Predictive Accuracy of Rural Physicians' Stated Retention Plans

Donald E. Pathman, MD, MPH; Thomas R. Konrad, PhD; and Christopher R. Agnew, PhD

ABSTRACT: *Context: The retention of rural physicians is a difficult phenomenon to study because job changes—the outcome of interest—take years to unfold. One common way to study retention is to ask rural practitioners through surveys how much longer they expect to remain in their current positions and use these statements of "anticipated retention" as an expedient proxy measure of actual retention. Purpose: To test the predictive accuracy of rural physicians' stated retention plans and test the hypotheses that predictions are more accurate for certain physicians, such as those with more experience, more control of their work situations, and at less risk for job burnout. Methods: A 1991 mail survey (national stratified random sample) prospectively queried rural physicians' retention plans, and a follow-up survey 5 to 6 years later determined if and when respondents (N = 405, 67.5% combined response rate) had moved. Findings: Retention predictions for the entire cohort corresponded remarkably well to the group's actual retention, with the proportion remaining each year deviating by only a few percentage points from what the group collectively expected. Predictions for individuals were also moderately accurate: 4 of 5 physicians who predicted remaining at least 5 years did so; 2 of 3 who predicted remaining less than 5 years indeed left before 5 years. Predictions of job changes in less than 2 years tended to be more accurate than predictions of 2 to 5 years. Physicians' predictions were more accurate when they worked in practices they owned (greater control) and were on-call 2 or fewer times each week (lower burnout risk). Accuracy was not greater with any of 5 measures of experience. Conclusions: Rural generalist physicians are moderately accurate when reporting how much longer they will remain in their jobs, validating the use of anticipated retention in rural health workforce studies.*

I n previous decades, research on the recruitment and retention of rural physicians primarily focused on the former process—that is, recruiting new practitioners to rural settings. Over the past 10 years studies have begun to also assess how to

retain physicians after they choose rural practices and, conversely, how to avoid physician turnover. Recent studies have started to identify the statistical correlates of physicians staying and going,[1-4] describe the factors physicians believe lead them to stay and leave,[1,5,6] and characterize the unique issues in retaining important rural physician subgroups such as those in community health centers and in sites of the National Health Service Corps (NHSC).[6-8]

Retention and turnover are not easy phenomena to study, primarily because individuals may go many years or even an entire career without changing jobs. Few researchers (or agencies that fund their work) are willing to prospectively identify, survey, and follow rural physicians waiting for job changes to occur so they can then correlate the timing of job changes with earlier aspects of rural work. For convenience, some studies take a second approach of surveying physicians who moved to rural settings years earlier—often including both those who have already left and those remaining—to query them about their reasons for staying or leaving and/or about the circumstances of their earlier years in rural practice to then correlate these circumstances with whether and when physicians left.[6,8,9] This retrospective approach has merits but carries the potential for recall bias and other distortions in data collected after the fact.[10,11]

This paper addresses a third and common approach

in which one assesses rural retention neither prospectively nor retrospectively, but rather through a cross-sectional study design. This approach asks current rural practitioners through survey questions to predict how many more years they will remain in their practices or, in an alternative wording, whether they expect to remain for some specified period of time, typically 1 or 2 years.[1,3,12-14] Subjects respond with estimates of the number of years they anticipate remaining or by indicating the likelihood (eg, "very likely" or "very unlikely") that they will remain for the period specified. In this study approach, conclusions are reached about the factors influencing retention or turnover by comparing the work, family, and community situations of those anticipating a longer future stay with those planning to leave sooner. "Anticipated retention" is thus used as a convenient proxy measure for actual retention.

The validity of this third study design in rural physician retention studies is uncertain, as it depends on whether rural physicians can accurately predict how long they will remain in their jobs. It is not known whether turnover occurs for rural physicians for reasons that are evident to them in advance and thus at times they can anticipate, or if it often occurs for unforeseeable reasons and at unanticipated times. If surveyed physicians misjudge their work futures despite careful reflection and honest reporting, then study conclusions based on their expectations will be inaccurate.

Evidence from the field of social psychology suggests that people's predictions are generally good indicators of their future behavior.[15-17] For workers in other professions, the association between stated plans to leave a job and actual subsequent turnover is known to be moderately strong, typically measured with correlation coefficients of about 0.5.[18-20] We are aware of only 2 such studies involving physicians, one of physicians in rural Australia[21] and the other of young US generalists in predominantly urban settings.[2] Both found that statements of the likelihood of future job changes generally predict actual subsequent job changes. To our knowledge, the predictive validity of stated retention plans for US rural physicians is untested.

