yes
10
Go to box #7
9
• Reevaluate compliance with medications, diet and exercise plan.
• Continue metformin.
• Start evening insulin. Start NPH (0.2u/kg or 10-15u) every PM. Check FS. Titrate evening dose of NPH by 10% of total daily dose (TDD) until AM FS are at goal.
• Reduce glipizide to 10mg every AM from BID.
• Monitor for hypoglycemia.
• Check AM and PM fingersticks (FS) for blood glucose (BG) response.
• Follow up at least monthly.
11
Go to box #12
GLYCEMIC CONTROL INDEX*
* See Glycemic Control Statement on page #1.
Ideal Goal Consider Action
Fasting Blood Glucose 80-120 90-130 <80 or > 140
Evening Blood Glucose 100-140 <180 <100 or >180
A1c <7% <7% >7%

Figure 27C

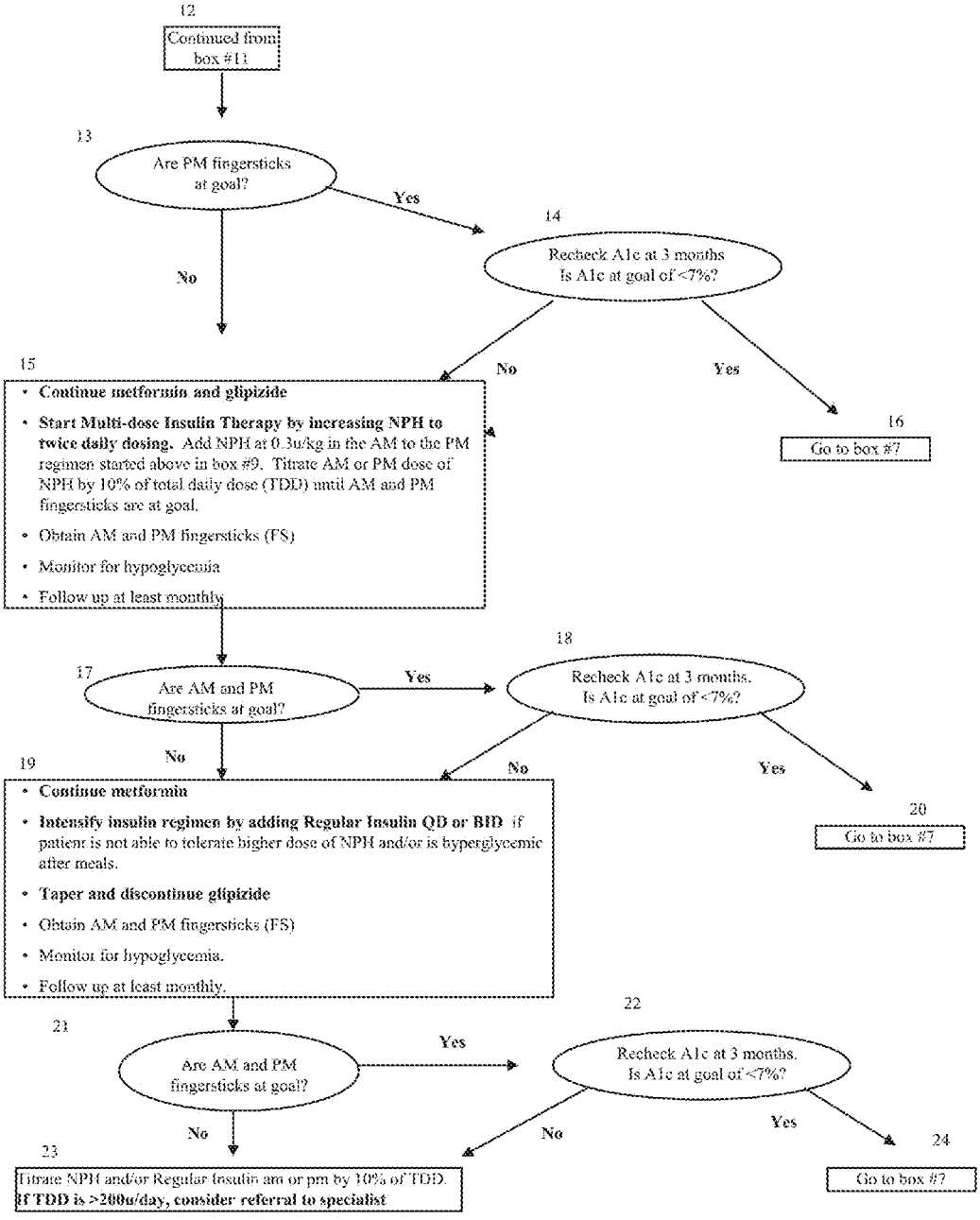
12
Continued from box #11
13
Are PM fingersticks at goal?
Yes
No
14
Recheck A1c at 3 months Is A1c at goal of <7%?
No
Yes
15
• Continue metformin and glipizide
• Start Multi-dose Insulin Therapy by increasing NPH to twice daily dosing. Add NPH at 0.3u/kg in the AM to the PM regimen started above in box #9. Titrate AM or PM dose of NPH by 10% of total daily dose (TDD) until AM and PM fingersticks are at goal.
• Obtain AM and PM fingersticks (FS)
• Monitor for hypoglycemia
• Follow up at least monthly
16
Go to box #7
17
Are AM and PM fingersticks at goal?
Yes
No
18
Recheck A1c at 3 months. Is A1c at goal of <7%?
No
Yes
19
• Continue metformin
• Intensify insulin regimen by adding Regular Insulin QD or BID if patient is not able to tolerate higher dose of NPH and/or is hyperglycemic after meals.
• Taper and discontinue glipizide
• Obtain AM and PM fingersticks (FS)
• Monitor for hypoglycemia.
• Follow up at least monthly.
20
Go to box #7
21
Are AM and PM fingersticks at goal?
Yes
No
22
Recheck A1c at 3 months. Is A1c at goal of <7%?
No
Yes
23
Titrate NPH and/or Regular Insulin am or pm by 10% of TDD. If TDD is >200u/day, consider referral to specialist
24
Go to box #7

Figure 27D

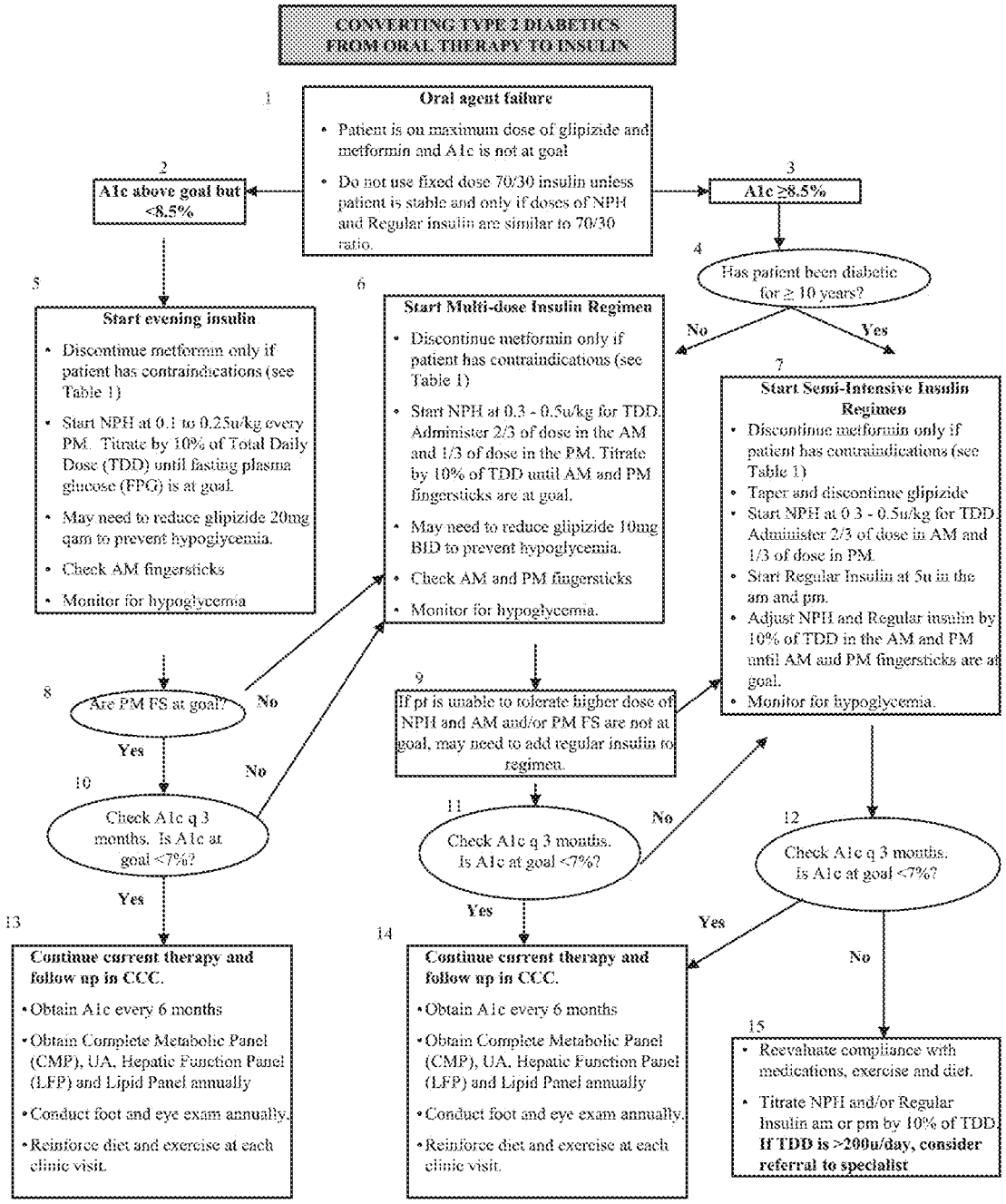
CONVERTING TYPE 2 DIABETICS FROM ORAL THERAPY TO INSULIN
1
Oral agent failure
• Patient is on maximum dose of glipizide and metformin and A1c is not at goal
• Do not use fixed dose 70/30 insulin unless patient is stable and only if doses of NPH and Regular insulin are similar to 70/30 ratio.
2
A1c above goal but <8.5%
3
A1c ≥8.5%
4
Has patient been diabetic for ≥ 10 years?
No
Yes
5
Start evening insulin
• Discontinue metformin only if patient has contraindications (see Table 1)
• Start NPH at 0.1 to 0.25u/kg every PM. Titrate by 10% of Total Daily Dose (TDD) until fasting plasma glucose (FPG) is at goal.
• May need to reduce glipizide 20mg qam to prevent hypoglycemia.
• Check AM fingersticks
• Monitor for hypoglycemia
6
Start Multi-dose Insulin Regimen
• Discontinue metformin only if patient has contraindications (see Table 1)
• Start NPH at 0.3 - 0.5u/kg for TDD. Administer 2/3 of dose in the AM and 1/3 of dose in the PM. Titrate by 10% of TDD until AM and PM fingersticks are at goal.
• May need to reduce glipizide 10mg BID to prevent hypoglycemia.
• Check AM and PM fingersticks
• Monitor for hypoglycemia.
7
Start Semi-Intensive Insulin Regimen
• Discontinue metformin only if patient has contraindications (see Table 1)
• Taper and discontinue glipizide
• Start NPH at 0.3 - 0.5u/kg for TDD. Administer 2/3 of dose in AM and 1/3 of dose in PM.
• Start Regular Insulin at 5u in the am and pm.
• Adjust NPH and Regular insulin by 10% of TDD in the AM and PM until AM and PM fingersticks are at goal.
• Monitor for hypoglycemia.
8
Are PM FS at goal?
No
Yes
9
If pt is unable to tolerate higher dose of NPH and AM and/or PM FS are not at goal, may need to add regular insulin to regimen.
10
Check A1c q 3 months. Is A1c at goal <7%?
No
Yes
11
Check A1c q 3 months. Is A1c at goal <7%?
No
Yes
12
Check A1c q 3 months. Is A1c at goal <7%?
Yes
No
13
Continue current therapy and follow up in CCC.
• Obtain A1c every 6 months
• Obtain Complete Metabolic Panel (CMP), UA, Hepatic Function Panel (LFP) and Lipid Panel annually
• Conduct foot and eye exam annually.
• Reinforce diet and exercise at each clinic visit.
14
Continue current therapy and follow up in CCC.
• Obtain A1c every 6 months
• Obtain Complete Metabolic Panel (CMP), UA, Hepatic Function Panel (LFP) and Lipid Panel annually
• Conduct foot and eye exam annually.
• Reinforce diet and exercise at each clinic visit.
15
• Reevaluate compliance with medications, exercise and diet.
• Titrate NPH and/or Regular Insulin am or pm by 10% of TDD. If TDD is >200u/day, consider referral to specialist

