Camden Coalition of
Healthcare Providers

The Camden Coalition of Healthcare Providers Approach to Risk Stratified Care Management

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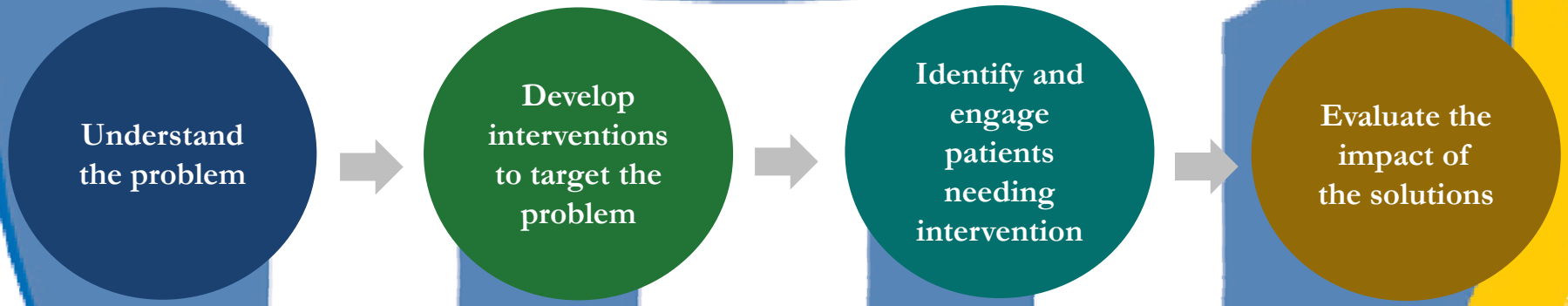
Camden Coalition of Healthcare Providers

