Rural Community Hospitals and Factors Correlated with Their Risk of Closing

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Synopsis

The issue of rural hospital closings in the United States in recent years has become of increasing concern to health care policy analysts. Rural communities face unique health needs, necessitating access to local health care. Much has been written about the social, economic, legislative, and technological changes that have increased the stress on rural hospitals in the 1980s. However, quantifiable models have been lacking with which to examine in detail factors associated with rural hospitals and to correlate such factors with individual hospitals' risks of closing.

In this study, we identify variables correlated with rural community hospital closures in the period 1980–87. Using epidemiologic case-control methods, 161 closed rural hospitals were matched 1 to 3 with a control group of 483 rural hospitals which remained open during the same period. A series of hospital performance indicators and demographic, economic, and social community variables were entered into a multiple logistic regression model.

Four variables were found to be positively correlated with risk of closure. They are for-profit ownership; nongovernment, not-for-profit ownership; presence of a skilled nursing or other long-term care unit; and the number of other hospitals in the county. Variables negatively correlated with risk of closure were accreditation by the Joint Commission on the Accreditation of Healthcare Organizations, the number of facilities and services, and membership in a multihospital system. Policy and research implications at the Federal, State, and local levels are discussed.

RURAL COMMUNITY HOSPITALS, a vital component of the nation's health care system, are community hospitals not located in a Metropolitan Statistical Area (MSA), as defined by the U.S. Bureau of the Census.

In 1986, more than 46 percent of all community hospitals were located in rural, or non-MSA, counties (*1a*). In 1985, rural hospitals accounted for 20 percent of the inpatient admissions, 20 percent of the average daily census for all hospitals, 17 percent of all surgical operations, and 19 percent of all births (*2a*).

Closings of rural hospitals have become a matter of increasing concern to policy analysts and planners. Many factors in rural life make access to high quality health care essential in rural areas. Among the factors are hazardous occupations such as mining, lumbering, and farming (*3*); chronic disease caused by pesticides or other chemicals (*4*); rising unemployment, with its attendant stressors and pathogenic effects (*5*); and a disproportionate share of elderly and poor populations (*1b*).

The contributions of hospitals to rural community life extend beyond health issues. The rural hospital serves as an economic and psychological anchor for a community. Often the area's largest employer (*4*), the rural hospital attracts new business, as well as vital human resources, such as persons with expert training, special skills, and management and leadership ability. As many as 600 of the remaining 2,700 rural hospitals have been identified as likely to close by 1990 (*6*). Studies have identified many variables, both positively and negatively correlated with risk of closure. However, there has remained a need for a quantifiable model to analyze such factors.

Our objective was to identify variables correlated with risk of closure for rural community hospitals during the period 1980–87, using an epidemiologic matched case-control study. Both hospital performance measures and selected environmental characteristics of hospitals' communities were included as test variables. Public health policy implications of the findings are discussed.

Stress on Rural Community Hospitals

Some of the problems faced by rural community hospitals reflect an overall rural economic downturn during the 1980s. The depressed economic conditions are the result of the farm crisis, high rural unemployment, decreased demand for lumber, an eroding manufacturing and mining base, and decreased Federal funding (*7*). Rural economies have lagged urban economies in converting to a service-based economy (*1c*). The problems have led to an emigration of young people from rural areas and a resulting decline in the population base. Rural hospitals, already smaller than their urban counterparts, and serving widely dispersed populations, have been left to serve somewhat older, poorer patients needing specialized services.

Rural populations contain a significantly higher percentage of economically disadvantaged persons than their urban counterparts. Despite this, however, Federal expenditures for human resource programs are much higher in urban areas. Rural residents are less likely to be the beneficiaries of income-supplement programs, such as Aid to Families with Dependent Children (AFDC). The rate of participation in AFDC among the urban population is 4.9 percent. Among the rural population, which tends to consist of more two-parent families than the urban poor population, the participation rate is 3.7 percent (*8*).

The net effect of the social and economic conditions has been that many rural hospitals experience declining occupancy rates, a reduced patient-day base, decreased patient revenues, increased uncompensated care, and rising costs. In addition, under Medicare's Prospective Payment System, rural hospitals are paid less for patients in some Diagnosis Related Groups (DRGs) than their urban counterparts (*9*). This policy places a burden on rural hospitals with a high proportion of elderly patients, since these hospitals on average depend more on Medicare revenues than urban hospitals (*2b*). Rural hospitals tend to have fewer overall patients than urban institutions, allowing for few economies of scale and exacerbating the fiscal pressures placed on them by their high ratio of Medicare patients (*10*). Of 2,638 rural hospitals in 1986, 71 percent had fewer than 100 beds (*2c*). In comparison, 45.4 percent of all community hospitals in the nation had fewer than 100 beds (*11*).

