Identifying people who have caregivers that are not documented in Medicare

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Background

Maximizing the assistance that caregivers can provide requires communication between the caregiver and all parts of the healthcare team, including the insurer. Insurance plans can assume that a caretaker role is played by friends or family who are identified in Protected Health Information (PHI) consent forms as being authorized to receive an enrollee's PHI. However, since completion of the consent form is voluntary, PHI designation is often missing. Furthermore, PHI designation is – at best – a proxy for having a true caregiver.

Objective

To develop and validate a predictive model for identifying individuals in a Medicare Advantage or Medicare Advantage Prescription Drug (MA/MAPD) plan who have a caregiver.

Methods

Study Design: Model development and validation
Data Sources:
- Claims and enrollment data from Humana Inc., a healthcare company that had approximately 2.4 million individual Medicare Advantage enrollees at the time of the study (as of June 30, 2014).[1] Variables derived from claims pertain to the 14 months prior to the survey (clinical conditions) or to a 12-month window starting 15 months prior to the survey (utilization measures).
- Currently available consumer data supplied by a third party vendor.
- Telephone survey administered to all study participants between June 16, 2014 and July 9, 2014.

Study Sample: Individuals in the company's Medicare Advantage population were randomly selected to undergo a telephone survey. The model was developed and tested on a sample of 5,002 survey respondents.
Independent variable: *Primary Analysis:* Having a caregiver, as identified through survey responses. Five survey items (see Table 1) were subjected to factor analysis. *Secondary Analysis:* Having completed the PHI consent form.
Types of model covariates considered:
- Age, sex
- Consumer characteristics
- Claims-based healthcare utilization and chronic disease diagnoses
- Customer interactions with Humana
- Humana-designated segmentation based on a member's claims activity, healthcare beliefs and attitudes, demographics, and other data.

Type of model: Logistic regression.
Model development and validation: The sample was randomly divided into a development set (60% of participants) and a validation set (40% of participants). During development model covariates were selected for inclusion through an iterative process. No a priori criteria were defined.

Table 1. Caregiver Variable

Survey Items Used to Define a Binary Variable for Caregiver*
1. Have you designated someone who can make medical decisions for you?
2. Have you designated someone who can make financial decisions for you?
3. Do you have someone who routinely helps you with your medical decisions?
4. Do you have someone who routinely helps you with your financial decisions?
5. Do you have anyone who helps you with household chores like cleaning and cooking?

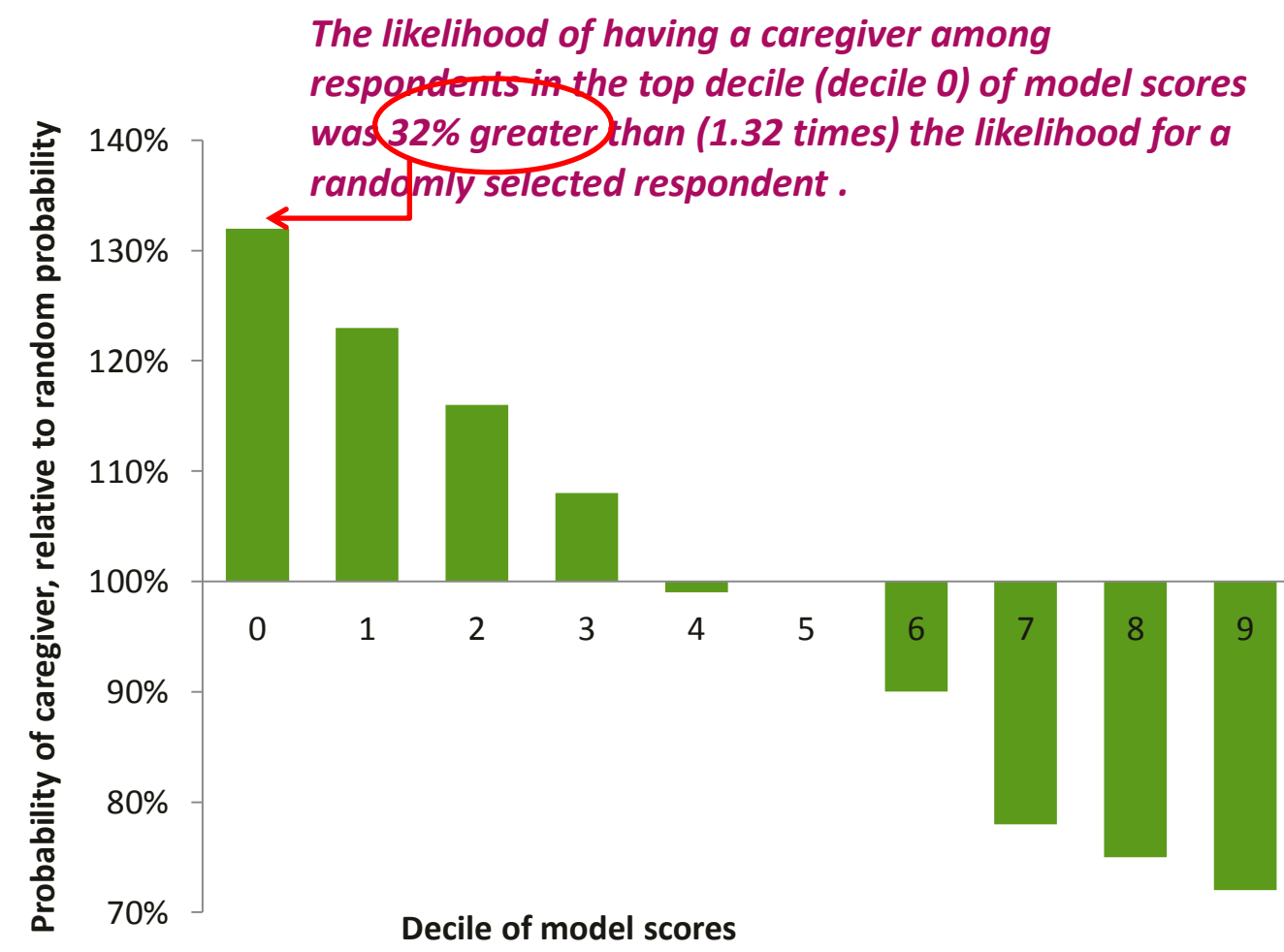*Responses subjected to factor analysis for definition of a single variable

