

Patient involvement in care management programs for chronic conditions

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Introduction

- Increase in chronic diseases: “*one of the greatest challenges that will face health systems globally in the twenty-first century*” WHO
- Chronic disease affects 50% of US adult population, with 25% having multiple chronic conditions.
- Patient engagement and participation in own care, essential for the effective control and management.
- Achievement of patient engagement is multifaceted: affected by access to care, belief and knowledge, provider relationships, provider actions, co-morbidities, personal and social circumstances.
- A better understanding of key patient factors is important



Care Management

- Advocated as a model of care for individuals with chronic conditions to improve health outcomes and quality of care, through improving care coordination, patient support and self-management.
- Found to be associated with better quality and satisfaction in care, but results of cost savings differ, and changes in utilization are mixed.
- For care management to be effective not only must patients participate but also engage with their care and the health professionals supporting them.
- What influences a patient's engagement and the resulting outcomes are important to understand, to ensure care management interventions are appropriately designed and implemented.



Goals and Aims

1. To develop an approach for defining and measuring patient participation in care management
2. Determine which individual and organizational factors are associated with patients' active engagement
3. Create a model to predict participation, and estimate the independent effects of participation on care process and utilization
4. To create and recommend metrics for the measurement of care management participation across the study populations to enhance understanding of patient groups and sub-populations

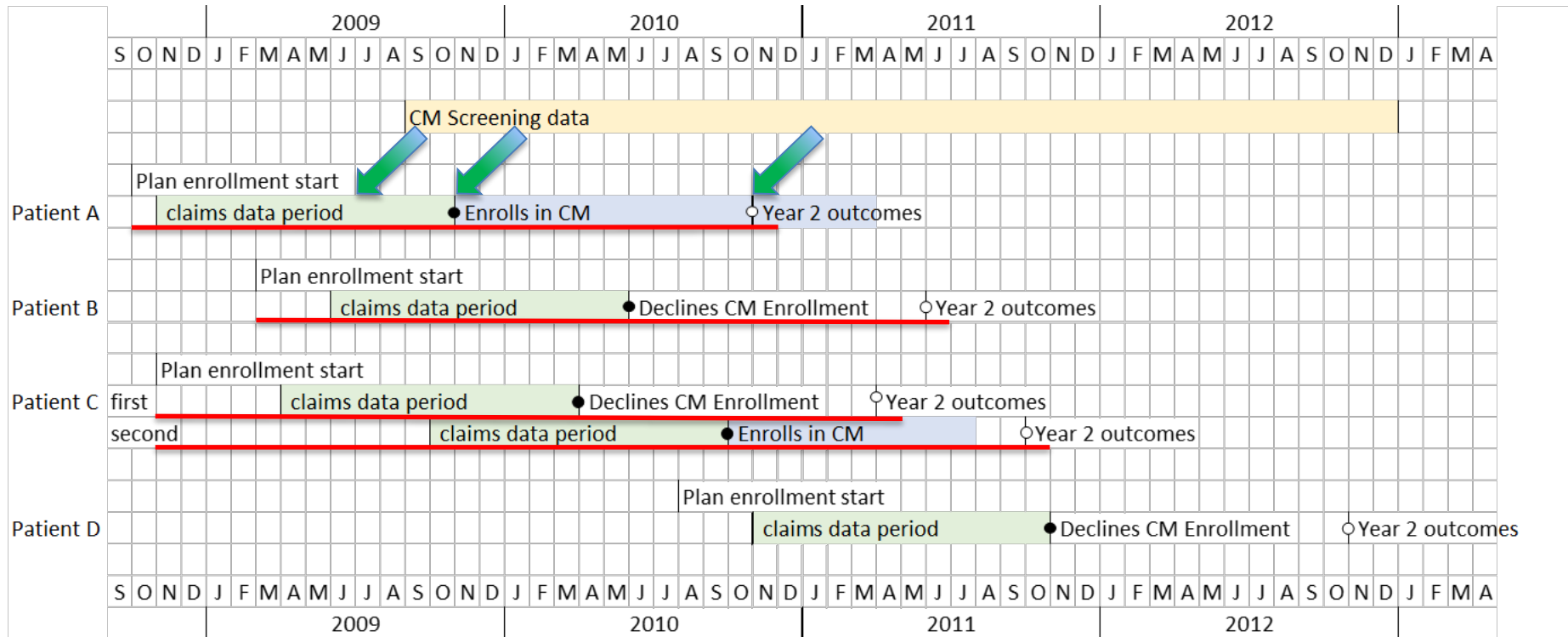


Methods

- Literature review: Care Management, Engagement and Participation
- Data collection and data integration
- Data exploration, production of descriptive statistics
- Development of measures
- Linear & Logistic regression models
- Random-effects models
- Exploratory Factor Analysis
- Variable Cluster Analysis
- Framingham Study risk score functions
- Propensity Score Matching (Near Neighbor, Caliper)