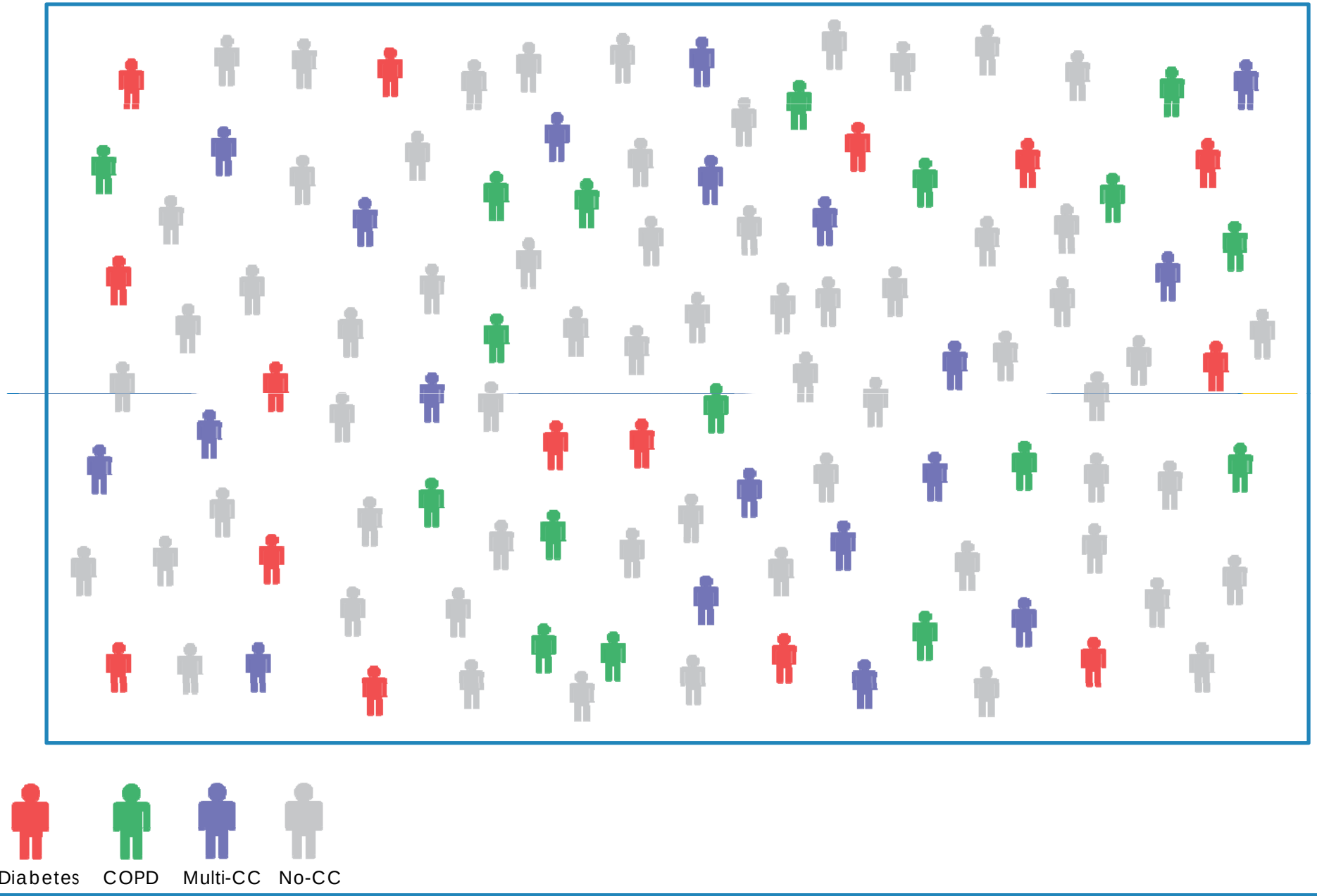
www.camdenhealth.org

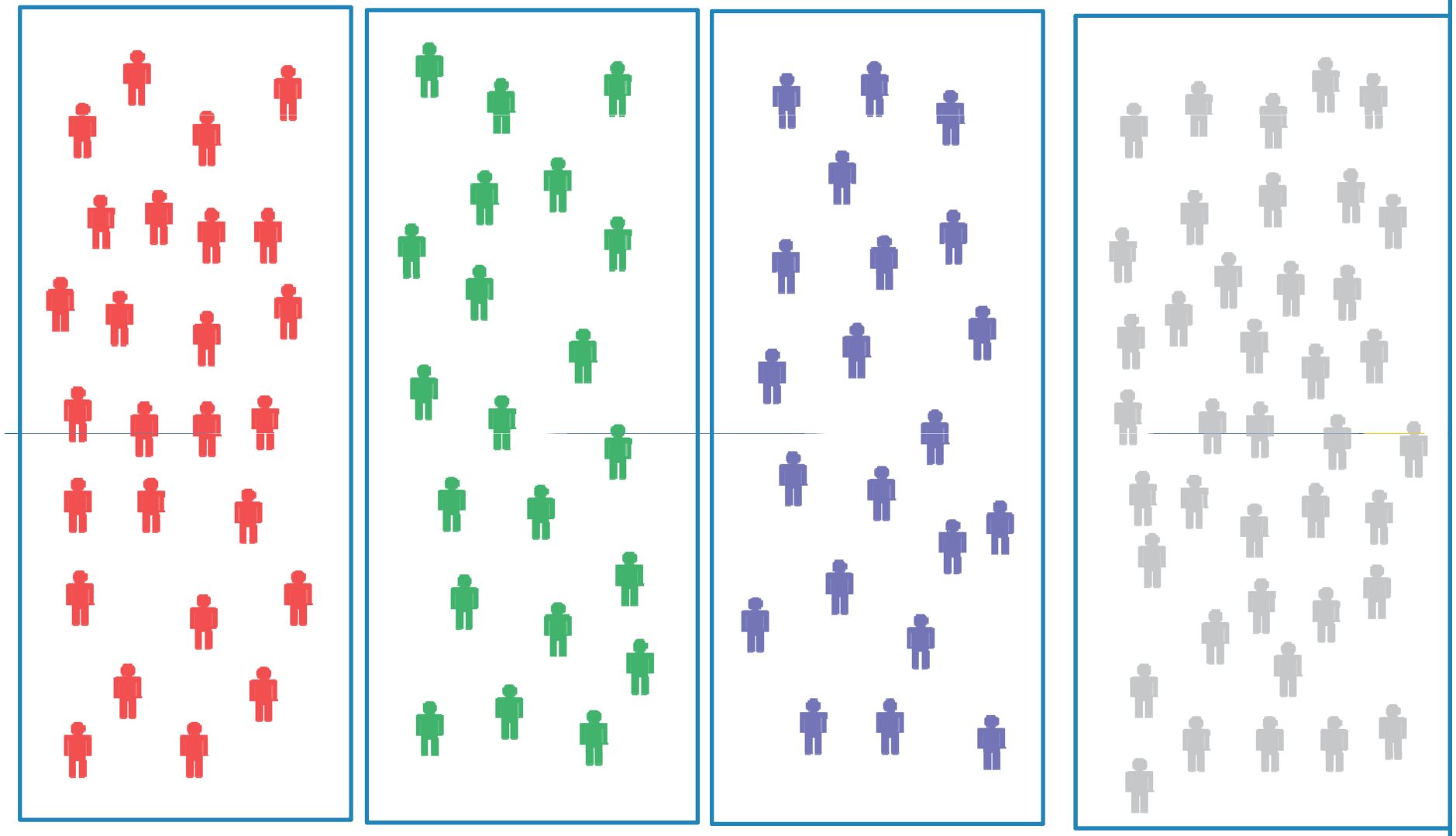
The mission of CCHP is to improve the health status of all Camden residents by increasing the capacity, quality and access to care in the city.

Hot Spotting

Hot Spotting: the ability to identify in a timely manner patients who are heavy users of the system and their patterns of use, so that targeted intervention and follow-up programs can be put in place to address their needs and change the existing, potentially ineffective, utilization pattern.

