The Johns Hopkins University's
2010 ACG International Risk Adjustment Conference
MAY 10-12
Tucson, Arizona
Loews Ventana Canyon

Understanding the High Pharmacy Utilization Model

Presenter: Chad Abrams

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Contributing Authors:

Chad Abrams[1], Hsien-Yen Chang[1], Amaia Calderón-Larrañaga[2], Beatriz Poblador-Plou[2] and Alexandra Prados-Torres[2]

[1]Johns Hopkins University, Baltimore USA,
[2]Aragon Health Science Institute, Zaragoza, Spain

Author for correspondence: Chad Abrams, cabrams@jhsph.edu

Research Question

- **Unexpected** or **Unexplained** High Pharmacy Utilization
  - High Pharmacy Utilization is often associated with high (or multi) morbidity, but what about when drug use exceeds expectations?
  - Can we predict this subgroup (those that have high pharmacy utilization but which do not have the morbidity burden to support this utilization)?

Said another way....

- In traditional predictive modeling, lots of morbidity is typically linked to high pharmacy expenditures.

- Models of the form:

  Pharmacy cost = $\alpha + \beta$(series of risk assessment variables) + ε

- **Goal**: To predict those likely to have high pharmacy expenses above and beyond that which might be expected based on morbidity burden (or clinical rationale)

Why Are We Interested in this Sub-Group?

- Pharmacy expenses may be higher than expected because of:
  - Quality – poor or uncoordinated care
  - Use of expensive drugs
  - Patient choice (potential abuse?)
  - Any combination of above

Intervention (Management) Opportunities

- Individuals consuming more pharmacy resources than expected may benefit from:
  - Improved coordination
  - Refining the drug regimen
  - Other intervention/education programs as appropriate

Design and Methods

- On development data set utilized a two part modeling approach:
  1. We identified those who have unusually large pharmacy expenditures (more than 1.75 STD from predicted amount based on diagnosis information only)[1]
  2. Having identified this group, we implemented components of the traditional ACG Predictive Modeling tools to predict them
     - Age/gender
     - A measure of overall morbidity
     - Individual disease markers
     - Pharmacy utilization markers
     - Prior use (when available)

[1]Gray, Woodall 1993

Validation Criteria
(or– how do we determine success!?)

- Performance statistics (PPV/SENS, ROC) had to be (roughly) as good as traditional ACG Predictive Modeling
- We wanted to identify a different subset
  - The "who" identified as high risk for future high pharmacy expenditures had to be different than who was identified by traditional ACG predictive models

How Did We Do?

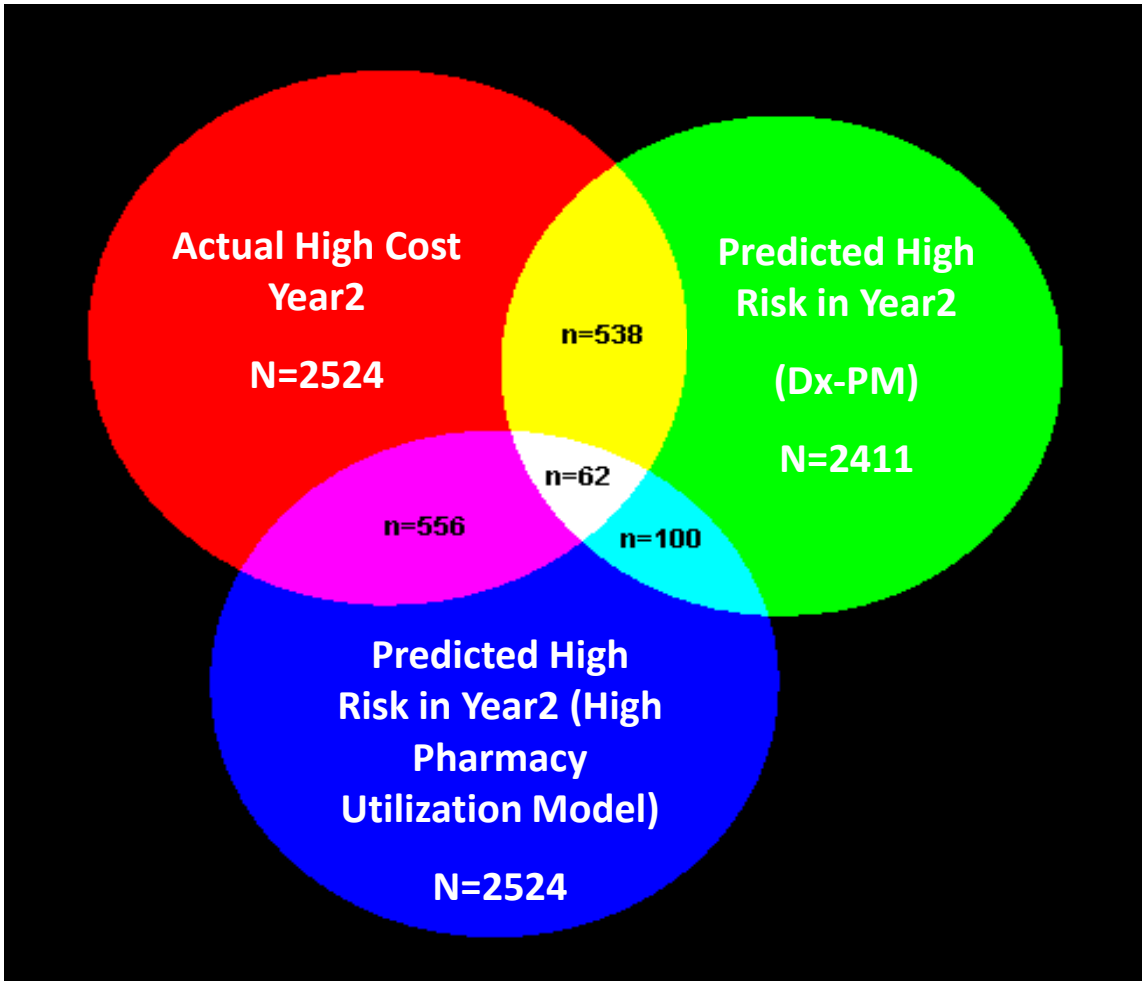
Predictive Positive Value, Sensitivity/Specificity

