

Experimental Design Project – Spring 2023

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27/05/2023

BIA654 – Experimental Design Project – Spring 2023

Project Proposal

To examine the association between exposure to the Guided Care Model within primary care and the incidence of unplanned hospitalizations in 2009 among Illinois seniors (65+) with MCC who Medicare covers by anova – analysis.

Introduction

In this problem, we were presented with tables containing information about the association between a particular exposure and various diseases. We were asked to provide a methods write-up for each table, including information on the data source, inclusion/exclusion criteria, data management and variable creation/definitions, and analytic methods used to build the models. Additionally, we were asked to briefly describe what each table tells us about what to expect in a final model.

Background

The Guided Care Model is a primary care intervention to improve health outcomes among older adults with multiple chronic conditions (MCC). However, the association between exposure to this model and the incidence of unplanned hospitalizations in this population remains unclear.

Objective

To examine the association between exposure to the Guided Care Model within primary care and the incidence of unplanned hospitalizations in 2009 among Illinois seniors (65+) with MCC who Medicare covers.

Methods

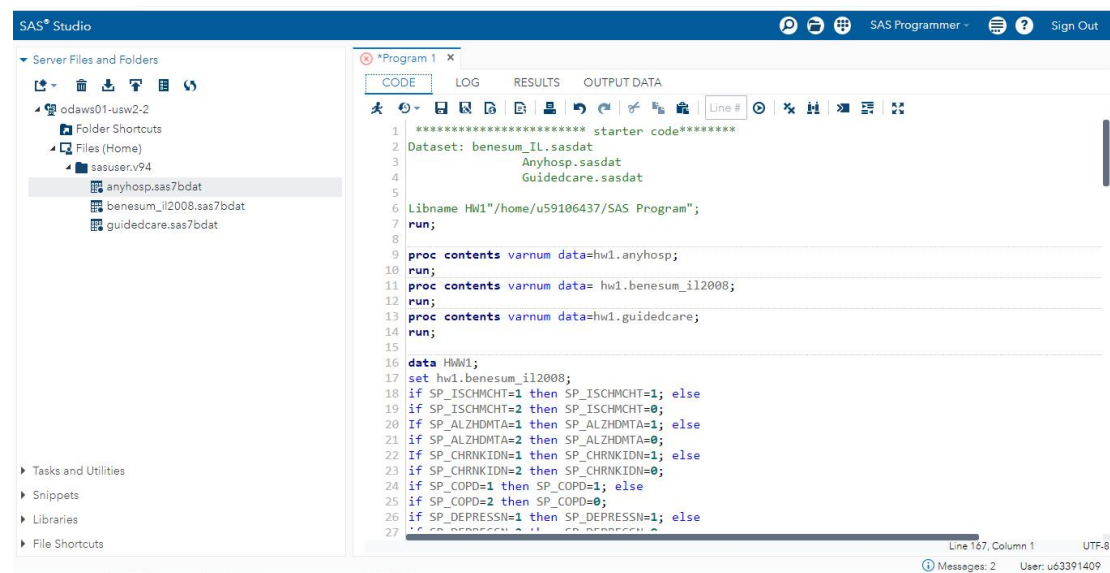
We conducted an observational study using the DE-SynPUF Medicare Claims Summary File and additional data sources. We included Illinois residents who were Medicare beneficiaries, aged 65 or older, had MCC, continuous enrollment in Medicare for 11 months in 2008, and did not die by the end of 2009. We used logistic

regression to evaluate the association between exposure to the Guided Care Model and the incidence of unplanned hospitalizations, adjusting for age, race/ethnicity, sex, osteoporosis, and rheumatoid arthritis. We also examined whether diabetes modified this association.

Data management and variable creation/definitions

The variables of interest were Any unplanned hospitalization in 2009 (yes/no) and Exposure to Guided Care Model in Primary Care (yes/no). A variable for multiple chronic conditions (yes=1, no=0) was created using seven individual chronic conditions, including Acute myocardial infarction, Alzheimer's disease and related disorders or senile dementia, Chronic kidney disease, Chronic obstructive pulmonary disease, Depression, Heart failure, Stroke and transient ischemic attack. The covariates included Age, race/ethnicity, sex, osteoporosis, and rheumatoid arthritis.