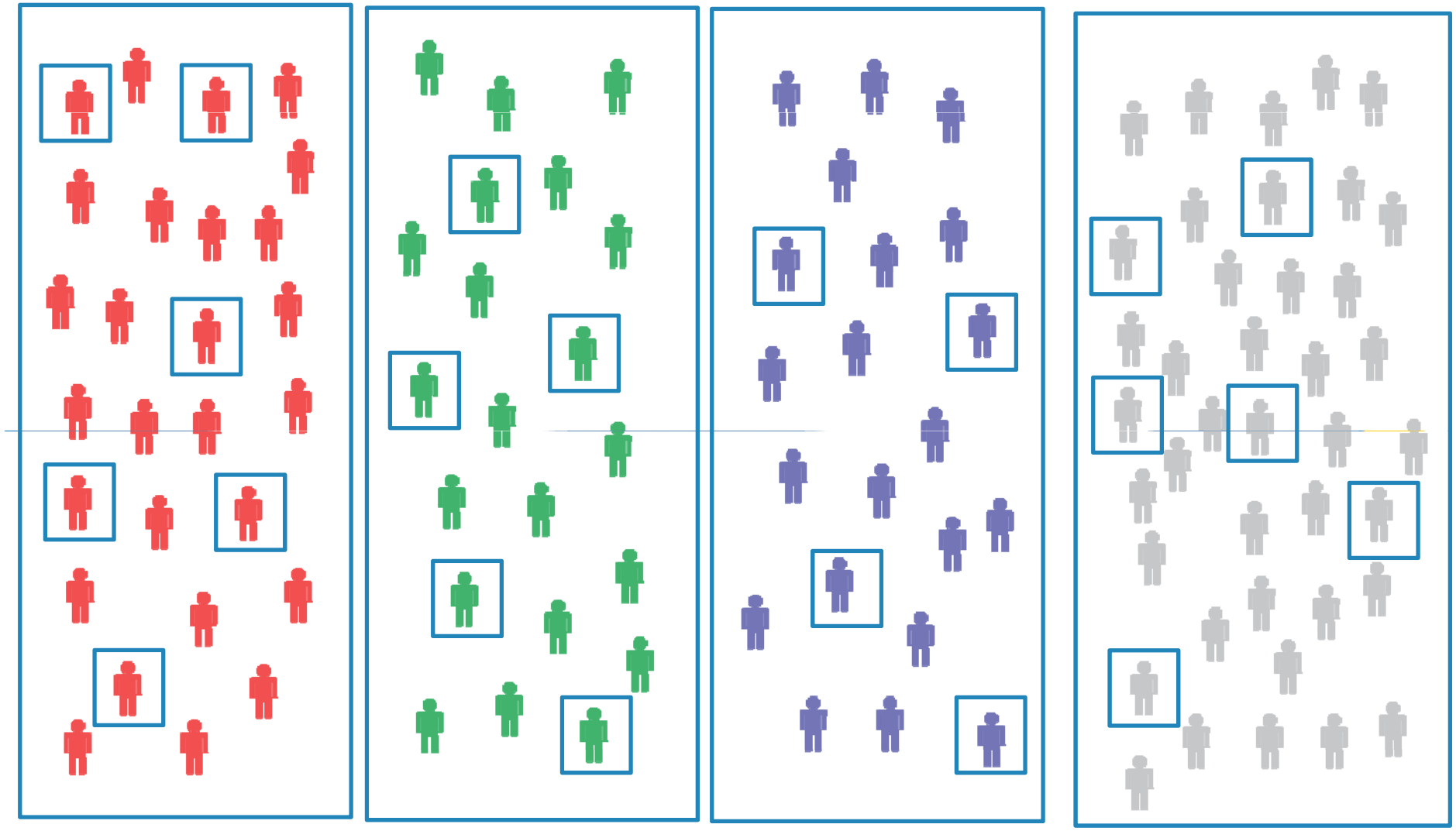



Diabetes
COPD
Multi-CC
No-CC

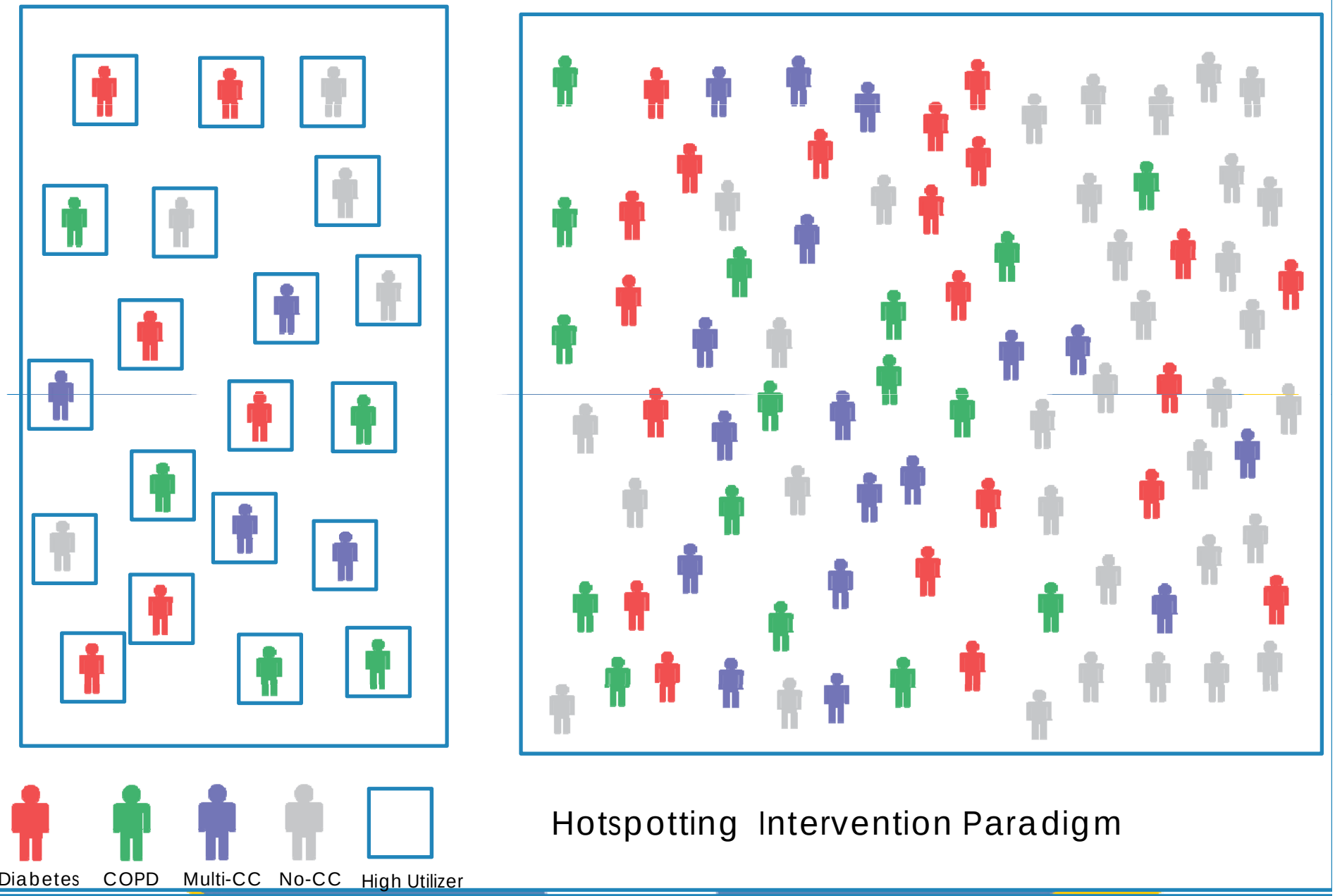


Diabetes COPD Multi-CC No-CC

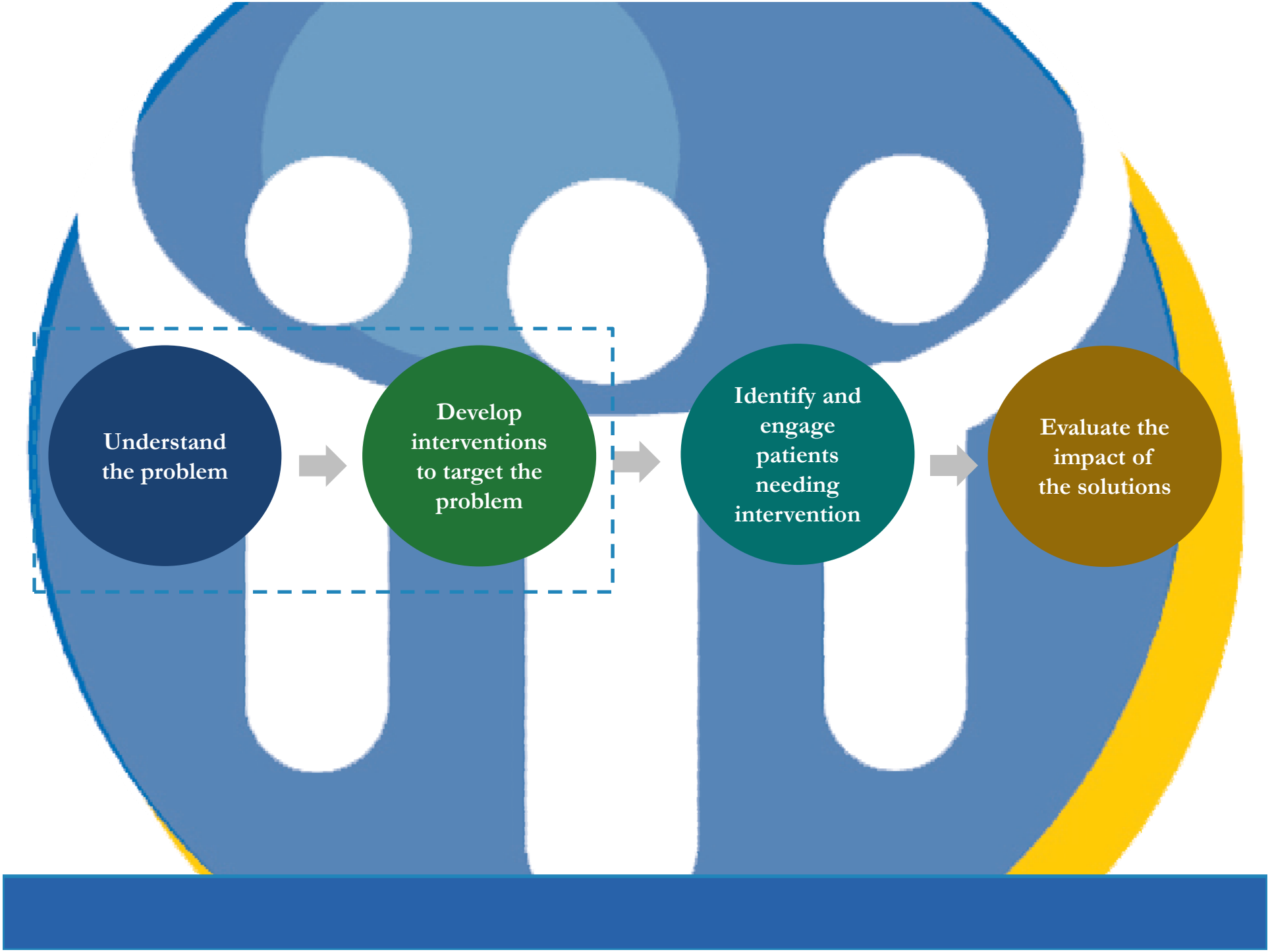
Traditional Intervention Paradigm



Traditional Intervention Paradigm



Hotspotting Intervention Paradigm


Understand the problem
Develop interventions to target the problem
Identify and engage patients needing intervention
Evaluate the impact of the solutions