Figure 27E

DIABETES DISEASE MANAGEMENT GUIDELINES

I. **Assessment**

A. Screening: Should be conducted on high risk individuals and those with suggestive symptomatology.
   1. Criteria for Testing for Diabetes in Asymptomatic Undiagnosed Individuals
      a. Testing for diabetes should be considered in all individuals at age 45 years and above, if normal, if should be repeated at 3 year intervals.
      b. Testing should be considered at a younger age or be carried out annually in individuals who:
         - are obese (≥ 120% desirable body weight/IBW or BMI ≥ 25 kg/m²)
         - have a first-degree relative with diabetes
         - are members of high-risk ethnic population (e.g., African-American, Latino Native American, Asian American, Pacific Islander)
         - have delivered a baby weighing > 9 lb or have been diagnosed with GDM
         - are hypertensive (≥ 140/90)
         - have an HDL cholesterol level ≤ 35 mg/dl and/or a triglyceride level ≥ 250 mg/dl
         - on previous testing, had IGT or IFG
         - have a history of vascular disease
         - have other clinical conditions associated with insulin resistance (e.g. PCOS or acanthosis nigricans)

B. Symptoms
   1. Polyuria
   2. Weight loss with polyphagia
   3. Polydipsia
   4. Blurred vision
   5. Vaginitis or balanitis
   6. Extremity numbness/paresthesia
   7. Fatigue
   8. Acanthosis Nigracans

C. Past Medical History: If previously diagnosed with diabetes, relevant history includes:
   1. Periodontal disease
   2. Exercise pattern
   3. Eating patterns (frequency of going to chow and/or eating out of commissary)
   4. Prior and current treatment of diabetes and results
   5. Prior or current infections, frequency
   6. Severity and cause of acute complications of DM (hypoglycemia/ketoacidosis)
   7. Symptoms and treatment of chronic diabetic complications
      a. Microvascular: eye, kidney, nerve
      b. Macrovascular: cardiac, CVD, PAD
      c. Other: sexual dysfunction, gastroparesis

D. Physical exam: (Initial and CCC) Should include the following:
   1. Height & Weight (complete at each visit)
   2. Blood pressure (complete at each visit)
   3. HEENT: Ophthalmoscopic examination (preferably dilated), oral exam, thyroid palpation
   4. CV: cardiac exam, peripheral vascular exam to include pedal pulses
   5. Extremities: Especially sensation of hands, fingers and feet
   6. Abdominal exam
   7. Skin examination
   8. Neurological examination (to include monofilament exam on feet)
   9. Dental examination

E. Lab Evaluation (See pathways for frequency)
   1. Complete Metabolic Panel (CMP)
   2. Fasting lipid panel
   3. Urinalysis (C & S if U/A abnormal)
   4. Calculated GFR
   5. Test for microalbuminuria
   6. A1c
   7. EKG (if age > 35)
   8. TSH (baseline)
   9. Hepatic Function Panel (LFP)

Figure 27F

Diabetes Disease Management Guideline Page 2

II. Diagnosis

A. FPG: Ideally after an overnight fast (alternatively, no caloric intake for a minimum of 8 hours)
B. OGTT: Use is reserved for pregnant patients but may be used as an alternative to FPG
C. A1C: The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.

CRITERIA FOR DIABETES MELLITUS DIAGNOSIS			
Lab:	**Normal:**	**Categories of increased risk for diabetes:**	**Diabetes:**
Fasting Plasma Glucose (FPG)*	**< 100 mg/dL**	**100 to 125 mg/dL**	**≥ 126mg/dL**
2hPG following OGTT**	**< 140 mg/dL**	**140 to 199 mg/dL**	**≥ 200mg/dL**
HbA1c (A1C)*	**< 5.7 %**	**5.7 to 6.4 %**	**≥ 6.5 %**

*In the absence of unequivocal hyperglycemia the tests should be confirmed by repeat testing.
**OGTT = Oral glucose tolerance test.

III. Plan/Treatment - Treatment should begin with metformin (see algorithm page 2), weight loss, dietary restrictions (ADA diet) and exercise.

A. Diet: 45-65% total energy from carbohydrates, 20-35% from fat, 10 to 35% from protein and 20-35g of fiber daily.
B. Exercise: If there are no medical contraindications, at least 150 min/week of moderate-intensity aerobic phydical activity (50-70% of maximum heart rate) and/or at least 90 min/week of vigorous aerobic exercise (>70% of maximum heart rate) is recommended.
C. Weight loss: Goal to approach ideal body weight
D. Pharmacologic Therapy:
   1. See Treatment Algorithms and tables 1-3.
   2. Glycemic Goals include A1c <7%, AM fingersticks 90-130mg/dL and PM fingersticks <180mg/dL.
E. Control of Co-morbid disease states such as:
   1. HTN – BP goal < 140/80
   2. Lipids – goal TC < 200 mg/dl, LDL < 100 mg/dl, HDL > 40 mg/dl, TG < 150 mg/dl
F. Vaccinations: pneumococcal and annual influenza

IV. Classification

A. HSM-18 Restrictions: Should be an individualized assessment commiserate with the patient's severity of disease.
   1. Unit of Assignment: If a patient is a brittle Type 1 Diabetic, for example, the patient should be assigned to a unit with 24 hours nursing coverage. Patients with severe diabetes and multi-system end organ disease would be more appropriately monitored at a 24 hour nursing unit or RMF. Diabetics that require BID insulin dosing should be housed at units with at least 12 hour nursing service.
   2. Housing Assignment: For most diabetics, who are stable, no restrictions. However, a severe diabetic should not be assigned to a single cell. Those diabetics who are prone to hypoglycemia or ketoacidosis should also be restricted to a lower bunk, ground floor and restricted from climbing.
   3. Work Assignment: For patients prone to hypoglycemia or severe hyperglycemic, consideration should be given to restriction from temperature and humidity extremes. Patients with documented peripheral vascular disease and/or neuropathy should not wear steel toed boots and should limit squatting.
   4. ITP: No restrictions unless severe diabetic, then as needed.
   5. Transportation: No restriction unless severe/brittle diabetic that would necessitate nursing/EMS care/monitoring during transport.

Figure 27G

EDUCATION FOR PATIENTS AND PRACTITIONERS

I. Who is educated?
   A. Unit Practitioners – updated on diabetes so accurate and easy to understand information is provided to patients.
   B. All diabetic patients
      1. Type 1 diabetics - absolute deficiency in insulin secretion.
      2. Type 2 diabetics - A combination of resistance to insulin action and inadequate compensatory insulin secretory response.

II. Who educates?
   A. The Unit Team will delegate educational responsibility
      1. Educator must document date and time of education in patient's chart.
      2. Physician, Physician's Assistant, and Clinical Pharmacist have final responsibility to ensure education occurs (if not documented on chart as completed by some other designated education provider, must provide diabetes education at clinic visit).
      3. Units with available dieticians will provide counseling on diet and how to choose the correct foods from the meal line, otherwise, diet counseling will be completed by the diabetes educator.

III. When does education take place?
   A. Within the patient's first week of stay on unit assignment OR at the initial visit to clinic, whichever comes first.
   B. Group Education providing individual goals for weight, exercise, glucose levels, diet, etc.
   C. Individual Education at clinic visits will supplement information provided by group education.

IV. What is included in diabetes education? (to include health services personnel and diabetic patients)
   A. Pathophysiology of Type 1 versus Type 2 diabetes
   B. Non-pharmacologic treatment plan & importance of lifestyle modifications
   C. Signs, symptoms, and treatment for acute complications of diabetes mellitus
      1. Hypoglycemia
         a. Signs and symptoms – dizziness, lightheadedness, shakiness, blurry vision
         b. Treatment - Counsel patient to ingest 15 grams of carbohydrates (i.e. 1 slice of bread, 4-5 small pieces of candy, ½ can of soda, 4oz of orange juice). Have the patient wait 5-10 minutes for blood glucose to rise. If patient is continues to be symptomatic, counsel patient to have another 15 grams of carbohydrates or to seek medical attention.
      2. Hyperglycemia
         a. Signs and symptoms – polyria, polyphagia, polydipsia, blurry vision
         b. Treatment – exercise, hydration, diet counseling
      3. DKA
         a. Signs and symptoms – Polyuria, polyphagia, polydipsia, acute abdominal pain, nausea, shortness of breath, altered mental status, sinus tachycardia, ketotic breath
         b. Labs – serum ketones, anion gap/metabolic acidosis
         c. Treatment – manage as inpatient or as an emergent issue
   D. Monitoring parameters – frequency and importance
      1. A1c – Done every 3 months (if not at goal) or every 6 months (if at goal). A1c signifies overall control patient's diabetes.
      2. Finger sticks – Ordered at the provider's discretion. This depicts a snapshot of patients' blood glucose at the current time. The patient should be counseled to take the finger stick before the meal (i.e. breakfast and dinner). They should know what his or her goals are and should be encouraged to self record his or her fingersticks and bring the log to his or her clinic appointments.
   E. The importance of insulin – Patients should be counseled that diabetes is a progressive disease and that eventually he or she may be started on insulin. Thoroughly counsel patient on potential side effects (i.e. hypoglycemia and possible weight gain), and how to manage them. Counsel patient to administer insulin before meals and that it is important not to skip meals when on insulin.
   F. Proper techniques of administering insulin for all patients on insulin (i.e., proper self-administration, insulin preparation, mixing, and administration sites)
   G. Chronic complications of diabetes (i.e., retinopathy, neuropathy, nephropathy, cardiovascular, cerebrovascular, and peripheral vascular disease) and means for prevention
   H. Patient self monitoring to include foot, skin, and wound care
      Foot/skin care tips:
      1. Watch for pain, numbness, and/or wounds that will not heal.
      2. Keep skin supple by drinking plenty of water. Never put lotion or moisturizers between the toes.
      3. Wash feet daily with lukewarm water and soap.
      4. Dry feet well, especially between the toes.
      5. Check feet daily (including bottoms and between toes) for sores, redness, and swelling.
      6. Change into clean socks daily.
      7. Keep feet warm and dry.
      8. Never walk barefoot.
      9. Keep toenails trimmed.
      10. Examine shoes daily for things that could hurt your feet such as rocks or debris.
   I. Dental hygiene to include daily brushing in the morning and evening and flossing once daily.