Data collection timeline



Data Summary

- 3 Plans: Employee; Medicaid; DoD Family
- Screened for Care Management
 - n = 11 364 (2 836, 6 478, 2 050)
- Female 64.6% (63.7%, 68.8, 52.8%)
- Average age 49.9 years (50.1, 44.0, 68.2)
- Mean chronic conditions 4.5 (3.4, 4.4, 6.2)
- Classified as frail 28.4% (19.0, 31.6, 31.0)
- Conditions:
 - diabetes 38.4%; asthma 36.9%;
 - lipidemia 45.2%; hypertension 70.5%;
 - depression 40.2%.



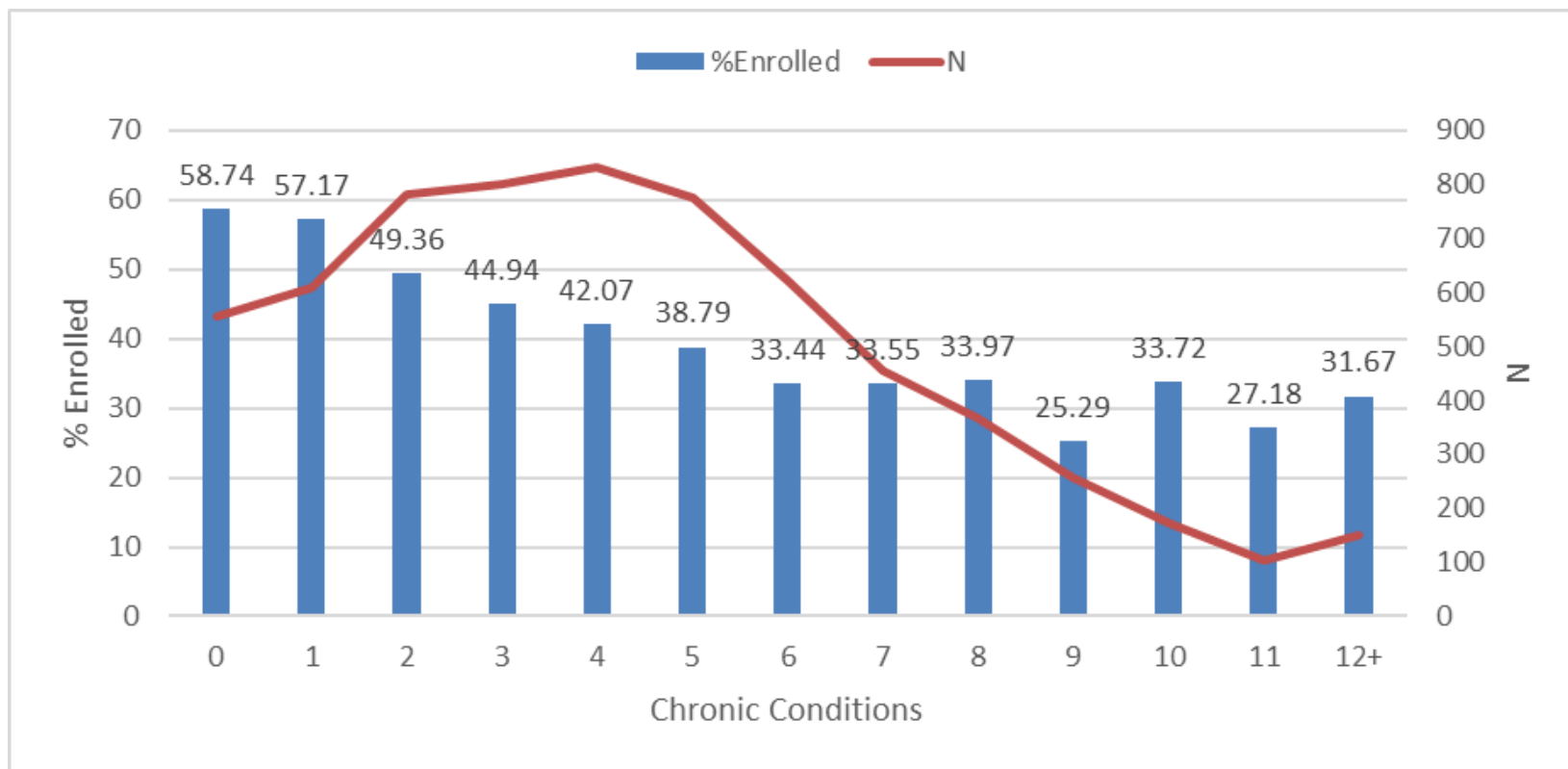
Enrollment in CM

- 40.2% of the members
 - (38.3%, 42.5%, 35.9%)
- 85.8% remained enrolled for at least 6 months
 - (89.8%, 80.8%, 96.1%)
- 67.9% for at least 12 months
 - (76.6%, 60.0%, 80.9%)

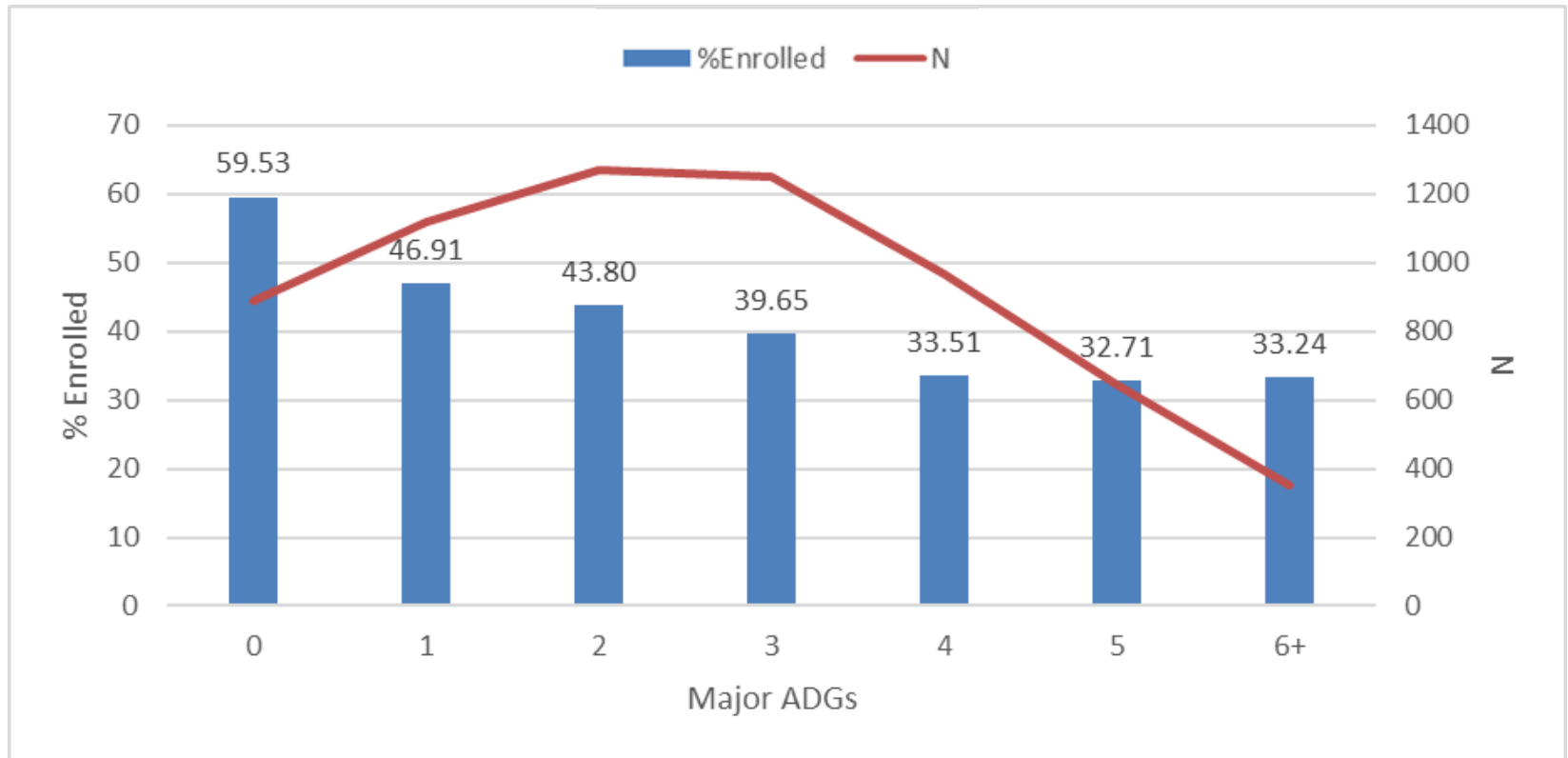
Key: (Employee, Medicaid, DoD Family)