It may be that physicians with certain characteristics or those working in certain types of practice and community settings are better able to predict their future job retention and departure. Research from social psychology allows us to make some predictions. To anticipate one's future behavior, individuals draw on their previous related experiences and recollections of the problems they encountered.[22,23] Thus, we hypothesize that rural physicians with more relevant experience—those older, with previous practice experience, with experience living in rural towns, and those with

longer work histories within their current jobs—are better able to predict how long they will remain in their jobs. Further, predictions in general are more accurate when individuals have greater independence and more control over their behaviors and are less subject to the needs and decisions of others.[24] Hence, we also hypothesize that physicians' retention expectations are more accurate when they own and control their practices and less accurate when they are married and have children, when decisions must be made jointly and family needs may supersede their own. Relatedly, because of the importance society places on the child-care role of women and on the work of men, we hypothesize that female physicians may be particularly vulnerable to unanticipated job disruptions when required to accommodate the needs of their husbands and children.[25] Last, we note that workers often do not recognize when they are emotionally and physically exhausted in their work and careers, but burnout nevertheless places them at increased risk for job turnover.[26] Thus, we hypothesize that job changes come sooner than anticipated for physicians at risk for job burnout—those working very long hours, seeing many patients per hour, and with very low incomes—and they overestimate their retention.

The purpose of this study is to test the predictive accuracy of the retention plans reported by US rural primary care physicians. We prospectively queried a cohort of rural generalists about their job plans through an initial mail survey and then resurveyed them 5 to 6 years later to learn if and when they had actually moved in the interim. We assessed both the short-term and intermediate-term accuracy of their predictions. We also tested our hypotheses above about the sorts of physicians and practice and community situations in which physicians' retention predictions were more accurate. In this study, predictions of future job changes were queried through a survey question we crafted in 1991, "How many more years do you think you will remain in your current principal practice?"

Methods

In 1991 we used the American Medical Association's Physician Masterfile to identify all practicing family physicians, pediatricians, general internists, and general practitioners whose file information indicated that they had moved to a nonmetropolitan (rural) ZIP code in the continental US in 1987 through 1990.[8] Physicians listed on the NHSC roster of physicians were eliminated. Of the 8286 non-NHSC physicians identified, we randomly selected 1000 of the 1938 who had moved to federally designated health professional shortage areas (HPSAs) and 600 of the 6348 physicians

who had moved to non-HPSA rural areas (HPSA physicians were oversampled for reasons unrelated to the current study). Samples were selected after strati-fying the HPSA and non-HPSA groups by age, specialty, and location in the US South versus all other regions grouped together.

The 1600 selected physicians were sent up to 3 mailings in 1991. Of these physicians, 87 were never located, 465 apparently were located but did not respond, and 349 responded but indicated their in-eligibility by checking on the questionnaire's cover that they had not moved to a town of under 50 000 population during the targeted years. The remaining 699 subjects returned completed questionnaires, for a 69.3% response rate among known and estimated eligible respondents.[27] Response rates were comparable for the HPSA and non-HPSA physicians but were lower for younger physicians, internists, and physicians in the South. We adjusted for differential strata response rates by statistically weighting all analyses.

In the 1991 survey respondents identified the first rural practice to which they moved between 1987 and 1990, hereafter called their index practice. They specified its location and their employment dates, described their practices and work, and described their personal back-grounds and family situations. Those still working in their index practices reported how many more years they expected to remain, the question whose accuracy this study assesses (see below).

The 699 eligible respondents to the 1991 survey were resurveyed in the fall and winter of 1996 at their then-current Masterfile addresses to learn where they had worked since 1991 and the dates of any intervening job changes. A total of 548 (78.4%) returned completed questionnaires. In the summer and fall of 1997, we used phone and fax contacts to solicit complete (n = 123) or partial (n = 22) work histories from the 151 nonres-pondents to the previous year's mailed follow-up questionnaire, sometimes relying on their practice partners and staff for information (n = 44). Using combined information acquired by mail, phone, and/or fax in 1996 and 1997, we determined how long 681 of the 699 original respondents to the 1991 survey (97.4%) had remained in their index rural practices (67.5% combined rate of response to both surveys).