Figure 27H

Pharmacologic Therapy

Table 1. Contraindications to medications commonly used in Diabetes Management

Medication	Absolute Contraindications
Metformin	•Renal impairment (i.e. SCr ≥1.4mg/dL in females and ≥1.5mg/dL in males •Metabolic acidosis, acute or chronic, including ketoacidosis •Iodinated contrast media, intravascular use in radiologic studies •Hypersensitivity to metformin
Glipizide	•Diabetic ketoacidosis •Hypersensitivity to glipizide
Insulin	•Hypersensitivity to any component of the formulation
Enalapril	•ACE-inhibitor induced angioedema •Hereditary or idiopathic angioedema •Pregnancy •Hypersensitivity to enalapril or other ACE inhibitors
Aspirin	•Syndrome of asthma, nasal polyps and rhinitis •Inherited or acquired bleeding disorders (including factor VII and factor IX deficiency •Children (<16 years of age) for use in viral infections •Pregnancy (3rd semester) •Hypersensitivity to salicylates, other NSAIDs, or any component of the formulation
Statins (e.g., Pravastatin and Atorvastatin)	•Active liver disease •Unexplained persistent elevations of serum transaminases •Pregnancy •Hypersensitivity to statins or any component of the formulation

Table 2. Comparison of Agents

Intervention	Decrease in A1c (%)*	Advantages	Disadvantages
Lifestyle monotherapy	1-2	Low cost, many benefits	Fails in 1 year
Metformin	1.5	Weight neutral, inexpensive	GI side effects, rare lactic acidosis
Glipizide	1.5 - 2.5	Inexpensive	Weight gain, hypoglycemia
Insulin	1.5	No dose limit, improved lipid profile, inexpensive	Injections, monitoring, hypoglycemia, weight gain

*UKPDS showed that a 1 percent fall in A1C was associated with a 35 percent reduction in microvascular endpoints, an 18 percent reduction in myocardial infarction, and a 17 percent reduction in all-cause mortality.

Table 3. Pharmacokinetics of Insulin*

Insulin	Onset of Action	Peak Action	Effective Duration
Regular Insulin	30 to 60 min	2 to 3 hours	8-10 hours
NPH Insulin	2 to 4 hours	4 to 10 hours	12 to 18 hours
70/30 Insulin	30 to 60 min	3 to 12 hours	12 to 18 hours

*The pharmacokinetics of insulin preparations may be used to determine which insulin to adjust when a patient is experiencing symptoms of low or high blood glucose.

Examples:

1. If patient is symptomatic of hypoglycemia around 9am and he or she injected NPH and Regular insulin at 4am, most likely it is the NPH that needs to be adjusted as it is peaking 5 hours after injection.

2. If patient is symptomatic of hyperglycemia after dinner, the Regular insulin will need to be adjusted as its onset of action is faster than the NPH.

Table 4. Sample Regular Insulin Sliding Scale

Blood glucose range (mg/dL)	Units of regular insulin to be administered
150 to 200	2
201 to 250	4
251 to 300	6
301 to 350	8
351 to 400	10
401 to 450	12
451 to 500	14
>501	Check for kerones. Contact unit provider

Figure 27I

Table 5. Indications for Daily Aspirin Therapy*

Indication	Comments
Primary Prevention	
• Men > 50 years of age with diabetes and at least 1 additional major cardiac risk factor (family history of CVD, hypertension, smoking, dyslipidemia, or albuminuria).	Consider aspirin therapy (75 to 162 mg/day).
• Women > 60 years of age with diabetes and at least 1 additional major cardiac risk factor (family history of CVD, hypertension, smoking, dyslipidemia, or albuminuria).	Consider aspirin therapy (75 to 162 mg/day).
• Lower risk individuals, such as men < 50 years of age or women < 60 years of age without other major risk factors.	There is not sufficient evidence to recommend aspirin.
• Not recommended for patients < 21 years	Risk of Reye's syndrome.
Secondary Prevention	
• Patients with diabetes and a history of CVD.	Use aspirin therapy (75 to 162 mg/day).
• Patients with diabetes, CVD, and documented aspirin allergy.	Use clopidogrel (75 mg/day).
• Patients with diabetes, CVD, and an Acute Coronary Syndrome.	Combination therapy with aspirin (75 to 162 mg/day) and clopidogrel (75 mg/day) is reasonable for up to 1 year after the event.

METHOD AND SYSTEM FOR POPULATION HEALTH MANAGEMENT IN A CAPTIVATED HEALTHCARE SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority to U.S. provisional patent application Ser. No. 62/402,493 filed on Sep. 30, 2016 entitled "Method and System for Population Health Management in a Captivated Healthcare System", which is hereby incorporated by reference in its entirety.

INCORPORATION-BY-REFERENCE OF MATERIALS FILED ON COMPACT DISC

[0002] None.

TECHNICAL FIELD OF THE INVENTION

[0003] The present invention relates generally to the field of information systems and, more particularly, to managing patient or patient populations within a fully integrated captivated healthcare system.

STATEMENT OF FEDERALLY FUNDED RESEARCH

[0004] None.

BACKGROUND OF THE INVENTION

[0005] The medical needs of inmates in US prisons and jails were largely ignored by society until the early 1970s, when the convergence of several independent forces brought the issue of correctional healthcare to the forefront. One of these forces was organized medicine. In response to surveys indicating serious and pervasive healthcare deficiencies within correctional institutions, several organizations became involved in efforts to improve medical care for prisoners. The American Public Health Association published the first comprehensive national healthcare standards for correctional facilities in 1976. The American Medical Association developed model healthcare delivery systems for jails, published its own correctional healthcare standards, and established a program to accredit healthcare systems in jails.

[0006] Another force in bringing about reforms was the court system. A series of decisions by the lower federal courts during the early 1970s established a constitutional basis for providing an adequate level of medical care to prisoners. In the landmark case of Estelle v Gamble, the US Supreme Court affirmed that deliberate indifference to the serious medical needs of prisoners was a violation of the Eighth Amendment and ruled that the federal courts could intervene to ensure sufficient medical care. By 1981, 25 states were under court order or consent decree to improve conditions in their correctional institutions.

[0007] These reforms were soon threatened by demographic changes in the nation's correctional populations. Responding to society's concerns about crime, lawmakers enacted legislation that limited judicial discretion in sentencing for certain offenses, resulting in sizeable increases in the number of mandatory and fixed sentences, and concurrent decreases in the use of alternatives to incarceration. Between 1980 and the early 1990s, the US prison population more than doubled. Additionally, incarceration rates for offenders with special healthcare needs, including elderly offenders and women, increased rapidly.

[0008] The explosive growth of the prison population, coupled with soaring medical costs and a shrinking base of public funding, severely strained the healthcare resources of many correctional systems in the 1990s. Moreover, health policy analysts began to point out that existing health delivery models were not designed to handle the increase in chronic illnesses and infectious diseases within the prison population. Faced with these challenges and a legal mandate to improve conditions in its prisons, the state of Texas began to develop and implement a novel fully integrated population management healthcare system.

[0009] The Texas correctional managed healthcare system is structured on a series of contractual relationships between Texas Department of Criminal Justice (TDCJ), Correctional Managed Health Care Committee (CMHCC), and 2 state medical schools. TDCJ contracts with CMHCC to provide statewide oversight and coordination of health services. The CMHCC in turn contracts with University of Texas Medical Branch (UTMB) and Texas Tech University Health Sciences Center (TTUHSC) to provide physical, mental, and dental healthcare to the prison population. Both universities subcontract with local clinicians on an as-needed basis.

[0010] The TDCJ Health Services Division monitors the quality of care delivered by the contracted clinicians via its Health Services Quality Improvement Program. Biennial operational reviews of prison health facilities are conducted to ensure compliance with national and state standards and laws. Additionally, the division investigates all medical-related grievances, reviews all prisoner deaths, and monitors the incidence of communicable diseases.

[0011] The CMHCC is composed of 9 appointed members, including 3 public members and 2 representatives from TDCJ, UTMB, and TTUHSC. Five members are physicians. Besides coordinating the contractual provision of health services, the committee monitors the general quality of healthcare, resolves disputes related to medical care, and implements the use of case management, utilization review, and other managed care tools. The committee has the power to enforce compliance with contract provisions.

[0012] The TTUHSC service area includes the western portion of Texas (about 20% of the prison population); UTMB serves the remainder of the population. UTMB primarily uses its own employees to provide correctional health services; TTUHSC uses a mix of its own employees and subcontracted local clinicians.

[0013] Primary care is provided at ambulatory clinics located in every TDCJ facility. Basic dental and mental health services are also available at all but a few clinics. Additionally, infirmaries are located in 16 correctional facilities. More advanced levels of care are available at Hospital Galveston and several regional medical facilities. Either the American Correctional Association or the National Commission on Correctional Health Care accredits all medical facilities. Hospital Galveston has been awarded accreditation with full standards compliance by the Joint Commission on Accreditation of Healthcare Organizations.

[0014] A number of programs are available for inmates with special health needs, including those with chronic diseases and psychiatric disorders. Chronic care clinics have been established to provide more effective interventions for the increasing number of offenders with chronic diseases. Elements of chronic care management include patient edu-

cation, regular evaluations by a clinician, monitoring for medication efficacy and compliance, and evaluation of laboratory tests. Interventions are based on evidence-based practice guidelines and clinical protocols developed by a joint pharmacy and therapeutics committee. The clinics provide care for patients with hepatitis C virus infection, essential hypertension, psychiatric disorders, asthma, diabetes mellitus, HIV infection, and numerous other diseases and disorders.

[0015] Many inmates have a medical alert code, indicating a current or past history of a mental disorder. Services available to this population include group and individual psychotherapy, psychopharmacologic therapy, and crisis intervention counseling. Inpatient care is provided at dedicated psychiatric facilities. Outpatient services are available at almost all ambulatory clinics. Extensive use of telepsychiatry has also expanded treatment access and scope. As an alternative to administrative segregation, TTUHSC implemented an inpatient program for mentally ill offenders with a history of aggression. The Program for the Aggressive Mentally-Ill Offender uses cognitive behavioral therapy to help inmates curb aggressive impulses. Texas also was one of the first states to develop a model program for the mentally retarded offender. Telehealth has been an integral component of healthcare delivery under the managed care model. Besides general medicine and surgery, 28 specialty and subspecialty services are available via Telehealth. Telehealth has proved to be especially effective for Texas' sprawling prison system, because it improves timely access to specialty care for offenders in remote locations. Telehealth also has helped reduce the overall cost of transporting inmates over considerable distances for consultations.

[0016] UTMB deploys a correctional telehealth network that combines the videoconferencing capabilities of telehealth with a customized electronic records management system (EMR). The technology enables secure, comprehensive storage of medical records that can be readily accessed by clinicians at the prisons and the hub site. Clinicians also have immediate access to the TDCJ formulary and disease management guidelines. Utilization review and case management are facilitated by the fully digital system, which also integrates a pharmacy management program to permit monitoring of compliance with treatment guidelines.

