SOF Analysis Plan Submission Form

Date: April 9, 2011

Investigator's Name: John T. Schousboe, MD, PhD

Clinical Center: Minnesota

Sponsor (if not a SOF investigator): Kristine E. Ensrud, MD, MPH

Telephone: 952-993-3877 e-mail:scho0600@umn.edu

Other investigators who will be working on this analysis: Brent C. Taylor, PhD MPH; Misti Paudel MPH; Kris Ensrud MD MPH; Beth A. Virnig PhD; Sara Durham, MS; Jane Cauley

Analysis Plan Title:
Association between Disenrollment from Medicare Advantage and Incident Hip Fracture

Data sets to be used: SOF visits 2 through 9

Primary variables to be used in the analysis: Incident hip fracture

Do you plan to submit an abstract based on these results? X YES ☐ NO
If YES, when is the abstract due? Probably Academy Health (abstract due Dec 2011 or Jan 2012)

Who will perform the analyses?
☐ Coordinating Center
X Other local analyst, please specify: Brent C. Taylor, PhD MPH & John Schousboe MD PhD, Misti Paudel MPH

Please attach a 1-2 page description of your analysis plan. Please include the following:
1) Short background/rationale for addressing the research question
2) Brief description of statistical methods
3) Mock tables

E-mail this completed form (as an attachment) to Dana Kriesel (dkriesel@sfcc-cpmc.net).

Association between Disenrollment from Medicare Advantage and Incident Hip Fracture

Background

Most studies done to date have shown that healthier Medicare beneficiaries are more likely to enroll in Medicare Advantage (MA) plans and sicker beneficiaries are more likely to disenroll from these plans,[1-4] such that recent Medicare Advantage disenrollees have significantly higher health care costs than other Medicare Fee for Service beneficiaries.[5] Discrepancies between the claims experience and health care costs of MA enrollees and per member per month payments to the private insurers offering these plans can lead to a significant excess costs for Medicare, which is under substantial financial stress. Therefore, understanding the characteristics of Medicare beneficiaries that are associated with enrollment and disenrollment choices of FFS compared to MA coverage, and the associations of those choices with adverse health events, is critically important for the Medicare program to structure its benefits for beneficiaries as efficiently as possible.

Studies to date have suggested that individuals who desire to have elective procedures such as total joint arthroplasty prefer to be enrolled in Medicare FFS rather than MA.[6] However, while some chronic conditions with predictably higher health care costs may be associated disenrollment from Medicare Advantage,[7] those with a new diagnosis of breast, prostate, lung, or colorectal cancer may be *less* likely to disenroll from Medicare Advantage.[8] The availability of prescription drug benefits[2, 7] and increasing Medicare Advantage market share in the local health care market[5] have consistently been associated with reduced rates of Medicare Advantage disenrollment.

The association of non-elective health care utilization due to less predictable adverse health events and disenrollment from Medicare Advantage is less clear. One study to date found utilization due to hip fracture to be only slightly associated with Medicare disenrollment, and found no association between incident myocardial infarction and Medicare disenrollment.[6] Unlike elective procedures such as total joint arthroplasty where patients may specifically disenroll as part of their strategy to get their hip or knee replaced, the association between MA disenrollment and non-elective utilization for adverse health events (if it exists) is likely to be indirect. Most experts hypothesize that enrollees choose to disenroll from Medicare Advantage if they are dissatisfied with access to or quality of care for health care for specific conditions, or if benefits are structured by Medicare Advantage private insurers that encourage disenrollment by those who can be predicted to have higher health care costs.[1, 9-12] Therefore, if there are health status factors that are associated with higher health care costs (from the insurer's perspective) and/or perceived need for health care services that are difficult to access in the available MA plans (from the beneficiary's perspective) that are also associated with a higher risk of hip fracture, then those who disenroll from Medicare Advantage plans could be at particularly high risk of hip fracture.

There are three reasons to re-examine the possible association between MA disenrollment and hip fracture using the merged SOF – Medicare claims database. First, the single study cited above attributed only the 3 month period after disenrollment as the risk period for MA disenrollees and did not do secondary analyses with longer time periods after disenrollment. Examining the incidence of hip fracture over a longer time period following disenrollment may capture the association, to the extent that it exists, more completely. Second, the Study of Osteoporotic Fractures (SOF) has much broader measures of health status on study participants than prior investigations, and hence if an association between disenrollment from Medicare Advantage and incident hip fracture is confirmed, the mediating effects of changes in health status before disenrollment can be explored. That is, we hypothesize that changes in health status that predispose to hip fracture may also prompt disenrollment from Medicare Advantage. Third, studies that can detect health care utilization only through Medicare claims cannot compare hip fracture incidence among those who remain enrolled in Medicare Advantage compared to recent disenrollees or longer-term FFS enrollees. Therefore, while estimating and

comparing the rates of incident hip fracture among MA disenrollees, longer-term FFS enrollees, and MA enrollees using the SOF – Medicare claims dataset presents some significant challenges (detailed below), we believe that the analyses detailed below will add significantly to the health services literature.

