Predicting Readmissions Among Children with Special Health Care Needs

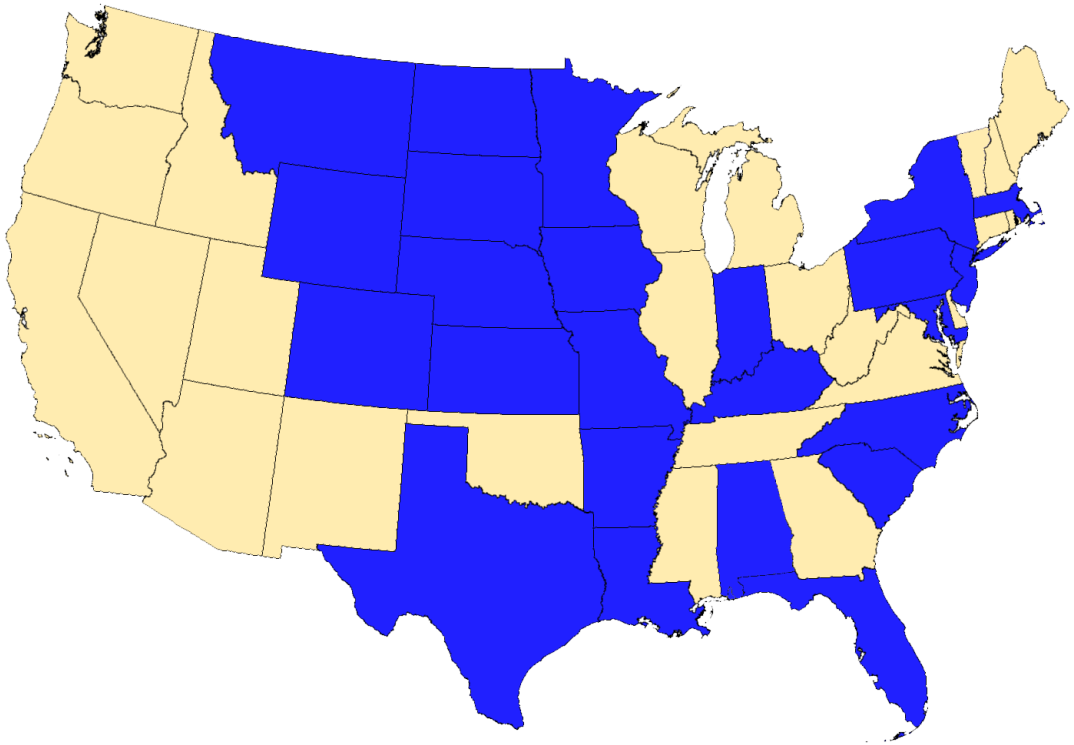
Herb Fillmore, VP Strategic Innovations
Hfillmore@TreoSolutions.com

Collaborating with:
Matt Vielkind, MS
Abbe Herzig, PhD

TREO SOLUTIONS

Treo Solutions. An Essential Partner in Transforming Care.

The right information in the right hands at the right time.



Commercial Payers	Government Payers	Health Systems	All Payer Claims Data Bases	Multi-Payer Initiatives

Offerings

Foundation:
- Data Enrichment & Aggregation
- Business Rules & Methodology
- Multi layered Portals

Strategy:
- Strategic Opportunity Assessments (SOA)
- Provider & Population Mgmt
- Transforming Payment
- Value Based Metrics and Alignment for True ROI

Logistics:
- Intelligent Transparency
- Intelligent Analytics
- Intelligent Provider and Population Engagement

Presentation Goals

- Understand Value of Public Health Social Ecological Model for Predictive Analytics in Health Care
- Understand Value of Population Health Perspective in building models
- Identification of approaches to improving model ROI through action flags
- Illustrate these concepts with a Readmission Model for Children with Special Health Care Needs.

Treo Predictive Analytics: Start with the population not a disease.

Population health is key to reducing readmissions

Healthcare Business News

Reform Update: Broad approach may be better for reducing readmissions, study suggests

By Maureen McKinney
Posted: November 25, 2013 - 3:15 pm ET
Tags: Comparative Effectiveness, Healthcare Reform, Hospitals, Insurance, Patient Care, Readmissions

As the **CMS** begins the second year of a penalty program for preventable hospital **readmissions** required by the **healthcare reform law**, new research indicates that hospitals fare better when they focus on **patient care** more generally rather than targeting specific conditions, such heart failure, or specific timeframes such as 30 days post-discharge.