Care Management Enrollment Rate by Chronic Condition Count: Medicaid Plan



Care Management Enrollment Rate by Major ADG: Medicaid Plan



Patient factors with reduced likelihood of member's acceptance to join CM program

Variable	<i>Medicaid</i> (<i>n</i> = 6029)	<i>Employee</i> (<i>n</i> = 2692)	<i>US Family</i> (<i>n</i> = 2028)
Age 35-64 (base 18-34)	0.761*	0.984	0.980
Age 64+	<i>n/a</i>	0.525*	0.914
PCP Multiple vs 1	0.605*	0.434*	<i>n/a</i>
Chronic Conditions			
1	0.735*	0.837	1.378
2	0.696*	0.642*	1.364
3	0.654*	0.746	1.891
4	0.641*	0.513*	1.591
5	0.599*	0.447*	1.415
6+	0.474*	0.407*	1.316
Major ADG			
1	0.658*	0.626*	0.698
2	0.656*	0.536*	0.960
3	0.544*	0.497*	0.737
4	0.445*	0.720	0.921



Patient factors with increased likelihood of member's acceptance to join CM program

Variable	<i>Medicaid</i> (<i>n</i> = 6029)	<i>Employee</i> (<i>n</i> = 2692)	<i>US Family</i> (<i>n</i> = 2028)
Age 18-34 v 35-64	1.239 ^{*a}	1.475 ^b	1.094
Race			
Black vs White	1.478 [*]	<i>n/a</i>	1.015
Referral	2.243 [*]	3.192 [*]	1.810 [*]
Number of Specialties	1.099 [*]	1.122 [*]	0.969

* significant at 95% confidence level, ^a Baseline Age 35-64, ^b Age 65+



Patient Participation Risk Models

Population / Plan	N	Outcome	Model C-Statistic			
			Model 0	Model1	Model7	Score
Training Data	5701	0.4031	0.5729	0.6318	0.6622	0.6622
Validation Data	5663	0.4019	0.5754	0.6206	0.6327	0.6326
Medicaid Plan	3249	0.4217	0.5842	0.6389	0.6358	0.6357
Employee Plan	1390	0.3871	0.5678	0.6275	0.6442	0.6442
DoD Plan	1024	0.3594	0.5280	0.5612	0.6209	0.6206

N	Cut Point Probability	PPV	Sensitivity	Specificity	% of Data
230	0.6	73.5	7.4	98.2	4%
1143	0.5	57.4	28.8	85.6	20%
2794	0.4	49.9	61.2	58.6	49%
4665	0.3	43.0	88.0	21.4	82%
5461	0.2	40.6	97.5	4.3	96%



Medicaid Plan model, Validated on Employee and US Family Health plans

Population / Plan	N	Outcome	Model C-Statistic		
			Model 0	Model1	Model7
Medicaid Plan (Training)	6478	0.4248	0.5846	0.6423	0.6654
Employee Plan (Validation)	2836	0.3829	0.5721	0.6410	0.6432
DoD Plan (Validation)	2050	0.3590	0.5244	0.5443	0.5821

Model 7 independent variables: Gender, Age, Primary Care Provider, Major ADG count (max 4), Chronic Count (max 6), Frailty, Referral, Generic Drug count, Selected Conditions



Personal Wellness Survey: Employee Health Plan Descriptive Statistics

Characteristic	All Initial CM Records		PWP Survey	
	Unmanaged	Case Management	Unmanaged	Case Management
N	1750	1086	481	396
	61.7%	38.3%	54.8%	45.2%
Female	62.1%	66.3%	84.8%	84.1%
Age at Screening	51.18	48.32	48.91	46.30
Plan Enrollment (days)	672.87	664.59	708.63	682.62
Chronic Conditions	3.66	3.01	3.41	2.45
Major ADGs	1.80	1.35	1.63	0.97

