Factors associated with worsening health-related quality of life among a Medicare Advantage population

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Background

Studies show that self-reported health and health-related quality of life (HRQOL) are highly associated with actual morbidity, mortality and healthcare costs.[1-4] The HRQOL-4 instrument, also known as Healthy Days, was developed by the Centers for Disease Control and Prevention in the early 1990s as a simple measure of population health status and HRQOL. This validated 4-question instrument measures self-reported general health status and the number of physically and mentally unhealthy days (UHD) and activity-limited days in the past 30 days. The Health Outcome Survey (HOS), which is administered each year to a new random sample of Medicare Advantage enrollees, includes the CDC HRQOL-4. The HOS is repeated in each cohort after 2 years to assess change in outcome measures. Previous studies have generally used a one-time measurement of HRQOL to assess relationships with health conditions. Such studies do not allow an assessment of how patient characteristics and chronic conditions might predict changes in HRQOL.

Objective

To assess the ability of demographics, chronic conditions, healthcare utilization measures, and self-reported functional and health status to predict worsening HRQOL, as indicated by an increase in reported UHD, in a Medicare Advantage population.

Methods

Study Design: Historical cohort study

Data Source: HOS unhealthy days (UHD) responses at baseline and at follow-up and other HOS data regarding baseline patient characteristics were combined with administrative claims data from Humana Inc., a health care company insuring over 1.6 million Medicare Advantage members at the time of the baseline HOS survey (2nd quarter 2011 enrollment).[5]

Inclusion Criteria:

- 2011 HOS cohort

Exclusion Criteria

- Data unavailable or considered inappropriate, either at baseline or at the 2013 follow-up, for the HOS survey items of interest to this study.
- Physically unhealthy days (PUHD) and mentally unhealthy days (MUHD) of 14-30 at baseline since the study objective was to assess predictors of worsening HRQOL.

Outcomes:

- Difference in reported MUHD and PUHD between 2011 to 2013, categorized as no change or an increase from <14 to ≥14 days.

Statistical Analyses: A total of 74 variables were considered as potential predictors of increase in UHD. Variables included demographics , clinical conditions, healthcare utilization, and self-reported functional and health status. Two main analyses of the 74 variables were conducted.

- Bivariate analyses assessed the relationship between each predictor and change in UHD, but only analyses of demographic predictors are presented here (Table 1).
- A form of decision tree analysis identified the most important predictors whether UHD increased. Since the frequency distributions of reported PUHD and MUHD were not normally distributed, the baseline PUHD and MUHD responses were grouped into two categories—0-13 and 14-30. After exclusion of individuals with baseline responses of 14-30, change was coded as 1 (increase from 0-13 to 14-30) or 0 (no change from 0-13). These criteria determined which predictor variables were included in the decision tree:
  - P value <0.05 on tests of the relationship between the variable and UHD change: F statistic (interval variables), chi square (nominal variables), or entropy (ordinal variables). Results were used to select the variable that added the greatest improvement in prediction, relative to an uninformed guess, at each node.
  - A minimum size of 100 for each leaf (final class).
  - No more than 3 branches at each level of the tree.

After the tree was constructed a value of 1 was assigned to the most important predictor and a relative value <1 was assigned to each of the other predictors. Importance was determined by these criteria (Figures 2 and 3):

- Count of times a variable was used to split the data in the decision tree.
- Sum of the squared error in results of the statistical testing.

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Results

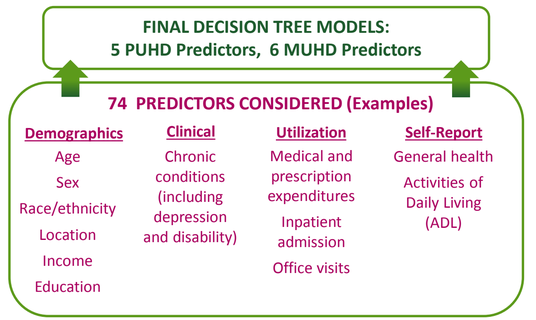
Table 1. Unadjusted Analysis of Demographic Predictors of Increased UHD

- Individuals who reported an increase in PUHD or MUHD were more likely to be older, disabled, have lower incomes and educational levels, and qualify for Medicaid.
- Those who reported an increase in MUHD were more likely to be widowed, and an increase in MUHD was more likely than no change in the Central and Southeastern regions but not other regions.
- An increase in PUHD was more likely than no change among individuals who were black or Hispanic, but this was not true of other racial/ethnic groups.