Public Health Social Ecological Model

Illustration From CDC: http://www.cdc.gov/cancer/crccp/sem.htm

A Population Health Perspective leads to the Ecological Action Framework

Opportunity

Identified through Treo Analytics

High Readmission Rates

Sphere of Influence

System

Limited intra system Information

Limited Access to PCP

Clinician

Poor Continuity of Care

Poor Chronic Care Management

Person

Poor Adherence

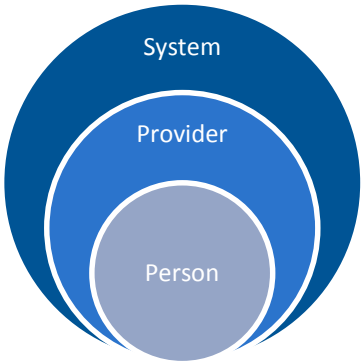
Low Patient Engagement

Intervention

- Integrated information with PA
- Discharge/community inegration
- Wrap around ICM
- Expanded PCP Network
- Rotating Evening Clinic Hours
- Distributed work through care teams (e.g. Health Coach)
- Advanced access scheduling
- Electronic Access Channels
- Skill set intervention (e.g. Stages of Change, teaching problem solving)
- HRA, CAHPS, HYH

Treo Predictive Intelligence– Dynamic and Adaptive

- Treo models begin with identification of:
  - Opportunities in the populations of interest and
  - Customer Initiatives that are underway at each level



- **The most important attribute of a model is that it is *used*!**
- That is why we begin by defining the opportunity (e.g., high spend, ancillary use, readmissions, ACSC visits, etc.)
- Next we determine if a predictive score would make a difference. Would a predictive score in a workflow change workflow and outcomes?

Treo Predictive Intelligence– Dynamic and Adaptive

- After reviewing key findings in the literature and soliciting hypothesis from the program staff, we build the model with attention to action flags.
- The model is validated statistically and with program staff. Anticipated ROI is assessed and ongoing feedback loops established.
- The final model results are delivered via a variety of platforming and timing delivery options.
- The model performance is assessed on a monthly basis. Model coefficients are updated monthly. Model structure is revisited as needed.

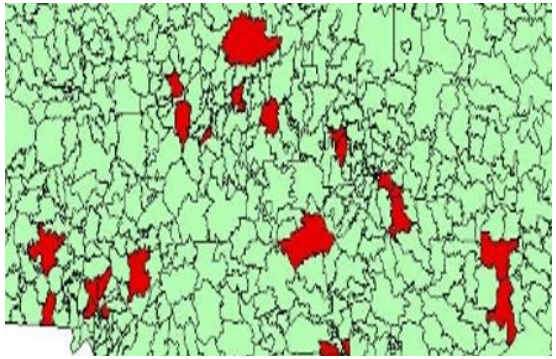
Treo Predictive Intelligence– Dynamic and Adaptive

- We have produced a number of models for general and special populations including
  - Persons with disabilities receiving long term home and community based servcies
  - Dual (Medicare and Medicaid) recipients
  - Persons characterized by severe and persistent mental illness
  - Persons 60+ with multiple chronic conditions
  - Children with special health care needs

- Most of our modeling is for populations that are known to the program and are relatively stable in membership.

Treo Predictive Intelligence– Dynamic and Adaptive

- Wide scope administrative data is the primary source of information (including ADT) and facilitates recurring dynamic results reflecting each level of the health eco system.
- Periodic Functional Status information has also been used and we are testing lab data and publically available eco system social determinants.
- Zip code has proven to be a key determinant in all of our readmission models. It is a useful but crude indicator.
- Social and behavioral determinants of health are clearly the next frontier for PA in special populations. Indicators of system integration/coordination will also be critical metrics.



Treo Predictive Intelligence– Dynamic and Adaptive

- Model results can be used for individual interventions and in aggregate to assist program managers deciding between program strategies and population priorities.
- Patterns of troubling system issues or provider behavior can be identified by clustering the action flags produced by the predictive model.
- Resource allocation can be optimized in the light of perceived impactability of the problem within the parameters of current skill sets and competing opportunities.