SUMMARY OF THE INVENTION

[0017] The disclosed invention relates to a comprehensive integrated healthcare population management method and system in a captivated healthcare system, which includes creating a patient profile or a patient population profile; screening, assessing and treating a patient or patient population; reviewing, analyzing, and comparing a patient or patient population to a control group or pre-treatment patient profile or patient population profile; and prioritizing, scheduling, and care coordination for a patient or patient population as part of follow-up healthcare assessment and services included in the fully integrated healthcare delivery system. The disclosed invention further relates to the ability to utilize comparative patient and patient population data to assess and control healthcare access, quality and cost using aggregated and de-aggregated data displayed on a plurality of dashboards.

[0018] In one embodiment, a computerized method of population health management in a captivated healthcare system (a) provides a computer system having at least one memory unit and at least one processing unit communicably coupled to the at least one memory unit, wherein the at least one memory unit stores data in one or more patient profiles or patient population profiles, (b) screens one or more of the patients or patient population for a disease based on one or more established clinical protocols using the computer system, (c) assesses a state of the disease based upon clinical results, and updating the patient profile(s) or patient population profile(s) to include the clinical results of the at least one test and the assessed disease state using the computer system, (d) determines a health management status of the one or more patients or patient population in comparison to the established clinical protocol(s) or a disease criteria, a control patient or the patient population or other comparison mechanism using the computer system, and (e) provides a recommended corrective action plan (CAP) based on the health management status and patient profile(s) or patient population profile(s) using the computer system.

[0019] In other aspects or embodiments, the method may include the step of coordinating a delivery of a health care to a plurality of patients using the computer system, wherein the health care comprises an acute and non-acute integrated health care involving at least one of a physical health care, a behavioral health care, or a dental health care. Other steps may include (a) evaluating the delivery of the health care to the plurality of patients using the computer system based on one or more metrics comprising at least one of a patient access to the health care, a quality of the health care, a cost of the health care, a clinical data, a non-clinical data or a financial data, (b) coordinating a follow-up to the delivery of the health care to the plurality of patients using the computer system, or (c) providing one or more health education materials to the plurality of patients using the computer system. The patient profile(s) or patient population profile(s) may include at least one unique identifier such as medical record number, social security number, inmate number, unit number, facility name, region name, or state name. The patient profile(s) or patient population profile(s) may further includes a prior medical record(s) or a history of medical conditions.

[0020] In other aspects or embodiments, the screening step may further (a) include performing at least one screening test and including results of the at least one screening test in the patient profile(s) or patient population profile(s), (b) be based on the established clinical protocol and/or disease criteria, or (c) include an evaluation of risk factors in the patient profile(s) or patient population profile(s) relevant to the disease state or condition. The disease may be a first disease, and the steps further include determining a health management status of the patient with respect to a second disease based on the patient profile and a co-morbidity of the first disease with the second disease.

[0021] In other aspects or embodiments, the method may include (a) receiving an inquiry or request from a patient for related products, treatment, procedures, tests, education or counseling via the computer system, (b) providing a recommended action and a clinical or non-clinical follow-up via telehealth, (c) providing a recommended action to a recipient on an intranet or internet-based system, (d) displaying a recommended action on a visual enabled device comprising at least one of a computer, a smart phone, or tablet, (e) implementing the recommended corrective action plan (CAP) to address the disease state or condition, (f) providing the one or more metrics and one or more recommendations

via one or more devices communicably coupled to the computer system, (g) displaying at least one of the metrics in a dashboard format on the one or more devices, or (h) providing a quality system and risk management program.

[0022] In another embodiment, a system of population health management in a captivated healthcare system includes at least one memory unit to store a patient profile or a patient population profile including a patient data and a test results, and at least one processing unit communicably coupled with at least one memory unit. The at least one processing unit (a) screens one or more of the patients or patient population for a disease based on one or more established clinical protocols, (b) assesses a state of the disease based upon clinical results, and updating the patient profile(s) or patient population profile(s) to include the clinical results of the at least one test and the assessed disease state, (c) determines a health management status of the one or more patients or patient population in comparison to the established clinical protocol(s) or a disease criteria, a control patient or the patient population or other comparison mechanism, and (d) provides a recommended corrective action plan (CAP) based on the health management status and patient profile(s) or patient population profile(s). In other aspects or embodiments, the at least one processing unit: can be communicably coupled to one or more internal databases or local devices; can be communicably coupled to one or more remote devices and/or external database(s) via a network; and/or can automatically receive data, transmit data or control medical-related devices. The system may perform other functionality and/or include other components as described above in reference to the method.

[0023] The present invention is described in detail below with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The above and further advantages of the invention may be better understood by referring to the following description in conjunction with the accompanying drawings, in which:

[0025] FIG. **1** is a hub and spoke diagram outlining the components of the method and system according to an embodiment of the current invention;

[0026] FIG. **2** is a workflow diagram outlining clinical decision points and analyses metrics according to an embodiment of the current invention;

[0027] FIG. **3** is a data flow diagram outlining the data transport, data storage, and data reporting according to an embodiment of the current invention;

[0028] FIG. **4** is a flow diagram outlining the population health management metrics calculation process.

[0029] FIG. **5** is a flow diagram outlining the multidimensional persistent data store KPI fact.

[0030] FIG. **6** is a flow diagram outlining the multidimensional persistent data store patient fact.

[0031] FIGS. **7-8** are examples of dashboard interfaces according to an embodiment of the current invention;

[0032] FIG. **9** is a flow diagram of the Quality Systems and Risk Management processes according to an embodiment of the current invention;

[0033] FIGS. **10-13** are annotated screen shots of the Medical Sick Call interfaces and printed output reminder according to an embodiment of the current invention;

[0034] FIG. **14** is an annotated screen shot of a patient level dashboard according to an embodiment of the current invention;

[0035] FIG. **15** is a screen shot of a Corrective Action Plan (CAP) form according to an embodiment of the current invention;

[0036] FIG. **16** is a screen shot of a facility level dashboard according to an embodiment of the current invention;

[0037] FIG. **17** is a screen shot of a region level dashboard according to an embodiment of the current invention;

[0038] FIG. **18** is a screen shot of an all region level dashboard according to an embodiment of the current invention;

[0039] FIG. **19** is a list of patent education topics according to an embodiment of the current invention;

[0040] FIGS. **20-21** are examples of dashboard interfaces according to another embodiment of the current invention;

[0041] FIG. **22** is a screen shot of a facility level dashboard according to another embodiment of the current invention;

[0042] FIG. **23** is a screen shot of a region level dashboard according to another embodiment of the current invention;

[0043] FIG. **24** is a screen shot of an all region level dashboard according to another embodiment of the current invention;

[0044] FIG. **25** is a flow chart of a method in accordance with another embodiment of the current invention;

[0045] FIG. **26** is a block diagram of a system in accordance with another embodiment of the current invention; and

[0046] FIGS. **27A-27I** are a diabetes mellitus clinical protocol according to an embodiment of the current invention.

DETAILED DESCRIPTION OF THE INVENTION

[0047] The current invention now will be described more fully hereinafter with reference to the accompanying drawings, which illustrate embodiments of the invention. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. For example, the present invention is not limited to use in a captivated healthcare system. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[0048] Embodiments of the current invention provide a method and system that provide population health management in a captivated healthcare system. FIG. **1** shows embodiments of the current invention that provide a plurality of services and support that directly and indirectly increase patient access to primary and specialty healthcare; healthcare quality metrics, evaluation and comparison, and reduction in overall healthcare costs. Further embodiments of the current invention are provided that improve patient outcomes, increase communication between key stakeholders, identify opportunities for process improvement and monitor clinical progress of patients.

[0049] Now referring to FIG. **1**, a hub and spoke diagram summarizing the services and support offered by a captivated population health management system **100** in accordance with an embodiment of the present invention is shown. The current invention utilizes a modular component system that is comprised of, but not limited to: care coor-

dination **102**, clinical delivery **104**, ancillary services **106**, population health **108**, Triple Aim metric assessment **110**, other services and support **112**, etc. Care coordination **102** may include, but is not limited to: scheduling **102***a*, sick call **102***b*, telehealth **102***c*, disease management **102***d*, care follow-up **102***e*, correction action plan **102***f*, etc. Clinical delivery **104** may include, but is not limited to: physical health **104***a*, behavioral health **104***b*, oral health **104***c*, etc. Ancillary services **106** may include, but are not limited to ambulance transport **106***a*, pharmacy **106***b*, mammography **106***c*, physical therapy **106***d*, etc. Population health **108** includes, but is not limited to: clinical protocols **108***a*, clinical outcomes **108***b*, training **108***d*, patient education **108***e*, etc. Triple Aim metric assessment **110** may include, but is not limited to: care access **110***a*, quality management **110***b*, cost **110***c* (e.g., utilization review **110***d*, financial analysis **110***e*, etc.), metric dashboards **110***f*, etc. Other services and support **112** may include, but are not limited to: provider recruitment and retention **112***a*, EMR integration and optimization **112***b*, etc.

[0050] Referring now to FIG. **2**, a clinical workflow diagram **200** outlining clinical decision points and analyses metrics in accordance with an embodiment of the present invention is shown. A scheduling component **202** is used for care coordination, which can be initiated from the electronic medical record (EMR) based on the patient being seen on a treatment timeline or disease progression indicated in the healthcare dashboard and treatment algorithms in block **204** or through a requested sick call initiated by the patient in block **206**. In a further embodiment of the current invention, the use of telehealth (multi-point audio visual enabled interaction) is used to support the care coordination if the required clinical specialty is not located at the same physical location as the patient in block **208**. The care coordination also includes care follow-up and corrective action plan (CAP) development in block **210**.

[0051] Once the captivated population unit requests the appointment through the EMR in block **212** via blocks **204** or **206**, the clinical provider schedules the patient's appointment based on clinical indications from the dashboard or patient initiated requested sick call process in block **214**. Once the appointment has been scheduled in block **214**, the patient is notified of the appointment schedule in block **216**. At this point, if the medical provider is located at the same physical location as the patient as indicated in block **218**, the patient receives clinical care via on-premises staff in block **220**. If the required medical provider is not located at the same physical location as the patient, telehealth is utilized to conduct a remote medical visit with a medical provider located in a different physical location than the patient in block **208**. The remotely conducted medical encounter via telehealth may direct on-premises staff to deliver clinical care to the patient in block **220**. If the remotely conducted medical encounter indicates that the patient needs to be further evaluated or examined by the remotely located specialist, the patient, via EMR care coordination and communication, can utilize the ancillary services such as ambulatory transport to be moved off-site to another physical location for further healthcare related services in block **222**. All clinical monitoring and interaction during the on-premises staff **220** and the off-site medical encounter **222** are documented and becomes part of the longitudinal patient records embodied in the current invention in block **224**. The clinical provider order patient disposition for follow-up and corrective action plan (CAP) development as appropriate in block **210**.

[0052] FIG. **2** further provides examples of Triple Aim (access **110**a, quality **110**b, and cost **110**c) metrics **110** that can be collected, assessed, compared and reported under the current invention. These metrics can be collected, assessed, compared and reported at a plurality of time points within the progression of the method and system of the current invention. The metrics collected, assessed compared, and reported under this invention are viewable on a plurality of dashboards **110**f that can be displayed on an intranet and/or Internet enabled video capable device.