One study, that of Mayer and coworkers (*12*), has attempted to identify analytically risk factors associated with rural hospital closure. In their study of rural hospital closures in the period 1970–80, they found that the most significant variables positively correlated with closure were for-profit ownership of the hospital and the number of competitive beds per 1,000 residents within the county. Negatively correlated with closure were occupancy rate, the number of facilities and services provided in the hospital, and change in county population during the preceding decade.

Although the findings are important, Mayer and coworkers may not reflect recent conditions and possible changes in risk factors for hospital closure. Factors such as the farm crisis of the 1980s, an increase in the number and proportion of elderly persons in rural areas, and changes in Medicare payment may have significantly changed the variables correlated with closure, requiring examination of the issue of rural hospital closure through analysis of more recent data.

Methods

Data. Data on rural community hospital closure and the characteristics of hospitals were obtained from the membership files of the American Hospital Association (AHA) and from the AHA's Annual Survey of Hospitals for the period 1980–87. Data on hospitals that closed were verified with State and local hospital associations. Data on county characteristics were obtained from a Bureau of the Census taxonomy of demographic, economic, political, and social characteristics of counties and cities (*13*).

Because of the exploratory nature of the study, a large number of variables were initially selected for investigation. Variables describing hospital characteristics included ownership status, membership status in a multihospital system, accreditation status by the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), number of admissions, occupancy rate, number and type of facilities and services, and expenses per bed. Data were collected on environmental variables describing the county's geographic, demographic, and economic characteristics, and on the medical professions and institutions located there. The box lists

Variables Used in the Study

Hospital performance indicators
Bed-size
Number of admissions
Occupancy (percent)
Number of facilities and services
Number of births
Ownership: Government control; investor-owned; or nongovernment, not-for-profit
Member of a multihospital system
Total expenses in terms of number of beds
Total number of personnel in terms of number of beds
Total expenses in terms of number of personnel
Number of long-term care beds
JCAHO accreditation
Approval codes by outside bodies (such as American College of Surgeons)
Organized outpatient department
Home care program
Skilled nursing or other long-term care facility

County characteristics
Total births in county
County birth rate
Total deaths in county
County death rate
County land area
Adjacent to a large urban area (MSA)
County population
Population density
Percent urban
Migrants from different counties of State (percent)
Migrants from different States or abroad (percent)
Population change, 1970–80 (percent)
Black population (percent)
Spanish origin population (percent)
Percent population 65 years or older
Percent population younger than 5 years
Median age
Number of active non-Federal physicians
Number of active non-Federal physicians in terms of county population
Number of hospital beds in county
Number of hospitals in county
Hospital beds in terms of population
Number of nursing homes in county
Number of nursing home beds in county
Nursing home beds in terms of county population
Mean family income
Median family income
Total number of unemployed in 1982
Rate of unemployment in 1982
Employment in manufacturing (percent)
Employment in wholesale and retail trade (percent)
Employment in professional and related services (percent)
Total number enrolled in Medicare Part A (Hospital)
Rate of enrollment in Medicare Part A
Total number enrolled in Medicare Part B (Medical)
Rate of enrollment in Medicare Part B
Number and percent of families with incomes below poverty level
Number and percent of persons with income below poverty level
Local government expenditure for public welfare (percent of total budget)
Local government expenditure for health and hospitals (percent of total budget)
Total farm population
Total number of farms
Number and percent of farms with less than 50 acres
Number and percent of farms with 500 acres or more
Percent of county in farms
Number and percent of county in family or individual farms
Policy classification code of the U.S. Department of Agriculture

those hospital performance indicators and environmental variables used in the study.

Hospital closure was defined as the "permanent closing of a hospital facility or the discontinuance of the provision of inpatient medical care, whether acute or chronic. Hospital mergers and consolidations are not included" (*14*). Community hospitals are defined as "all non-Federal, short-term general and other special hospitals, excluding hospital units of institutions, whose facilities and services are available to the public" (*11*).