Children With Special Health Care Needs

- Children with special health care needs (CSHCN) have serious chronic health care problems and numerous interactions with health care providers. They are susceptible to high rates of readmission.
- CSHCN was defined for the study as having an Aggregate Clinical Risk Group (ACRG) status of a single dominant chronic condition or greater using the 3M Clinical Risk Group(CRG)* technology with some exclusions.
- A word about data integrity and enrichment
  - During both development and Implementation

*3M technologies also used to establish APRDRGs, Potentially Preventable Admissions (PPA), Potentially Preventable Visits(PPV), Potentially Preventable Readmissions (PPR)

Children With Special Health Care Needs

- A special program was underway by the customer to link children with special health care needs to high intensity care managers associated with specialized medical care homes.
- Readmissions were identified as a key quality and financial metric and Treo was requested to develop a model for prioritizing children for the intervention.
- 5406 discharges from 78 hospitals in one State were identified for modeling readmissions among children with special health care needs (CSHCN) 1 to 18 years old enrolled in the Medicaid program for at least 12 consecutive months prior to the discharge.
- A readmission risk model was devised that could be deployed routinely and with little or no data acquisition cost to providers beyond the usual practice of completing administrative data completion requirements.

Children With Special Health Care Needs

			AGE	Re Admit (Days)		Last Year PMPM	This Year PMPM	MD Vsts		ER Vsts		# Unique MDs	
		Index D/C's	Mean	% 30	% 90	Mean	Mean	Mean	Max	Mean	Max	Mean	Max
ACRG	ACRG3												
50	Single Dominant or Moderate Chronic	2604	6.2	3%	9%	$910	$958	17	229	1.7	14	3.8	18
60	Pairs - Multiple Dominant and/or Moderate Chronic	1663	7.7	7%	21%	$2,935	$2,517	33	365	2.1	20	5.6	22
70	Triples - Multiple Dominant Chronic	1139	8.0	12%	28%	$8,727	$9,064	55	344	2.1	17	6.2	17
ALL		5406	7.1	6%	17%	$3,180	$3,146	30	365	1.9	20	4.8	22

