Commentary: Improving Risk-Adjustment Models for Capitation Payment and Global Budgeting

Mark C. Hornbrook

In this issue, Dr. Leida Lamers has contributed an excellent, well-written, understandable article that adds significantly to our understanding of risk adjustment in capitation payment systems (in this case the Netherlands sickness fund system) (Lamers 1998). The Lamers model has high applicability to strategic planning for healthcare resource allocation systems in many public and private healthcare systems around the world.

The study clearly demonstrates the value of adding more health status information to improve the overall accuracy and goodness-of-fit of annual per capita expense prediction models. The author's results reinforce the independent contributions of demographics, diagnoses, and functional health status (FHS) to predicting annual per capita expenditures. In particular, the addition of information on hospital diagnoses during the previous year improves prediction over demographics only; adding information on hospital diagnoses over the previous three years improves prediction over hospital diagnoses for the past year only; and adding FHS information improves prediction over demographics and three years of inpatient diagnoses.

MEDICARE AND THE BALANCED BUDGET ACT OF 1997

One direct implication of this study for Medicare risk contracting in the United States is that the recent reforms contained in the Balanced Budget Act of 1997 can be improved by using three prior years of inpatient diagnoses in the Diagnostic Cost Groups (DCGs) instead of using only the immediate past

---

Address correspondence and requests for reprints to Mark C. Hornbrook, Ph.D., Associate Director, Center for Health Research, Kaiser Permanente, Northwest Division, 3800 North Interstate Avenue, Portland, OR 97227-1098.

year in the risk-adjustment model. If HCFA is not ready to move quickly to a model that includes both inpatient and ambulatory diagnoses, the next step should be to build a three-year DCG risk-adjustment model for the adjusted average per capita cost (AAPCC).

Ambulatory Diagnoses

Although Dr. Lamers' study does not show the relative importance of ambulatory diagnoses, self-reported use of medications for rheumatoid arthritis—one of the variables included from the health survey—does hint at this potential source of untapped information. We know from previous studies that ambulatory diagnoses carry considerable prediction information for next year's expenditures per person (Blough, Madden, and Hornbrook 1998; Ellis, Pope, Iezzoni, et al. 1996; Ellis, Pope, Iezzoni, et al. 1998; Kronick et al. 1996; Starfield et al. 1991; Weiner, Dobson, Maxwell, et al. 1996). Potential explanations of the prediction power of ambulatory diagnoses over inpatient diagnoses are that (1) inpatient diagnoses simply miss the considerable disease burden that is cared for outside the hospital; (2) random variation in ambulatory expense is less than that for inpatient expense; and (3) many chronic diseases are treated primarily in the ambulatory setting and involve continuing care patterns. As a result, ambulatory expenses are much more predictable than inpatient expenses, which are lumpy and infrequent on an individual basis. This implies that the Dutch sickness funds and other health systems concerned about selection bias and risk adjustment should make strategic investments in clinical information systems for ambulatory care providers. From a policy perspective, it is not sufficient to be content with the current state of healthcare information systems. Information systems should be viewed not as exogenous constraints but as strong policy instruments for the achievement of desired performance goals.

Health Status Surveys

Dr. Lamers contends that risk adjusters based on survey information are at present inappropriate in the Dutch context. She uses a health survey conducted by one of the Dutch sickness funds to test for bias and imprecision in the demographic/inpatient diagnoses risk-adjustment model rather than estimating a new version of a richer risk-adjustment model. Her results show that functional health status must be included in risk models. Dr. Lamers discusses the administrative costs of health surveys and their potential for gaming. Gaming will occur by providers and sickness funds on any information advantage they have over the national health insurance program.

Policymakers and payers are concerned that providers will coach their patients to select survey responses that make them appear sicker. Whether this behavior is random or uniform will have little effect on the outcomes of the risk-adjustment system. If, however, some providers or funds are faster and better at coaching respondents, then selection bias will occur because the model will fail at detecting real differences in risks. This calls forth the following menu of policy responses:

1. Continue to develop risk models to include new risk factors and recalibrate the coefficients of existing factors to compensate for health status creep.
2. Embed health status surveys in the clinical context so that the primary sponsors and users of the results are the patients' physicians, not the payers.
3. Implement specific policies to penalize risk skimming (discussed further on).
4. Use health survey data for quality assessment purposes.

