Providers and Incentives

No Exit: An Evaluation of Measures of Physician Attrition

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Objective. To validate physicians' self-reported intentions to leave clinical practice and the American Medical Association (AMA) Masterfile practice status variable as measures of physician attrition, and to determine predictors of intention to leave, and actual departure from, clinical practice.

Data Sources. Survey of specialist physicians in urban California (1998); the AMA Physician Masterfile (2001); and direct ascertainment of physician practice status (2001).

Study Design. Physicians' intention to leave clinical practice by 2001 (self-reported in 1998) was tested as a measure of each physician's actual practice status in 2001 (directly ascertained). Physician practice status according to the 2001 AMA Masterfile was also tested as a measure of physicians' actual practice status in 2001. Multivariate regression was used to predict both physicians' intentions to leave clinical practice and their actual departure.

Data Collection/Extraction Methods. AMA Masterfile data on 2001 practice status were obtained for 967 of 968 physician respondents to the 1998 survey. Actual practice status for 2001 was directly ascertained for 957.

Principal Findings. The sensitivity of Masterfile practice status as a measure of actual departure from clinical practice was 9.0 percent, and the positive predictive value was 52.9 percent. Allowing for a two-year reporting lag did not change this substantially. Self-reported intention to leave clinical practice had a sensitivity of 73.3 percent and a positive predictive value of 35.4 percent as a measure of actual departure from practice. The strongest predictor of both intention to leave clinical practice and actual departure from practice was older age. Physician dissatisfaction had a strong association ($OR = 5.6$) with intention to leave clinical practice, but was not associated with actual departure from practice.

Conclusions. Our findings call into question the accuracy of both AMA Masterfile data and physicians' self-reported intentions to leave as measures of physician attrition from clinical practice. Research using these measures should be interpreted with caution. Self-reported intention to leave practice may be more of a proxy for dissatisfaction than an accurate predictor of actual behavior.

Key Words. Physicians/supply and distribution, retirement, job satisfaction, career choice, specialties, medical/manpower

“...but what do numbers matter?”

—Garcin, the protagonist of the play *No Exit*, by Jean Paul Sartre

Physician supply is the product of a dynamic interplay between production of new physicians and attrition of existing physicians. Although dramatic growth in the number of graduate medical education positions in the United States in recent decades has focused workforce discussions on trends in the entry of new physicians, little attention has been paid to the “exiting” side of the physician supply equation. Several recent studies demonstrate a significant level of physician stress and dissatisfaction nationwide (Landon et al. 2002; Linzer et al. 2002; DeVoe et al. 2002; Wetterneck et al. 2002; Sturm 2002; Shugerman et al. 2001; Linzer et al. 2001; Buchbinder, Melick, and Powe 2001; Linzer et al. 2000; Frank et al. 1999), raising the possibility that physicians may be leaving clinical practice prematurely, and highlighting the need for further research in this area. This issue of potential premature attrition drew attention in California in 2001 when the California Medical Association issued a widely publicized report, *And Then There Were None*. Based largely on anecdotal evidence, this report suggested that a large proportion of physicians were planning to quit practice or leave California within the ensuing three years due to their disgust with the practice environment in the state (California Medical Association 2001). The Massachusetts Medical Society published a similar study in June 2002, concluding that physician retention in Massachusetts had become increasingly difficult (Massachusetts Medical Society 2002).

Other than through death, there are two main routes by which physicians exit clinical practice. The first is a change in profession, either within medicine or to another field. Although there is a growing body of research into the antecedents of job turnover among physician employees (Pathman et al. 2002; Buchbinder et al. 2001; Buchbinder et al. 1999), we found only one American study (Williams et al. 2001) and one English study (Sibbald, Bojke, and Gravelle 2003) that focused on physicians choosing to leave clinical

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practice altogether. The second and more traditional route of exit from clinical practice is retirement. The literature does contain some studies of antecedents of physician retirement (Sturm 2002; Davidson et al. 2001; Kmietowicz 2001; Travis et al. 1999; Davidson, Lambert, and Goldacre 1998; Wakeford, Roden, and Rothman 1986), although only two are from the United States (Kletke et al. 2000; Powell and Nakata 2001).