Specific Aims

1. **Estimate the association of incident hip fracture (identified in SOF) among MA enrollees compared to recent (within one year) MA disenrollees and longer-term FFS enrollees**

Specifically, *we hypothesize that the rate of incident hip fracture is significantly lower among MA enrollees compared to recent MA disenrollees and compared to longer-term FFS enrollees.*
This analysis will have the advantage of estimating hip fracture rates in those who are MA enrollees in addition to FFS enrollees. We will use proportional hazards models to estimate these associations, initially only age adjusted but subsequently multivariable adjusted (including bone mineral density, anthropometric measures, physical performance measures, and other characteristics that influence hip fracture rates such as visual acuity). If apparent differences in hip fracture rates between MA and FFS enrollees go away with such multivariable adjustment, it may mean that the same characteristics that pre-dispose to hip fracture also are driving disenrollment from MA. The population for this analysis will be those all SOF participants who are alive and still enrolled in SOF as of 1/1/1991, and have been enrolled in Medicare for at least one year as of 1/1/1991 (so that we can assess enrollment in Medicare Advantage vs Fee for Service for all of the 12 months before they are "eligible" to have a hip fracture). Since all SOF participants needed to be age 65 or older at the time of their study entry in 1986 to 1988, we believe that virtually all SOF study participants still alive as of 1/1/1991 will have been enrolled in Medicare for at least on year.

This analysis will be subject to bias because of false negative hip fracture self-reports. If individuals who have a greater chronic disease burden are more likely to both disenroll from MA and have a false negative hip fracture self-report, the estimated hip fracture rate will be biased downward to a greater degree among MA disenrollees compared to those who remain enrolled in MA. However, we believe the direction of the bias is likely to narrow differences between hip fracture incident rates in MA enrollees versus fee for service, and that if we do find that hip fracture incidence (reported to SOF) are still lower in MA compared to FFS enrollees, our conclusion will be robust to that bias.

2. **Estimate the relative rate of incident hip fracture (identified in Medicare Claims) among SOF participants during the first year after Medicare Advantage (MA) disenrollment compared to longer-term fee for service (FFS) Medicare enrollees.**

Specifically, *we hypothesize that the rate of incident hip fracture is higher among FFS beneficiaries who recently disenrolled from MA compared to longer-term FFS Medicare enrollees.*
While this secondary aim has the disadvantage that hip fractures among MA enrollees are unobservable, it has the advantage of avoiding the bias from false negative hip fracture self reports, and hence is a good complement to aim 1. This analysis is very similar to that done by Morgan and Virnig regarding the association of recent disenrollment from Medicare Advantage with likelihood of having total joint arthroplasty.
We will use proportional hazards models with incident hip fracture as the dependent variable and MA disenrollment as the main predictor, initially adjusting only for age. MA disenrollment will be a dichotomous variable being "yes" for the first 12 months after disenrollment and "no" if no MA disenrollment occurred or occurred more than 12 months previously. The unit of analysis will be person-month. Participants will contribute no time to exposure to hip fracture during time periods that they are enrolled in Medicare Advantage. In essence, this analysis compares hip fracture rates in two groups of fee for service (FFS) Medicare beneficiaries,

those who were enrolled in Medicare Advantage in the recent past and those who were not. Because hip fractures among MA enrollees are not visible in Medicare claims, this approach cannot compare hip fracture rates in FFS compared to MA enrollees. The population for this analysis will be those who are FFS enrollees with observable claims data at any time. That is, all SOF participants will contribute those patient-months of time for which they were enrolled in FFS Medicare to the analysis.

We will repeat these analyses adjusting for other covariates that may be associated with both hip fracture Medicare Advantage disenrollment such as physical performance (e.g. 6 meter walk time), cognitive function, depression, positive affect, prior clinical fractures, self-reported health status, and co-morbid medical conditions (**table 1**). We will also adjust for the characteristics of Medicare Advantage health plans available in participants' health care market areas that are known to affect rates of MA disenrollment, specifically MA market share and availability of prescription drug benefits.