The data set used has several limitations. First, although the AHA collects detailed data on hospital revenues and expenses, the number of hospitals reporting those data was so small that the information could not be used. Second, no information could be obtained on the competence and management style of hospital executives and staff. Third, the data do not contain detailed information on the quality of care given by hospitals. Fourth, because we matched hospitals that closed with those that remained open in the same State, we cannot evaluate the impact of differences among State hospital regulatory systems on the risk of closure.

Study design. An epidemiologic matched case-control study was used to investigate risk factors for rural hospital closure (*15*). Although this type of study design has been widely used to investigate disease etiology, its application to health services

Table 1. Univariate statistics and significance tests for differences between closed and control rural hospitals, categorical variables

Categorical variable	Closed (percent)	Control (percent)z	P[1]
Organized outpatient department	29	33	NS
Home care program	8	16	.04
Skilled nursing or other long-term care unit	26	17	.02
For-profit ownership status	23	7	.000
Nongovernment, not-for-profit ownership	40	40	NS
Member of multihospital system	14	26	.008
JCAHO accreditation	22	48	.000
Adjacent to large urban area (MSA)	62	57	NS
Hospital contracts with Blue Cross and Blue Shield	97	96	NS
Medicare certification by HCFA	93	99	.001
Nongovernment, not-for-profit, with multihospital system	5	47	.001
For-profit ownership, with multihospital system	6	12	.01

[1] P-value for the chi-square. NS = not significant.

research and its use in the development of health policy has only recently been recognized (*16*).

The study design is a particularly useful choice for conducting exploratory studies because it enables the researcher to investigate a large number of possible causative factors, it is well suited for studying rare events, it can use existing records, and it is relatively quick to mount and conduct (*17*). Cases for this study were rural community hospitals that closed during the period 1980–87. Controls were rural community hospitals that remained open during the period.

A total of 161 rural community hospitals were identified as having closed during the study period. Because previous studies (*18–20*) have shown that small bed-size is a risk factor for closure, and to ensure the comparability of counties on the key characteristic of population size, each closed hospital was matched with three hospitals of similar bed-size located in rural counties in the same State, having a population size similar to the county where the closure occurred.

A three-stage procedure was used to identify the set of variables significantly associated with the dependent variable, hospital closure. Specifically, closures in the period 1980–86, and their controls, were used to construct the statistical model, and the model was independently tested using 1987 closure data. In the first stage, the unique relationship of each variable to hospital closure was examined. For continuous variables, means were compared between cases and controls by use of Student's *t*-test. For categorical variables, χ-square tests were used to examine significant proportional differences between cases and controls. All variables found to be associated (at the 5 percent level) with hospital closure were examined two at a time and together with two-way interaction terms for any relationship with hospital closure.

In the second stage, all variables found significantly related to closure were further screened in a stepwise multiple logistic regression procedure (*21*). The statistical model was developed with closure as the dependent variable and the matching variables as covariates.

In the third stage, all variables found to be significant at the second stage were tested in a conditional logistic regression procedure (*22*), which maintained the 1 to 3 case-control matching scheme.

Results

Univariate analysis. The initial analysis consisted of comparing proportional and mean differences between cases and controls on hospital performance variables for the period 1980–86. The results are presented in tables 1 and 2. Eight categorical and 10 continuous variables were found to be significantly related to hospital closure in the univariate analysis. Closed rural hospitals had proportionately more skilled nursing or long-term care units ($P<.02$) and more had for-profit ownership status ($P<.0001$) than did controls.

Comparing closed hospitals with controls revealed that closed rural hospitals were located in counties with higher numbers of other hospitals ($P<.005$) and competitive hospital beds ($P<.009$). The counties also had a higher ratio of hospital beds to population ($P<.01$).

Multivariate analysis. The second stage of analysis was multivariate screening for independent variables which had been found to be significant by univariate analysis. The regression model used the matching variables as covariates. The final regression model, conditioned on the matched case-control design, included only independent variables found significant in the second-stage multivariate screening. The final conditional logistic model contained seven variables. Four variables were identified as being associated with increased risk of rural hospital closure. They were for-profit ownership; nongovernment, not-for-profit ownership; presence of a skilled or long-term care unit; and

Table 2. Univariate statistics and significance tests for differences between closed and control rural hospitals, continuous variables