For these analyses of the accuracy of rural physi-cians' retention plans, we eliminated 122 of the 699 original respondents because of the location and circumstances of their work. We excluded (1) 63 subjects serving obligations in the military, Indian Health Service, NHSC, and US Public Health Service; (2) 37 who reported on index practices that we determined were in metropolitan (urban) counties (1986 Office of Management and Budget criteria); and (3) 25 working in

emergency care, urgent care, and full-time teaching positions (categories not mutually exclusive). We dropped an additional 172 subjects who had already left their index practices at the time of the 1991 survey and who thus could not contribute to a prospective assess-ment of the accuracy of retention predictions. The remaining 405 nonobligated, generalist respondents still working in their index rural practices in 1991 were used for these analyses.

Retention Prediction Measure. We crafted the following questionnaire item and instructions for the 1991 survey to solicit physicians' expected retention duration:

> *Please answer with your best estimate to the year, if possible—a short range of years if necessary.*
>
> **How many *more* years do you think you will remain in your current *principal practice*?**
> _____ **years**

A total of 95.1% (weighted) of the 405 eligible respondents provided a meaningful response to the question of their expected retention duration in their present practices, 1.0% left the item blank, and 3.9% indicated that they did not know how long they would remain (eg, by writing "uncertain" or "?" on the response line). Of those who responded with a mean-ingful answer, 72.4% provided a single-year estimate of how much longer they would remain, and 27.6% indicated a numerical range of years (eg, "2 or 3 years"). In the analyses of this paper, we used the midpoint value for those who specified a range after demon-strating that findings varied little for analyses using high-end, mean, and low-end estimates.

Some physicians provided meaningful estimates of their anticipated retention in nonnumerical terms, writing in phrases such as "for my entire career" or "for a couple of years." In these instances the research team interpolated a numerical value for the number of years. For example, we assigned the value "30" for young physicians who responded an "entire career," "forever" and "indefinite"; and "10" for a response of "about 10 years."

Other Variables. From the Area Resource File,[28] we appended 1990 data characterizing the counties where physicians worked. Data on town populations were imported directly from the 1990 US Census.

Analyses. We used descriptive statistics to charac-terize the eligible physician sample and their practice situations. Physicians' retention predictions and actual retention were described and graphically contrasted year-by-year and as survival functions—line graphs

Table 1. Description of Physician Cohort as of 1991 and Their Index Medical Practices (N = 402)*

Characteristic	Percentage or Mean
Physician characteristics	
Mean age in 1991 (y)	37.5
% Men	77.2
% Non-Hispanic white	85.1
% Married	82.3
% Subjects with children less than 18 y old	74.6
% With rural upbringing	53.2
% Raised and/or trained in state of index practice	61.2
% International medical school graduates	14.1
Specialty	
% Family practice	49.5
% Internal medicine	29.0
% Pediatrics	14.4
% General practice	7.1
% Board certified	78.3
% With previous practice experience	48.1
Number of years respondents worked in index practice when responding in 1991	
% Less than 2 y	23.1
% From 2 up to 4 y	55.1
% From 4 to 6 y	21.8
Community characteristics	
Mean town population	10 322
Mean county per capita income ($)	13 911
% Located within a designated HPSA	25.3
Mean county physicians per 100 000 population	107.5
Practice and job characteristics	
% Of respondents who own their practices	50.5
% In solo practice	26.0
% On-call 3 or more times per wk	48.6
Mean noncall work h	49.2
Mean outpatient encounters per d	26.0
Mean starting salary ($)	67 445

* All figures weighted for strata sampling probabilities and response rates. HPSA indicates health professional shortage area.

depicting the falling proportion of physicians remaining in their practices over time. Predictive accuracy was examined further through odds ratios and adjusted kappa statistics—a measure of interrater agreement where a value of 1.0 indicates perfect agreement and 0.0 reflects agreement no greater than expected by chance alone—for accurately predicting retention at 5 years or less versus longer than 5 years. We tested our

hypotheses of the correlates of accuracy of retention predictions with physicians who predicted retention beyond 5 years and stayed versus left by 5 years, using χ^2 analyses and simple odds ratios of association. We then used logistic regression analysis, which incorporated all variables that were individually associated with 5-year prediction accuracy below the $P = .20$ level, to account simultaneously for other potentially correlated factors.