[0053] Now referring to FIG. **3**, data flow diagram **300** outlining the data transport, data storage, and data reporting (Data Mart) in accordance with an embodiment of the current invention. The schematic outlines the data collection points **302** such as, but not limited to, the Pearl EMR Database (EMR) **302***a*, Pharmacy Database (PRS) **302***b*, Datalogic Automation (Accusort) Database (DLA) **302***c*, First DataBank National Drug Data File (NDDF) Database (FDB) **302***d*, and Utilization Review Database (UR) **302***e*. All collected data **304** is brought into the ETL **306** for data extraction, data transformation, and data loading. The extracted, transformed, and loaded data **308** is then moved to the CMC data warehouse **310** for storage. Data **312** may also be manually entered into the data warehouse **310** via data entry dashboards (e.g., web site, etc.) **314**. The data **316** located in the data warehouse **310** can then be accessed through a multitude of processes such as, but not limited to, pre-fetch queries, manual queries, or push and pull direct messaging. The data **316** stored in the data warehouse **310** can also be utilized to construct a plurality of multi-dimensional analysis tools **318** including, but not limited to, facility scorecards **318***a*, Excel spreadsheet (pivot tables) **318***b*, patient clinical stats **318***c*, etc. The data **316** stored in the data warehouse **310** can be utilized to build custom dashboards and reports that capture, track, and analyze: Triple Aim (access, quality, and cost) metrics **110**, Disease Prevention and Management statistics, Medication Management, Access to Care metrics, Specialty and Hospital Services totals, and Telehealth Encounters. Further, custom dashboards can be constructed to include a multitude of levels that can be aggregated and de-aggregated as needed.

[0054] In a preferred embodiment of the current invention, the patient and patient population data can be aggregated for assessment and comparison of larger populations. Patient level data includes, but is not limited to: patient results related to disease prevention and management, disease states and criteria, patient process, lifestyle improvement opportunities, etc. Unit level data includes, but is not limited to: patient lists (patients that make up a unit) related to disease prevention and management, patient and unit identifiers and criteria, unit process improvement opportunities, etc. Facility level data includes, but is not limited to: unit lists related to disease prevention and management, unit and facility identifiers and criteria, facility process improvement opportunities, etc. Regional level data includes, but not limited to: facility lists related to disease prevention and management, facility identifiers and criteria, facility process improvement opportunities, etc. In a further preferred embodiment of the current invention, more complex data aggregation and de-

aggregation is provided, allowing greater sorting for disease prevention and management data based on geographical identifiers.

[0055] In a preferred embodiment of the current invention, all dashboards and reports are arranged around a plurality of glossaries. Examples of these glossaries are provided below, which include, but are not limited to: Disease Management Glossaries, Access to Care Glossaries, etc. Each glossary is typically comprised of Measure, Target Goal, Definition, Methodology, Corrective Action Threshold, and the HEDIS 2013 Corrective Action Target (Medicaid Standard). The outputs of the dashboard and related spreadsheets and reports are a direct result of the definitions and methodologies used to generate each measure against the target. Disease states include, but are not limited to, the following: Diabetes (HbA1c, LDL, Blood Pressure, nephropathy screening), Hypertension (BP), Coronary artery Disease (LDL), Asthma (prescribed appropriate treatment), etc.

[0056] An example of a Disease Management section of the Disease Management Glossary is shown below.

Disease Management Glossary
Disease Management

Measure	Target Goal	Definition	Methodology	Corrective Action Threshold	HEDIS 2013 (Medicaid)
Asthma	90%	Percentage of patients who were prescribed the appropriate treatment based on the current CMC asthma disease management guideline at the time of the report. To be included, the patient must meet the criteria below: 1. The patient must have the condition mild persistent, moderate persistent, or severe persistent asthma for at least 12 months Asthma 90"/o prior to the report date. This is based upon the first observed date for the diagnosis in the EMR (ICD9 codes 493.2 | 493.3 | 493.4) 2. The patient must have been in TDCJ custody for at least 12 months. This is based upon the patient's received date. (The 12 month custody period and the 12 month condition period must be concurrent)	Denominator: Total number of patients who meet the criteria to be included. Numerator: Number of points in the above group with active orders for inhaled corticosteroids	81%	73%
Hypertension (both <60 and >60)	55%	Percentage of hypertension patients whose most recent blood pressure measurement at the time of the report met both the systolic and diastolic standards for their age group. To be included, the patient must meet the three criteria below: 1. The patient must have a current diagnosis of hypertension which was first observed at least 12 months prior lo the report date. (All ICD9 codes starting with 401.) This is based upon first observed dale for the diagnosis in the EMR. 2. The patient must have been in TDCJ custody for at least 12 months. This is based upon the patient's received date. (The 12 month custody period and the 12 month condition period must be concurrent) 3. The patient must have a documented blood pressure in the EMR within 12 months of the date of the report.	Denominator: Total number of patients who met the criteria to be included. Numerator: Number of patients in the above group whose systolic and diastolic the blood pressures met the standard for their age group. Patients are sorted by their age group, and a calculation is conducted for each age group.	50%	56%

-continued

Disease Management Glossary
Disease Management

Measure	Target Goal	Definition	Methodology	Corrective Action Threshold	HEDIS 2013 (Medicaid)
		For hypertension patients <60 y/o, the standard for systolic blood pressure was ≤140, and the standard for diastolic blood pressure was ≤90 (less than or equal to 140/90). For hypertension patients ≥60 y/o, the standard for systolic blood pressure was ≤150, and the standard for diastolic blood pressure was ≤90 (less than or equal lo 150/90).			
Coronary Artery Disease (CAD)	55%	Percentage of CAD patients whose most recent low density lipoprotein (LDL) result at the time of the report was <100 mg/dl. To be included, the patient must meet the three criteria below: 1. The patient must have the condition CAD (defined below) for at least 12 months prior to the report date. This is based upon the first observed date for the diagnosis. CAD defining diagnoses include: myocardial infarction or who have a diagnosis of ischemic vascular disease (IVD) (ICD9 codes starting with 410 ! 411 ! 412 ! 413 ! 414) 2. The patient must have been in TDCJ custody for at least 12 months. This is based upon the patient's received date. (The 12 month custody period and the 12 month condition period must be concurrent) 3. The patient must have a documented LDL result in the EMR within 12 months of the date of the report.	Denominator: Total number of patients who met the criteria to be included. Numerator: Number of patients in the above group whose LDL was ≤100 mg/dl.	50%	41%
Diabetes BP	55%	Percentage of diabetes patients whose most recent blood pressure was less than or equal to 140/90. Both the systolic and diastolic pressure must meet the standard. To be included, the patient must meet the three criteria below: 1. The patient must have the condition diabetes (any type) for at least 12 months prior to the report date. This is based upon the first observed date for the diagnosis in the EMR. 2. The patient must have been in TDCJ custody for at least 12 months. This is based upon the patient's received date. (The 12 month custody period and the 12 month condition period must be concurrent) 3. The patient must have a documented BP result in the EMR within 12 months of the date of the report.	Denominator: Total number of patients who met the criteria to be included. Numerator: Number of patients in the above group whose BP was ≤140/90	50%	59%

-continued

Disease Management Glossary
Disease Management

Measure	Target Goal	Definition	Methodology	Corrective Action Threshold	HEDIS 2013 (Medicaid)
Nephropathy Screening	80%	Percentage of diabetes patients who have either had a documented urine microalbumin result in the EMR or who have an active prescription for an ACE inhibitor or ARB medication. To be included, the_patient must meet the two criteria below: 1. The patient must have the condition diabetes (any type) for at least 12 months prior to the report date. This is based upon the first observed date for the diagnosis in the EMR. 2. The patient must have been in TDCJ custody for at least 12 months. This is based upon the patient's received date. (The 12 month custody period and the 12 month condition period must be concurrent)	Denominator: Total number of patients who met the criteria to be included. Numerator: Number of patients in the above group whose either have a documented urine microalbumin result in the EMR or who have an active prescription for an ACE inhibitor or an ARB medication.	72%	78%
Diabetes		Percentage of diabetes patients who met the various criteria and standards below. (ICD9 codes that start with 250.)			
1. Diabetes HbA1c	45%	Percentage of diabetes patients whose most recent HbA1c result at the time of the report was <8%. To be included, the patient must meet the three criteria below: 1. The patient must have the condition diabetes (any type) for at least 12 months prior to the report date. This is based upon the first observed date for the diagnosis in the EMR. 2. The patient must have been in TDCJ custody for at least 12 months. This is based upon the patient's received date. (The 12 month custody period and the 12 month condition period must be concurrent) 3. The patient must have a documented HbA1c result in the EMR within 12 months of the date of the report.	Denominator: Total number of patients who met the criteria to be included. Numerator: Number of patients in the above group whose HbA1c was <8%.	41%	47%
2. Diabetes LDL	50%	Percentage of diabetes patients whose most recent low density lipoprotein (LDL) was <100. To be included, the patient must meet the three criteria below:	Denominator: Total number of patients who met the criteria to he included.	45%	34%

-continued

Disease Management Glossary Disease Management					
Measure	Target Goal	Definition	Methodology	Corrective Action Threshold	HEDIS 2013 (Medicaid)
		1. The patient must have the condition diabetes (any type) for at least 12 months prior to the report date. This is based upon the first observed date for the diagnosis in the EMR. 2. The patient must have been in TDCJ custody for at least 12 months. This is based upon the patient's received date. (The 12 month custody period and the 12 month condition period must be concurrent) 3. The patient must have a documented LDL result in the EMR within 12 months of the date of the repot.	Numerator: Number of patients in the above group whose LDL was <100.		

[0057] An example of a Staffing section of the Disease Management Glossary is shown below.

Disease Management Glossary Staffing			
Measure	Target Goal	Definition	Sources
Total Actual FTEs	N/A	Actual Full Time Equivalent (FTE) number of current FTE staff being utilized through actual permanent employee filled positions, Overtime and Agency FTEs	Monthly Vacancy Report (finance)
Total Authorized FTEs	N/A	Authorized FTE number of ongoing positions approved in the FY14 budget	Monthly Vacancy Report (finance)
Vacancy Rate	N/A	Percentage of number of actual FTE numbers to number of authorized FTEs	Monthly Vacancy Report (finance)
Medical FTEs	N/A	Number of actual and authorized medical staff to include MDs, Dos, PAs and NPs	Monthly Vacancy Report (finance)
Nursing FTEs	N/A	Number of actual and authorized nursing staff to include RN's, LVNs, CMAs and PCTs	Monthly Vacancy Report (finance)
Dental FTEs	N/A	Number of actual and authorized dental staff to include DDSs, DHs and DAs	Monthly Vacancy Report (finance)
Other Staff FTES	N/A	Number of actual and authorized other staff to include CCAs and PMs	Monthly Vacancy Report (finance)
Agency FTEs	N/A	Number of actual agency staff FTEs used	Monthly Vacancy Report (finance)
Overtime FTEs	N/A	Number of actual OT FTEs used	Monthly Vacancy Report (finance)

[0058] An example of a Specialty and Hospital Services section of the Disease Management Glossary is shown below.

Disease Management Glossary Specialty and Hospital Services			
Measure	Target Goal	Definition	Sources
Specialty Care Referrals	N/A	Number of referrals for specialists consultations submitted and approved	HG Report

-continued

Disease Management Glossary Specialty and Hospital Services			
Measure	Target Goal	Definition	Sources
Appointments via Tele-health	N/A	Number of primary and specialty clinic encounters conducted via Tele-health	Operations Report
Hospital Admissions	N/A	Number of community hospital admissions	UR Report
ER Department Visits	N/A	Number of community emergency visits	UR Report

[0059] An example of a Pharmacy section of the Disease Management Glossary is shown below.