Data on physician attrition in the United States have traditionally derived from the American Medical Association (AMA) Physician Masterfile or from self-reported measures of physicians' intention to retire or leave clinical practice. The AMA Masterfile contains continuously updated information on all U.S. allopathic physicians and many osteopathic physicians, including those who are not AMA members. Masterfile data are used to determine age and sex specific attrition rates in the Bureau of Health Professions forecasting models and by other researchers to study retirement (Vector Research 2000). A variety of sources are used to update the Masterfile, including information from medical schools, hospitals, state licensing agencies, medical societies, and professional associations. In addition, the AMA conducts an ongoing survey of the entire physician population to collect detailed practice information, cycling through each physician every three years. These methodologies for updating Masterfile data may result in delays in posting information on physician attrition from clinical practice. Details regarding administration of the Masterfile database have been published elsewhere (Pasko, Seidman, and Birkhead 2000; Kletke et al. 2000; Baldwin et al. 2002).

Another source of data on physician attrition is the self-report of physicians' intentions to leave clinical practice. It is common to rely on "intent to..." variables in the absence of data on actual rates of particular behaviors, and the advantages and disadvantages of such surrogate variables have been reviewed elsewhere (Dalton, Johnson, and Daily 1999). The relationship between employee intent to quit specific employment positions and actual job turnover has been extensively studied and two large meta-analyses estimate the correlation coefficient to be 0.50 (Steel and Ovalle 1984; Tett and Meyer 1993). Only two studies of physicians have attempted to validate this relationship. Buchbinder and colleagues (2001) found that primary care physicians who indicated that they were very likely to leave their current practice situation within the next two years were 2.38 times more likely to have done so on follow-up survey four years later than those who indicated that they were very unlikely to leave. Similarly, in a follow-up survey of 45 Western Australian rural physicians who indicated in 1986 that they intended to leave rural practice, Kamien (1998) found that 22 (49 percent) remained in rural practice

in 1996. The relationship between intent to leave clinical practice entirely, as opposed to intention to leave a particular job position or location, and actual departure has not been studied.

Review of the literature on physicians' intention to leave clinical practice provides limited insight into this topic. Williams and colleagues (2001) found that among physicians under age 56, higher perceived stress is associated with lower satisfaction levels that are in turn related to greater intentions to quit, decrease work hours, change specialty, or leave direct patient care. They also found that higher perceived stress is associated with poorer mental health that is in turn related to greater intentions to leave direct patient care. A recent study in England also identified overall job satisfaction as a key predictor of physicians' intent to quit, along with older age, having no children under age 18, and ethnic minority status (Sibbald, Bojke, and Gravelle 2003). The strong association between physician dissatisfaction and intention to quit found in these studies raises the question of whether intention to leave clinical practice is an accurate predictor of actual departure, or simply an expression of discontent.

The gold standard for measuring physicians' exit from clinical practice is primary data collection in the form of a prospective cohort study. No such studies exist in the literature. The most complete source of information on physician practice status nationwide is the AMA Physician Masterfile. However, the challenges of updating the Masterfile documented elsewhere (Kletke et al. 2000) have raised concerns about the validity of the data. Increasing reliance on proxy variables for physician attrition such as intention-to-quit is equally concerning in light of research that suggests that "intention to..." variables are not strongly correlated with actual behavior. The possibility that current measures of physician attrition are not valid has important policy implications, particularly if these data are used in forecasting models that inform policy decisions regarding physician supply.