Results

Table 2. Study Sample Characteristics

- *39.5% of the study sample had caregivers.*
- *Those with caregivers were more likely to be male.*
- *Individuals with and without caregivers did not differ by race category or by whether they were dual eligible.*
- *There was little variation in geographic distribution between those with and without caregivers.*

Variable	Had Caregiver	No Caregiver	Total
N (%)	1974 (39.5%)	3028 (60.5%)	5002 (100%)
Male, n (%)*	819 (41.5%)	965 (31.9%)	1784 (35.7%)
White race, n (%)*	1570 (79.5%)	2411 (79.6%)	3981 (79.6%)
Dual eligibility*†	246 (12.5%)	388 (12.8%)	634 (12.7%)
Geographic Region, n (%)			
Midwest*	432 (22.1%)	757 (25.1%)	1189 (23.9%)
Northeast	155 (7.9%)	244 (8.1%)	399 (8.0%)
South	1176 (60.0%)	1694 (56.1%)	2870 (57.7%)
West	196 (10.0%)	324 (10.7%)	520 (10.4%)

*Percent of respondents with or without caregiver and percent of total demographic subgroup; slight variation in denominators because of missing data.
†Eligibility for Medicaid as well as Medicare

Figure 1. Model Performance in Validation Set

The likelihood of having a caregiver among respondents in the top decile (decile 0) of model scores was 32% greater than (1.32 times) the likelihood for a randomly selected respondent .

- *As expected, probabilities declined as model scores declined.*
- *The model performed better than random selection through the top 4 deciles (0-3).*
- *When the same model was used to predict having a PHI designation, a similar pattern of declining probabilities (data not displayed) was observed. This provides additional validation of the model, under the assumption that individuals who made a PHI designation were more likely to have a caregiver.*

Table 3. Final Model Covariates

Out of more than 2500 variables considered, 11 were deemed to be the strongest predictors of having or not having a caregiver. Odds ratios (ORs) are presented in parentheses.

Increased likelihood	↑ ≥ 1 **login to MyHumana** in past 12 months (1.41) ↑ ≥ 1 **call to Humana** in past 12 months (1.12) ↑ More **inpatient claims** in past 12 months (1.09) ↑Higher **Charlson Comorbidity Index** score (1.08) ↑ More **tier 2 pharmacy claims** in past 12 months (1.02)
Decreased likelihood	↓ Identity as a **female** member of household (0.04) ↓ **Less frugality** (model-based score) (0.04) ↓ Acceptance of **alternative medicine** (0.65) ↓ Ownership of a regular **credit card** (0.73) ↓ Higher likelihood of **responding to Medicare Advantage offers** (0.75) ↓ Documentation of **mammogram** screening (0.78)

Table 4. Predicted Probability of Caregiver in the entire MA/MAPD Population

Decile of Model Score	Probability of Having Caregiver	
	Absolute	**Relative to Random Selection***
0	48.3%	Higher
1	45.3%	Higher
2	42.7%	Higher
3	39.6%	Higher
4	36.3%	Similar
5	36.5%	Similar
6	33.0%	Lower
7	28.7%	Lower
8	27.6%	Lower
9	26.5%	Lower

*The reference was 36.7% (probability of a randomly chosen individual from the validation study sample set having a caregiver).

Conclusions

- A predictive model based on claims and consumer data allowed identification of individuals in a MA/MAPD plan with a relatively high likelihood of having someone who performed a caregiver role.
- The caregiver model also predicted whether individuals had designated someone with PHI privileges.
- The model provides a new way of knowing when it might be fruitful to inquire about a caregiver and/or PHI consent in interactions with enrollees. Such knowledge will improve care management by facilitating outreach to patients and their caregivers with guidance, support, educational materials and program offerings.

Limitations

- The analysis is subject to limitations common to claims databases, including missing or incorrect data, and limitations common to surveys, including recall bias.
- The model may not be applicable to, or perform as well among, individuals unlikely to answer a telephone call and participate in a survey.
- The model may not be applicable to traditional Medicare populations or other Medicare Advantage plans.

References
1. Humana, Inc. Investor Relations. Detailed 2Q14 Earnings release. Available at: http://phx.corporate-ir.net/phoenix.zhtml?c=92913&p=irol-newsArticle&ID=1952797. Accessed January 8, 2017.

Humana.