Continuous variables	Closed		Control		
	Mean	SD	Mean	SD	P [1]
Number of long-term beds	11.6	26.2	7.4	19.5	NS
Total number of births in county	566.1	852.0	436.9	486.5	NS
County birth rate	16.7	3.4	16.5	3.3	NS
Deaths in county	354.0	606.6	262.8	315.7	NS
County death rate	17.4	74.3	12.4	29.0	NS
Population per square mile	49.4	76.6	37.7	53.5	NS
Percent population change, 1970–80	16.6	21.4	16.6	15.9	NS
Percent black	8.1	16.2	6.3	12.8	NS
Percent Hispanic	6.1	12.3	6.3	12.9	NS
Percent 65 years and older	14.6	4.1	14.8	5.9	NS
Number of active, non-Federal physicians	35.1	121.4	21.2	46.1	NS
Number of active, non-Federal physicians as percent of county population	73.2	56.0	63.7	45.5	NS
Number of other hospitals in county	2.5	2.5	1.8	1.2	.005
Number of competitive hospital beds in county	277.1	501.9	151.2	271.9	.009
Hospital beds as percent of population	833.9	1,039.9	576.9	625.5	.01
Number of nursing homes in county	4.0	8.6	3.0	3.3	NS
Number of nursing home beds	344.5	845.3	251.6	317.1	NS
Nursing home beds as percent of county population	12.3	26.9	10.9	7.6	NS
Percent of families with income below poverty level	13.2	6.5	13.4	6.5	NS
Percent of persons with income below poverty level	4.9	6.1	5.7	23.5	NS
Percent of local government expenditures for public welfare	2.6	4.3	2.5	4.3	NS
Percent of local government expenditures for health and hospitals	7.6	8.4	8.7	9.1	NS
Expenses as percent of total personnel	23.3	8.2	30.5	9.5	.001
Total number of beds	42.8	31.6	51.2	32.2	.01
Expenses as a percent of beds	43.3	33.0	64.6	31.2	.0001
Number of admissions	948.3	821.7	1,563.1	1,259.7	.0001
Occupancy rate (percent)	44.5	21.8	46.6	19.0	NS
Number of facilities and services	8.2	4.7	11.8	5.7	.0001
Number of births	60.2	100.4	139.9	179.4	.0001
Number of personnel as a percentage of number of beds	1.8	0.9	2.3	2.2	.005

[1] *P*-value for the *t*-test. NS = not significant.

number of other hospitals in the county.

Three variables were identified as being protective, as associated with decreased risk of closure. They were accreditation by the JCAHO; membership in a multihospital system (for nongovernment, not-for-profit hospitals); and number of facilities and services. Multihospital system membership was identified in the univariate analysis as a protective variable for investor-owned, for-profit hospitals. However, this variable was not retained in the multivariate analysis owing to the small number of investor-owned hospitals in the overall sample.

Table 3 shows relative risk and 95 percent confidence intervals for each variable. The relative risks contained in the table are ranked from highest to lowest (variable number 1 being highest), based on their strength of association with closure. The specific value of the relative risk indicates the strength of the association with closure. For example, the for-profit ownership variable has a relative risk of 7.51. This means that a for-profit hospital has a 7.5 times greater risk of closure (than does a State or local government hospital). A nongovernment, not-for-profit hospital has 3.13 times greater risk (than a State or local government hospital). Relative risks lower than 1.00 (or unity) indicate a protective effect, that is, association with a decreased risk of closure.

The greater the difference from unity, the stronger is the observed effect. For example, a rural hospital accredited by JCAHO has a relative risk of 0.21. The reciprocal of that value ($1 \div 0.21$) is 4.76, meaning that a rural hospital with JCAHO accreditation has nearly a fivefold likelihood of avoiding closure.

Predictive Power of the Model

To test the predictive ability of the model, two procedures were used. First, the cases and controls for the rates of closure for the period 1980–86 were compared to risk scores derived from the model

Table 3. Predictors of rural community hospital closure, 1980–86 [1]

Variable	Beta coefficient	Standard error of beta	Significance (P value)	Relative risk	95 percent confidence interval for relative risk: Lower level	95 percent confidence interval for relative risk: Upper level
For-profit ownership status	2.0166	0.5162	.0001	[2] 7.51	2.73	20.66
JCAHO accreditation	−1.5401	0.4726	.0011	0.21	0.08	0.54
Nongovernment, not-for-profit ownership status with membership in a multihospital system	−1.2694	0.6457	.0493	0.28	0.08	1.00
Nongovernment, not-for-profit ownership status	1.1414	0.3905	.0035	[2] 3.13	1.46	6.73
Presence of a skilled nursing or other long-term care unit	1.0569	0.4076	.0095	2.88	1.29	6.40
Number of other hospitals in the county	0.4363	0.1413	.0020	1.55	1.17	1.04
Number of facilities and services	0.1919	0.0432	.0001	0.83	0.76	0.90

[1] Model chi-square = 102.25, $P < .001$, DF = 7; $R^2 = 0.408$.
[2] Relative to State and local government hospital ownership status.