This aim of this study was to use primary ascertainment of attrition from clinical practice to attempt to validate the two traditional sources of data on physician attrition: the practice status variable from the AMA Masterfile, and physicians' self-reported intentions to leave clinical practice. A related objective was to compare physician attrition predicted by standard physician supply models to that ascertained by primary data collection in a longitudinal cohort. Additionally, we were interested in determining predictors of both intention to leave, and actual departure from, clinical practice in an attempt to develop a conceptual framework for future research in this area.

METHODS

1998 Physician Questionnaire

In 1998, as part of a study of specialist physicians' practice experiences and opinions (Pena-Dolhun et al. 2001; Backus et al. 2001; Fernandez et al. 2001), we mailed self-administered questionnaires to specialist physicians practicing in California's 13 largest urban counties (Alameda, Contra Costa, Fresno, Los Angeles, Orange, Riverside, San Bernadino, San Diego, Sacramento, San Francisco, San Mateo, Santa Clara, and Solano). These counties together constituted 79 percent of the state's practicing specialist physicians. Study physicians were identified from the AMA's Physician Masterfile. Specialists were included in the study sample if their primary specialty was listed as cardiology, endocrinology, gastroenterology, general surgery, neurology, ophthalmology, or orthopedics. These specialties were chosen to provide a broad spectrum (procedure- and non-procedure-oriented) of both surgical and medical office-based subspecialties. Physicians were excluded if they were not listed as providing direct patient care or if they were listed as currently in training or employed by the federal government.

Physicians were selected using a probability sample stratified by specialty, county, and physician race/ethnicity (nonwhite physicians were over-sampled). Completed questionnaires were obtained from 978 of the 1,492 eligible specialist physicians (66 percent). Physicians were ineligible if they were found to be no longer active in patient care or were not practicing in the study counties. There were no significant differences in the age, gender, race, or specialty between respondents and nonrespondents to the specialist questionnaire. Ten specialists (1 percent) who completed questionnaires did not respond to the question regarding intentions to leave clinical practice; these physicians were excluded from the analyses. For the analyses, cardiology, endocrinology, gastroenterology, and neurology were considered collectively as "medical specialties," and general surgery, ophthalmology, and orthopedics were considered collectively as "surgical specialties."

Survey items included career intentions, physician satisfaction, physician demographics, practice setting, and a variety of questions regarding practice experience. "Practice intentions for 2001" was measured by physicians' response to the question: Three years from now, do you think that you will be: (1) still practicing medicine and seeing patients; (2) still working in medicine but no longer seeing patients; (3) working in a career other than medicine; (4) retired. "Intended to leave clinical practice by 2001" was

defined as any response other than “still practicing medicine and seeing patients.”

Ascertainment of 2001–2002 Practice Status

In the fall and winter of 2001–2002, we attempted to ascertain the current practice status of each of the respondents to the 1998 physician survey. Two methods were used. First, for each physician in the sample we obtained current information from the AMA Physician Masterfile. For the purposes of this study, the Masterfile variable “type of practice” was used to determine “2001 Masterfile practice status.” All physicians whose type of practice was listed as other than “direct patient care” (including “administration,” “medical education,” “medical research,” “other medical activities,” “retired,” “semi-retired,” and “inactive for other reasons”) were considered collectively as “left clinical practice according to Masterfile.”

Next, we attempted to directly ascertain each physician’s actual practice status. The majority of physicians were sent a repeat questionnaire in the fall of 2001 as part of the UCSF California Physician Survey Project and practice status was assigned based on their survey responses. For nonrespondent physicians, we began by searching the DocFinder websites of the Medical Board of California (CMB) and the Osteopathic Medical Board of California (OMB). Physicians whose primary license status code was listed on the websites as “deceased,” “revoked,” “denied,” “retired,” or “surrendered,” were considered to have left clinical practice. These were considered valid endpoints because they each require a positive action by the medical boards to limit a physician’s practice status (as opposed to a license status of “current” which may describe a physician who has retired from practice without notifying the medical boards, or “delinquent,” which may describe a practicing physician whose license renewal fees are past due). For those physicians not responding to the survey whose practice status could not be determined definitively by the DocFinder websites, multiple attempts were made to contact them by mail, by telephone, by e-mail, or in person to determine whether or not they had left clinical practice. The results of this search were defined as “2001 actual practice status.” Physicians who were determined by this method to have left clinical practice were considered collectively as “left clinical practice by 2001.” Despite our exhaustive effort we were unable to ascertain “2001 actual practice status” for 11 physicians. For analyses, these 11 physicians were categorized as having left clinical practice; sensitivity analyses were performed to measure the effect of this assumption.