CCHP Data Access Solution:
Camden Health Database

Yearly Clams Data
Data Use Agreements
IRB Agreement

- Data processing/cleaning
- Probabilistic matching
- Geocoding

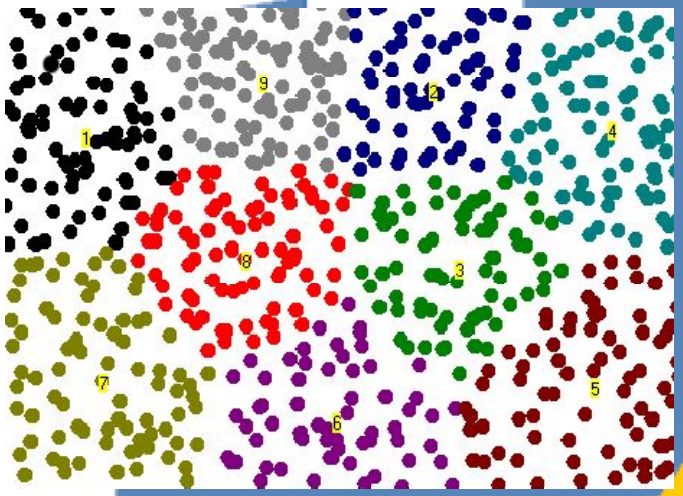
Camden Residents All-Payer Claims Longitudinal Dataset

- Demographics
- Inpatient and Emergency visits
- Diagnosis codes
- Charges/receipts
- Insurance

Methodology

Cluster analysis

- an exploratory data analysis tool for solving classification problems. Its object is to sort cases (patient utilization history) into groups, or clusters, so that the degree of association is strong between members of the same cluster and weak between members of different clusters.
- Each cluster thus describes, in terms of the data collected, the class to which its members belong.



Cluster Analysis Results

Cluster	% total	% total ED	% total IP	% total LOS	% total charges	% total receipts	% total 60 readmits	Total charges	Total receipts
Low Utilization	36.9%	16.7%	0.0%	0.0%	4.1%	3.9%	0.0%	$29,459,067	$3,216,749
Average Utilization	20.3%	21.2%	0.0%	0.0%	5.0%	4.7%	0.0%	$35,843,429	$3,867,264
Cluster	% total	% total ED	% total IP	% total LOS	% total charges	% total receipts	% total 60 readmits	Total charges	Total receipts
High ED Utilizers	10.1%	23.8%	3.0%	1.7%	6.5%	6.6%	0.0%	$46,579,465	$5,505,723
Borderline ED/IP Utilizers	7.9%	3.3%	8.1%	7.5%	7.8%	7.7%	0.0%	$56,204,358	$6,439,403
Moderate ED Utilizers	7.8%	9.5%	6.2%	3.7%	6.3%	6.5%	0.0%	$45,433,623	$5,391,079
Outlier ED Utilizers	2.1%	11.6%	2.5%	1.7%	3.9%	3.4%	.3%	$28,203,522	$2,829,333
Cluster	% total	% total ED	% total IP	% total LOS	% total charges	% total receipts	% total 60 readmits	Total charges	Total receipts
Borderline IP/ED Utilizers	11.3%	6.6%	41.9%	34.9%	27.3%	27.3%	0.0%	$196,526,193	$22,735,172
Moderate Inpatient Utilizers	2.8%	3.6%	24.5%	22.5%	18.5%	20.4%	75.9%	$133,209,990	$16,957,202
High Inpatient Utilizers	.8%	1.5%	13.0%	27.5%	20.0%	18.8%	23.0%	$144,148,652	$15,652,705
Extreme Utilizers	.1%	2.1%	.7%	.5%	.7%	.6%	.9%	$5,192,345	$537,555
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	$720,800,645	$83,132,186

High ED Utilizers

2,854 patients (10%)

Mean # ED visits	Mean # IP visits	Mean total LOS	Mean % of all unique primary ICD classified as chronic	Mean % of IP that are 60 day readmissions	Mean total charges	Mean total receipts	Median Age
5.24	.09	.25	8%	0%	$16,321	$1,929	31

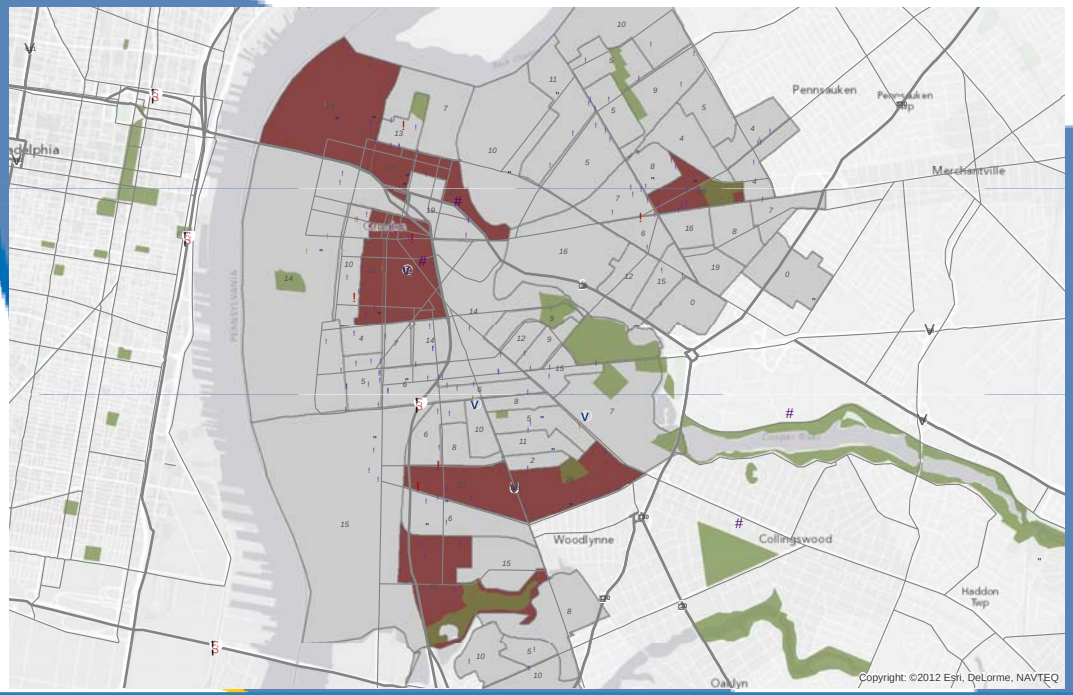
% total	% total ED	% total IP	% total LOS	% total charges	% total receipts	% total 60 readmits	Total charges	Total receipts
10.1%	23.8%	3.0%	1.7%	6.5%	6.6%	0.0%	$46,579,465	$5,505,723