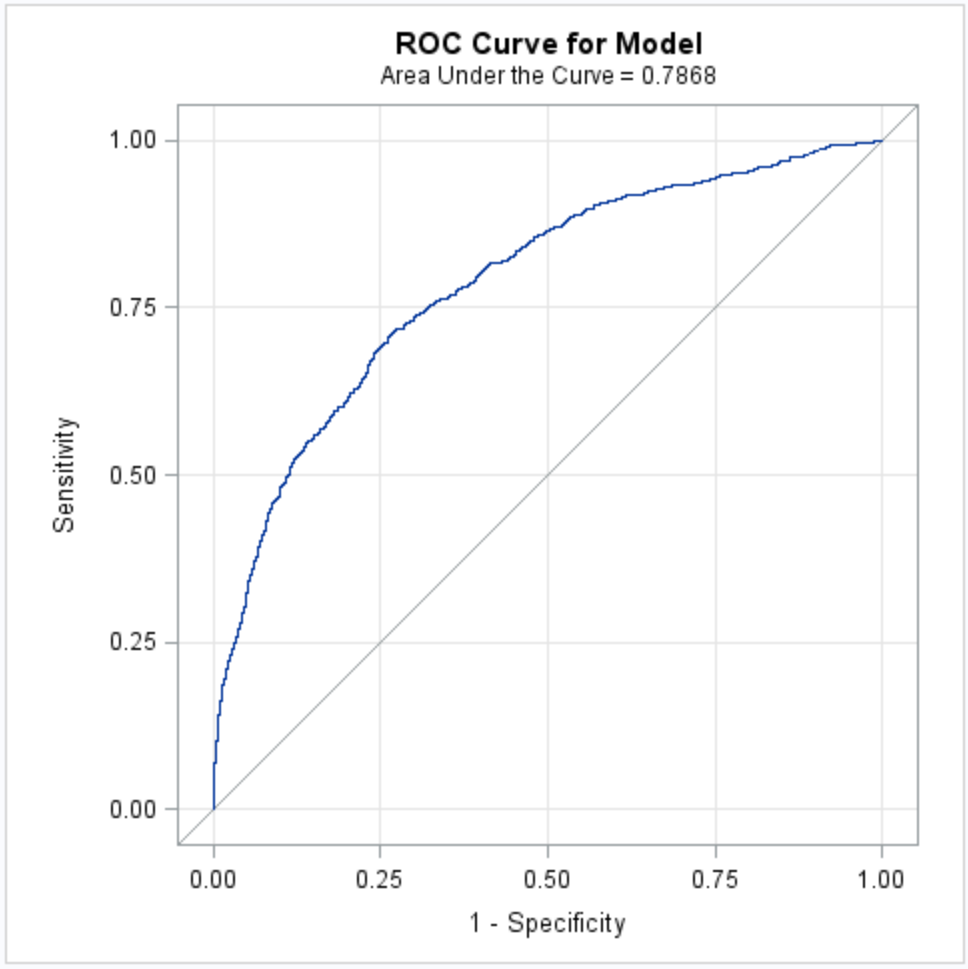
Sample of Variables Assessed

- **Person**
  - Health Status
    - EDCs (Subset)*
    - CRG (Subset)*, Shift CRG (T1-T2)
  - Demographics
    - Gender, Age
- **System**
  - Zip code*, SES
  - IP & ER Follow up 30 days* and 7 day
  - Inpatient
    - Facility Auspice -- Last LOS*
    - Facility DRG Vol -- # Readmits*
    - Index DRG* -- # ACSC*
  - ER Visits & ACSC ER Visits*

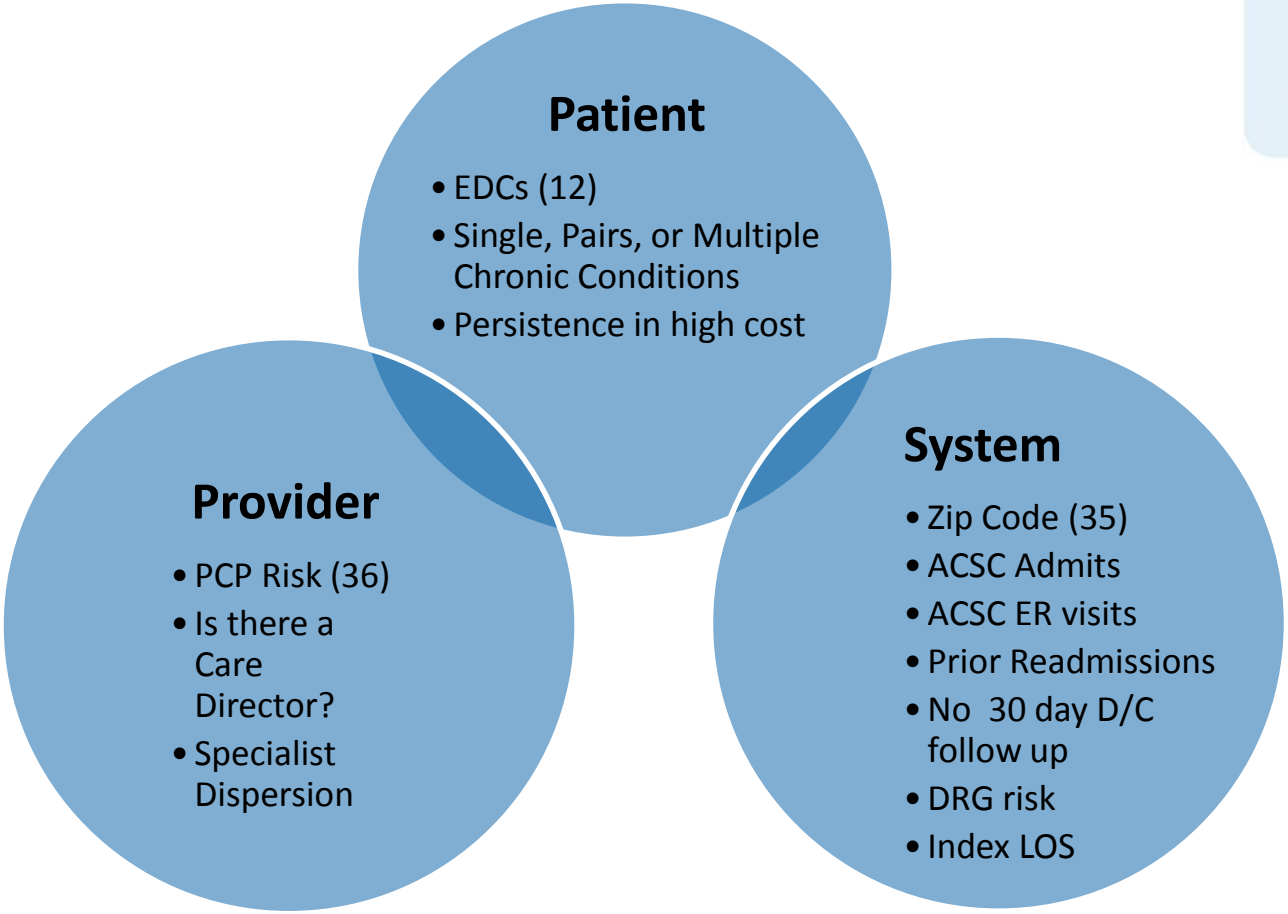
- **Provider**
  - Primary Care
    - PCP*, # PCP's
    - # PCP visits ,
    - Degree of Association*,
    - Scope, Dispersal*
    - Coordination of Care
  - Specialist & Ancillary
    - #Non PCP's & # Non PCP visits
    - Imaging $
    - Physical Therapy, Home Care & DME
- Cost of Care
  - Total Curr QTR, Curr Year, Prior Year
  - Shift, Spike, Persistence*
  - RX scripts & $ Curr QTR, Curr/Prior Year