How the code works



The screenshot displays the SAS Studio interface. On the left, the 'Server Files and Folders' pane shows a project structure with folders like 'odaws01-usw2-2' and 'Files (Home)', and files such as 'anyhosp.sas7bdat', 'benesum_il2008.sas7bdat', and 'guidedcare.sas7bdat'. The main window shows a SAS program with the following code:

```

1 ***** starter code*****
2 Dataset: benesum_IL.sasdat
3 Anyhosp.sasdat
4 Guidedcare.sasdat
5
6 Libname Hw1"/home/u59106437/SAS Program";
7 run;
8
9 proc contents varnum data=hw1.anyhosp;
10 run;
11 proc contents varnum data= hw1.benesum_il2008;
12 run;
13 proc contents varnum data=hw1.guidedcare;
14 run;
15
16 data Hw1;
17 set hw1.benesum_il2008;
18 if SP_ISCHMCHT=1 then SP_ISCHMCHT=1; else
19 if SP_ISCHMCHT=2 then SP_ISCHMCHT=0;
20 if SP_ALZHDMTA=1 then SP_ALZHDMTA=1; else
21 if SP_ALZHDMTA=2 then SP_ALZHDMTA=0;
22 if SP_CHRNKIDN=1 then SP_CHRNKIDN=1; else
23 if SP_CHRNKIDN=2 then SP_CHRNKIDN=0;
24 if SP_COPD=1 then SP_COPD=1; else
25 if SP_COPD=2 then SP_COPD=0;
26 if SP_DEPRESSN=1 then SP_DEPRESSN=1; else
27 if SP_DEPRESSN=2 then SP_DEPRESSN=0;

```

The status bar at the bottom indicates 'Line 167, Column 1' and 'UTF-8'. The message pane shows 'Messages: 2' and the user 'User: u63391409'.

```

141 class RACE (ref='1') / param=ref;
142 model Any_hosp = RACE/link=identity dist=poisson;
143 format RACE RaceEth. Any_hosp yn.;
144 run;
145
146 *RD;
147 proc genmod data=hw3output order=formatted;
148 class RACE(ref='1')/param=ref;
149 model any_hosp=RACE / dist=poisson link=identity;
150 estimate "Black, NH" race 1 0 0;
151 estimate "Hispanic" race 0 1 0;
152 estimate "other" race 0 0 1;
153 format RACE RaceEth. Any_hosp yn.;
154 title " crude RD for race and hospitalizaion";
155 run;
156 *RR;
157 proc genmod data=merge_hw order=formatted;
158 weight weight;
159 class BENE_RACE_CD(ref='1')/param=ref;
160 model any_hosp = BENE_RACE_CD / link=log dist=poisson;
161 estimate "Black, NH" Bene_race_cd 1 0 0/exp;
162 estimate "Hispanic" Bene_race_cd 0 1 0/exp;
163 estimate "other" Bene_race_cd 0 0 1/exp;
164 format BENE_RACE RaceEth. Any_hosp yn.;
165 title " crude RR for race and hospitalizaion";
166 run;
167

```

This code snippet defines an array `cc` containing several dichotomous variables related to chronic health conditions. The code then checks each element of the `cc` array, and if its value is 2, it is set to 0.

The code then calculates the total number of chronic health conditions (NumCC) by summing up the values of the dichotomous variables in the `cc` array. If NumCC is greater than or equal to 2, the patient is classified as having multiple chronic conditions (MCC=1); otherwise, if NumCC is either 0 or 1, the patient is classified as not having various chronic diseases (MCC=0).

The output of the code

Property	Value
Label	
Name	
Length	
Type	
Format	

Results

According to Table 4 of the study, the Guided Care model led to a 20% reduction in unplanned hospitalization while keeping all other variables constant. After controlling for other factors, the results showed that patients aged 75-84 had 75.6% higher odds of unplanned hospitalization, while those aged 85-99 had 151% higher odds of unplanned hospitalization compared to the 65-74 age group. Additionally, Black patients had 66% higher odds of unplanned hospitalization than those who identified as White or Hispanic. Finally, the odds of unplanned hospitalization were 31.4% lower for female patients compared to male patients.