Disease Management Glossary
Pharmacy

Measure	Target Goal	Definition	Sources
Prescriptions per inmate	N/A	Average number of prescriptions dispensed per inmate per month	Pharmacy TDCJ Monthly Utilization Report
Number of formulary scripts	N/A	Percentage of all provider generated prescriptions filled for medications on the formulary	Pharmacy TDCJ Monthly Utilization Report

-continued

Disease Management Glossary
Pharmacy

Measure	Target Goal	Definition	Sources
Number of non-formulary scripts	N/A	Percentage of all provider generated prescriptions filled for medications not on the formulary	Pharmacy TDCJ Monthly Utilization Report
Reclamation dollars	N/A	Number of dollars reclaimed from unused medications	Pharmacy TDCJ Monthly Utilization Report

[0060] An example of an Access section of the Access to Care Glossary is shown below.

Access to Care Glossary
Access

Measure	Target Goal	Definition	Sources
Dental ATC	80%	Each patient who submits a Sick Call Request for Dental Services will be physically seen by a licensed healthcare worker within 72 hours of receipt of the SCR. A Licensed Health Care Professional includes a nurse, medical/dental provider or dental hygienist.	Electronic Medical Record
Dental ATC	80%	Each patient who submits a Sick Call Request for Dental Services will have chief complaint(s) listed and the date and time the SCR was received documented in the medical record.	Electronic Medical Record
Dental ATC	80%	Each patient who has been referred to a dentist (through nursing dental triage) will be seen by the dentist within 10 working days of receipt of the SCR in the Health Services Department.	Electronic Medical Record
Nursing ATC	80%	Each patient who submits a Sick Call Request for Medical Services (whether NSC or Provider Sick Call) will be physically seen within 72 hours. Must be seen by a Licensed Health Care Professional (Nurse [LVN or RN], MD, DO, PA or FNP).	Electronic Medical Record
Nursing ATC	80%	Each patient who submits a Sick Call Request for Medical Services will have chief complaint(s) documented in the medical record.	Electronic Medical Record
Medicine ATC	80%	Each patient who has been referred to a physician, physician assistant or advanced practice nurse will be seen by the physician, physician assistant or advanced practice nurse within 10 working days of receipt of the SCR in the Health Services Department.	Electronic Medical Record
Mental Health ATC	80%	Each patient on outpatient status who submits a Sick Call Request or is referred for Mental Health Services will be interviewed within 72 hours. For triage, the patient must be seen by a Health Care Professional.	Electronic Medical Record
Mental Health ATC	80%	Each patient who submits a Sick Call Request or is referred for Mental Health Services, will have chief complaint(s) listed and the date and time the SCR was received or reason for referral documented in the medical record.	Electronic Medical Record
Mental Health ATC	80%	Each patient on Outpatient Mental Health status who has been referred to a Qualified Mental Health Professional (QMHP) for further evaluation and/or treatment is seen by the QMHP within 10 working days of receipt of the SCR in the Health Services Department. Or notification by Health Care Professional to determine urgency of need as follows: Urgent Mental Health Needs-refer immediately to QMHP, includes but is not limited to risk of suicide or injury to self or others, acute distress or agitation and certain medication side effects.	Electronic Medical Record

-continued

Access to Care Glossary Access			
Measure	Target Goal	Definition	Sources
		Non-Urgent Mental Health needs-refer to QMHP within 10 working days. Request/Complaint not mental health related-refer patient to appropriate department and follow-up on further requests or referrals.	

[0061] Referring now to FIG. **4**, a flow diagram **400** outlining the population health management metrics calculation process in accordance with an embodiment of the present invention is shown. Population health management performance metrics are based off all patients within the captivated population health management system. The population of all patients goes through a series of reduction algorithms based on several factors and criteria before a cohort is created to calculate metrics:

[0062] Diagnosis: Diagnosis to be included is configurable and set of diagnoses is iterated to determine the patient population. Diagnoses: D={d **1**, d **2**, . . . d n}

[0063] Key Performance Indicators: A set of Key Performance Indicators is defined. Key Performance Indicators (KPI): K={k **1**, k **2**, . . . k n}

[0064] Criteria: There are several configurable criteria. An example would be that the offender has been incarcerated and in the healthcare system being measured for at least one year. Criteria to be Included in Measure: C={c **1**, c **2**, . . . c n}

Patient locations (Patient Units: U={u **1**, u **2**, . . . u n}) are iterated and the group of all patients is programmatically reduced to the desired Measure Group M which is then iterated for a comparison function h(x) with target values for each and every patient and the count of patients meeting target goals is incremented. The Measure Group is divided by the cohort to yield a percentage meeting targets for a facility.

[0065] $A=\leftrightarrow\forall x(x\in A\rightarrow x\in D)$

[0066] $A=\leftrightarrow\forall x(x\in A\rightarrow x\in C)$

[0067] h(x): {A, count of A}

[0068] M=M+1

[0069] X=M/A

Data is aggregated to any level defined in the Location Dimension (e.g. R=Region Level) by using sum of numerators over sum of denominators

[0070] $R=\Sigma M/\Sigma A$

KPI Facts, and Patient Facts are created during the iterative process.

[0071] Iterate diagnoses to be measured from the diagnosis set {D, count of D} in block **402**. Filter and reduce to total set of patients with diagnosis d_n from all offenders a_n at prison unit u_n where $A=\leftrightarrow\forall x(x\in A\rightarrow x\in D)$ in block **404**. Filter and reduce to total set of patients in A that meet all criteria in C to be included in the measure group (Cohort) where $A=\leftrightarrow\forall x(x\in A\rightarrow x\in C)$ in block **406**. Iterate patients meeting criteria to be included in measure group and compare with Key Performance Indicators (KPI) value to determine patient is meeting target goal or not where h(x): {A, count of A} in block **408**. If the target goal is not met, as determined in decision block **410**, save to persistent storage as non-compliant patient fact in block **412**. If, however, the target goal is met, as determined in decision block **410**, increment count of patients meeting target goals where M=M+1 in block **414** and save to persistent storage as compliant patient fact in block **416**. Thereafter, calculate percentage of patients meeting target goals at the unit where X=M/A in block **418** and save to persistent storage as KPI fact in block **420**. Thereafter, aggregate to region level using sum of numerators over sum of denominators for region R where $R=\Sigma M/\Sigma A$ in block **422**. Finally, aggregate organizational level using sum of numerators of sum of denominators for region R where $O=\Sigma M/\Sigma A$ in block **424**.

[0072] To measure Key Performance Indicators (KPI) for varying and disparate diagnoses, treatment regimens, lab results and other clinical data, a custom-built Online Analytical Processing (OLAP) persistent data store was built to support Multidimensional Analytical (MDA) queries and data mining in dashboard format. Data is stored in the persistent data store as numeric clinical facts categorized by dimensions. Two Facts were defined for Health performance metrics in the captivated healthcare system: a KPI Fact (FIG. **5**) and a Patient Fact (FIG. **6**).

[0073] FIG. **5** is a flow diagram **500** outlining the multidimensional persistent data store KPI fact **502**. The KPI Fact **502** (% meeting target goals) provides a multidimensional view of clinical measures **504** in relation to performance indicators for each measure (e.g., health care service areas, clinical measures (e.g., Diabetes Hemoglobin A1C<8%), target goals, national averages, corrective action thresholds, etc.). This view of the metrics allows for comparison of locations **506** (e.g., TDCJ units, CMC regions, unit types, etc.) over time **508** (date/time of measure) and the development of trend analysis.

[0074] FIG. **6** is a flow diagram **600** outlining the multidimensional persistent data store patient fact **602**. The patient fact provides **602** a multidimensional view of patients included in measures including patient demographics data **604** as well as specific outcomes that were recorded **606** (diagnosis, first observed, etc.), custody status **608** (segregated, general population, etc.), incarceration date **610** (e.g., length of time incarcerated, etc.). This view allows for clinical analysis of outcomes over time **508** (date/time of measure), clinical measurement **504** (e.g., health care service areas, clinical measures (e.g., Diabetes Hemoglobin A1C<8%), target goals, national averages, corrective action thresholds, etc.), locations **506** (e.g., TDCJ units, CMC regions, unit types, etc.), as well as identifying high-risk patient groups and predictive analysis.

[0075] In another preferred embodiment of the current invention, non-clinical metrics are collected, assessed, compared, and reported in a plurality of dashboard formats.

Non-clinical metrics include, but are not limited to: Access to Care (timeliness), Medical Provider Type, Specialty and Hospital Services (specialty referral volume, telehealth clinic volume, community hospital admissions, community ER visits), Staffing (vacancies by discipline, use of agency staffing, overtime), Pharmacy (formulary and non-formulary volume, prescriptions per patient, reclamation dollars), etc.

[0076] FIGS. **7** and **8** provide example dashboards of an embodiment of the current invention. In FIG. **7**, the dashboard **700** includes a first set of links **702** (e.g., Home, About UTMB, Directory, Web Mail, UTMB, Logout, Search, etc.), a second set of links **702** (e.g., Health System, Education, Research, Business & Finance, Leadership, Communications, Give to UTMB, Alumni, Contacts, etc.), and a third set of links (e.g., Home, Facility Dashboards, Patient Dashboards, Data Miner, Site Map, Glossary, Help, etc.). Links **702**, **704**, **706** are configured to allow users to access internal and/or external functions, information, resources, software, etc. from the dashboard **700**. Links **702**, **704**, **706** can be buttons, tabs, text, icons, graphics, etc. that are single items or part of a navigation bar, menu or other configuration. Note that the current invention is not limited to the links **702**, **704**, **706** shown or their orientation or configuration. In FIG. **8**, an example of Facility Dashboards **800** includes Org/Facility Drill Down **802**, Facility Scorecard **804**, Region Breakdown **806**, Facilities Compliance Map **808** and Facility Report **810**. These dashboards display desired information and analytics in graphs, tables, lists and text. The information can be changed, viewed or updated using various functional links or buttons. Note that the current invention is not limited to the links **702**, **704**, **706** shown or their orientation or configuration.

[0077] The current invention provides a Quality Systems and Risk Management program to ensure data integrity, data accuracy, date timeliness. In a preferred embodiment of the current invention, the Quality Systems and Risk Management program employs Lean-Six-Sigma Green Belt and/or Black Belt certified staff to provide quality assessments included, but not limited to: Facility Quality Improvement/Quality Management, Support Services Quality Improvement/Quality Management, Peer Review, Morbidity/Mortality Review, Clinical Quality Review, Pharmacy and Therapeutic Review, Incident Reports, Corrective Action, Root Cause Analysis, etc.

[0078] For example, FIG. **9** is a flow diagram of the Quality Systems and Risk Management processes **900** according to an embodiment of the current invention. The risk management process **902** receives data from occurrences **904**, inquiries **906**, deviations **908** and programs **910**. The risk management process **902** provides data to and receives data from root cause analysis **912** and audits **914**. The executive quality council **916** uses the risk management process **902** to provide data and recommendations to in patient/out patient clinical services **918**, performance improvement **920** and medical executive committee **922**, which in turn provide data and recommendations to executive management **924**.

