

# Accuracy of Medicaid Payer Coding in Hospital Patient Discharge Data

## *Implications for Medicaid Policy Evaluation*

*Arpita Chattopadhyay, PhD, and Andrew B. Bindman, MD*

**Background:** Ambulatory care-sensitive hospitalization rates derived from hospital discharge data have been used to compare ambulatory care across insurance and delivery system groups.

**Objective:** We sought to quantify the impact of coding inaccuracies in hospital discharge data on counts of hospitalizations for ambulatory care-sensitive conditions among Medicaid beneficiaries.

**Methods:** This was a cross-sectional comparison of administrative databases of all California Medicaid beneficiaries younger than 65 years of age. We compared the number of hospitalizations that were attributed to Medicaid beneficiaries in California's hospital discharge data for 1994 to 1999 with the number derived from a file that linked hospital discharge data with the Medicaid eligibility file.

**Results:** Hospital discharge data undercounted 28.2% of hospitalizations for ambulatory care-sensitive conditions among Medicaid beneficiaries and overcounted 13.4% of such admissions among non-Medicaid beneficiaries. Approximately 5% of hospitalizations for ambulatory care-sensitive conditions captured as Medicaid admissions in routine hospital discharge data were among patients who gained Medicaid coverage as a result of the hospitalization. Patients who acquire Medicaid coverage as a result of a hospitalization are much more likely to be placed into Medicaid fee for service rather than Medicaid managed care which biases comparisons of these 2 delivery models.

**Conclusion:** Caution should be used in the interpretation of Medicaid hospitalization rates as calculated from routine hospital discharge data. State agencies that provide hospital discharge data should consider the opportunity to improve the evaluation of Medicaid services by linking hospital discharge data with Medicaid enrollment files.

**Key Words:** data quality, medicaid, ambulatory care-sensitive conditions, discharge data, hospitalization rate

(*Med Care* 2005;43: 586–591)

The analysis of preventable hospitalizations for ambulatory care-sensitive conditions has emerged as a tool for monitoring ambulatory care.<sup>1</sup> Ambulatory care-sensitive conditions, such as asthma, diabetes, and hypertension, are conditions that often can be managed with timely and effective treatment in an outpatient setting, thereby preventing hospitalization. Hospital admissions for these conditions reflect a decline in health status, and higher rates of admission for these conditions are associated with worse access to care.<sup>2</sup>

The widespread availability of data on hospitalizations also makes the measurement of admissions for ambulatory care-sensitive conditions an efficient means to monitor outpatient care. Most states collect abstracted information on hospitalizations that can be used in combination with population estimates at relatively low cost for research purposes.<sup>3</sup>

Hospitalization rates for ambulatory care-sensitive conditions are higher among Medicaid persons than among privately insured patients.<sup>4</sup> Among privately insured patients, hospitalization rates for ambulatory care sensitive conditions are lower in managed care than in fee for service.<sup>5,6</sup> One study comparing these 2 delivery models in Medicaid has not demonstrated a reduction in hospitalization rates for ambulatory care-sensitive conditions in managed care.<sup>7</sup> However, there are several reasons to question whether studies that use routine hospital discharge data accurately reflect hospitalizations for Medicaid beneficiaries, particularly after the introduction of Medicaid managed care. For example, Medicaid hospitalizations could be undercounted in hospital discharge files that provide only one field for coding the patient's payer status even though many patients might have dual coverage such as Medicare and Medicaid.<sup>8</sup> Medicaid managed care might further contribute to undercounting of Medicaid admissions because Medicaid beneficiaries who are enrolled in

From the Primary Care Research Center and Division of General Internal Medicine, San Francisco General Hospital, University of California San Francisco, San Francisco, California.

Funding for this project was provided by the California Healthcare Foundation's Medi-Cal Policy Institute.

Reprints: Andrew B. Bindman, Primary Care Research Center, Division of General Internal Medicine, San Francisco General Hospital, Box 1364, University of California San Francisco, San Francisco, CA 94143. E-mail: bindman@itsa.ucsf.edu.

Copyright © 2005 by Lippincott Williams & Wilkins  
ISSN: 0025-7079/05/4306-0586

commercial health plans might be mistakenly coded as privately insured.