	PUHD			MUHD		
Measure	**Increased from 0-13 to 14-30**	**Maintained at 0-13**	***P* value***	**Increased from 0-13 to 14-30**	**Maintained at 0-13**	***P* value***
N	961	7,539	-	594	8613	-
Age, mean ± SD	76.7 (6.7)	75.5 (6.1)	<0.001	76.6 (7.0)	75.7 (6.2)	<0.001
Female, n (%)	544 (57.6)	4,160 (55.2)	0.147	361 (60.8)	4,774 (50.4)	<0.05
Disabled, n (%)	130 (13.5)	404 (5.4)	<0.001	123 (20.7)	584 (6.8)	<0.001
LIS	182 (18.9)	705 (9.3)	<0.001	137 (23.1)	921 (10.7)	<0.001
Eligible for Medicaid	114 (11.9)	408 (5.4)	<0.001	85 (14.3)	545 (6.3)	<0.001
Baseline UHD response, mean ± SD	2.9 (3.9)	1.2 (2.6)	<0.001	3.2 (4.)	0.9 (2.3)	<0.001
Becoming widowed within past 2 years	41 (4.2)	308 (4.1)	0.790	60 (10.1)	311 (3.6)	<0.001
Race/Ethnicity, n (%)						
White	832 (86.6)	6,666 (88.4)	<0.05	516 (86.9)	7,618 (88.4)	0.334
Black	91 (9.5)	570 (7.6)		51 (8.6)	663 (7.7)	
Asian	9 (0.9)	94 (1.2)		4 (0.7)	99 (1.1)	
Hispanic	12 (1.2)	67 (0.9)		1.5 (9)	75 (0.9)	
Other, unknown	41 (4.2)	308 (4.1)		14 (2.4)	164 (1.9)	
Geographic Region, n (%)						
Central	282 (29.3)	2,021 (26.8)	0.170	188 (31.6%)	2,314 (26.8%)	<0.5
Eastern	163 (17.0)	1,302 (17.3)		103 (17.3%)	1,397 (17.4%)	
Northern	197 (20.5)	1.795 (23.8)		106 (17.8%)	2,041 (23.7%)	
Southeastern	185 (19.2)	1,321 (17.5)		115 (19.4%)	1,512 (17.5%)	
Western	134 (14.0)	1,100 (14.6)		82 (13.8%)	1,254 (14.6%	
Education Level, % (n)						
8th grade or less	99 (10.7)	450 (6.2)	<0.001	82 (14.3)	536 (6.4)	<0.001
Some high school	141 15.2)	804, (11.0)		83 (14.5)	944 (11.3)	
High school graduate or GED	332 (35.8)	2,680 (36.8)		222 (38.7)	3,049 (36.5)	
Some college	233 (25.1)	1,861 (25.5)		132 (23.0)	2,151 (25.8)	
4-year college graduate	59 (6.4)	715 (9.8)		28 (4.9)	800 (9.6)	
Education beyond 4-year college degree	63 (6.8)	718 (10.7)		26 (4.5)	862 (10.3)	

LIS, low income subsidy; GED, General Educational Development [certificate]; SD, standard deviation

Figure 1. Decision Tree Development



Clinical conditions were recorded if they were new during 2-year follow-up or present at baseline. Other factors were measured only at baseline.

Figure 2. Most Important Predictors of PUHD

Derived from a test set (n=5,100) representing 60% of the of survey population.

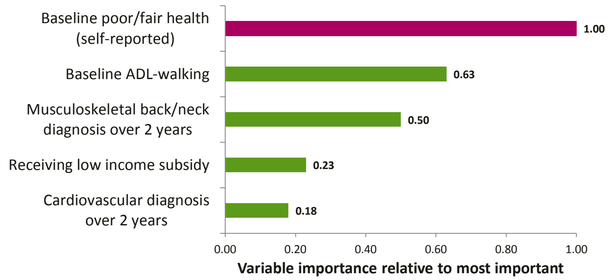
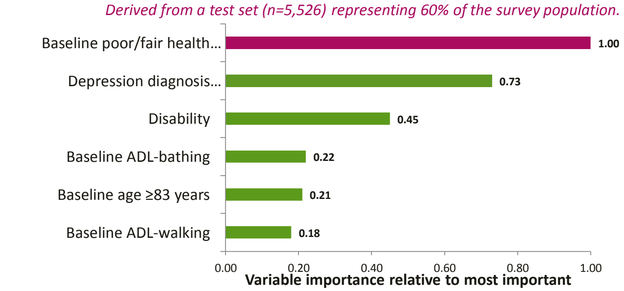