In the United States, health status surveys are now a part of health plan performance measures (HEDIS for employer groups and Health of Seniors for Medicare). With additional work, these surveys can be expanded to payment applications. The importance of having dual-purpose payment and performance assessment is that it provides countervailing incentives for gaming. Risk adjustment provides an incentive for providers, plans, and sickness funds to encourage their members to deflate their health status scores to make the members appear sicker in order to obtain higher revenues. On the other hand, outcomes assessment provides an incentive for plans and sickness funds to inflate health status scores so that they appear to have healthier enrollees and better outcomes than their competitors.

Therefore, performance (i.e., outcome) assessment and risk adjustment should be treated as complementary policy instruments to provide neutral incentives to survey respondents and providers.

If and when functional health status surveys become a part of routine clinical care and as ordinary as taking vital signs, the incentive for patients to respond truthfully will relate directly to their desire to build a close relationship with their primary care provider(s). The health status survey on which Dr. Lamers' study is based obtained a very good response rate with the sickness fund as the sponsor. With additional work on response rate management and consumer education about the uses of the data for improving quality of care, response rates might be pushed even higher.

Perhaps the most critical policy goal for population health status surveys is the measurement of unmet need. Virtually every health system faces problems managing access: some patients come in too often and others stay away too long. Health status surveys can be part of a comprehensive population-based healthcare system that reaches out to positively identify need and provide service, rather than waiting for sick persons to cross the medical office threshold. One of the findings of this study is that, as more diagnostic information (one versus three years) is added to the risk-adjustment model, less information is contributed by the health survey. This implies that risk-adjustment researchers should examine carefully how to apply FHS survey data in conjunction with diagnosis data. Careful specification of functional form will reduce the problem of multicollinearity between disease vectors and functional health status. For some diseases, for example, FHS should be used as a within-disease severity marker (e.g., congestive heart failure), while in other cases it should be used as a more accurate summary measure of disease burden across a family of diagnoses. Functional health status is a continuum. Research has shown that severe restrictions in functional abilities among aged persons signify multifold increases in health risk (Gruenberg, Kaganova, and Hornbrook 1996). Persons with significant and permanent disabilities are more likely to need continuing multidisciplinary medical care and personal support. The long-term care sector uses functional assessment instruments that focus on the high end of the disability spectrum: basic Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), and measures of cognitive function, emotional/behavioral function, and the need for complex assistive devices (e.g., wheelchairs, hospital beds) and medical supports (e.g., dressing changes, ventilatory assistance). This implies that functional health status surveys should be hierarchical, rather than uniform for all respondents, so that persons with poorer functions are guided to provide more information on the nature and severity of their limitations and healthy persons are not burdened with unnecessary questions.

Risk Skimming

Cream skimming is based on information asymmetry. The sickness funds know more about the patients than the national health insurance program. Specifically, they know the patients' current utilization patterns, which are very strong predictors of future utilization, for both patients and providers. This implies that the Dutch national health insurance plan should impose requirements for regular (monthly) data transfers on ambulatory encounters and hospital admissions so that short-run forecasts of annual financial risks

can be made and estimates of the magnitude of cream skimming can be made available to policymakers on a regular basis. This gives a sense of the degree of severity and concentration of cream skimming and adverse selection.

Initiatives to reduce risk skimming include imposing taxes on excess profits (operating surpluses); mandating health plans/sickness funds to provide additional benefits (reduction in copayments and coverage of uncovered services) to members when profits rise above a certain level; and requiring sickness funds to carry the liability for patients who disenroll for a defined time period, say, up to a year. Cream skimming is a sign of market failure. Policymakers should take steps to create a regulatory environment that is sensitive to and reacts quickly when evidence of cream skimming is imperative.

Other Issues

Prescription drug costs are omitted from Dr. Lamers' model because they are covered by the Dutch mandatory national health insurance program, not the sickness funds. The expenses for general practitioners (GPs) are also omitted because these providers are capitated. Thus, the model produces predictions of sickness fund liability, rather than overall health risk weighted by resource consumption from a societal perspective. In the case of the Dutch health insurance system, these omissions produce no distortions because patients face no additional liability for their medications and GP visits. Applying Lamers' model to another health system in which medication and physician costs are not covered on a first-dollar basis will create risk-based distortions. Sicker people will pay more than healthy people will. When some components of healthcare costs are excluded from the risk-adjustment system, patients face variations in out-of-pocket expense relative to their health status, thereby undermining the redistributive function of health insurance. Future advances on the Lamers model should include medication and GP costs on a person-specific level in the dependent variable. This enables sharing a greater proportion of the risk for overall healthcare expenditures with the sickness funds and increases the generalizability of her model.