[0079] Prevention and Disease Management goals include a Corrective Action Threshold (CAT). Any unit that drops below the CAT on a Dashboard Report is required to initiate a Corrective Action Process that includes the following: a Quality Improvement/Quality Management meeting to discuss corrective actions, a Corrective Action Plan prepared by Unit Managers and approved by Regional Managers, Follow Up Tracking for six (6) months.

[0080] At the end of the Follow Up Tracking period, if a unit is still below the CAT, the unit must repeat the process: conduct a Quality Improvement/Quality Management Meeting to discuss corrective actions, submit a second Corrective Action Plan approved by Regional Managers, submit to a further six (6) months of Follow Up Tracking at the end of the second Follow Up Tracking period, if a unit is still below the CAT, the unit is referred to the Executive Quality Council for action.

[0081] A non-limiting example of the system will now be described. A Diboll Facility patient is feeling dizzy and decides to request sick call at his unit location. The patient's sick call request is documented using the process and interfaces provided in FIG. **10-13**. FIG. **10** provides that every patient to be scheduled will have a reminder created in the EMR. FIG. **11** provides that reminder is now available on the patient's Current Reminder Screen. FIG. **12** provides the Admin Reminder Screen that allows viewing, modifying, and printing the list of patients scheduled to be seen by a specific provider or all providers at that facility. FIG. **13** is an example of the printed Reminder List that is provided to the patient for their records.

[0082] After the patient's appointment has been scheduled, an onsite medical provider performs the clinical encounter with the patient. The local medical provider is not specialized in the area of diabetes mellitus and informs the patient that he will need to be seen by a specialist via telehealth. An offsite specialist provides the patient telehealth specialty care consultation. The specialist utilizes the established diabetes mellitus clinical protocol provided in FIGS. **27A-271**. After the telehealth specialty consult, the onsite medical provider can provide the direct clinical care prescribed by the telehealth specialty provider. The medication management system embodied in the current invention is used to track the delivery and compliance of the prescribed medication.

[0083] The test results and medication, along with other clinical and non-clinical information become part of the patient's longitudinal patient record within the electronic medical record (EMR). The data is presented in a plurality of dashboards outlined and demonstrated in the current invention. FIG. **14** is an annotated screen shot of a detailed Disease Measurement Work dashboard for the patient based on two diabetic criteria: 1) No HbA1C recorded within the last year and 2) HbAiC>8% patient level dashboard. The individual patient dashboards display patient identifiers such as, but not limited to: Medical Record Number (MRN), Patient Name, Age, Gender, Race, Weight, Custody, etc. Based on the individual patient's medical results, indicated on the dashboards, a corrective action plan could be customized for the patient to work towards reaching clinical care criteria that fall within acceptable targets and overall system goals as illustrated in FIG. **15**. FIG. **19** illustrates patient education materials that can assist the patient to achieve the target goals.

[0084] The clinical and non-clinical data collected and reported on the individual patient basis, can be aggregated to other dashboards to better and more accurately demonstrate the assessment of a larger health population such as a unit, facility, region, or state. FIG. **16** provides an illustration of the Concepcion Prison dashboard **1600**, made up of aggregate data collected from individual patients at the Concep-

cion Prison. The dashboard **1600** captures data based on a time frame **1602**, a facility type **1604** and/or unit **1606**. Other criteria can be used. The dashboard **1600** captures: Prevention and Disease Management metrics **1608** of four major disease states (Asthma, Diabetes, Hypertension, and Coronary Artery Disease (CAD)) along with a multitude of sub categories of each disease state; Medication Management metrics **1610** including reclamation dollars; Access to Care metrics **1612** including Dental, Mental, Physical (Nursing and Medical) care; Specialty and Hospital Services metrics **1614** including community ER visits, community hospital admissions, and specialty care referrals; UTMB CMC Telehealth encounters **1616** by modality; and Total Inmates **1618**. The Prevention and Disease Management metrics **1608** and Access to Care metrics **1612** display the percentage as well as a visual performance indicator (e.g., a green light if the metric is greater than or equal to the goal, a red light if the metric is less than the goal). Other metrics and types of visual performance indicators can be used.

[0085] FIGS. **17** and **18** provide illustrations of other stratified dashboards that are a further aggregation of data. FIG. **17** illustrates the Region level dashboard **1700** and associated metrics similar to those shown in FIG. **16**. FIG. **18** illustrates the All Region level dashboard **1800** and associated metrics. The dashboard **1800** captures data based on a time frame **1602**, a facility type **1604**, service category **1802**, measure group **1804** and/or measure **1806**. Other criteria can be used. The dashboard **1800** captures: target goal, national average and corrective action threshold **1808**; metrics **1810** for each region; unit metrics **1812** for each region; and a graph **1814** displaying the metrics for each region over time. The collection, assessment, comparison, and recording of the patient's data become part of the complete population management system that can be used to achieve the Triple Aim **110** (access, quality, and cost).

[0086] FIGS. **20** and **21** provide example dashboards of another embodiment of the current invention. In FIG. **20**, reference **1** identifies the geographical region of the integrated population health management method and system. Reference **2** identifies the time frame. Reference **3** identifies the dashboard target summary. Reference **4** identifies the Prevention and Disease Management results, Medication Management results, Access to Care results, Specialty and Hospital Services results, Telehealth Encounters results, and Total Number of Offenders results.

[0087] In FIG. **21**, Reference **1** identifies the disease state. Reference **2** identifies the timeframe. Reference **3** identifies the Target Goal, National Average, and Corrective Action Threshold. Reference **4** identifies the dashboard target summary. Reference **5** identifies the summary aggregate Total, Met, and % Met. Reference **6** represents the individual facility metrics that make up the aggregate region metrics shown.

[0088] The clinical and non-clinical data collected and reported on the individual patient basis, can be aggregated to other dashboards to better and more accurately demonstrate the assessment of a larger health population such as a unit, facility, region, or state. FIG. **22** provides an illustration of the Diboll Facility dashboard, made up of aggregate data collected from individual patients at the Diboll Facility. The dashboard captures: Prevention and Disease Management metrics of four major disease states (Asthma, Diabetes, Hypertension, and Coronary Artery Disease (CAD)) along with a multitude of sub categories of each disease state; Medication Management metrics including reclamation dollars; Access to Care metrics including Dental, Mental, Physical (Nursing and Medical) care. Specialty and Hospital Services metrics including community ER visits, community hospital admissions, and specialty care referrals; Telehealth Encounter by modality, and Total Number of Offenders. The Prevention and Disease Management metrics and Access to Care metrics display the percentage as well as a visual performance indicator (e.g., a green light if the metric is greater than or equal to the target, a yellow light if the metric is less than the target and greater than or equal to 10% of the target, and a red light if the metric is less than 10% of the target). Other types of visual performance indicators can be used. FIGS. **23** and **24** provide illustrations of other stratified dashboards that are a further aggregation of data. FIG. **23** illustrates the Region level dashboard and associated metrics. FIG. **24** illustrates the All Region level dashboard and associated metrics. The collection, assessment, comparison, and recording of the patient's data become part of the complete population management system that can be used to achieve the Triple Aim 110 (access, quality, and cost).

[0089] FIG. **25** is a flow chart of a method **2500** in accordance with another embodiment of the current invention. The computerized method **2500** of population health management in a captivated healthcare system (a) provides a computer system in block **2502** having at least one memory unit and at least one processing unit communicably coupled to the at least one memory unit, wherein the at least one memory unit stores data in one or more patient profiles or patient population profiles, (b) screens one or more of the patients or patient population for a disease based on one or more established clinical protocols using the computer system in block **2504**, (c) assesses a state of the disease based upon clinical results, and updating the patient profile(s) or patient population profile(s) to include the clinical results of the at least one test and the assessed disease state using the computer system in block **2506**, (d) determines a health management status of the one or more patients or patient population in comparison to the established clinical protocol (s) or a disease criteria, a control patient or the patient population or other comparison mechanism using the computer system in block **2508**, and (e) provides a recommended corrective action plan (CAP) based on the health management status and patient profile(s) or patient population profile(s) using the computer system **2510**. The captivated healthcare system can be a prison, nursing home, assisted living facility, veteran's facility, school, college, or university, etc.

[0090] In addition, the method may include the step of coordinating a delivery of a health care to a plurality of patients using the computer system, wherein the health care comprises an acute and non-acute integrated health care involving at least one of a physical health care, a behavioral health care, or a dental health care. Other steps may include (a) evaluating the delivery of the health care to the plurality of patients using the computer system based on one or more metrics comprising at least one of a patient access to the health care, a quality of the health care, a cost of the health care, a clinical data, a non-clinical data or a financial data, (b) coordinating a follow-up to the delivery of the health care to the plurality of patients using the computer system, or (c) providing one or more health education materials to the plurality of patients using the computer system. The

patient profile(s) or patient population profile(s) may include at least one unique identifier such as medical record number, social security number, inmate number, unit number, facility name, region name, or state name. The patient profile(s) or patient population profile(s) may further includes a prior medical record(s) or a history of medical conditions.

[0091] The screening step may further (a) include performing at least one screening test and including results of the at least one screening test in the patient profile(s) or patient population profile(s), (b) be based on the established clinical protocol and/or disease criteria, or (c) include an evaluation of risk factors in the patient profile(s) or patient population profile(s) relevant to the disease state or condition. The disease may be a first disease, and the steps further include determining a health management status of the patient with respect to a second disease based on the patient profile and a co-morbidity of the first disease with the second disease.

[0092] Other steps may include (a) receiving an inquiry or request from a patient for related products, treatment, procedures, tests, education or counseling via the computer system, (b) providing a recommended action and a clinical or non-clinical follow-up via telehealth, (c) providing a recommended action to a recipient on an intranet or internet-based system, (d) displaying a recommended action on a visual enabled device comprising at least one of a computer, a smart phone, or tablet, (e) implementing the recommended corrective action plan (CAP) to address the disease state or condition, (f) providing the one or more metrics and one or more recommendations via one or more devices communicably coupled to the computer system, (g) displaying at least one of the metrics in a dashboard format on the one or more devices, or (h) providing a quality system and risk management program.

[0093] FIG. **26** is a block diagram of a system **2600** in accordance with another embodiment of the current invention. The system **2600** of population health management in a captivated healthcare system includes at least one memory unit **2602** to store a patient profile or a patient population profile including a patient data and a test results, and at least one processing unit **2604** communicably coupled with at least one memory unit **2602**. The at least one processing **2604** unit (a) screens one or more of the patients or patient population for a disease based on one or more established clinical protocols, (b) assesses a state of the disease based upon clinical results, and updating the patient profile(s) or patient population profile(s) to include the clinical results of the at least one test and the assessed disease state, (c) determines a health management status of the one or more patients or patient population in comparison to the established clinical protocol(s) or a disease criteria, a control patient or the patient population or other comparison mechanism, and (d) provides a recommended corrective action plan (CAP) based on the health management status and patient profile(s) or patient population profile(s). The at least one processing unit **2604** can be communicably coupled to one or more internal databases **2606** or local devices. In addition, the at least one processing unit **2604** can be communicably coupled to one or more remote devices **2608** and/or external database(s) **2610** via a network **2612**. Moreover, the at least one processing unit **2604** can automatically receive data, transmit data or control medical-related devices. The system **2600** may perform other functionality and/or include other components as described above in reference to FIG. **25**.