3. **Estimate the associations of physical performance measures, health status, ability to do independent activities of daily living (IADL), bone mineral density, and cognitive impairment with disenrollment from Medicare Advantage**

Specifically, we hypothesize that disenrollment from MA will be associated with decline in self-assessed health status, cognitive function, and physical performance capability.
Those SOF study participants who are enrolled in Medicare Advantage as of 1/1/1991, or who at any time between 1/1/1991 and 12/31/2007 will contribute patient-months to this analysis. We will use a proportional hazards model, where "time to failure" (in months) will be time to MA disenrollment. The primary predictors will be the trajectories of health status (measured by a single question), cognitive impairment (measured by Mini Mental State Examination), walk speed (measured in meters per second), timed chair stands, and femoral neck BMD. All of these primary predictors have been associated in other studies with higher levels of health care utilization. These associations will be adjusted for age, co-morbidity, and other co-variates. Elimination of co-variates with p-values of association >0.2 will be done in a step-wise manner.

4. **Estimate the association of incident hip fracture at the Portland SOF site (using Kaiser Permanente and Medicare claims) among MA enrollees compared to recent MA disenrollees and longer-term FFS enrollees.**

This is an exploratory analysis, given the low power that we will have by virtue of limiting ourselves to one site and the relatively small proportion of exposure time in Medicare FFS among Portland SOF enrollees. However, this both allows us to estimate hip fracture incidence in the MA population relative to FFS population and avoids the bias from false negative hip fracture self reports inherent in the analyses that will be performed to satisfy aim #1. The population for this analysis will be all Portland SOF participants who are alive and still enrolled in SOF as of 1/1/1991.

Data Sources
The main predictor variable, Medicare Advantage disenrollment, will be determined for each SOF participant for each month of every year between January 1, 1991 and December 31, 2007 using the Medicare Denominator files for each year that we have already obtained for all SOF participants from CMS. The individual level predictor variables will be primarily obtained from SOF visits 1 through 9 (see **table 1**).

Medicare Advantage plan characteristics for all of the counties within which SOF participants reside in the four geographical regions (Portland, Minneapolis, Pittsburgh, and Baltimore) will be obtained from the CMS website.

These include a) market penetration of Medicare Advantage vs. Medicare Fee for Service; b) availability of a prescription drug benefit in one or more MA plans in the county of residence. We will also include a dummy variable to mark the availability of prescription drug coverage under Medicare part D, where 0 is the time period 1/1/1991 through 12/31/2005 and 1 is the time period 1/1/2006 through 12/31/2007.

Mock Table 1 – Association of Incident Hip Fracture (in SOF) with Medicare Enrollee Status (MA or recent MA disenrollee or longer-term FFS enrollees)

Predictor	Age-Adjusted	Multivariable-Adjusted
Medicare Enrollment Status: MA Recent MA Disenrollee Longer-term FFS		
Age^		
6-Meter Walk Time*	-	
Time Chair Stand*	-	
GDS depression score*	-	
MMSE score*	-	
Trails B score*	-	
Marital status*	-	
Femoral neck BMD*	-	
Body Mass Index*	-	
Change in weight since age 25*	-	
Prior Clinical Fractures* (Yes/No)	-	
Self-reported health status*	-	
IADL score*	-	
Smoking status*	-	
Other chronic disease conditions	-	
Distant depth perception	-	
Contrast sensitivity	-	
Number of hospital days 6 months before hip fracture admission date	-	
Study site	-	
Site*time interaction	-	
County level: MA penetration (%)	-	
County level: MA prescription drug benefit available (Yes/No)	-	
County level: number of MA plans available	-	

^Age at time of hip fracture
*Last value recorded in SOF prior to hip fracture date
**Within 12 month period prior to hip fracture date

Mock Table 2 – Association of Incident Hip Fracture (in claims) with FFS Enrollee Status (recent MA disenrollee vs. longer-term FFS enrollees)

Predictor	Age-Adjusted	Multivariable-Adjusted
FFS Status (Recent MA disenrollee vs. long-term FFS)		
Age^		
6-Meter Walk Time*	-	
Time Chair Stand*	-	
GDS depression score*	-	
MMSE score*	-	
Trails B score*	-	
Marital status*	-	
Femoral neck BMD*	-	
Body Mass Index*	-	
Change in weight since age 25*	-	
Prior Clinical Fractures* (Yes/No)	-	
Self-reported health status*	-	
IADL score*	-	
Smoking status*	-	
Other chronic disease conditions	-	
Distant depth perception	-	
Contrast sensitivity	-	
Study site	-	
Site*time interaction	-	
County level: MA penetration (%)	-	
County level: MA prescription drug benefit available (Yes/No)	-	
County level: number of MA plans available	-	