Dr. Lamers mentions the problem with discretionary diagnoses in the diagnosis risk model. One of the major problems with the inpatient diagnosis approach to risk adjustment is that patients must be hospitalized in order to have their illnesses counted. Hospital-based risk-adjustment models penalize hospital-conserving styles of practice and reward hospital-intensive practice styles. Moreover, this type of model conveys a strong incentive to hospitalize patients whenever closer observation and acute care might improve safety and outcomes. Hence, discretionary diagnoses should certainly receive careful

scrutiny before they are included in the risk-adjustment model. Another way to reduce inpatient bias is to count day treatment and same-day surgery diagnoses in the risk model. Of course, the locus of treatment bias can be avoided altogether by counting diseases wherever they are treated—another argument for collecting ambulatory diagnosis data and establishing disease registries with rigorous diagnostic criteria for case accrual.

An apparently contradictory finding from this study was that profits were higher for good risks with a previous hospital admission than for good risks without an earlier admission. This seems to suggest that having the additional diagnosis risk cells enables sickness funds to obtain higher profits from cream skimming relative to profits from persons grouped only by demographic variables. Readers should be reminded that the "good" and "bad" risks were defined on the basis of knowing actual expenses for the future. Hence, the profit estimates represented maximum amounts if the sickness funds were omniscient, and the estimates were not necessarily indicators of a flawed risk model. In this case, persons with a previous hospital admission had higher expected overall healthcare costs compared to persons without a previous admission. With a higher mean expense, the returns to omniscience will be absolutely greater than for lower mean expense.

CONCLUSION

This study makes a significant contribution to the field. The model is useful both for global budgeting (to assure equitable resource allocation across localities) and for managed competition (to assure equitable resource allocation across health plans or sickness funds). With the available menu of demographic, diagnosis, and functional health status risk-adjustment models now available, risk adjustment should become an integral component of all healthcare resource allocation systems. A major challenge to researchers and policymakers is presented by the fact that static risk-adjustment models do not reward health plans/sickness funds for cost-effective disease prevention efforts or for investing in the improved health status of their members. We need to devise means to reward plans/sickness funds for improving health outcomes for their members. This is no simple task because the normal trajectory of health status for a defined population is downward. Hence, as the population ages, we are faced with providing incentives for slowing down the rate of decrease in health status and for maintaining functional abilities over longer time periods. The immediate challenges to researchers are to develop

measures of population health status trajectories to serve as the dependent variable in a dynamic risk-adjustment model and then to estimate models to adjust for exogenous factors that affect providers' ability to alter health status trajectories. We have only just begun to define the field of risk adjustment in healthcare. We applaud Dr. Lamers' contributions to the field.

REFERENCES

Blough, D. K., C. W. Madden, and M. C. Hornbrook. 1998, in press. "Modeling Risk Using Generalized Linear Models." *Journal of Health Economics.*

Ellis, R. P., G. C. Pope, L. I. Iezzoni, J. Z. Ayanian, D. W. Bates, H. Burstin, and A. S. Ash. 1996. "Diagnosis-based Risk-Adjustment for Medicare Capitation Payments." *Health Care Financing Review* 17: 101–28.

Ellis, R. P., G. C. Pope, L. I. Iezzoni, J. Z. Ayanian, D. W. Bates, H. Burstin, D. A. Dayhoff, and A. S. Ash. 1998. "Risk Adjustment of Medicare Payments Using the Hierarchical Coexisting Conditions Model." Unpublished manuscript, Boston University.

Gruenberg, L., J. Kaganova, and M. C. Hornbrook. 1996. "Improving the AAPCC with Health Status Measures from the MCBS." *Health Care Financing Review* 17: 59–76.

Lamers, L. M. 1998. "Risk-adjusted Capitation Based on the Diagnostic Cost Group Model: An Empirical Evaluation with Health Survey Information." *Health Services Research* 33 (6): 1727–44.

Kronick, R., T. Dreyfus, L. Lee, and Z. Zhou. 1996. "Diagnostic Risk Adjustment for Medicaid: The Disability Payment System." *Health Care Financing Review* 17: 7–33.

Starfield, B. H., J. P. Weiner, L. Mumford, and D. Steinwachs. 1991. "Ambulatory Care Groups: A Categorization of Diagnosis for Research and Management." *Health Services Research* 26 (1): 53–74.

Weiner, J. P., A. Dobson, S. L. Maxwell, K. Coleman, B. H. Starfield, and G. F. Anderson. 1996. "Risk-adjusted Medicare Capitation Rates Using Ambulatory and Inpatient Diagnoses." *Health Care Financing Review* 17: 77–99.