All figures and analyses were weighted for sampling probabilities and subgroup response rates to the 1991 survey, so that findings reflect the eligible universe of nonobligated, office-based rural primary care physicians. Analyses were generated with SPSS for Windows (release 11.0.1, SPSS Inc., Chicago, IL). We set a P-value of .05 as the threshold of clear statistically significant differences in group comparisons and designated a value above .05 but less than or equal to .10 as a level of borderline statistical significance ("tending" to be associated), also relevant in a policy-related study of this sort. This study was submitted and exempted from full review by the University of North Carolina School of Medicine's Committee on the Protection of the Rights of Human Subjects.

Results

Physicians were predominantly men and non-Hispanic white (Table 1). When asked in 1991 to predict their future retention, physicians' mean age was 37 years (median, 36; range, 27 to 76 years), and they had been working in their index practices for an average of 2.8 years (range, 0.0 to 5.7 years). Most were married then and had school-age children. Half were family physicians and half had practiced elsewhere before coming to work at their index practices.

Retention Predictions in 1991 and Actual Retention from 1991 Through 1996. In 1991 physicians' median estimate of their future retention in their index practices was 15.0 years (mode, 20 years). Only 9.3% of physicians anticipated leaving their practices within 12 months, a total of 32.7% by 5 years, 42.9% by 10 years, and 62.7% by 20 years (Figure 1). If physicians' estimates were accurate, then more than one third (37.3%) of the physicians would still be working in their index practices 20 years after the 1991 survey.

A total of 15.6% of the physicians actually left within 12 months of the 1991 survey, and 36.1% left by 5 years. Over the first 5 years following the 1991 survey, the proportion of the group who had left was close to but consistently just over what the group had collectively predicted (Figure 1). Differences between predicted and actual departures were greatest in the first 12
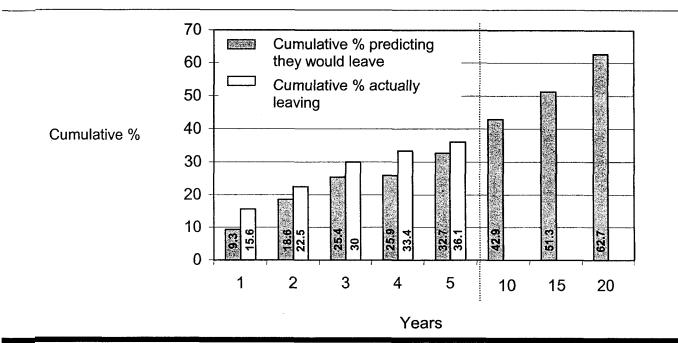
Figure 1.   Cumulative Percentages of the Rural Physician Group Who Predicted and Actually Left Their Index Practices at Various Years (n = 384).

months when the proportion leaving was 6.3 percentage points more than predicted; thereafter, the year-to-year attrition rates were 0.7 to 4.1 percentage points more or less than predicted for each year.

Association Between Retention Predictions and Actual Retention. Although the proportion of physicians who left their rural practices over the first 5 years was close to what they as a group had predicted, many of the individuals who left were not those who predicted doing so. Of the 111 physicians (weighted) who predicted that they would leave within 5 years, 36 (32.4%) were still in their practices at 5 years. Of the 237 who predicted that they would remain in their rural practices for more than 5 years, 50 (21.1%) left before 5 years. These 50 physicians who predicted remaining longer than 5 years constituted 40.0% of the 125 physicians who left within 5 years. Indeed, 38 of the 125 physicians (30.4%) who left within 5 years had predicted that they would stay 15 years or longer.

Although some physicians inaccurately predicted their retention at the 5-year mark, those who initially thought they would stay beyond 5 years were nevertheless much more likely to stay the 5 years than those who predicted they would be gone (odds ratio [OR] = 7.8, 95% confidence interval [CI$_{95}$] = 4.7 to 12.9; χ^2 $P<.001$; weighted adjusted kappa, 0.45, $P<.001$).

Calculated as a hazard function, physicians who predicted they would remain at least 5 years were half as likely to leave at each point in time over the first 5 years as those who predicted they would be gone by 5 years (hazard ratio, 0.50; $P<.001$; Figure 2).

Physicians who predicted that they would leave within 2 years were half again as likely to have left by 5 years as those who predicted they would leave between 2 to 5 years (hazard ratio, 1.55; P = .07); however, the difference was not quite statistically significant.