^Age at time of hip fracture
*Last value recorded in SOF prior to hip fracture date
**Within 12 month period prior to hip fracture date

Mock Table 3 – Predictors of MA Disenrollment

Predictor	Multivariable-Adjusted Hazard Ratio (95% C.I.)
Self-reported health status*	
IADL score*	
6-Meter Walk Time*	
Time Chair Stand*	
GDS depression score*	
MMSE score*	
Trails B score*	
Femoral neck BMD*	
Other Chronic Diseases	
Age^	
Marital status*	
Body Mass Index*	
Change in weight since age 25*	
Prior Clinical Fractures* (Yes/No)	
Smoking status*	
Distant depth perception	
Contrast sensitivity	
Study site	
Site*time interaction	
County level: MA penetration (%)	
County level: MA prescription drug benefit available (Yes/No)	
County level: number of MA plans available	

^Age at time of hip fracture
*Last value recorded in SOF prior to hip fracture date
**Within 12 month period prior to hip fracture date

Mock Table 4 – Association of Incident Hip Fracture (in SOF) with Medicare Enrollee Status (MA or recent MA disenrollee or longer-term FFS enrollees) (PORTLAND ONLY)

Predictor	Age-Adjusted	Multivariable-Adjusted
Medicare Enrollment Status: MA Recent MA Disenrollee Longer-term FFS		
Age^		
6-Meter Walk Time*	-	
Time Chair Stand*	-	
GDS depression score*	-	
MMSE score*	-	
Trails B score*	-	
Marital status*	-	
Femoral neck BMD*	-	
Body Mass Index*	-	
Change in weight since age 25*	-	
Prior Clinical Fractures* (Yes/No)	-	
Self-reported health status*	-	
IADL score*	-	
Smoking status*	-	
Other chronic disease conditions	-	
Distant depth perception	-	
Contrast sensitivity	-	
Number of hospital days 6 months before hip fracture admission date	-	
Study site	-	
Site*time interaction	-	
County level: MA penetration (%)	-	
County level: MA prescription drug benefit available (Yes/No)	-	
County level: number of MA plans available	-	

^Age at time of hip fracture
*Last value recorded in SOF prior to hip fracture date
**Within 12 month period prior to hip fracture date

References

1. Morgan RO, Virnig BA, DeVito CA, Persily NA. The Medicare-HMO revolving door--the healthy go in and the sick go out. N Engl J Med 1997;337:169-75.
2. Ng JH, Kasper JD, Forrest CB, Bierman AS. Predictors of voluntary disenrollment from Medicare managed care. Med Care 2007;45:513-20.
3. Maciejewski ML, Dowd B, Call KT, Feldman R. Comparing mortality and time until death for medicare HMO and FFS beneficiaries. Health Serv Res 2001;35:1245-65.
4. Buntin MB, Garber AM, McClellan M, Newhouse JP. The costs of decedents in the Medicare program: implications for payments to Medicare + Choice plans. Health Serv Res 2004;39:111-30.
5. Call KT, Dowd BE, Feldman R, Lurie N, McBean MA, Maciejewski M. Disenrollment from Medicare HMOs. Am J Manag Care 2001;7:37-51.
6. Morgan RO, Virnig BA, DeVito CA, Persily NA. Medicare HMO disenrollment and selective use of medical care: osteoarthritis-related joint replacement. Am J Manag Care 2000;6:917-23.
7. Atherly A, Hebert PL, Maciejewski ML. An analysis of disenrollment from Medicare managed care plans by Medicare beneficiaries with diabetes. Med Care 2005;43:500-6.
8. Elkin EB, Ishill N, Riley GF, et al. Disenrollment from Medicare managed care among beneficiaries with and without a cancer diagnosis. J Natl Cancer Inst 2008;100:1013-21.
9. Feldman R, Dowd B, Wrobel M. Risk selection and benefits in the Medicare+Choice program. Health Care Financ Rev 2003;25:23-36.
10. Mobley L, McCormack L, Booske B, et al. Voluntary disenrollment from Medicare managed care: market factors and disabled beneficiaries. Health Care Financ Rev 2005;26:45-62.
11. Lied TR, Sheingold SH, Landon BE, Shaul JA, Cleary PD. Beneficiary reported experience and voluntary disenrollment in Medicare managed care. Health Care Financ Rev 2003;25:55-66.
12. Mobley LR, McCormack LA, Wang J, et al. Voluntary disenrollment from Medicare advantage plans: valuable signals of market performance. Am J Manag Care 2007;13:677-84.