	Patients	Percent
URIN TRACT INFECTION NOS	382	2.8
ABDOM PAIN NOS (Begin 1994)	319	2.4
ACUTE PHARYNGITIS	302	2.2
BACKACHE NOS	277	2.0
NO PROC/PATIENT DECISION	265	2.0
HEADACHE	224	1.7
ACUTE URI NOS	215	1.6
CHEST PAIN NOS	214	1.6
ABDOM PAIN NEC (Begin 1994)	190	1.4
VAGINITIS NOS	189	1.4

Moderate Inpatient Utilizers 786 patients (2.8%)

Mean # ED visits	Mean # IP visits	Mean total LOS	Mean % of all unique primary ICD classified as chronic	Mean % of IP that are 60 day readmissions	Mean total charges	Mean total receipts	Median Age
2.91	2.72	12.15	32%	49%	$169,478	$21,574	53

% total	% total ED	% total IP	% total LOS	% total charges	% total receipts	% total 60 readmits	Total charges	Total receipts
2.8%	3.6%	24.5%	22.5%	18.5%	20.4%	75.9%	$133,209,990	$16,957,202

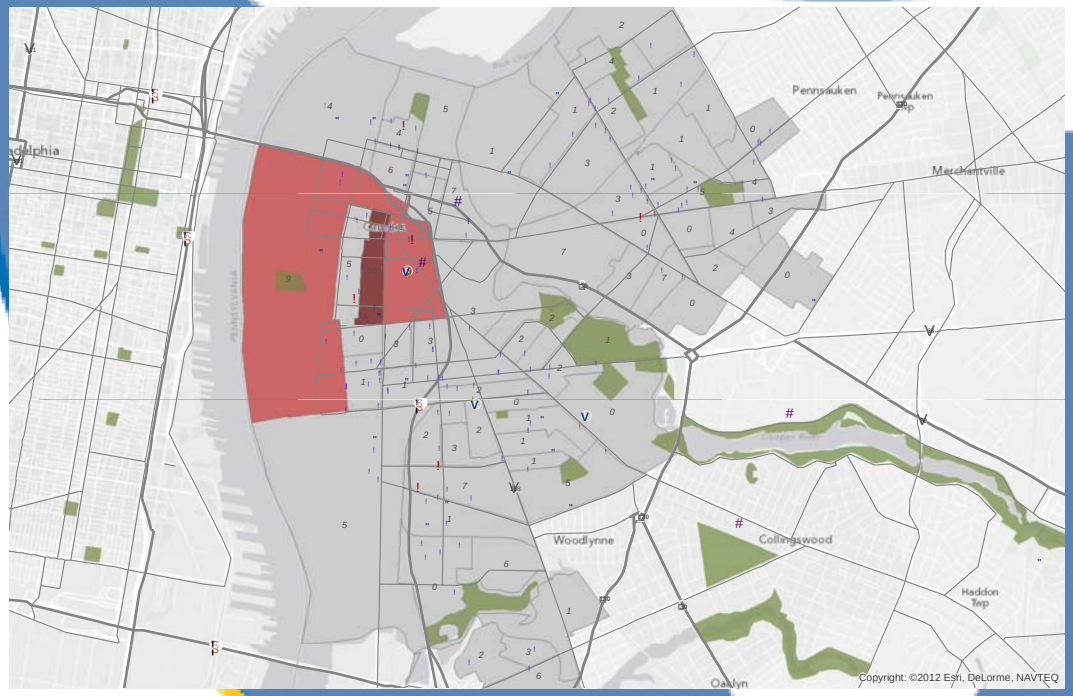


	Patients	Percent
CHEST PAIN NOS	74	2.0
URIN TRACT INFECTION NOS	65	1.8
SHORTNESS OF BREATH (Begin 1998)	56	1.5
RESPIRATORY ABNORM NEC	53	1.5
NO PROC/PATIENT DECISION	51	1.4
ABDOM PAIN NOS (Begin 1994)	50	1.4
PNEUMONIA ORGANISM NOS	50	1.4
CEREBR ART OCCLUS NOS W/ INFARCT (Begin 19	40	1.1
CHEST PAIN NEC	40	1.1
ACUTE RENAL FAILURE NOS	38	1.0

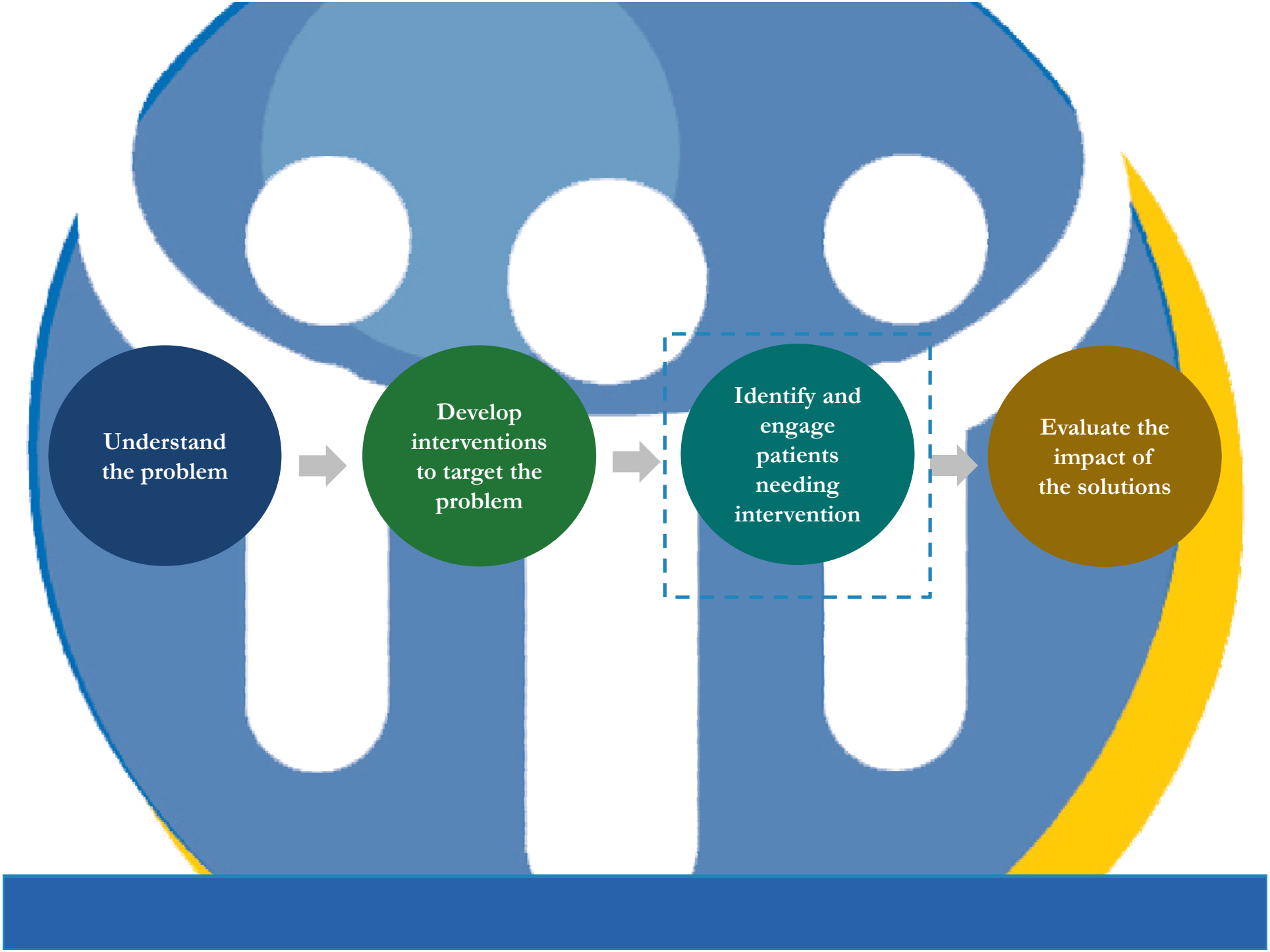
High Inpatient Utilizers 215 patients (1%)