Table 4. Number of hospital closures and hospital closure rates, by risk scores, 1980–86 and 1987

Decile	Conditional logistic risk scores	Number of hospital closures [1]: 1980–86	Number of hospital closures [1]: 1987	Closure rate per 100 hospitals: 1980–86	Closure rate per 100 hospitals: 1987
1	−7.37 to −3.42	1	4	2.29	23.52
2	−3.41 to −2.60	1	0	2.29	. . .
3	−2.59 to −2.07	4	4	9.30	26.67
4	−2.06 to −1.59	5	2	11.63	12.50
5	−1.58 to −1.20	11	3	25.00	20.00
6	−1.19 to −0.59	9	7	20.93	28.00
7	−0.58 to −0.14	13	0	30.23	. . .
8	−0.13 to 0.38	15	4	36.59	44.44
9	0.39 to 1.10	22	7	50.00	46.67
10	1.11 to 8.78	33	6	76.74	60.00

[1] Column totals do not equal total number of cases because of missing data.

equation. Second, the same model equation was used to test independently its predictive ability using 1987 case and control data.

For the first procedure, the regression coefficients estimated by the conditional logistic regression model were used to calculate a risk score, *CLRS*, for each of the 484 rural hospitals considered in the study for the period 1980–86. The *CLRS* was based on particular values of each hospital's characteristics (such as for-profit ownership; nongovernment, not-for-profit ownership; and JCAHO accreditation status) by means of the conditional logistic regression equation where $B1$ through $B7$ are the beta weights of the equation and $X1$ through $X7$ are the values of each hospital.

$$CLRS = BiXi + B2 \times 2 \ldots B7 \times 7$$

The correlation between the risk scores (*CLRS*) of the rural hospitals and their rates of closure were examined by grouping the hospitals into deciles on the basis of their scores, and computing the closure rates for each decile (1 = lowest and 10 = highest risk). As shown in table 4, the scores generally increase with increases in rates of closure. The correlation is especially evident in the higher ranking deciles (deciles with the highest scores), and is most prominent in the tenth decile, in which a closure rate of 77 per 100 is found among hospitals with scores ranging from 1.11 to 8.78.

Table 4 shows closure status by high (deciles 6–10) and low (deciles 1–5) risk scores. The results reveal a significant chi-square association of 60.17 ($P < .0001$). Calculation of the odds ratio showed that hospitals which actually closed were 6.7 times more likely to have high risk scores (that is, in deciles 6–10). The correlation of hospital closure with risk scores is further illustrated by 2-by-2 table

5. To summarize, the risk scores obtained for any rural hospital can be interpreted as a prognostic index of its relative likelihood of closure.

For the second procedure, the regression coefficients estimated by the conditional logistic regression model for the period 1980–86 were used to generate risk scores (*CLRS*) for each of the 40 rural hospitals that closed during 1987, along with three controls per case which did not close. Again, the risk scores were based on the particular values of the hospitals' characteristics.

Rates of closure were examined by grouping the hospitals into deciles on the basis of their risk scores and computing the closure rates per 100 hospitals (table 4). The 1987 rates were compared to the rates for the period 1980–86, resulting in a significant association (chi-square = 5.32, $P < .02$), and an odds ratio of 2.44 (table 5). This means that hospitals which actually closed were approximately 2.5 times more likely to have high risk scores than those which did not close. The comparative analysis gives an idea of how well the logistic model is able to predict future hospital closure.

Predicted 1987 hospital closure rates vary somewhat in comparing decile ranks, particularly for hospitals with low risk status (decile 1–5) (table 4). This would suggest that the model may be poor in predicting risk status for lower risk hospitals. However, the pattern of 1987 hospital classification by 1980–86 model data reveals that our predictive model actually has a high negative predictive value (such as, the probability that a hospital will not be closed when the model predicts it should not be). That is, 83.5 percent (66 out of 79) of the time our model data correctly ruled out hospitals which were not at risk for closure, although this varies downward from the 1980–86 negative predictive value of 196 out of 218, or 89.9 percent.