[0094] To facilitate the understanding of this invention, a number of terms are defined below. Terms defined herein have meanings as commonly understood by a person of ordinary skill in the areas relevant to the present invention. Note that these terms may be used interchangeable without limiting the scope of the present invention. Terms such as "a", "an" and "the" are not intended to refer to only a singular entity, but include the general class of which a specific example may be used for illustration. The terminology herein is used to describe specific embodiments of the invention, but their usage does not delimit the invention, except as outlined in the claims.

[0095] It will be understood that particular embodiments described herein are shown by way of illustration and not as limitations of the invention. The principal features of this invention can be employed in various embodiments without departing from the scope of the invention. Those skilled in the art will recognize, or be able to ascertain using no more than routine experimentation, numerous equivalents to the specific procedures described herein. Such equivalents are considered to be within the scope of this invention and are covered by the claims.

[0096] All publications and patent applications mentioned in the specification are indicative of the level of skill of those skilled in the art to which this invention pertains. All publications and patent applications are herein incorporated by reference to the same extent as if each individual publication or patent application was specifically and individually indicated to be incorporated by reference.

[0097] The use of the word "a" or "an" when used in conjunction with the term "comprising" in the claims and/or the specification may mean "one," but it is also consistent with the meaning of "one or more," "at least one," and "one or more than one." The use of the term "or" in the claims is used to mean "and/or" unless explicitly indicated to refer to alternatives only or the alternatives are mutually exclusive, although the disclosure supports a definition that refers to only alternatives and "and/or." Throughout this application, the term "about" is used to indicate that a value includes the inherent variation of error for the device, the method being employed to determine the value, or the variation that exists among the study subjects.

[0098] As used in this specification and claim(s), the words "comprising" (and any form of comprising, such as "comprise" and "comprises"), "having" (and any form of having, such as "have" and "has"), "including" (and any form of including, such as "includes" and "include") or "containing" (and any form of containing, such as "contains" and "contain") are inclusive or open-ended and do not exclude additional, unrecited elements or method steps.

[0099] The term "or combinations thereof" as used herein refers to all permutations and combinations of the listed items preceding the term. For example, "A, B, C, or combinations thereof" is intended to include at least one of: A, B, C, AB, AC, BC, or ABC, and if order is important in a particular context, also BA, CA, CB, CBA, BCA, ACB, BAC, or CAB. Continuing with this example, expressly included are combinations that contain repeats of one or more item or term, such as BB, AAA, AB, BBC, AAABCCCC, CBBAAA, CABABB, and so forth. The skilled artisan will understand that typically there is no limit on the

number of items or terms in any combination, unless otherwise apparent from the context.

[0100] It will be understood by those of skill in the art that information and signals may be represented using any of a variety of different technologies and techniques (e.g., data, instructions, commands, information, signals, bits, symbols, and chips may be represented by voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, or any combination thereof). Likewise, the various illustrative logical blocks, modules, circuits, and algorithm steps described herein may be implemented as electronic hardware, computer software, or combinations of both, depending on the application and functionality. Moreover, the various logical blocks, modules, and circuits described herein may be implemented or performed with a general purpose processor (e.g., microprocessor, conventional processor, controller, microcontroller, state machine or combination of computing devices), a digital signal processor ("DSP"), an application specific integrated circuit ("ASIC"), a field programmable gate array ("FPGA") or other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. Similarly, steps of a method or process described herein may be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module may reside in RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art.

[0101] All of the systems, devices, computer programs, compositions and/or methods disclosed and claimed herein can be made and executed without undue experimentation in light of the present disclosure. While the systems, devices, computer programs, compositions and methods of this invention have been described in terms of preferred embodiments, it will be apparent to those of skill in the art that variations may be applied to the systems, devices, computer programs, compositions and/or methods and in the steps or in the sequence of steps of the method described herein without departing from the concept, spirit and scope of the invention. All such similar substitutes and modifications apparent to those skilled in the art are deemed to be within the spirit, scope and concept of the invention as defined by the appended claims.

What is claimed is:

1. A computerized method of population health management in a captivated healthcare system, comprising:

providing a computer system having at least one memory unit and at least one processing unit communicably coupled to the at least one memory unit, wherein the at least one memory unit stores data in one or more patient profiles or patient population profiles;

screening one or more of the patients or patient population for a disease based on one or more established clinical protocols using the computer system;

assessing a state of the disease based upon clinical results, and updating the patient profile(s) or patient population profile(s) to include the clinical results of the at least one test and the assessed disease state using the computer system;

determining a health management status of the one or more patients or patient population in comparison to the established clinical protocol(s) or a disease criteria, a control patient or the patient population or other comparison mechanism using the computer system; and

providing a recommended corrective action plan (CAP) based on the health management status and patient profile(s) or patient population profile(s) using the computer system.

2. The method of claim **1**, further comprising the step of coordinating a delivery of a health care to a plurality of patients using the computer system, wherein the health care comprises an acute and non-acute integrated health care involving at least one of a physical health care, a behavioral health care, or a dental health care.

3. The method of claim **2**, further comprising the step of evaluating the delivery of the health care to the plurality of patients using the computer system based on one or more metrics comprising at least one of a patient access to the health care, a quality of the health care, a cost of the health care, a clinical data, a non-clinical data or a financial data.

4. The method of claim **2**, further comprising the step of coordinating a follow-up to the delivery of the health care to the plurality of patients using the computer system.

5. The method of claim **1**, further comprising the step of providing one or more health education materials to the plurality of patients using the computer system.

6. The method of claim **1**, wherein the patient profile(s) or patient population profile(s) includes at least one unique identifier such as medical record number, social security number, inmate number, unit number, facility name, region name, or state name.

7. The method of claim **1**, wherein the patient profile(s) or patient population profile(s) further includes a prior medical record(s) or a history of medical conditions.

8. The method of claim **1**, wherein the screening step further comprises performing at least one screening test and including results of the at least one screening test in the patient profile(s) or patient population profile(s).

9. The method of claim **1**, wherein the screening step is based on the established clinical protocol and/or disease criteria.

10. The method of claim **1**, wherein the screening step further comprises an evaluation of risk factors in the patient profile(s) or patient population profile(s) relevant to the disease state or condition.

11. The method of claim **1**, wherein the disease comprises a first disease, and further comprising the step of determining a health management status of the patient with respect to a second disease based on the patient profile and a co-morbidity of the first disease with the second disease.

12. The method of claim **1**, further comprising the step of receiving an inquiry or request from a patient for related products, treatment, procedures, tests, education or counseling via the computer system.

13. The method of claim **1**, further comprising the step of providing a recommended action and a clinical or non-clinical follow-up via telehealth.

14. The method of claim **1**, further comprising the step of providing a recommended action to a recipient on an intranet or internet-based system.

15. The method of claim **1**, further comprising the step of displaying a recommended action on a visual enabled device comprising at least one of a computer, a smart phone, or tablet.

16. The method of claim 1, further comprising implementing the recommended corrective action plan (CAP) to address the disease state or condition.

17. The method of claim 1, further comprising the step of providing the one or more metrics and one or more recommendations via one or more devices communicably coupled to the computer system.

18. The method of claim 17, further comprising the step of displaying at least one of the metrics in a dashboard format on the one or more devices.

19. The method of claim 1, further comprising the step of providing a quality system and risk management program.

20. The method of claim 1, wherein the captivated healthcare system comprises a prison, nursing home, assisted living facility, veteran's facility, school, college, or university.

21. A system of population health management in a captivated healthcare system, comprising:

at least one memory unit to store a patient profile or a patient population profile including a patient data and a test results;

at least one processing unit communicably coupled with at least one memory unit; and

the at least one processing unit (a) screens one or more of the patients or patient population for a disease based on one or more established clinical protocols, (b) assesses a state of the disease based upon clinical results, and updating the patient profile(s) or patient population profile(s) to include the clinical results of the at least one test and the assessed disease state, (c) determines a health management status of the one or more patients or patient population in comparison to the established clinical protocol(s) or a disease criteria, a control patient or the patient population or other comparison mechanism, and (d) provides a recommended corrective action plan (CAP) based on the health management status and patient profile(s) or patient population profile (s).

22. The system of claim 21, wherein the at least one processing unit further coordinates a delivery of a health care to a plurality of patients, wherein the health care comprises an acute and non-acute integrated health care involving at least one of a physical health care, a behavioral health care, or a dental health care.

23. The system of claim 22, wherein the at least one processing unit further evaluates the delivery of the health care to the plurality of patients based on one or more metrics comprising at least one of a patient access to the health care, a quality of the health care, a cost of the health care, a clinical data, a non-clinical data or a financial data.

24. The system of claim 22, wherein the at least one processing unit further coordinating a follow-up to the delivery of the health care to the plurality of patients.

25. The system of claim 21, wherein the at least one processing unit further provides one or more health education materials to the plurality of patients.

26. The system of claim 21, wherein the patient profile(s) or patient population profile(s) includes at least one unique identifier such as medical record number, social security number, inmate number, unit number, facility name, region name, or state name.

27. The system of claim 21, wherein the patient profile(s) or patient population profile(s) further includes a prior medical record(s) or a history of medical conditions.

28. The system of claim 21, wherein the screening provided by the at least one processing unit further comprises performing at least one screening test and including results of the at least one screening test in the patient profile(s) or patient population profile(s).

29. The system of claim 21, wherein the screening provided by the at least one processing unit is based on the established clinical protocol and/or disease criteria.

30. The system of claim 21, wherein the screening provided by the at least one processing unit further comprises an evaluation of risk factors in the patient profile(s) or patient population profile(s) relevant to the disease state or condition.

31. The system of claim 21, wherein the disease comprises a first disease, and further comprising the step of determining a health management status of the patient with respect to a second disease based on the patient profile and a co-morbidity of the first disease with the second disease.

32. The system of claim 21, wherein the at least one processing unit further receives an inquiry or request from a patient for related products, treatment, procedures, tests, education or counseling.

33. The system of claim 21, wherein the at least one processing unit further provides a recommended action and a clinical or non-clinical follow-up via telehealth.

34. The system of claim 21, wherein the at least one processing unit further provides a recommended action to a recipient on an intranet or internet-based system.

35. The system of claim 21, wherein the at least one processing unit further displays a recommended action on a visual enabled device comprising at least one of a computer, a smart phone, or tablet.

36. The system of claim 21, wherein the at least one processing unit further implements the recommended corrective action plan (CAP) to address the disease state or condition.

37. The system of claim 21, wherein the at least one processing unit further provides the one or more metrics and one or more recommendations via one or more devices communicably coupled to the system.

38. The system of claim 37, wherein at least one of the metrics is displayed in a dashboard format on the one or more devices.

39. The system of claim 21, wherein the at least one processing unit further providing a quality system and risk management program.

40. The system of claim 21, wherein the captivated healthcare system comprises a prison, nursing home, assisted living facility, veteran's facility, school, college, or university.

41. The system of claim 21, wherein the system is intranet or internet-based, displayed on a visual enabled device such as, but not limited to, a computer, smart phone, and tablet.

42. The system of claim 21, wherein the system utilizes a telehealth embedded function within the Electronic Medical Record to facilitate clinical and non-clinical communication.

43. The system of claim 21, wherein data for the patient profile(s) or patient population profile(s) is retrieved from a database externally linked to the system.

44. The system of claim 21, wherein data for the one or more metrics is retrieved from a database externally linked to the system.

* * * * *