Analysis

We performed bivariate analyses of specialists' "practice intentions for 2001," and "2001 Masterfile practice status," by "2001 actual practice status." We then calculated the specificity, sensitivity, and predictive value of both "intended to leave practice by 2001," and "left clinical practice according to Masterfile" as measures of "left clinical practice by 2001." Chi-square tests for bivariate comparisons of categorical data were performed.

To test the policy implications of variation between "2001 Masterfile practice status" and "2001 actual practice status," we obtained the physician death and retirement rates used in the Bureau of the Health Professions (BHP) physician supply model. The BHP physician supply model contractor develops national forecasts of physician supply based on trends in physician entry and attrition. These models use comparisons of cross-sectional AMA Masterfile data for sequential years between 1991 and 1995 to compute death and retirement rates for strata that are specific to age, sex, and country of graduation (U.S. versus non-U.S. medical school) (Vector Research 1997). We applied these BHP death and retirement rates to our sample of 968 physicians and calculated the predicted number of physicians deceased or retired by 2001. We then compared this predicted number to the number of physicians whose "actual practice status in 2001" was "deceased" or "retired."

We also investigated potential determinants of both physicians' intentions to leave clinical practice in 3 years and their actual departure. Variables that were significant on bivariate analyses ($p < 0.05$) were included in a multivariate regression model predicting "intended to leave clinical practice by 2001," and "left clinical practice by 2001." A variable for income was also included because it significantly improved goodness of fit for the model.

RESULTS

Characteristics of the respondents are shown in Table 1. Consistent with our sampling design, African Americans and Latinos were overrepresented. Seventy-nine percent of respondents reported being "very" or "somewhat" satisfied with being a physician, while 21 percent indicated that they were "somewhat" or "very" dissatisfied.

Practice Intentions for 2001

In 1998, 78.4 percent of respondents reported that they intended to still be practicing medicine and seeing patients in three years. Five percent intended

Table 1: Characteristics and Career Intentions of Respondents to 1998 California Specialist Physician Survey ($n = 968$)

Gender, %	
Male	89.8
Female	10.2
Age, %	
<55 years	62.8
55–64 years	27.3
65+ years	9.9
*Race/Ethnicity, %	
African American	6.7
Asian	17.6
Latino	8.1
White	63.9
Other	3.7
Type of Specialty, %	
Medical	57.4
Surgical	42.6
Board Certified, %	
Yes	84.9
No	15.1
Practice Setting, %	
Solo practice	43.3
Group practice	
2–10 physicians	29.0
11+ physicians	14.2
Group or staff model HMO	11.9
Other	1.6
**Mean income, dollars/hour (<i>SD</i>)	111.2 (105.9)
Satisfaction with Being a Physician, %	
Very satisfied	47.7
Somewhat satisfied	31.4
Somewhat dissatisfied	15.4
Very dissatisfied	5.6
Practice Intentions for 2001, %	
Still practicing medicine and seeing patients	78.4
Still working in medicine but no longer seeing patients	5.0
Working in a career other than medicine	3.8
Retired	12.8

*Nonwhite physicians oversampled.

**Dollars per hour computed as net annual income after practice expenses divided by reported patient care hours per week $\times$ 52 weeks.

to still be working in medicine, but no longer seeing patients. Four percent intended to be working in a career other than medicine, and 13 percent intended to retire. In further analyses, the latter three categories were considered collectively as “intended to leave clinical practice by 2001.”