In addition to circumstances that would lead to an undercounting of Medicaid beneficiaries, there are at least 2 scenarios that could result in a large number of uninsured individuals being misclassified as Medicaid beneficiaries in routine hospital discharge data. First, hospitals may presume that some uninsured individuals are going to qualify for Medicaid on the basis of the hospitalization, and they may mistakenly submit erroneous information on those hospitalizations. Second, even in the circumstance that hospitals correctly indicate that a previously uninsured individual will qualify for Medicaid as a result of the hospitalization, this transition in insurance status, from uninsured to Medicaid, threatens the interpretation of hospitalization rates for ambulatory care sensitive conditions. Hospitalization rates for ambulatory care sensitive conditions are designed to be an indicator of outpatient care prior to a hospitalization and are only a valid indicator of the effectiveness of ambulatory care by insurance group if the payer information pertains to the period prior to the hospitalization.<sup>9</sup> Relying on the insurance status information recorded at the time of a hospitalization may bias hospitalization rates for ambulatory care sensitive conditions upward for Medicaid beneficiaries and downward for the uninsured.

This article uses gold-standard estimates of the number of Medicaid hospitalizations in California to determine whether there are systematic errors in the coding of Medicaid as the insurance category for patients in the state's routine hospital discharge data that could bias estimates of Medicaid beneficiaries' hospitalization rates for ambulatory care sensitive conditions. In addition, we examine whether these errors may differentially impact the accurate estimation of admission rates for ambulatory care sensitive conditions among patients in Medicaid fee-for-service versus Medicaid managed care.

## METHODS

To create a gold-standard estimate of the number of hospitalizations for ambulatory care sensitive conditions that could be attributed to California's Medicaid beneficiaries (Medi-Cal), we used a special research file that linked California's Office of Statewide Health Planning and Development's (OSHPD) routine hospital Patient Discharge Data (PDD) with the California Department of Health Services (DHS) Medi-Cal Monthly Eligibility File (MMEF) for the period of 1994–1999.

California's OSHPD produces an annual data file on all nonfederal acute care hospitalizations in the state. OSHPD applies several hundred audit rules to enhance the validity of their data before making them available for research.<sup>10</sup> The routine PDD file includes, among other things, information on admission month and year, patient demographics, ex-

pected source of payment, and diagnosis and procedure codes. The linkage of the PDD file with data from the DHS Medi-Cal monthly eligibility file (PDD-MMEF) provided additional information for the entire year on patients' month-by-month Medi-Cal enrollment status, aid category, health plan, and the county of residence. These data elements allowed us to classify each hospitalization as occurring for a Medi-Cal beneficiary and, if so, whether that beneficiary was in fee-for-service or managed care.

The linking of the 2 data files (PDD and MMEF) was performed by DHS using a combination of deterministic and probabilistic matching techniques. First, DHS performed a deterministic match on social security number (SSN), gender, and year of birth. Because both files contained records with incorrect or missing social security numbers, probabilistic matching was performed using additional data elements including date of birth, race/ethnicity, county of residence, date of admission and diagnostic and procedure codes available in the PDD and the MMEF as well as a separate Medi-Cal billing file. Overall, 93% of Medi-Cal hospitalizations recorded by DHS in its billing file could be linked with a hospitalization record in the PDD. The 7% that could not be matched were mostly among newborns whose records could not be distinguished from their mothers'.<sup>11</sup>

We used the linked PDD-MMEF file as a gold standard to determine the accuracy of payer coding for hospitalizations for ambulatory care sensitive conditions in the routine PDD. We examined how often patients identified as Medi-Cal beneficiaries with hospitalizations for these conditions in the PDD-MMEF file were correctly coded as Medi-Cal patients in the PDD. Hospitalizations for ambulatory care-sensitive conditions were identified based on a commonly accepted list of these conditions as determined by the ICD-9 codes recorded in the primary admission condition field.<sup>12,13</sup> We limited our analysis to patients younger than 65 years of age to be consistent with most studies that measure hospitalizations for ambulatory care sensitive conditions. To avoid the error of attributing to Medi-Cal a hospitalization of an uninsured individual who gained Medi-Cal as a result of the hospitalization, we counted in the PDD-MMEF only those hospitalizations that occurred to individuals who had Medi-Cal coverage during the month prior to admission. Ideally we would have classified individuals on the basis of their insurance status just prior to coming to the hospital, however the previous month's Medi-Cal status was the nearest available measure. This approach required that we exclude January admissions from our analysis as information on an individual's Medi-Cal eligibility was only available for the calendar year, and we could not determine if someone with a January admission was a Medi-Cal beneficiary in the previous December. Also, because the PDD-MMEF files were linked to a calendar year, we could not accurately count Medi-Cal admissions for hospital admissions that resulted in discharges in

a different calendar year. Less than 1% of admissions had discharges in a subsequent year, and these were excluded from the analysis. Finally, because the PDD-MMEF file was created using a probabilistic linkage method and some records in the PDD file had missing information on key identifying variables, we could not verify the Medi-Cal enrollment status for approximately 2% of the hospitalizations for ambulatory care sensitive conditions in the PDD file.