Figure 3. Most Important Predictors of MUHD

Derived from a test set (n=5,526) representing 60% of the survey population.



Figures 2 and 3 show that the most important predictor of an increase in UHD in this population was baseline general health status. Certain incident diagnoses and baseline measures of disability were also important predictors.

Conclusions

- This study identified several important predictors for identifying individuals in an older population who are at risk for worsening HRQOL: less than good self-reported general health; problems with walking or bathing ADL; a diagnosed disability; new development of back and neck pain, cardiovascular disease, or depression; very advanced age; and low income.

Implications

- Social support to address disability and financial need may be necessary to maintain HRQOL in older persons.
- Interventions designed to prevent or ameliorate back and neck pain, CVD, and depression may have an especially large impact on the HRQOL of a population of older persons.
- In evaluating the needs of individuals, special circumstances such as recent widowhood should be considered.

Limitations

- The model was designed to identify the most important predictors from a population perspective. Results do not include potentially strong predictors that had low prevalence.
- The 2-year follow-up might not reflect individuals' ability to adapt long term to life changes.
- Results may not be generalizable to individuals whose baseline HRQOL is in the 14-30 range.
- This study is subject to limitations common to claims data (e.g., coding errors, missing data, fixed variables).

References

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Handout for *Factors associated with worsening health-related quality of life among a Medicare Advantage population: a 2-year Cohort Analysis*