2001 Masterfile Practice Status

According to AMA Masterfile data, 949 (98.1 percent) respondents to the 1998 survey were in active patient care in 2001.

2001 Actual Practice Status

Eight hundred and sixty-five (89.4 percent) respondents to the 1998 survey were still in active patient care in 2001. All but 2 of these physicians were practicing in California. Of the remaining 101 physicians, 11 were working in medicine but not seeing patients; 11 had a medical license that was surrendered, denied, or revoked according to the California Medical Board; 66 were retired; and 2 were deceased. We were unable to ascertain 2001 actual practice status for 11 physicians.

Comparison of "Practice Intentions for 2001" and "2001 Masterfile Practice Status" to "2001 Actual Practice Status"

Table 2A shows the comparison of "practice intentions for 2001" and "2001 actual practice status." Of the 209 physicians who reported in 1998 that they intended to leave clinical practice within three years, only 74 (35.4 percent) had actually left clinical practice by 2001. The remaining 135 (64.6 percent) were still in active patient care in 2001. Of the 759 who reported in 1998 that they intended to stay in clinical practice, 732 (96.4 percent) actually remained in active patient care and (3.6 percent) had left clinical practice by 2001. Table 2B shows the comparison of "2001 Masterfile practice status" to "2001 actual practice status." According to the Masterfile, 17 (1.8 percent) of the original 968 specialists had left clinical practice by 2001. Of these 17 specialists, we found 9 (52.9 percent) who had actually left clinical practice by 2001, and 8 (47.1 percent) that remained in active patient care. Of the 950 specialists that the Masterfile listed as remaining in clinical practice, 859 (90.4 percent) actually remained in active patient care in 2001, and 91 (9.6 percent) had left clinical practice.

Summary analyses of the accuracy of "intended to leave practice by 2001" and "left clinical practice according to Masterfile" as measures of actual departure from clinical practice are presented in Table 2C. "Intended to leave practice by 2001" had a sensitivity of 73.3 percent and a specificity of 84.4 percent. The probability that an individual specialist who indicated in 1998 that he or she "intended to leave clinical practice" had actually left practice by 2001 (positive predictive value) was 35.4 percent; the probability that an individual specialist who indicated that he or she intended to stay in clinical

Table 2A: Comparison of Practice Intentions for 2001 and 2001 Actual Practice Status

	2001 Actual Practice Status	
	Left Clinical Practice	Active Patient Care
Practice Intentions for 2001		
Intended to leave clinical practice by 2001	74	135
Intended to stay in clinical practice	27	732

Table 2B: Comparison of 2001 Masterfile Practice Status and 2001 Actual Practice Status

	2001 Actual Practice Status	
	Left Clinical Practice	Active Patient Care
2001 Masterfile Practice Status		
Left clinical practice	9	8
Active patient care	91	859

Table 2C: Validity of “Intended to Leave Clinical Practice by 2001” and “Left Clinical Practice, According to Masterfile” as Measures of “Left Clinical Practice by 2001”

	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Intended to leave clinical practice by 2001	73.3%	84.4%	35.4%	96.4%
Left clinical practice, according to 2001 Masterfile	9.0%	99.1%	52.9%	90.4%

practice actually remained in active patient care in 2001 (negative predictive value) was 96.4 percent. “Left clinical practice, according to 2001 Masterfile” had a sensitivity of 9.0 percent and a specificity of 99.1 percent. The positive predictive value of this measure was 52.9 percent and the negative predictive value was 90.4 percent. We used data on work hours from our 2001 California Physician Survey to assess whether physicians who “intended to leave practice

by 2001” had remained in clinical practice but substantially reduced their work hours by 2001. Although we found a trend toward reduced work hours among those that had intended to quit, this trend was not statistically significant.