We determined how often Medi-Cal beneficiaries were undercounted in the PDD because of 2 potential sources of error. First, we estimated the number of patients younger than 65 years of age who had dual coverage with Medicare and Medi-Cal by examining the number of Medi-Cal beneficiaries in the PDD-MMEF file who were recorded as Medicare beneficiaries in the PDD. Although some of the differences in the 2 files could represent random errors in data recording, we assumed that the majority would be due to the limitation in the PDD of only being able to record one payer source. Second, we evaluated how often Medi-Cal beneficiaries were undercounted in the PDD because they were mistakenly coded as privately insured and whether this error was systematically related to Medi-Cal beneficiaries who were in managed care and receiving their health care through commercial health plans. We conducted comparisons for all Medi-Cal beneficiaries and separately for those in Medi-Cal fee-for-service and Medi-Cal managed care.

We also performed analyses to determine how often Medi-Cal beneficiaries with hospitalizations for ambulatory care sensitive conditions were overcounted in the PDD file. We compared how often individuals coded as Medi-Cal beneficiaries with hospitalizations for ambulatory care sensitive conditions had their Medi-Cal status confirmed in the

linked PDD-MMEF file. To quantify how much of the overcount of Medi-Cal hospitalizations in the PDD could be attributed to individuals who gained Medi-Cal as a result of a hospitalization, we compared the agreement in Medi-Cal status between the PDD recording of the hospitalization and the PDD-MMEF file recording of Medi-Cal eligibility based on the Medi-Cal status during the month of admission versus the month before the hospitalization. The analysis was further stratified on the basis of Medi-Cal fee for service and Medi-Cal managed care to assess whether overcounts varied in these subgroups.

Although described differences in the results would meet statistical significance in our large dataset, we have not indicated this with p values in the tables or text as our results pertain to the entire Medicaid population, not samples of the Medicaid population, for the indicated time period.

## RESULTS

### Accuracy of Payer Information

We were able to confirm more than 340,000 hospitalizations for ambulatory care-sensitive conditions among Medi-Cal beneficiaries younger than 65 years who were identified in the PDD-MMEF that were also coded as Medi-Cal in the PDD. However, only 71.8% of Medi-Cal admissions in the gold-standard PDD-MMEF file were coded as being insured by Medi-Cal for that hospitalization in the routine PDD (Table 1). The extent of the undercount in the PDD was greater for Medi-Cal patients in managed care plans than in fee-for-service care (34.1% of 84,907 versus 26.9% of 391,387 hospitalizations). For Medi-Cal managed care patients, most of the misclassification in the PDD was in coding

**TABLE 1.** Distribution of Medi-Cal Hospitalizations for Ambulatory Care-Sensitive Conditions for Patients Younger Than 65 in Medi-Cal Monthly Eligibility File (MMEF) by Payer Code Information in Patient Discharge Database (PDD), 1994 to 1999

PDD Payer Code	MMEF		
	All Medi-Cal (n = 476,294)	Medi-Cal Managed Care (n = 84,907)	Medi-Cal Fee-For Service (n = 391,387)
Medi-Cal	71.8	65.9	73.1
Medicare	18.0	8.1	20.2
Private managed care	5.2	17.5	2.5
Private fee-for-service	2.1	4.7	1.5
Other	1.0	2.0	0.8
Uninsured	1.9	1.8	1.9
Total	100%	100%	100%

Source: Office of the Statewide Health Planning and Development, Department of Health Services 1994 to 1999. Excludes January admissions. PDD payer status during time of hospitalization. MMEF eligibility status in the month before hospitalization.

these patients as privately insured, either in private managed care (17.5%) or in private fee-for-service (4.7%). This error is most likely attributable to hospitals failing to recognize that Medi-Cal managed care patients who were receiving their managed care through commercial health plans were still Medi-Cal patients. However, Medi-Cal fee-for-service patients were most commonly misclassified in the PDD as Medicare beneficiaries (20.2%). This undercount of Medi-Cal hospitalizations is most likely attributable to the inability to record more than one insurance category in the PDD for patients who have dual coverage with Medi-Cal and Medicare. A very small percentage of Medi-Cal patients in managed care (1.8%) or fee-for-service (1.9%) were identified as uninsured in the PDD suggesting that hospitals aggressively determine the Medi-Cal eligibility of low-income patients.

