26th PCSI Conference,

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Potential efficiency and quality gains from using predictive modeling and case management in a primary care population

Paulo Boto

JHSPH, ENSP, CMDT-LA

Possible conflict of interest

PhD student at Hopkins

Advisor: Jonathan Weiner, PhD

Hopkins + Weiner = ACGs ?

The last few years (or decades, depending on the context) have seen a growing interest in case-mix analysis, patient classification systems and risk adjustment in health care and particularly in predictive modeling, the use of different types of information to try and predict future outcomes of interest, be it clinical results or costs, for instance.

One particular use of these tools is to identify patients at risk of being high users of care in the future.

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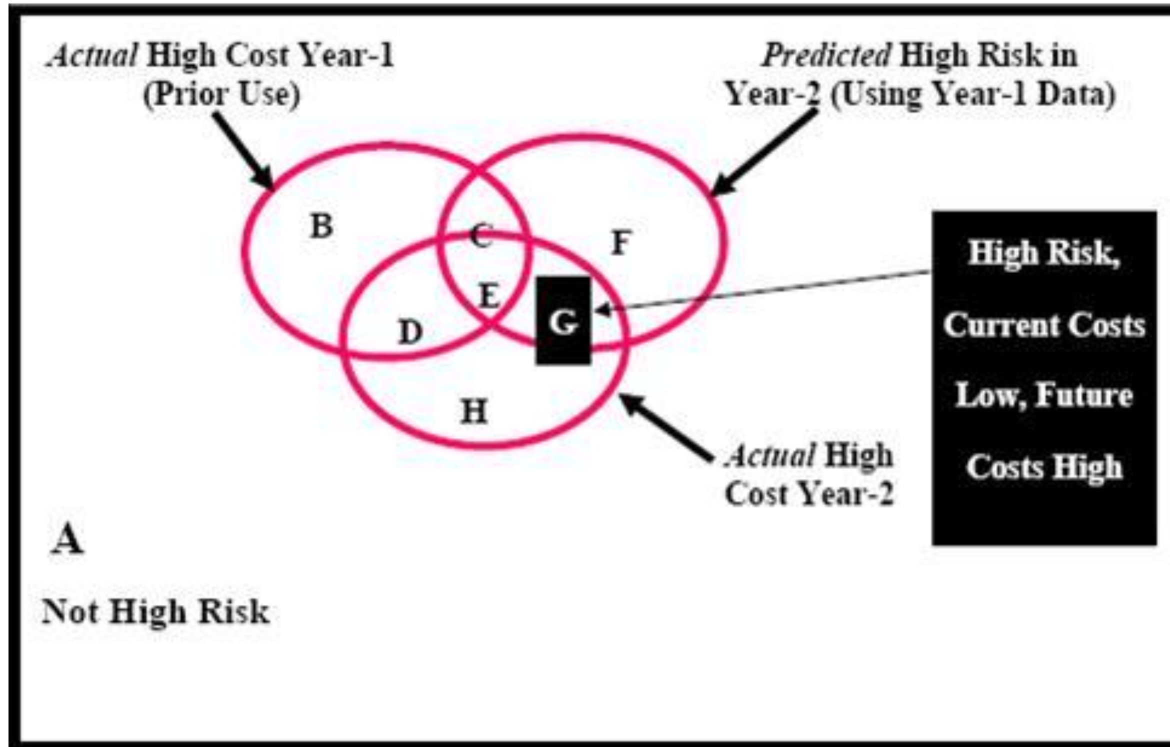

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This group, often with chronic conditions, might be amenable to specific interventions (broadly defined as disease or case management) that might manage them better in ambulatory care settings, thus avoiding costly emergency room visits and/or hospital admissions.

In this study, we hypothesize the potentials gains from such an approach in a general primary care population.

Methods

Data were collected for two consecutive years (2006 and 2007) for a population of about 55,000 adults attending 5 primary care clinics (in Catalonia, Spain).

Data collected included demographic information, as well as diagnostic and pharmacy codes in year 1, and outcome information (namely costs) in year 2.

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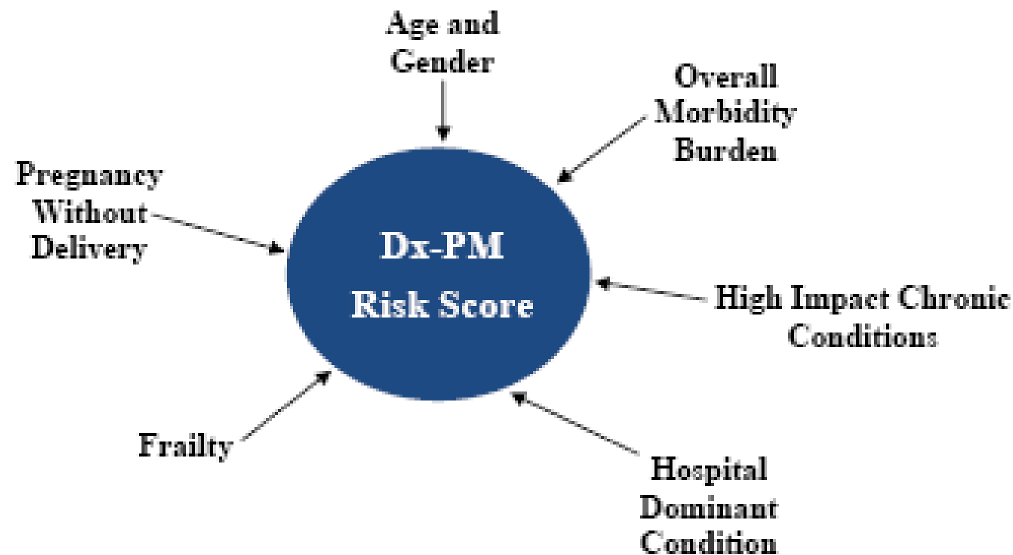
Methods