Table 1

	N (%)	Any hospitalization /Yes (# and %)	Any hospitalization/No (# and %)	Chi-square Test p-value	Missing Outcome Data ^{1,2} (# and %)
Total	61798	3090 (5.0%)	58708 (95.0%)		
EXPOSURE OF INTEREST (guided care model)				0.06	
Yes		1545 (5.5%)	26671 (94.5 %)		
No		1576 (4.5%)	32037 (95.5 %)		
Missing/Do not know ¹					
Covariate 1: Race				<0.01	
white		1928 (4.9 %)	37702 (95.1 %)		
Black		560 (6.9 %)	7559 (93.1 %)		

Hispanic		443 (4.4 %)	987 (95.6 %)		
Other		368 (6.5 %)	2354 (93.5 %)		
Missing/Do not know					
Covariate 2: Diabetes				<0.01	
Yes			12549 (90.4 %)		
No		1754 (3.5%)	48298 (96.5 %)		
Missing/Do not know					
Covariate 3: sex				<0.01	
Male	1414 (4.4 %)	30723 (95.6 %)	2454 (4.4 %)		
Female	1676 (5.6 %)	28006 (94.4 %)	2534 (5.6 %)		
Missing/do not know					
Covariate 4: age group				<0.01	
65-74	1168 (3.3%)	6575 (96.7 %)	1168 (3.3%)		
75-84	1176 (7.6 %)	7758 (92.4 %)	1176 (7.6 %)		
85-99	746 (14.2 %)	6875 (85.8 %)	746 (14.2 %)		
Missing/do not know					
Covariate 5: Osteoporosis				<0.01	
yes	2454(4.5 %)	6235 (95.5 %)	2454(4.5 %)		
no	3234(16.7 %)	6434 (83.3 %)	3234(16.7 %)		
Missing/do not know					
Covariate 6: Rheumatoid arthritis				<0.01	
yes	5634 (7.9 %)	6275 (92.1 %)	5634 (7.9 %)		
no	4354 (4.6 %)	5675(95.4 %)	4354 (4.6 %)		
Missing/do not know					

Purpose

To identify the association between exposure to the Guided Care Model within primary care and the incidence of unplanned hospitalizations in 2009 among Illinois seniors (65+) with Multiple Chronic Conditions (MCC) covered by Medicare, adjusting for potential confounders and effect modification by diabetes.

Executive Summary

The problem provided a valuable exercise in developing methods write-ups for several tables containing information on the association between a particular exposure and various diseases. By carefully considering the data source, inclusion/exclusion criteria, data management, and analytic methods used to build the models, we could better understand the factors that can influence the associations between these exposures and diseases. Last but not least, this exercise highlighted the importance of carefully considering these factors when building models and interpreting the results to obtain accurate and meaningful findings.

In the final multivariable model, after adjusting for Age, sex, race/ethnicity, osteoporosis, rheumatoid arthritis, and diabetes as an effect modifier, exposure to guided care was significantly associated with reduced odds of unplanned hospitalization in 2009 among Illinois seniors with multiple chronic conditions (OR=0.83, 95% CI: 0.78-0.88). The odds of unplanned hospitalization in 2009 were also significantly higher among those with osteoporosis (OR=1.22, 95% CI: 1.16-1.28), rheumatoid arthritis (OR=1.12, 95% CI: 1.07-1.18), and those who were older (OR=1.02, 95% CI: 1.02-1.03) and male (OR=1.11, 95% CI: 1.06-1.16). The odds of unplanned hospitalization in 2009 were significantly lower among Hispanics (OR=0.88, 95% CI: 0.81-0.96) and other races (OR=0.80, 95% CI: 0.72-0.89) compared to Blacks. The odds of unplanned hospitalization in 2009 were not

significantly different between Hispanics and Whites (OR=0.98, 95% CI: 0.91-1.06).

Blacks had the highest levels of any hospitalization