Among those who predicted they would stay in their practices beyond 5 years, the likelihood of leaving at each point during the first 5 years was similar regardless of how far past 5 years they initially foresaw remaining. Thus, the retention curves during the first 5 years were very similar for groups who initially foresaw staying 5 to 10, 10 to 20, and more than 20 years (Figure 2).

Who Left Earlier Than They Predicted? As noted above, 50 (21.1%) of the 237 physicians who in 1991 anticipated remaining 5 years or longer in fact left their index rural practices in less than 5 years. Table 2 presents odds ratio measures of association between characteristics of individuals and their practice situations and leaving in less than 5 years when retention was predicted beyond 5 years. The variables shown are indicators of the factors hypothesized to be important to an individual's ability to predict his or her work
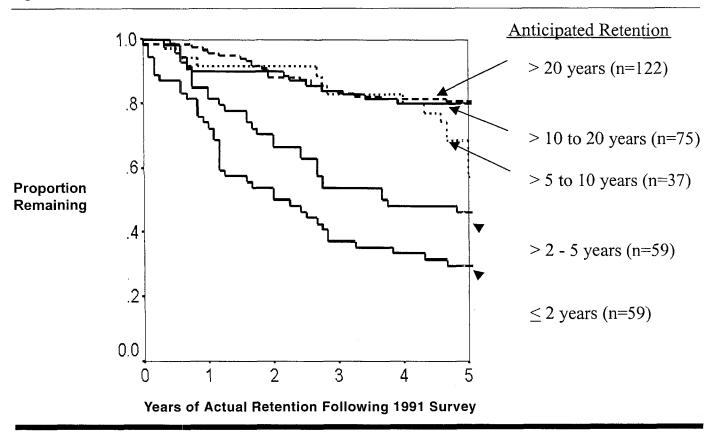
Figure 2. Actual Retention After 1991 Survey, by Duration of Anticipated Retention.

Years of Actual Retention Following 1991 Survey

Anticipated Retention
> 20 years (n=122)
> 10 to 20 years (n=75)
> 5 to 10 years (n=37)
> 2 - 5 years (n=59)
≤ 2 years (n=59)

Proportion Remaining

situation accurately: (1) level of relevant experience, (2) whether or not work and family situations suggested that he or she was relatively free and independent in choosing work situations, and (3) his or her risks for job burnout. A few environmental variables were also included.

Only a few of the hypothesized correlates indeed predicted departure earlier than anticipated. In the model that adjusted for other factors, the statistically significant correlates of leaving within 5 years after predicting retention beyond 5 years were (1) working in a practice owned by others (being subject to others' decisions) and (2) being on-call 3 or more times per week (burnout risk). Retention predictions were no more accurate for those who had more relevant experience by any of the measures tested: rural upbringing, previous residence in their index practice state, previous experience in rural practice, and longer tenure in their index practice at the time they predicted their future retention. To the contrary, those who were 38 years of age or older, who presumably had the opportunity to learn more about themselves and the world, predicted relatively poorly and tended to be

more likely than younger physicians to leave sooner than they predicted ($P = .06$).

Accuracy in predicting that one would remain 5 years did not differ across the primary care specialties or with most of the town and county characteristics we examined. The exception was that physicians working in counties with lower average per capita incomes tended to be more likely to leave earlier than they had previously anticipated ($P = .10$).

We could not model the correlates of remaining longer than 5 years when retention was estimated at less than 5 years, because there were too few such cases (n = 36).

Discussion

As has been found in previous studies for other types of workers, this study finds that US rural generalist physicians were able to predict with moderate accuracy the timing of their future job changes. Their retention estimates were predictive over at least 5 years, the limit at which this 5-year prospective study could assess.

Interestingly, retention/turnover predictions for

Table 2. Correlates of Leaving Within 5 Years for Those Who Estimated 5 to 30 Years More Retention (N = 237)