*SIGNIFICANT PREDICTORS

Performance of the Model. How accurate?



Final Variables



Action Flags

- A good model is a diagnostic for action.
- Can't just assign a risk score and hope it all works out.
- The core elements should be actionable. But some of can be unpacked.
- ~Recursive/path analysis concepts used to identify action flags

  Examples:
  - What makes some DRGs more "risky" than others? (volume?)
  - Why are some PCP's more "risky" than others? (Continuity, Panel size?)
  - Why are some zip codes more "risk" than others? (Supply, distance?)

Dashboards for Payers, Managers, Providers

Back to Dashboard | Export

Member List (limited to 1,000 members)

This list includes all patients who are attributed to the provider and who have had two or more Emergency Room Visits during the latest 12 months for which data is available.

Export All **517** Members

Search:

Show 10 entries

Member ID	Member Name	Age	Gender	Base Risk Group	Physician Name	Outpatient ER Visits
525138	SCOTT (DE-ID), DANIEL Y.	18	M	Diabetes and Other Moderate Chronic Disease	SCOTT R. RODRIGUEZ (DE-ID) MD	27
584855	CAMPBELL (DE-ID), LISA X.	43	F	One Other Moderate Chronic Disease and Other Chronic Disease Level 2	GRACE T. RODRIGUEZ (DE-ID) MD	17
509336	ROBINSON (DE-ID), CAROL U.	24	F	Multiple Minor Chronic PCDs	JAMES P. WHITE (DE-ID) MD	15
362371	JONES (DE-ID), DANIEL T.	25	M	Other - M21	EMILY M. HALL (DE-ID) MD	10
464596	WILLIAMS (DE-ID), SEAN J.	53	M	Diabetes and Hypertension	MIKE W. SMITH (DE-ID) MD	10
738640	TAYLOR (DE-ID), JUSTIN E.	62	M	Prostate Malignancy	LARRY D. ALLEN (DE-ID) MD	9
827948	WRIGHT (DE-ID), BETTY W.	21	F	Rheumatoid Arthritis	JEAN L. JONES (DE-ID) MD	9
155997	WILSON (DE-ID), VICTOR Z.	28	M	One Other Moderate Chronic Disease and Other Chronic Disease Level 2	LEONARD N. LOPEZ (DE-ID) MD	8
709241	THOMAS (DE-ID), GREGORY O.	75	M	Dialysis with Diabetes	JOSEPH F. HERNANDEZ (DE-ID) MD	8
739986	ROBINSON (DE-ID), KIM F.	44	F	Multiple Minor Chronic PCDs	ELIZABETH P. WHITE (DE-ID) MD	8

Showing 1 to 10 of 517 entries

First Previous 1 2 3 4 5 Next Last

Dashboards for Payers, Managers, Providers

Patient Profile

Patient: **BONNIE N. ROBERTS (DE-ID)** (DOB: 07/12/1961) Period: 01/01/2012 to 12/31/2012 Export

General | Professional Visit History | Frequently Used | Inpatient History | Outpatient History | Pharmacy | Gaps In Care