The Adjusted Clinical Groups (ACG®) software was used to group patients according to their morbidity patterns.

The ability of different models to predict high users of care in year 2 (defined as the top 5%) was assessed by comparing those predicted to be high cost in year 2 to the real high cost patients in year 2.

The models



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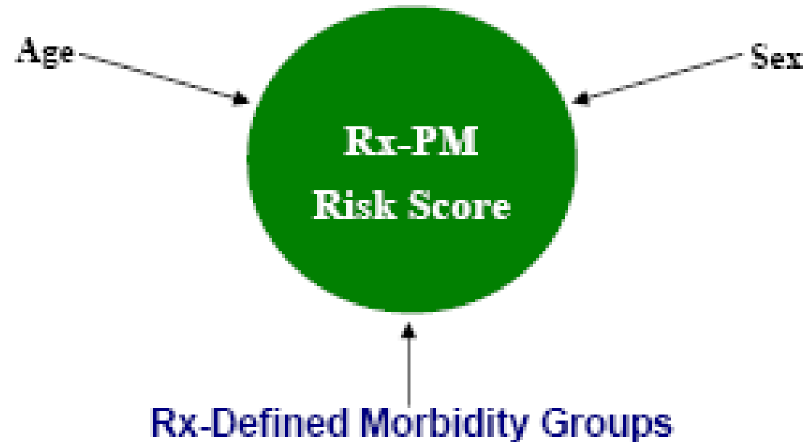

Source: ACG Reference Manual, Version 8.2

Results

Both diagnostic and pharmacy based models performed well in predicting the outcome chosen.

The use of any of these models (using diagnostic or pharmacy information, or both) always allowed the selection of a sicker and thus more expensive population (tables 1 and 2 below).

Results

Model	Sensitivity/PPV
Prior cost	64
Age and gender	18
Diagnostic codes based models	
Dx-PM w/o prior cost	40
Medications codes based models	
Rx-PM w/o prior cost	48
Mixed models	
DxRx-PM w/o prior cost	52

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Results

Predictive model	C-statistic
Prior cost	0,81
Diagnostic codes based models	
Dx-PM	0,91
Medications codes based models	
Rx-PM	0,93
Mixed models	
DxRx-PM	0,94

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Results

		Top 5% risk group		
Characteristic	**Total adult sample**	**Using DxPM**	**Using RxPM**	**Using DxRxPM**
Mean age (in years)	47,8	72,8	71,4	69,7
Any chronic condition (%)	46,9	99,1	94,6	97,1
Asthma	9,4	31,2	29,0	30,9
Arthritis	5,3	19,7	16,4	18,8
CHF	3,9	25,7	31,0	28,1
COPD	2,2	18,8	12,2	15,9
Chronic renal failure	0,9	7,3	5,1	6,0
Depression	14,6	32,0	41,5	41,0
Diabetes	9,8	54,7	51,2	51,0
Hyperlipidemia	21,2	50,8	61,0	58,0
Hypertension	26,6	79,6	82,7	78,9
Ischemic heart disease	2,4	18,3	13,8	15,1
Low back pain	13,1	21,8	19,9	20,7

Results

		Top 5% risk group			
Resource use measure	**Total sample**	**Prior cost**	**DxPM**	**RxPM**	**DxRxPM**
Medication use, %					
Any medication	85,2	100,0	99,4	99,7	99,8
? 10 unique medications	8,2	60,3	52,2	80,1	74,0
Physician ambulatory visits					
Mean number of visits	8,3	18,2	18,7	17,9	18,5
Healthcare charges, mean					
Pharmacy	401,14	2125,50	1435,34	1708,35	1705,49
Total primary care	1086,99	3532,97	2867,52	3081,54	3132,84

Results

What do we get for our money ? “Back of the envelope” estimates

Assuming the implementation of disease and/or case management programs could yield a modest 5 to 10% reduction in costs, in a group with overall yearly costs of about 8M €, this could mean savings of approximately 400,000-800,000 € a year (though the costs of interventions were not considered).

Conclusions

Predictive modeling can be helpful both to providers and to managers in helping select cases that might need specific clinical attention.

Through disease and/or case management efforts, results, both clinical and managerial, can improve.

Conclusions

Focus should not be only on financial savings though:

the use of standardized approaches (e.g. guidelines) can help both efficiency and quality efforts, by making sure providers adhere to the best evidence available.

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