Mean # ED visits	Mean # IP visits	Mean total LOS	Mean % of all unique primary ICD classified as chronic	Mean % of IP that are 60 day readmissions	Mean total charges	Mean total receipts	Median Age
4.48	5.33	54.71	34%	55%	$673,592	$73,143	57

% total	% total ED	% total IP	% total LOS	% total charges	% total receipts	% total 60 readmits	Total charges	Total receipts
.8%	1.5%	13.0%	27.5%	20.0%	18.8%	23.0%	$144,148,652	$15,652,705



	Patients	Percent
RESPIRATORY ABNORM NEC	34	2.2
CHEST PAIN NOS	29	1.9
SHORTNESS OF BREATH (Begin 1998)	28	1.8
REHABILITATION PROC NEC	26	1.7
ABDOM PAIN NOS (Begin 1994)	25	1.6
SEPTICEMIA NOS	23	1.5
ACUTE RENAL FAILURE NOS	21	1.4
URIN TRACT INFECTION NOS	21	1.4
PNEUMONIA ORGANISM NOS	19	1.2
ACUTE ON CHRONIC SYSTOLIC HEART FAILR(Begi	17	1.1


Understand the problem
Develop interventions to target the problem
Identify and engage patients needing intervention
Evaluate the impact of the solutions

CCHP Data Access Solution:
Camden Health Information Exchange

Web based HIE system

Daily HL-7 Feeds

HIE Vendor

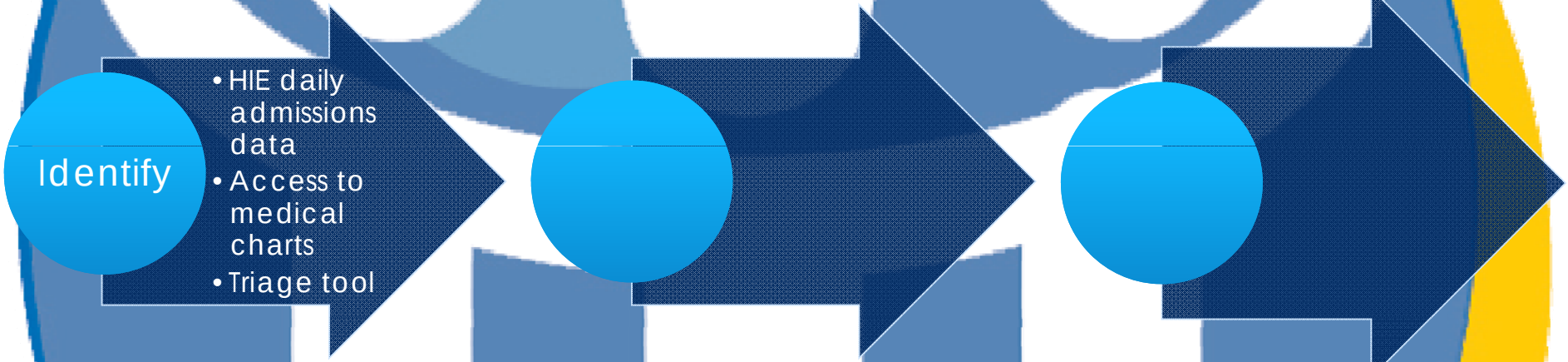
Daily Data Share

Customized data cleaning and processing

HIE Daily Report

- List of patients currently in hospital with 2+IP and/or 6+ ED in last 6 months
- CCHP care teams review cases
- Enroll patients in Care Management / Care Transitions program before discharge

Risk Stratification Workflow



Identify Eligible Patients

- Health Information Exchange (HIE) Daily Feed
  - Real time snapshot of currently hospitalized patients from 2 local hospitals
  - Emailed to teams each day
- Eligibility criteria
  - 2 or more inpatient admissions in last 6 months
  - ER utilization data is also collected & reported
- Access to Cooper and Lourdes' EMR
  - More in-depth information about patients used to further determine eligibility through triage

Step 1: Identify patients with 2+ inpatient visits in last 6 months

Recent Admissions for High Utilizers

Facility	Days Since Last	past 6 month episodes Inp	ED	Name	dob	age	sex
yesterday							
G.O.	[illegible]	[illegible]	[illegible]			87	M
G.O.	47	[illegible]	1			[illegible]	M
G.O.	14	[illegible]	[illegible]			[illegible]	M
Cancer	[illegible]	[illegible]	[illegible]			[illegible]	I
Cancer	[illegible]	[illegible]	[illegible]			31	I
Cancer	[illegible]	[illegible]	1			[illegible]	I
Cancer	146	[illegible]				[illegible]	I
Cancer	[illegible]	[illegible]				91	M
Cancer	[illegible]	[illegible]				[illegible]	M
2 days ago							
Cancer	[illegible]	[illegible]	1			[illegible]	F
G.O.	7	[illegible]				84	M
G.O.	[illegible]	[illegible]	[illegible]			37	F
G.O.	[illegible]	[illegible]	[illegible]			[illegible]	F
Cancer	14	[illegible]	1			[illegible]	F
G.O.	[illegible]	[illegible]				[illegible]	M
G.O.	[illegible]	[illegible]				79	M
Cancer	[illegible]	[illegible]	[illegible]			91	M
Cancer	[illegible]	[illegible]	1			[illegible]	F
Cancer	[illegible]	[illegible]				[illegible]	M
G.O.	[illegible]	[illegible]				97	F
Cancer	51	[illegible]				[illegible]	M
3 days ago							
G.O.	[illegible]	[illegible]	4			91	M
Cancer	[illegible]	[illegible]	4			[illegible]	I
Cancer	[illegible]	[illegible]	[illegible]			[illegible]	I
Cancer	[illegible]	[illegible]	[illegible]			21	M
Cancer	[illegible]	[illegible]	[illegible]			[illegible]	M
Cancer	71	[illegible]				91	F
4 days ago							
Cancer	[illegible]	[illegible]	[illegible]			[illegible]	F
Cancer	[illegible]	[illegible]	[illegible]			51	F
G.O.	[illegible]	[illegible]	[illegible]			[illegible]	F