We conducted sensitivity analyses to account for those 11 physicians whose “2001 actual practice status” was “unknown,” by recategorizing them from “left clinical practice by 2001” to “remained in active patient care in 2001.” This did not substantially change our findings. In addition, because of potential lags in Masterfile updating (Kletke et al. 2000), we obtained fall 2002 Masterfile data on our physician cohort. By the fall of 2002, the Masterfile identified an additional 17 physicians as retired whom we had ascertained as retired in fall 2001. Although use of this lagged version of the Masterfile resulted in some improvement in sensitivity when predicting “left clinical practice by 2001” (from 9 percent to 21 percent), there was little change in specificity, and positive or negative predictive value. A final check of the August 2003 Masterfile identified an additional 3 physicians as retired whom we had ascertained as retired in fall 2001.

Comparison of Predicted versus Actual Physician Separation

Using the BHPr separation rates we predicted that 54.6 physicians in our original sample would have died or retired by 2001. Using “2001 actual practice status,” we determined that 68 physicians actually died or retired by 2001, indicating that the BHPr forecasting model underpredicted actual death and retirement by 25 percent in our cohort. The 68 physicians we definitely ascertained as having died or retired do not include the 11 physicians for whom we were unable to determine practice status; it is plausible that many of these 11 physicians were no longer in clinical practice, which would result in an even greater discrepancy between the BHPr model prediction and actual attrition.

Predictors of Physicians’ Career Intentions and Actual Behavior

Table 3 shows the results of the multivariate regression models predicting physicians’ intention to leave clinical practice and actual departure from practice. The principal factors positively associated with “intention to leave clinical practice by 2001” were older age (age 55–64 years, OR = 3.7; age 65+, OR = 16.6) and dissatisfaction (OR = 5.6). Negatively associated were female gender (OR = 0.39) and medical specialty (OR = 0.60). In contrast, in

Table 3: Predictors of Physicians' Career Intentions and Actual Behavior

<i>Variable</i>	<i>Intended to Leave Clinical Practice by 2007**</i>		<i>Left Clinical Practice by 2001***</i>	
	<i>Odds Ratio Estimate</i>	<i>Confidence Interval</i>	<i>Odds Ratio Estimate</i>	<i>Confidence Interval</i>
Gender				
Male	ref	n/a	ref	n/a
Female	0.39*	(0.15–0.98)	0.58	(0.19–1.74)
Age				
<55 years	ref	n/a	ref	n/a
55–64 years	3.68*	(2.40–5.64)	2.58*	(1.46–4.56)
65+ years	16.61*	(9.23–29.87)	9.90*	(5.25–18.69)
Race/Ethnicity				
African American	1.16	(0.54–2.47)	0.65	(0.23–1.82)
Asian	0.80	(0.45–1.42)	1.01	(0.50–2.01)
Latino	1.46	(0.73–2.92)	0.38	(0.12–1.19)
White	ref	n/a	ref	n/a
Other	1.65	(0.63–4.34)	0.75	(0.17–3.42)
Type of Specialty				
Medical	0.60*	(0.40–0.91)	0.65	(0.39–1.1)
Surgical	ref	n/a	ref	n/a
Board Certified				
Yes	0.72	(0.43–1.22)	0.64	(0.34–1.21)
No	ref	n/a	ref	n/a
Practice Setting				
Solo practice	ref	n/a	ref	n/a
Group practice				
2–10 physicians	0.88	(0.54–1.43)	0.97	(0.52–1.79)
11+physicians	1.91	(0.91–4.01)	2.785*	(1.24–6.28)
Group or staff model HMO	1.42	(0.77–2.63)	0.82	(0.32–2.08)
Other	1.56	(0.33–7.37)	1.02	(0.17–6.17)
Income (dollars/hour)	1.00	(0.999–1.002)	1.00	(0.999–1.003)
Satisfaction with Being a Physician				
Satisfied	ref	n/a	ref	n/a
Dissatisfied	5.63*	(3.68–8.60)	1.12	(0.63–2.01)

ref = referent

*Statistically significant ($p < 0.05$).**Hosmer and Lemeshow goodness-of-fit test for the model: $p = 0.70$.***Hosmer and Lemeshow goodness-of-fit test for the model: $p = 0.48$.

the model explaining actual departure from practice ("left practice by 2001") only age (age 55–64 years, OR = 2.6; age 65+, OR = 9.9) remained significant. In this model, large group practice also had a positive association with departure from clinical practice (11 or more physicians, OR = 2.8).