Table 5. Closure status by risk scores, 1980–86 and 1987

	1980–86 [1]			1987 [2]		
	High	Low	Total	High	Low	Total
Closed hospitals	92	22	114	24	13	37
Controls	122	196	318	50	66	116
Total	214	218	[3] 432	74	79	[3] 153

[1] Chi-square = 60.17, $P < .0001$.
[2] Chi-square = 5.32, $P < .02$.
[3] Totals do not equal total number of cases because of missing data.

Discussion

Implications of the findings. The variables found to be associated with rural hospital closure indicate that a combination of factors, including hospital organizational structure, competition, and quality of care, is essential to a hospital's chances for continued viability in the contemporary health care marketplace.

Although direct measurements of financial and management performance were unavailable, these findings seem to indicate that a rural community hospital must possess the economic and managerial resources necessary to adapt to a changing local economy and a highly volatile, rapidly evolving health care market. It is important as well for a hospital to be able to provide a sufficiently wide array of services, appropriate to the community's needs (*23*).

In terms of hospital ownership, for-profit hospitals may have very high risk of closure because of their sensitivity to market pressures. Because the owners of these hospitals are guided by a standard of profitability, when they do not receive a significant return on their investment they may close the hospital and reinvest their funds in other, more profitable activities.

Freestanding, nongovernment, not-for-profit hospitals were found to have a high risk of closure. However, when the hospitals were members of multihospital systems, they were more likely to avoid closure. System membership may provide them with several advantages, namely greater access to capital and buying power, improved management and information systems, improved financial expertise and experience, a greater ability to diversify into new markets, an expanded geographic area for delivery of medical services, and more political clout for securing new service contracts (*24*).

However, it is possible that a beneficial selection process is at work, with multihospital systems selecting as members only those hospitals which seem likely to succeed. Two variables, the number of other hospitals in the county and the number of facilities and services a hospital offers, appear to be general indicators of competition. The number of other hospitals in the county reflects competition from other community institutions, which in turn increases risk of closure.

The more facilities and services a hospital offers reflects its diversification and the institution's ability to successfully compete in a range of services. The greater the number of facilities and services a hospital provides, the greater the likelihood of survival. Two variables identified in this study, the protective effect of accreditation status by the

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JCAHO and the risk factor of the presence of a skilled nursing or other long-term care unit, have not been previously identified in the hospital closure literature.

The protective effect of accreditation by the JCAHO is difficult to interpret. It may indicate that senior medical and administrative staff tend to seek appointments at JCAHO-accredited hospitals, enhancing the hospitals' quality of care and reputation (*24*), and thus its chances for survival. It may reflect overall support and cooperation between a hospital's medical staff and management. Without this support, a hospital would be unlikely to apply for accreditation.

The presence of a skilled nursing or other long-term care unit as a risk factor might seem anomalous in light of the widely recommended hospital survival strategy of diversification into long-term care (*25*). We suggest that the increased risk of closure may actually be an indication of the economic viability of nonacute care beds. Hospitals losing money on acute care beds may opt to close, discontinue their acute-care services, and become a nursing or long-term care facility.

There is, however, an alternative interpretation of this finding. A stressed rural hospital may diversify into long-term care in an attempt to strengthen its financial position and avoid closure. Such a strategy may be insufficient to ensure survival in the face of other pressures the hospital faces. Thus the presence of long-term care facilities as a variable correlated with risk of closure may indicate a failed survival strategy on the part of a hospital already at risk. Further research is needed to develop a more precise understanding of the relationship between long-term care facilities and risk of closure.

Numerous studies have suggested that, since the mid-1980s, a variety of factors has put increasing numbers of hospitals at risk (*14*, *19*, *26*). As noted, the factors include social and economic changes; changes in Federal payment mechanisms under Medicare; and hospital characteristics, such as small size and relatively low occupancy, that make it difficult to absorb higher costs and to acquire capital necessary to make adaptive changes. In the future, policy analysts and policy makers will need to focus on such issues to devise strategies to enable rural hospitals to continue meeting the health care needs of their populations while remaining financially solvent. As strategies such as diversification and conversion become more attractive (*25*, *27*), measures must be undertaken to ensure that existing health care needs continue to be addressed.