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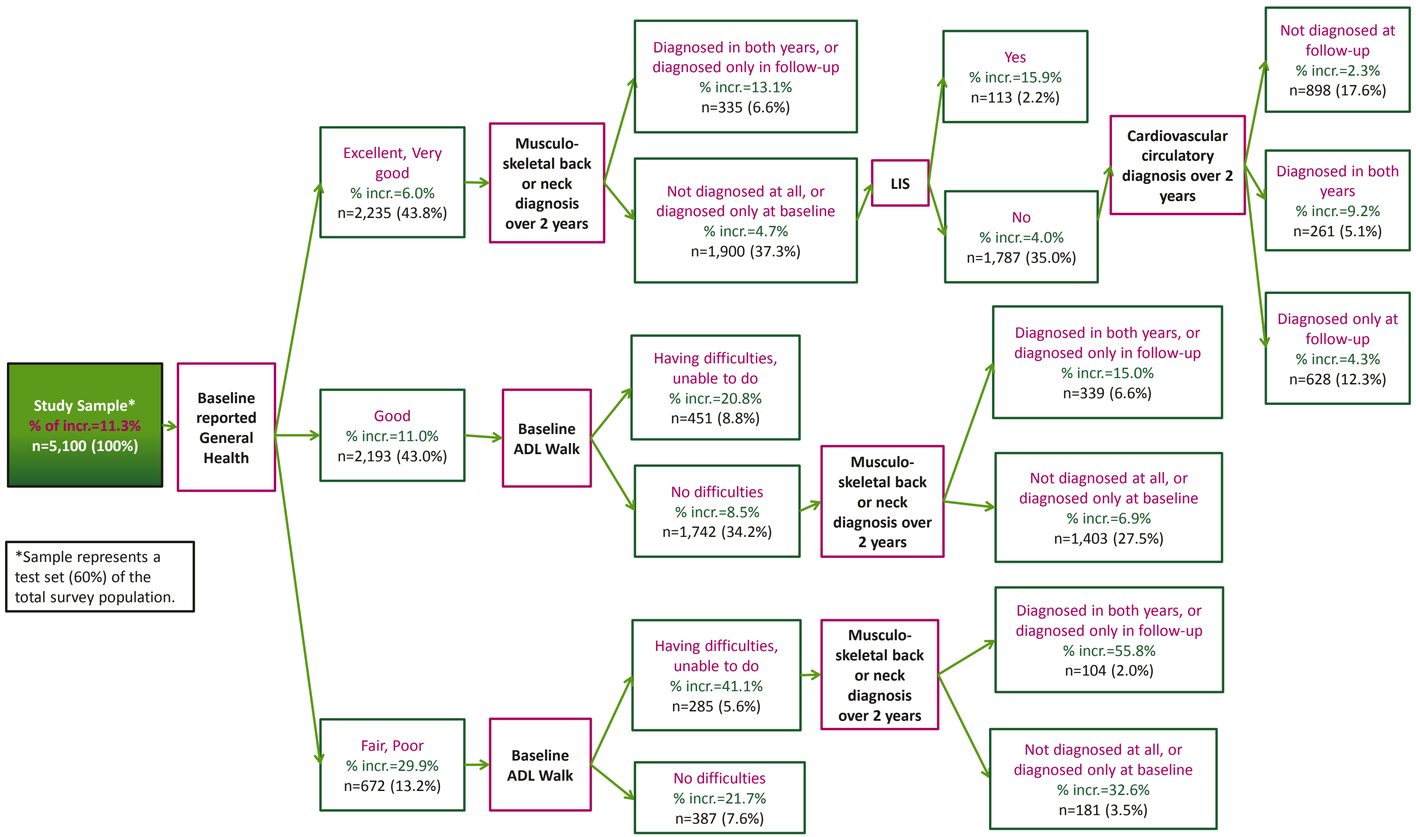
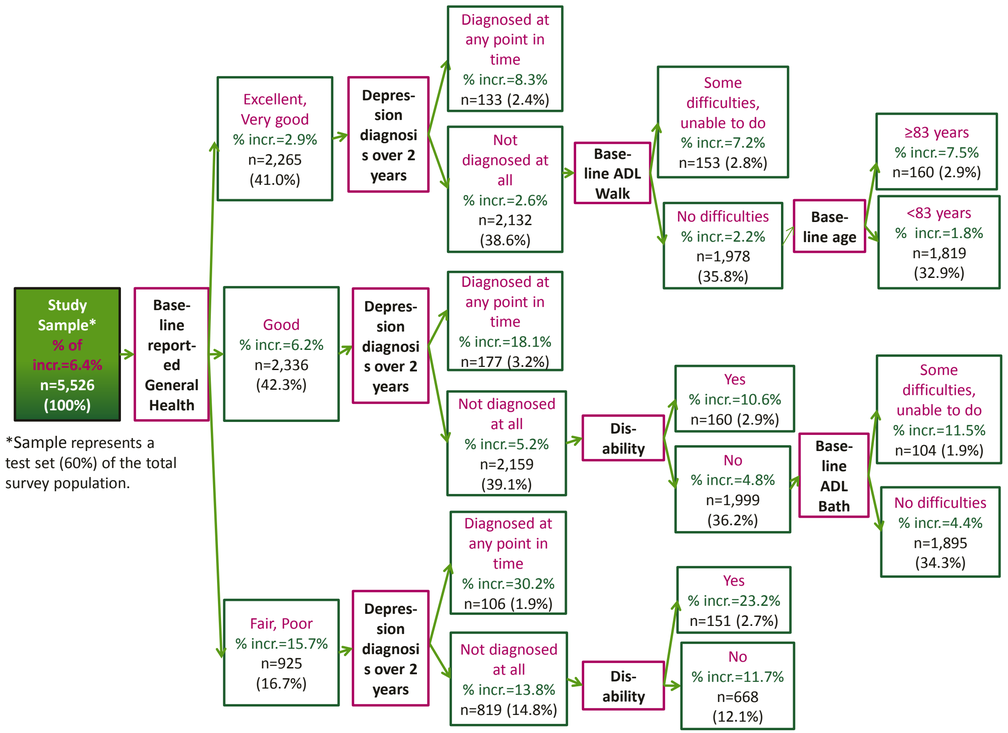
Figure 4. Increase in PUHD



*Sample represents a test set (60%) of the total survey population.

Figure 5. Increase in MUHD



*Sample represents a test set (60%) of the total survey population.

ADL, Activities of Daily Living; LIS, low income subsidy; MUHD, mentally unhealthy days; PUHD, physically unhealthy days

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