Table 2 indicates that the sensitivity of the Medicaid payer code information in the PDD was lower (71.8%) than its specificity (86.6%). In the PDD, it was more common to misclassify Medi-Cal patients into other insurance categories (undercount of 134,106 of 476,294 Medi-Cal admissions) than it was to misclassify patients from other insurance groups as Medi-Cal beneficiaries (overcount of 92,666 of 692,868 non-Medi-Cal admissions). The net result of the 2 types of errors is an undercount of 9% of Medi-Cal hospitalizations in the PDD.

Attributing a hospitalization for an ambulatory care sensitive condition to a Medi-Cal patient on the basis of the patient's Medi-Cal eligibility in the month before admission rather than the month of admission did not dramatically affect the sensitivity or the specificity of the Medi-Cal coding in the PDD. However, a comparison of these 2 analytic approaches reveals that approximately 5% of the 434,854 hospitalizations for ambulatory care-sensitive conditions attributed in the PDD to Medi-Cal beneficiaries occur among patients who

most likely were uninsured and who gained Medi-Cal eligibility because of the hospitalization (Table 3, 83.9% versus 78.7%). Individuals who were enrolled in Medi-Cal during the month of a hospitalization (presumably as a result of the hospitalization) accounted for 22,725 (25%) of the 92,666 overcount group. Moreover, most (90%) of the 22,725 individuals who gained Medi-Cal coverage as a result of their hospitalization were placed in Medi-Cal fee-for-service rather than Medi-Cal managed care. Using the Medi-Cal payer code in the PDD rather than the PDD-MMEF Medi-Cal eligibility code from the prior month inflates the count of hospitalizations for ambulatory care sensitive conditions for Medi-Cal fee-for-service patients (70.5% versus 65.8%) much greater than for Medi-Cal managed care patients (13.4% versus 12.9%). Therefore, the misclassification bias in routine PDD due to uninsured persons gaining Medi-Cal coverage as a result of a hospitalization undermines comparisons of Medi-Cal managed care and fee-for-service hospitalizations rates.

### DISCUSSION

This study demonstrates substantial error in the coding of Medicaid beneficiaries in routine hospital discharge data that affects the accuracy of calculated rates of hospitalizations for ambulatory care sensitive conditions. We identified and quantified the impact of 3 common and systematic sources of errors in the payer information of the California hospital PDD. Two of these errors, the nonrecording of Medi-Cal coverage among beneficiaries who have dual coverage with Medicare and the inaccurate recording of Medi-Cal managed care patients in commercial health plans as privately insured, contribute to an undercount of 28% of Medi-Cal hospitalizations for ambulatory care sensitive conditions for beneficiaries less than 65. This undercount is partially offset by a 13% overcount of non-Medi-Cal admissions as Medi-Cal hospitalizations. Approximately one quarter of this overcount occurs when uninsured individuals gain Medi-Cal insurance as a result of a hospitalization. Although the Medi-Cal payer code information in the PDD in this case is actually accurate for the period of the hospitalization, the error is in assuming that these individuals had the same health insurance status in the ambulatory setting prior to the hospitalization.

The errors in the PDD contribute toward a systematic bias in comparisons of Medi-Cal fee-for-service and Medi-Cal managed care toward higher hospitalization rates in Medi-Cal fee-for-service. The absolute size of this error increases in association with the growth of Medi-Cal managed care. This occurs because Medi-Cal managed care admissions are more likely than Medi-Cal fee-for-service admissions to be miscoded as privately insured. Second, uninsured persons who transition to Medi-Cal as a result of a hospitalization are disproportionately more likely to be placed into Medi-Cal fee-for-service rather than Medi-Cal managed care. Thus, comparisons of the performance of

**TABLE 2.** Agreement in Identification of Ambulatory Care-Sensitive Hospitalizations for Medi-Cal Patients Younger Than 65 Between Medi-Cal Monthly Eligibility File (MMEF) and Payer Code Information in Patient Discharge Database (PDD), 1994 to 1999

PDD payer code	Medi-Cal Enrollment in MMEF	
	Yes	No
Medi-Cal	71.8% (342,188)	13.4% (92,666)
Other payers	28.2% (134,106)	86.6% (600,202)
Total	100% (476,294)	100% (692,868)

Source: Office of the Statewide Health Planning and Development, Department of Health Services 1994 to 1999.