Public Health Policy Implications

Identification and quantification of variables correlated with closure permit researchers and policy analysts better to direct future policy at the Federal, State, and local levels. As suggested, variables correlated with rural hospital closure are components of a hospital's ability to adapt to a changing local economy and a highly volatile, rapidly evolving health care market, and to provide a sufficiently wide array of services appropriate to the community's needs.

Federal. Variables found negatively correlated with risk of closure for rural hospitals, such as JCAHO accreditation, number of facilities and services, and multihospital system membership, are indicators of financial and institutional stability, as well as access to the resources necessary to adapt to health care marketplace changes. Current economic realities facing rural hospitals make it increasingly difficult for them to attain the balance between stability and adaptability necessary for survivial.

One of the most important financial issues facing rural hospitals is the pressure brought on by increasing numbers of patients paid by Medicare. A further modification of Medicare payment methods should be investigated to take into consideration rural hospitals' special needs. One possible mechanism would be to enlarge the number of hospitals designated as Sole Community Hospitals (SCH). Although Medicare already pays them at a higher rate than other rural hospitals, their number is small (363 hospitals) (*28*) because of strict eligibility criteria. The criteria could be expanded to include other high-risk rural hospitals.

In 1987, new Medicare regulations allowed adjustment in payment for Sole Community Hospitals experiencing a significant increase in inpatient operating costs attributable to the addition of new inpatient services or facilities. It is possible that these adjustments could be extended to include

diversification into less expensive outpatient services, such as ambulatory care and outpatient surgery. Incentives such as these would encourage Sole Community Hospitals to continue providing acute care in a more cost-effective manner. Such incentives could be expanded to include other hospitals identified as at risk.

Greater flexibility in Medicare payment would aid rural hospitals. A hospital must have enough volume to ensure stable costs and revenues. Significant fluctuations in case mix and volume in rural hospitals can create cash-flow problems, which necessitate borrowing, or slowing payments to vendors, with a resulting increase in costs (*29*). Rural hospitals' relatively low patient volume should be given special consideration when computing outlier thresholds and rates of increase in payment. A hospital with sufficient volume may be able to compensate for its loss in treating DRG outliers, but in small rural hospitals this is often difficult or impossible. Likewise, a uniform rate of increase to update rural and urban prices for the effects of technology and product changes over time does not take into consideration the fact that rural hospitals' declines in admission and patient volume, accompanied by sharp cost increases, put them in a relatively disadvantageous position. The unique characteristics of rural hospitals with respect to low admission rates and patient volume should be recognized when computing these rates.

Another way in which inflexible payment policies put pressure on rural hospitals is in the rate-setting process. The difference between urban and rural payment rates is based on the average difference between urban and rural costs. Many rural hospitals, however, treat patients who are similar to those cared for in urban institutions. Level of payment, which is based on location and not on the type of patient served, puts rural hospitals at a financial disadvantage. Policymakers should consider devising alternative methods of price setting, sensitive to these imperfections in the DRG system.

State. Some health care analysts have suggested that States should develop policies to provide short-term grants to encourage rural hospitals to diversify or convert to ambulatory care facilities and nursing homes (*30*). Initiatives to encourage diversification and expansion would be consistent with our finding that the number of facilities and services offered by a hospital is negatively correlated with risk of closure.

Conversion, however, should be approached with caution. Conversion to ambulatory or nursing care might allow a hospital to survive as a financial entity, but there is a danger that this could deprive a rural community of needed acute care services, especially in light of the high correlation between presence of a long-term care facility and risk of closure of acute care beds. State-level initiatives to encourage diversification or conversion should be combined with requirements to guarantee the survival of a needed amount of acute care beds. If properly implemented, such policies could serve both to enhance the financial viability of rural health facilities and ensure needed care for rural communities.

To guarantee that needed acute care beds are not allowed to close to the point where rural populations are underserved, the implementation of regional planning may be necessary. Although regional planning has been out of favor as public policy since the late 1970s, developments suggested by these findings indicate that the need for such planning may now be greater than ever. Such planning initiatives may be funded by the State or the Federal government, with administration at the State level because State officials have greater knowledge of the particular local needs and characteristics of rural areas. Areas should be identified in which "the demise of services would mean that a significant number of people would have to travel significantly greater distances in order to obtain basic medical care" (*31*) and where hospitals that are meeting defined needs can be targeted for assistance. Policy initiatives should be directed toward these communities to ensure that current trends away from the provision of acute care do not leave other community health needs unmet.