Triaging Eligible Patients

- Triage utilized with patients who meet initial eligibility criteria
  - Semi-structured qualitative tool collecting patient data from EMR
  - Data on current and historical inpatient admissions that help assess complexity
    - PCP & insurance information
    - Chronic conditions diagnoses
    - Inpatient admission causes
    - Medication information
    - Histories of social comorbidities – homelessness, lack of social support, barriers to accessing services, substance use

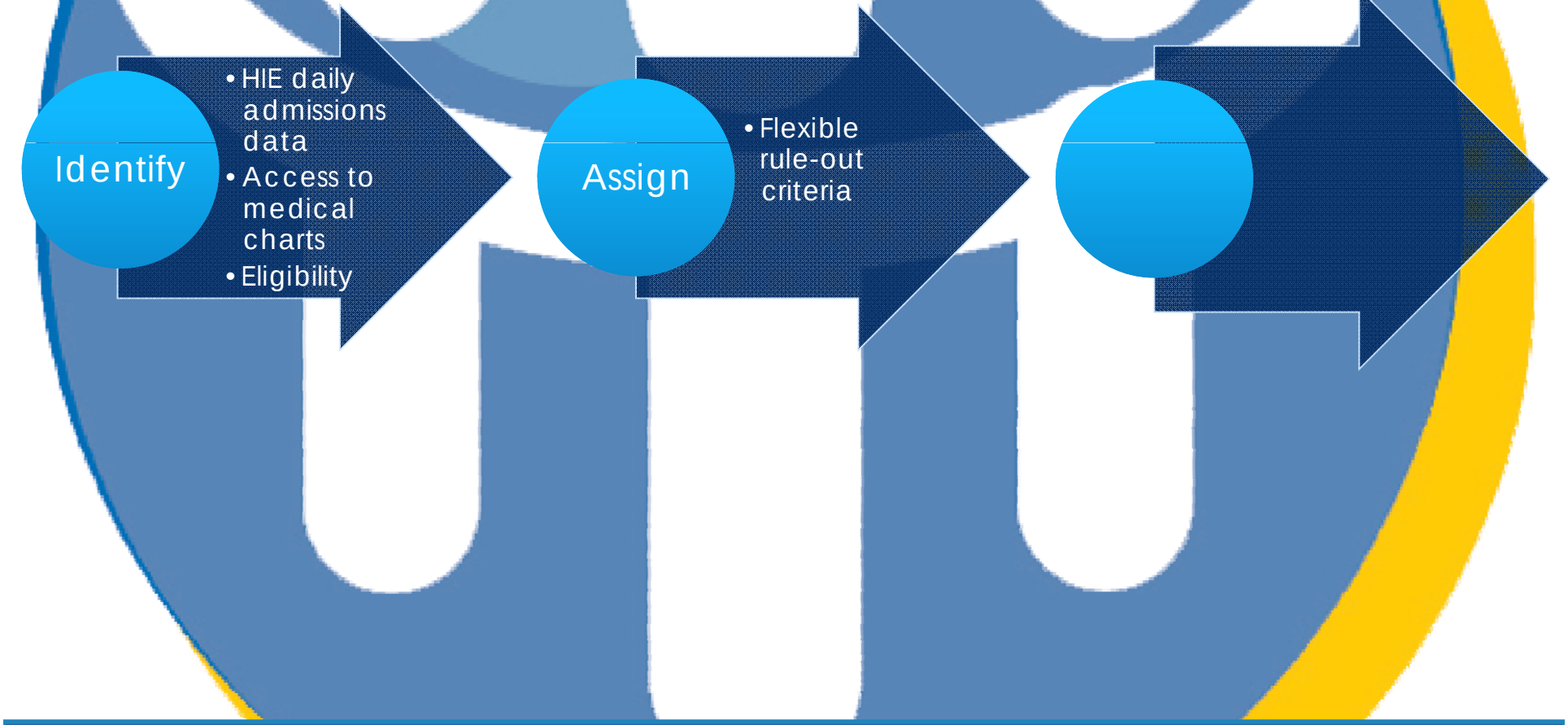
Rule-out Criteria at Triage

- Current & historical inpatient admission data from EMR used to rule-out patients
  - Was the primary cause of admission:
    - Oncology-related?
    - Pregnancy-related?
    - Related to a surgical procedure for an acute condition?
    - Mental health-related without other conditions?
    - Acute disease-related?
    - Due to complications of a condition with limited treatment options?
  - Was patient discharged prior to triage?

Static Risk Score at Triage

- Certain data collected at triage form a static triage risk score
  - Sum of score for 3 risk factors
    - Inpatient admissions
      - 2 visits = +1 point
      - 3 or more = +2 points
    - ED visits
      - 4 to 5 visits = +1 point
      - 6 or more visits = +2 points
    - Medication information
      - 5 or more medications = +1 point
  - Used as a subtotal in calculation of patient's Total Risk Score at bedside

Risk Stratification Workflow



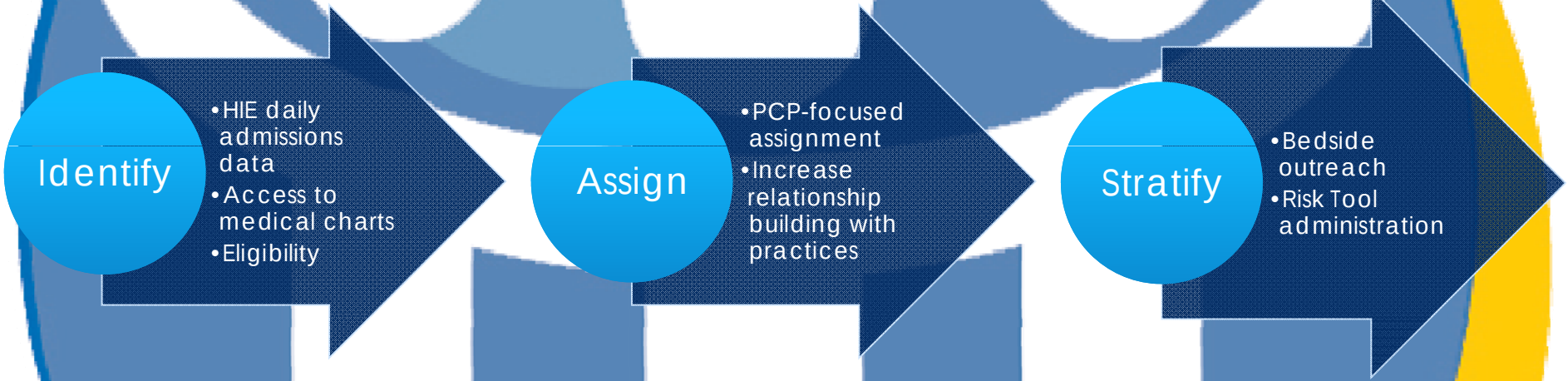
Assign to Care Teams

- Assignment to a care team made based on most current primary care provider (PCP)
  - Gives care teams an in-depth understanding of a limited set of PCP practices
  - Allows care teams to begin developing relationships with PCP practices