Excludes January admissions.

PDD payer status during time of hospitalization.

MMEF eligibility status in the month before hospitalization.

Numbers in parenthesis represent counts.

**TABLE 3.** Admission Month and Previous Month Medi-Cal Enrollment Status Among Patients Younger Than 65 Identified as Medi-Cal in PDD With Hospitalizations for Ambulatory Care Sensitive Conditions, 1994 to 1999

	Medi-Cal Enrollment in MMEF			
	Yes			No
	Managed Care	Fee-For-Service	Fee-For-Service	
Admission month MMEF MediCal status	13.4% (58,216)	83.9% (364,913)	70.5% (306,697)	16.1% (69,941)
Previous month MMEF MediCal status	12.9% (55,955)	78.7% (342,188)	65.8% (286,233)	21.3% (92,666)

Source: Office of the Statewide Health Planning and Development, Department of Health Services 1994 to 1999.  
 Excludes January admissions.  
 Numbers in parenthesis represent counts.

Medi-Cal fee-for-service versus Medi-Cal managed care using hospitalization rates for ambulatory care sensitive conditions will be biased upward for Medi-Cal fee-for-service because of uninsured patients being disproportionately transitioned into Medi-Cal fee-for-service. This bias toward higher rates of hospitalization in Medi-Cal fee-for-service than in managed care is on top of a health selection bias in voluntary Medi-Cal managed care that also exaggerates the difference in admission rates for ambulatory care sensitive conditions between Medi-Cal fee for service and managed care.<sup>14</sup> Studies that rely on routine hospital discharge data to compare Medicaid managed care and fee-for-service plans may not be accurate.<sup>7,15</sup>

Our study was limited to California’s routine patient discharge database, and our findings may not be entirely generalizable to other states. More than 40 states collect hospital discharge abstracts, but the data elements, coding rules, and quality vary across states. California’s Office of Statewide Health Planning and Development’s PDD has been used extensively for research purposes for more than 20 years. Thus, we suspect that payer code errors we identified in California’s routine PDD could be as common or more common in other state’s hospital discharge databases.

We focused our analysis on hospitalizations for ambulatory care-sensitive conditions, and our findings may not apply to other hospitalized conditions. For example, we suspect that the coding error that occurs when an uninsured individual gains Medi-Cal as a result of a hospitalization might be even greater for acute than chronic conditions. Low-income individuals who have chronic illnesses may be more likely to consistently qualify for Medicaid insurance and would therefore not transition into Medicaid as a result of a hospitalization. The coding error associated with individuals who gain Medicaid coverage as a result of a hospitalization is also more likely to occur in the context of policies, such as more frequent re-enrollment requirements, that increase the number of individuals who gain and lose Medicaid insurance coverage.<sup>16</sup>

To perform our analysis of the payer code errors in routine hospital patient discharge data attributable to patients gaining Medicaid as a result of a hospitalization, we relied upon a gold-standard measure of Medicaid coverage defined by having this insurance eligibility in the month prior to a hospitalization. In applying this standard, we may have undercounted some individuals who had the benefits of Medicaid coverage for less than a month in the outpatient setting prior to a hospitalization. However, we suspect if we did introduce such an error that the number of such people was probably small and that their opportunity to have used that coverage in the outpatient setting prior to their hospitalization was extremely time limited.