DISCUSSION

Our study is one of the only investigations of physician attrition to use a longitudinal cohort with primary ascertainment of practice status over time. Our findings call into question the accuracy of both AMA Masterfile data and physicians' self-reported intentions to leave as measures of physician attrition from clinical practice. Beginning with a cohort of 968 specialist physicians, the Masterfile identified only 17 physicians as having left clinical practice between 1998 and 2001. Half of these cases were misidentified. The sensitivity of Masterfile data for identifying physicians' exit from practice was only 9.0 percent. The sensitivity of the Masterfile improved only modestly (from 9 percent to 21 percent) when actual practice status was compared with lagged Masterfile data one year later, and minimally by 2003. Equally concerning was the low positive predictive value, indicating that the probability that a physician identified by Masterfile data as having left practice had actually left practice was 52.9 percent, or not much better than chance.

Assessment of physicians' intentions to quit clinical practice has been used in both the scientific and lay literature as a proxy for actual departure from medicine. Of the 968 specialist physicians in our 1998 survey, 209 (21.6 percent) responded that they intended to leave clinical practice within three years. Follow-up in 2001 revealed that only 74 (35.4 percent) of these physicians had actually left clinical practice; the rest remained in active patient care. The low specificity (84.4 percent) and low positive predictive value (35.4 percent) suggest that intention to leave, although perhaps better than Masterfile data, remains a poor predictor of actual exit from clinical practice.

The results of our multivariate regression models provide insight into physicians' intentions to leave clinical practice. The strongest predictor of both intention to leave clinical practice and actual departure from practice was, not surprisingly, advancing age. Dissatisfaction with being a physician emerged as a strong predictor of intention to leave clinical practice, but was not associated with actual exit. These findings suggest that intention to leave clinical practice is a better proxy for physician discontent than for actual physician attrition. Similarly, male gender and surgical specialty were positively associated with intention to leave, but not with actual departure.

Our study also revealed discrepancies between the attrition predicted by a standard physician supply forecasting model, the BHP_r supply model, and that actually observed through primary ascertainment of practice status in our longitudinal cohort. The BHP_r physician supply model underestimated the

actual number of physicians in the cohort who died or retired during this period by 25 percent.

The principal limitation of our study is that it includes only urban specialist physicians in California. The rate of physician attrition may vary by state, by specialty, or by urban/rural practice. Although this variation would not affect comparison of the "Masterfile practice status" and "actual practice status" for the physicians in our cohort, it might lead to differences between the predicted attrition rates based on national data and the actual attrition rate observed in our cohort. For example, specialists have higher incomes than primary care physicians, and might therefore be able to afford to retire at an earlier age than primary care physicians. However, the BHP_r does not compute attrition data by specialty or region in its forecasting models. This potential limitation of our study thus highlights potential problems in attempting to use national forecasting models for specialty or region-specific analysis. Similarly, although the overall level of dissatisfaction might vary among specialties and regions, our finding that intention to leave clinical practice is more a marker for physician dissatisfaction than for actual departure is consistent with prior research on satisfaction and retention of rural physicians (Pathman, Williams, and Konrad 1996), and is not likely to differ substantially by state or by specialty.