Local. Although local government control was not a statistically significant protective factor against closure, locally controlled public hospitals did have much lower risk. Thus strong support for local public sector involvement in health care may be an important strategy for ensuring a viable medical presence in rural communities.

This support does not necessarily mean an increase in outright public ownership of hospitals. A strong partnership between the local public and private sectors can be formed to develop approaches to enhance the viability of rural health care. It has been suggested that a viable strategy for stressed rural hospitals is to form networks with urban hospitals and health care systems (*32*). Such linkages may avail rural institutions of some of the advantages enjoyed by many urban hospitals, such as high census, greater access to technol-

ogy and capital, and a greater percentage of privately sponsored patients.

Rural hospitals should consider affiliating and developing referral networks with nursing or long-term care facilities and outpatient ambulatory care centers. Such referral systems would both guarantee patient access to needed care and encourage rural hospitals to diversify into nonacute care, while retaining needed acute care services as a component of an overall health care network.

It is possible for incentives to be developed to encourage rural hospitals to consolidate or merge into systems on a local level. This action would be consistent with the finding that multihospital system affiliation is negatively correlated with risk of closure. Mergers and consolidations with other hospitals or multihospital systems have been found (*27*) to be a viable option, allowing financially troubled institutions to remain open and deliver needed health care to their communities. Access to higher levels of management expertise in larger systems, greater availability of physicians and other care givers, and the financial stability resulting from mergers may reduce closure risk and improve rural hospital viability.

Conclusions

Our findings show that a combination of factors associated with fiscal and competitive strength, and ability to adapt to a rapidly changing health care marketplace, contributes to a rural hospital's risk of closure. Public policy to encourage and enable rural hospitals to implement strategies that will ensure fiscal and competitive viability is suggested as a way of ensuring rural hospitals' survival. We suggest that a minimum necessary level of acute care services must continue to be provided by rural hospitals as they expand their scope to other nonhospital modes of care. We have outlined findings that indicate that not only closure, but the substitution of skilled nursing or other long-term care beds for acute care beds in rural hospitals, is an emerging trend with a potentially significant impact on rural health care delivery.

Further research needs to be conducted to determine an optimum mix of acute care inpatient beds and ambulatory care services, nursing or other long-term care beds, and alternative types of nonacute care services in rural institutions. We suggest that there need not be a contradiction between rural hospital survival strategies and the health needs of rural populations. There must, however, be policies to ensure that the two priorities are met.

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A Review of PCP Abuse Trends and Perceptions

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Synopsis

A critical review of epidemiologic literature on the abuse of phencyclidine (PCP) suggests that current perceptions by the public and among members of the health professions and drug treatment communities about abuse of the drug are distorted. Epidemiologic data indicate that PCP abuse is not widespread in the United States, nor is its abuse prevalent among adolescents. Its abuse has become concentrated among post-high school age, black males in a limited number of cities, especially Washington, DC. The degree of PCP abuse in a metropolitan area may be related to the availability and cost of other, more highly coveted drugs, such as crack cocaine.

IN THE UNITED STATES, phencyclidine (PCP) is viewed as a socially undesirable and dangerous drug of abuse (*1-3*). Its dangers have been reported by the news media and described by the medical, educational, and law enforcement communities (*4*). In some major cities, newspaper accounts abound of bizarre or violent behavior among PCP abusers (*5-7*).

While PCP is well known as a dangerous drug of abuse, misconceptions regarding the drug exist in both popular and professional literatures. Inaccuracies are related to the prevalence of PCP abuse and to characteristics of the typical user, have created a distorted view of PCP abuse, and have led to a highly fearful view of this particular drug problem.

Prevalence

PCP abuse is frequently thought of as a widespread problem in the period of the 1980s (*1-3*). According to Garey and coworkers (*1*), "The illicit use of the psychotomimetic agent phencyclidine (PCP) is still a major problem throughout the United States." Issacs and coworkers (*2*) subtitled an article on PCP abuse with the phrase, "A close-up look at a growing problem." Schwartz and coworkers (*3*) began an article on PCP by referring to it as "a widely used illicit drug," and claimed " . . . there is accumulating evidence that PCP use is prevalent among adolescents."

An examination of the number of drug treatment