In summary, our results suggest that caution should be used in the interpretation of Medicaid hospitalization rates as calculated from routine hospital discharge data. This study quantifies several important sources of nonrandom error in the recording of Medicaid admissions in routine hospital discharge data. Relying upon routine hospital discharge data results in an underestimate of the total counts of hospitalizations for Medicaid beneficiaries. The majority of undercounted admissions in Medi-Cal managed care are related to patients being misclassified as privately insured. California has recently implemented a revision to its hospital patient discharge database that separates the recording of payer and health plan that may correct this error. The majority of undercounted Medicaid fee for service admissions are among those beneficiaries who are also covered by Medicare (dual eligibles). Medicaid studies that explicitly exclude these beneficiaries or do so by focusing on eligibility groups such as those in the Temporary Assistance for Needy Families program that are much less likely to have dual eligibles, would diminish the likelihood of an undercount of Medicaid fee for service admissions. However, if this is done without correcting some of the other identified errors in routine hospital discharge data, one might expect there to be a net overcounting of Medicaid fee for service hospitalizations that could bias comparisons with Medicaid managed care. Inattention to

the systematic errors in coding of Medicaid as the payer in routine hospital discharge data could result in erroneous conclusions when these data are used in evaluating Medicaid policies.

To improve the accuracy and usefulness of hospitalization data, we recommend that organizations that make these data available consider additional steps they could take to link their data with information from payers. As a first step, state agencies that provide hospital discharge data should pursue data linkages with their state Medicaid enrollment files to enhance opportunities to evaluate the quality of Medicaid services.

### ACKNOWLEDGMENTS

The authors thank the many people in the California Office of Statewide Health Planning and Development and the California Department of Health Services who worked to create the merged data files that made this project possible. In addition, comments by Chris Perrone and Lucy Streett at the California Health Care Foundation contributed to improving this research.

### REFERENCES

1. Agency for Health Research and Quality, Prevention Quality Indicators, Version 2. 1. Available at [http://www.qualityindicators.ahrq.gov/pqi\\_download.htm](http://www.qualityindicators.ahrq.gov/pqi_download.htm). Accessed March 25, 2005.
2. Bindman A, Grumbach K, Osmond D, et al. Preventable hospitalizations and access to health care. *JAMA*. 1995;274:305–311.
3. National Association of Health Data Organizations (NAHDO) *Prioritization of Data Needs for State Encounter: Data Sets for Public Health and Research Application*. Available at: [www.nahdo.org/project/matrix%20docs/Final2.pdf](http://www.nahdo.org/project/matrix%20docs/Final2.pdf). Accessed March 25, 2005.
4. Pappas G, Hadden WC, Kozak LJ, et al. Potentially avoidable hospitalizations: inequalities in rates between US socioeconomic groups. *Am J Public Health*. 1997;87:811–816.
5. Backus L, Moron M, Bacchetti P, et al. Effect of managed care on preventable hospitalization rates in California. *Med Care*. 2002;40:315–324.
6. Zhan C, Miller MR, Wong H, et al. The effect of HMO penetration on preventable hospitalizations. *Health Serv Res*. 2004;39:345–359.
7. Basu J, Friedman B, Burstin H. Medicaid managed care and preventable hospitalization. *Health Serv Res*. 2004;39:489–509.
8. Buchmueller TC, Allen ME, Wright W. Assessing the validity of insurance coverage data in hospital discharge records: California OSHPD data. *Health Serv Res*. 2003;38:1359–1372.
9. Friedman B, Jee J, Steiner C, et al. Tracking the State Children's Health Insurance Program with Hospital Data: National Baselines, State Variations, and Some Cautions. *Med Care Res Rev*. 1999;56:440–455.
10. Office of Statewide Health Planning and Development. *Errors and Acceptance. California Patient Discharge Data Reporting Manual, Third Edition*. Sacramento, CA: Office of Statewide Health Planning and Development; 2000.
11. Rains J, Tagupa C. *OSHPD/Medi-Cal Match Calendar Years 1994 through 1999*. Sacramento, CA: Department of Health Services, Medical Care Statistics section; 2001.
12. Millman M. *Access to Health Care in America*. Washington, DC: Institute of Medicine; 1993.
13. Billings J, Zeitel L, Lukomnik J, et al. Impact of socioeconomic status on hospital use in New York City. *Health Affairs*. 1993;12:162–173.
14. Bindman AB, Chattopadhyay A, Osmond DH, et al. The impact of Medicaid managed care on hospitalizations for ambulatory care sensitive conditions. *Health Serv Res*. 2005;40:19–38.
15. Porell FW. A Comparison of ambulatory care-sensitive hospital discharge rates for Medicaid HMO enrollees and nonenrollees. *Med Care Res Rev*. 2001;58:404–424.
16. Ku L, Ross DC. *Staying Covered: The Importance of Retaining Health Insurance for Low-Income Families*. New York: The Commonwealth Fund, Task Force on the Future of Health Insurance; 2002.