(to identify top 3% of pharmacy expenditures in year 2)

	PPV	Sensitivity	Specificity
Dx-PM	22.3%	21.3%	97.7%
DxRx-PM	22.7%	22.0%	97.7%
Unexpected High Pharmacy	22.0%	22.0%	97.6%

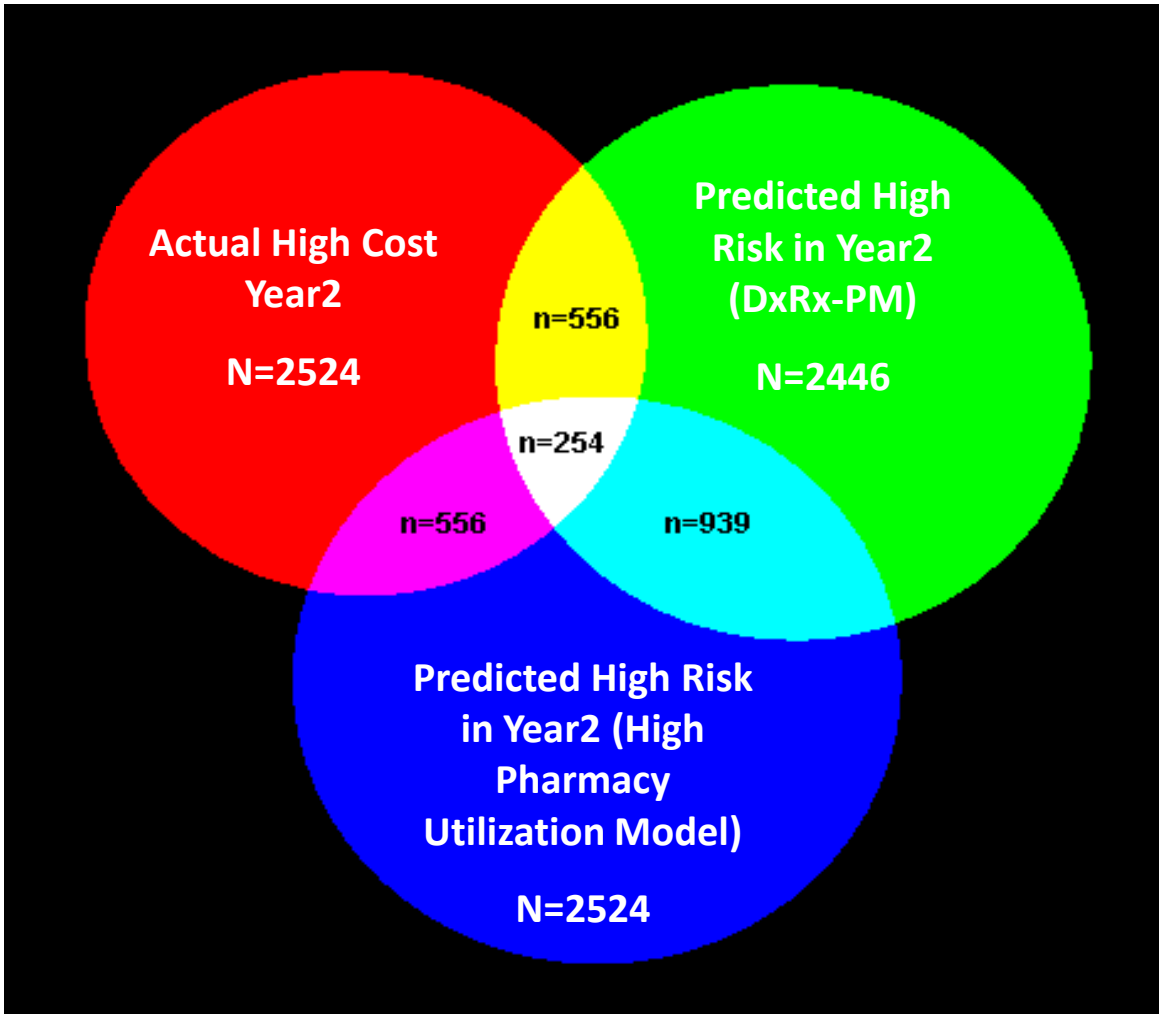
Data from Aragon's Public Health Care System, 2006-2007 (n=84,512)

Did We Identify a Different Subset?
(comparing ACG Dx-PM)



Data from Aragon's Public Health Care System, 2006-2007 (n=84,512)

Similar results comparing DxRx-PM?



Data from Aragon's Public Health Care System, 2006-2007 (n=84,512)

Conclusions

- Contrasted to traditional ACG Predictive Modeling
  - Performance statistics on par
  - A (mostly) different set of individuals is being identified
- There exist additional opportunities for intervention to:
  - Provide better coordination
  - Refine the drug regimen
  - Offer other interventions programs as appropriate

Discussion and Next Steps

- Focus has been on high pharmacy utilization
  - Opportunities for under-utilization or gaps in pharmacy utilization leading to bad outcomes?
  - Linkages to coordination markers?
  - Better understanding of this population and appropriate intervention strategies?
  - Other?