	Relative Odds of Leaving Within 5 Years			
	Unadjusted Odds Ratio	P	Adjusted Odds Ratio	P
Measures of experience and situation familiarity				
Age when arriving in index practice				
Younger than 30 y (versus 30 to 37 y)	0.54	.14	0.74	.56
Older than 37 y (versus 30 to 37 y)	2.62	.007	2.38	.06
Rural upbringing	1.16	.64	...	...
Raised and/or trained in state of index practice	0.79	.51	...	...
Has previous practice experience	1.06	.86	...	...
Years in index practice at time of 1991 survey			...	...
Less than 2 y (compared with 2 up to 4 y)	1.33	.43	...	...
From 4 to 6 y (compared with 2 up to 4 y)	1.18	.66	...	...
Measures of relative freedom from demands of others				
Male gender	0.36	.004	0.97	.67
Not married	2.50	.03	2.20	.13
No children less than 18 y old	1.02	.95	...	...
Respondent is an owner of the practice	0.42	.008	0.30	.003
Solo practice	1.41	.32	...	...
Measures of risk for burnout				
On-call 3 or more times per wk	2.94	.003	3.47	.004
Working over 55 noncall h/wk	0.71	.34	...	...
Averaging over 30 outpatient encounters per d	1.46	.31	...	...
Starting income below $60 000 per year	2.18	.02	2.17	.07
Miscellaneous, nonhypothesized factors				
Specialty				
Internal medicine specialty (versus family and general practice)	0.77	.45	...	...
Pediatrics specialty (versus family and general)	2.78	.01	1.33	.59
Community characteristics				
Location within designated HPSA	1.07	.86	...	...
County physicians per 100 000 population less than 70	1.37	.35	...	...
Town population under 3000	1.06	.87	...	...
County per capita income less than $13 000	2.10	.02	1.90	.10
Model χ^2				39.4
Model significance				<.001

Adjusted model includes all variables correlated at the $P < .20$ level in unadjusted models.
All figures weighted for strata sampling probabilities and response rates.
HPSA indicates health professional shortage area.

physicians as a group were particularly accurate, deviating only a few percentage points each year from the group's actual retention behavior. Retention/departure predictions of individuals were also predictive; 4 out of 5 physicians who predicted their retention at beyond 5 years remained 5 years, and 2 out of 3 who predicted their retention at less than 5 years in fact left by then. Predictions of job changes in the short term, that is less than 2 years, tended to be more accurate than

predictions at 2 to 5 years ($P = .07$). These findings suggest that future retention estimates are valid proxy measures for actual future retention behavior in studies involving US rural physicians.

For physicians who originally thought that they would stay beyond 5 years, it is interesting that the likelihood and timing of leaving during the first 5 years occurred at a set rate regardless of how much beyond 5 years they had planned to stay (ie, whether for 6 or

30 years). We wonder if early departure for these physicians occurred for pressing, perhaps abrupt and thus particularly unforeseeable reasons, such as local hospital closures, catastrophic practice events, and pressing family needs. Their departure rate—approximately 4% per year—may reflect a steady, background level of attrition to which all rural physicians are subject. If so, then although individuals cannot anticipate these occurrences, at the group level this 4% baseline attrition is a predictable source of error in physicians' retention predictions.

We found retention predictions to be less accurate for physicians working in practices owned by others, those on-call 3 or more times each week, and possibly those with particularly low incomes. This suggests that, as hypothesized, job change predictions are less accurate for physicians whose employment is subject to the decisions of others and those at risk for burnout. On the other hand, physicians' retention predictions were not more accurate with greater experience as reflected by any of the 5 tested indicators of experience. Indeed, younger (less experienced) physicians tended to be *more accurate* in their predictions than physicians over age 37.

This study also leaves many questions unanswered. We wanted to test another hypothesis—that physicians in less stable environments overestimate their retention[22,23]—but we lacked an adequate measure and data on environmental stability. In this study we assessed the accuracy of only 1 specific questionnaire item querying expected job retention; other formats and wordings may prove more or less accurate. Future studies will also need to assess the relative accuracy of retention predictions for rural physicians in nonprimary care specialties, nonphysicians and practitioners working in the Indian Health Service, and other special settings. Future studies should address retention predictions beyond 5 years, which we suspect are less accurate,[18,29,30] predictions for a more recent cohort of physicians, and predictions of retention within a particular community and in rural practice in general.

Conclusions

This study finds that the stated job retention/departure plans of US rural physicians are moderately predictive of their near- and medium-term future actions and validates studies that rely upon these predictions. Retention predictions show even greater accuracy at the population level and may be particularly useful for broad planning purposes. Certain subgroups of rural physicians are more likely to overestimate their retention likelihood, including those who are employed by others and perhaps those with lower incomes and working in poorer communities. These particular correlates suggest, unfortunately, that retention predictions may be least accurate for physicians employed by practices that emphasize care for poor patients, such as community and migrant health centers.

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