PWP survey total n = 876



CM Participation Likelihood (CMPL) Score: Based on PWP engagement response

- Five factors Identified from survey
 - Readiness to change: exercise, nutrition, and weight
 - Readiness to change: smoking, alcohol consumption
 - Multimorbidity and unique provider relationship
 - Preventative exams and enrolment in the health plan
 - General health perception, support & last physical exam
- C-Statistic of 0.7332
- Sensitivity 66.4%, Specificity 54.5%, PPV 54.6%
(probability = 0.4)



Cost and Utilization Outcomes, Year 2

- Propensity Score matching (PSM) applied to reduce the risk of selection bias
- Carried out separately for each of the three plans
- Two matching methods used
 - Nearest Neighbor, each treatment case the control is chosen that had the closest propensity score (probability of enrollment in case management). Ensures a control match for each treatment case, but does not ensure the absolute difference in scores are close
 - Caliper method allows for a minimum absolute difference in prevalence to be specified, but does result in data loss where a match cannot be found within the specified absolute difference
- (Coca-Perraillon, 2006).



Propensity Score matching

Year 2 Outcome Measures

Medicaid Health Plan	PSM - Near Neighbor (n=4662)				P value*
	Not-Enrolled (n=2331)		Enrolled (n=2331)		
	mean	CI	mean	CI	
Total Cost \$	30,718	(28906-32531)	26,644	(24809-28479)	0.002
Inpatient hospitalization	1.0854	(1.003-1.167)	0.828	(0.751-0.905)	0.000
Emergency Visits	3.2986	(3.071-3.526)	2.6319	(2.461-2.803)	0.000

- Employee plan mean cost reductions (Near Neighbor, Caliper)
 - -\$4486.86 (18.3%), -\$4186.91 (17.1%)
- Medicaid plan
 - -\$4074.07 (13.3%), -\$1372.66 (4.6%)
- Family Health plan
 - -\$2458.51 (7.3%), -\$2604.29 (7.7%)



Propensity Score matching

Year 2 Total Cost by sub-group

Plan/Sub-Group	Not-Enrolled		Enrolled		P value*
	N	Total Cost (CI)	N	Total Cost (CI)	
PSM - Near Neighbor (n=4662)					
Medicaid Health Plan					
<2 Chronic Conditions	342	14,939 (11901-17978)	559	13,305 (11353-15257)	0.374
0-2 Major ADGs	751	24,708 (21778-27638)	828	20,688 (18286-23091)	0.037
3-4 Major ADGs	821	34,632 (31606-37658)	674	33,614 (29927-37302)	0.675
5+ Major ADGs	417	46,779 (41448-52110)	270	55,127 (46356-63899)	0.110

- Medicaid plan mean cost reductions (Near Neighbor, Caliper)
 - <2 Chronic cond. **-\$1634.77 (10.9%), -\$1480.85 (9.7%)**
 - 2+ Chronic cond. **-\$4019.44 (16.3%), -\$3468.01 (14.1%)**
 - 3-4 Major ADGs **-\$1017.33 (2.9%), -\$1274.02 (13.7%)**
 - 5+ Major ADGs **+\$8348.21 (17.8%), +\$11,288.15 (25.7%)**



Findings / Discussion (1)

- Those who have less resources (e.g. poor) are more likely to accept resources, e.g. enroll
- “Band-width”/ “care-fatigue” is an issue for elderly and comorbid, i.e. a limit to what you can cope with
- Care Management is not a fit for some people and will continue not to be
- e.g. individuals who have competent care takers, those who feel they do not need assistance



Findings / Discussion (2)

- Findings appear counter to the objective of a Care Management plan (designed for more comorbid)
- But consistent with issues such as bandwidth, and less resources
- The health industry is interested in analyses of Care Management populations and which groups it is better suited to



Conclusion

The study, while not seeking to evaluate the current disease management program, seeks to identify factors associated with participation, and provide models and population groups for analysis.

The study was conducted in a managed care plan serving multiple populations in Maryland, and would be expected to inform other managed care organizations (in the US and worldwide).



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Thank You!

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