GENERAL INFORMATION

Member

Name	BONNIE N. ROBERTS (DE-ID)
County	
Zip code	58261
DOB	07/12/1961
Age	51
Gender	Female

Insurance

Primary Payer	Commercial
Enrolled Since	01/01/2009

Primary Care Physician

Name	EARL Y. HALL (DE-ID) MD
VIS	0.84

Medical Summary

Member Risk Group	Cerebrovascular Disease - 2 or More Other Dominant Chronic Diseases Level - 3
Treo Population Health Segment	Complex Chronic

UTILIZATION SUMMARY

Visit Summary

Inpatient visits	2
Outpatient visits	
ER	4
Non-ER	10
Professional	
PCP	12 - last visit: 11/05/2012
Specialist	74 - distinct specialties: 15
Total visits	102

Prescriptions

Total prescriptions	23
Unique prescriptions	16

Care Manager Reports

Member DOB	Member Months	CRG Weight	Fall Out Report	Jumpers Report	Newly Chronic	Missing Office Visit	Previous CRG	Previous CRG Desc
8/2/1952	12	0.552				Y	54241	Diabetes Level - 1
10/4/1947	12	1.424	Y				62932	One Other Moderate Chronic Disease and Other Chronic Disease Level 2 Level - 2
5/5/1994	12	1.997			Y		10000	Healthy
1/3/1963	12	1.198				Y	62603	One Other Dominant Chronic Disease and One or More Moderate Chronic Disease Level - 3
2/17/1924	12	0.603				Y	54241	Diabetes Level - 1
2/16/1950	12	1.435			Y		34451	Hyperlipidemia Level - 1
6/24/1970	12	1.501			Y		20500	1 Significant Acute ENT Illness
5/12/1947	12	2.557			Y		20820	Significant Cardiovascular, Pulmonary or other Vascular Diagnosis with Other Significant Illness
4/6/1918	12	0.530	Y				99801	Other Medical Condition - 1
10/29/1928	12	14.278		Y			61512	Advanced Coronary Artery Disease and Other Moderate Chronic Disease Level - 2
12/28/1921	12	0.537				Y	99795	Other Medical Condition - 5
1/8/1944	12	0.604	Y				62701	Two Other Moderate Chronic Diseases Level - 1
1/14/1924	12	2.543				Y	56642	Genitourinary Malignancy Level - 2
8/3/1955	12	0.552				Y	54241	Diabetes Level - 1
7/15/1911	12	0.511				Y	51791	Congestive Heart Failure Level - 1
8/20/1962	10	0.718			Y		10000	Healthy
7/6/1928	12	3.871				Y	99803	Other Medical Condition - 3
9/25/1921	12	12.146				Y	61814	History of Hip Fracture Age > 64 and Other Moderate Chronic Disease Level - 4
9/11/1951	12	1.032			Y		40001	Multiple Minor Chronic PCDs Level - 1
7/11/1989	9	1.548			Y		20300	1 Significant Acute Illness Excluding ENT
8/14/1923	12	2.557				Y	61442	Diabetes and Hypertension Level - 2
3/5/1945	12	1.066	Y				62934	One Other Moderate Chronic Disease and Other Chronic Disease Level 2 Level - 4
9/25/1916	12	3.018				Y	62702	Two Other Moderate Chronic Diseases Level - 2
4/18/1930	12	1.750		Y			61442	Diabetes and Hypertension Level - 2
11/13/1923	12	3.461				Y	61435	Diabetes and Other Moderate Chronic Disease Level - 5
11/6/1913	12	3.618				Y	62704	Two Other Moderate Chronic Diseases Level - 4
11/29/1925	12	14.503		Y			62702	Two Other Moderate Chronic Diseases Level - 2
2/17/1959	12	0.537				Y	51921	Hypertension Level - 1
10/18/1925	12	8.038		Y			62613	One Other Dominant Chronic Disease and Other Chronic Disease Level 2 Level - 3
3/11/1933	12	1.109				Y	54244	Diabetes Level - 4
2/26/1919	12	3.018				Y	62702	Two Other Moderate Chronic Diseases Level - 2
7/20/1947	12	0.537				Y	51921	Hypertension Level - 1
6/1/1949	12	9.374		Y		Y	62701	Two Other Moderate Chronic Diseases Level - 1
8/11/1963	12	0.537			Y		34451	Hyperlipidemia Level - 1