Rule-Out Criteria at Assignment

- Flexible set of rule-out criteria
  - Adjusted based on qualitative information from care team members & programmatic needs
  - Current criteria:
    - Discharged prior to pre-enrollment (result of time lapse between triage & assignment)
    - Uninsured
    - Over the age of 80 years old/dementia co-morbidity
      - Increased probability of diminished mental capacity
      - Not conducive to behavior change needed to manage advanced chronic conditions in age group
    - Non-Camden primary care provider

Risk Stratification Workflow



HIE Admissions Flag:
- 2+ hospital admissions < 6 months

Triage:
- In-depth analysis of medical record to complete triage tool

Flexible Rule-Out Criteria:
- Uninsured
- Discharged prior to triage (no longer in hospital)
- Over 80 years old
- Non-Camden PCP

Identify Risk Factors:
- Behavioral health issues
- Language barriers
- Homelessness
- Poor Self-Rating of Health
- Mobility limitations
- Lack of social support

Stratify by Risk

- Teams conduct bedside outreach to assigned patients (pre-enrollment)
  - Consent form process
  - Administration of risk stratification tool
- Mean total risk score for each team is monitored
  - To prevent over-assignment of higher risk patients to one team over the other

Assessment of Risk Factors

- Static risk factors (assessed only at pre-enrollment)
  - Language barrier
  - Number of chronic conditions
    - Increased # of risk points for increased # of conditions
    - Behavioral health co-morbidities weighted separately
    - Stroke history risk weighted separately
- Dynamic Risk Factors (can change throughout course of intervention)
  - Lack of PCP (or lack of recent PCP visit)
  - Housing barrier
  - Poor self-rating of health
  - Mobility barrier
  - Social support

Rule-out Criteria at Pre-enrollment

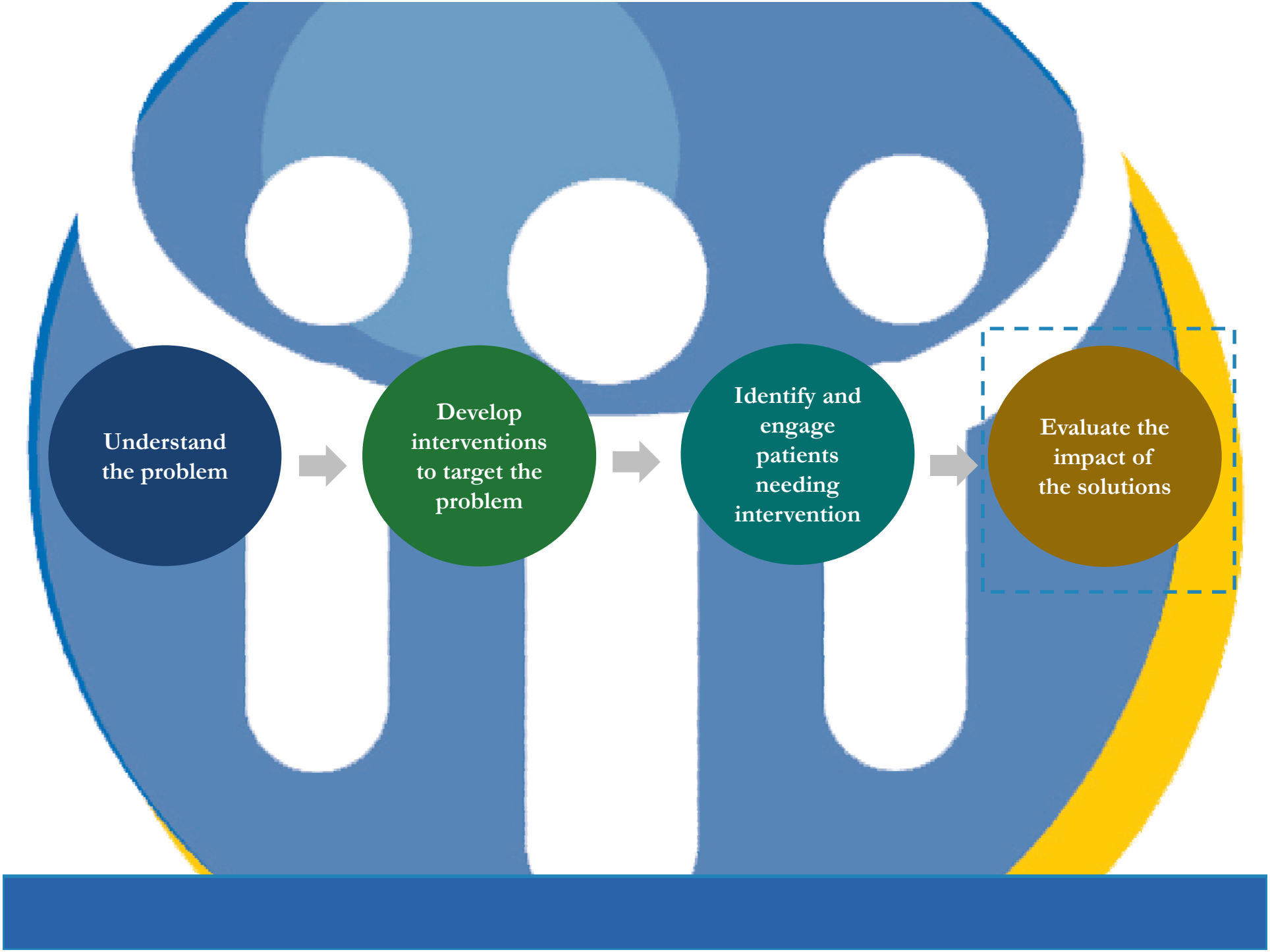
- Flexible set of risk-factors at pre-enrollment that rule-out official enrollment at hospital discharge
  - Currently receiving other care management services
  - Pass away in hospital
  - Decline to participate in services
  - Discharge to long-term rehabilitation

Enrollment

- Patients will be enrolled upon discharge from hospital or sub-acute rehabilitation
  - Goal of first home visit within 24-48 hours
  - Care plan is developed between pre-enrollment & discharge
- Validation of risk tool through tracking of hours spent with each patient by each care team staff member
  - Higher risk patients should require more intensive intervention/more hours
- Constant monitoring of re-admissions to hospital following discharge

Risk Follow-up

- Risk tool is re-administered at 30 days, 60 days, & 6 months post-discharge
  - Monitoring short-term & long-term reductions in risk following intervention
  - Reducing risk through targeting of dynamic risk factors from pre-enrollment
- Dramatic changes in self-rating of health, mobility, & social support scored to reduce risk score accordingly
- Re-admissions are factored into follow-up risk score
  - First re-admission = +1 point
  - All re-admissions after first = + 0.5 points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