Another limitation of our study is that it examines a single three-year period between 1998 and 2001. If in 1998 physicians were particularly dissatisfied with their careers they may have been more likely to make inaccurate predictions about their intention to leave clinical practice. To evaluate whether or not physician intention is a more accurate predictor of exit from practice during better times, the study would need to be repeated in a period of relative stability and higher physician satisfaction. Changes in the overall economy between 1998 and 2001 might have influenced physicians' abilities to leave practice in 2001, despite their intentions expressed in 1998, also reducing the validity of intention to leave as a predictor of actual departure. Physicians who reported their intention to leave practice by 2001 may have instead stayed in practice and reduced their work hours; however, our supplemental analyses of work hours in 2001 did not support this. Finally, the three-year time interval between physicians' expressed intentions and the occurrence of the actual behavior may have influenced our findings, however a meta-analysis examining the time interval as a modifier of the intention-behavior relationship found that the intention-behavior relationship does not significantly decline over time (Randall and Wolff 1994). In sum, our findings were consistent with previous research that found a low correlation coefficient between "intent to..." variables and actual behavior (Steel and Ovalle 1984).

Our study has significant policy implications. The first is that inaccuracies in measurement of attrition in the AMA Physician Masterfile may seriously limit the utility of the Masterfile for measuring current physician supply and projecting supply into the future. For a cohort of physicians known to be active in 1998, the Masterfile indicated that 98 percent were still active in patient care in 2001, when in fact only 89 percent were still in patient care—a 9 percent overestimate (in absolute terms) of the number of patient care physicians in 2001 among this cohort. The Masterfile may eventually “catch up” with the attrition of individual physicians, meaning that there would be a lag in retirement data in the Masterfile that produces a “steady state” over-measurement of physician supply. This lag phenomenon would make the Masterfile especially insensitive to short-term (e.g., 1–5 year) permutations in attrition rates, such as those that might occur in response to changes in the health care environment or overall economy.

Unfortunately, there is evidence that the lag in detection of attrition is not at a steady state, but is worsening for the Masterfile. The BHP_r physician supply model contractor has found that attrition rates in a cross-sectional comparison of more recent AMA Masterfile data are much lower than those found in comparisons among earlier years (Vector Research 2000). Similar increases in lag times also appear to be occurring in the Masterfile’s detection of new physician entrants. In 2000, 5.7 percent of physicians were listed in the Masterfile as “not classified,” compared with only 2.1 percent in 1990 (American Medical Association 1990, 2000). Most of the physicians in the “not classified” category are relatively recent residency graduates for whom the AMA has not yet ascertained practice status. Concerns about deteriorations in the quality of AMA Masterfile data are occurring at a time when the AMA has reduced the resources invested in its physician database operations. Even forecasting models based on earlier versions of the Masterfile may be susceptible to error or may not reflect current attrition behavior, especially for particular groups of specialties.

The second major policy implication is that physicians’ self-reported intentions to quit clinical practice have limited utility for gauging physician behavior. Although physician intention to quit clinical practice is a reasonable marker of physician dissatisfaction, it should not be used to predict actual future attrition.

All of these uncertainties about measurement of physician attrition create a situation of no exit for physician workforce analysis. Recent AMA Physician Masterfile data suggest almost no exit by physicians, when primary evidence indicates greater attrition. And yet physicians are not exiting at

anywhere near the levels implied by physicians' stated intentions. Federal agencies such as the Bureau of Health Professions and professional organizations such as the AMA should carefully appraise current physician supply databases and explore opportunities to collaborate on efforts to produce more reliable data on physician attrition. One possible approach would be to invest in an annual survey of a national sample of physicians, using both a longitudinal cohort and repeated cross-sectional design. This survey would need sufficient resources to allow a sample size and response rate sufficient to generate valid estimates of short-term trends in attrition. One possible vehicle for such a project would be the nationally representative physician surveys conducted by the Center for Health Systems Change (Landon, Reschovsky, and Blumenthal 2003). For workforce analysts who believe that the numbers do matter, collection of more valid and timely data on physician exit from practice is essential for accurate enumeration of current physician supply and forecasting of future supply.

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