Issue Paper

The Effect of State Regulation of Respiratory Therapy Practitioners on Salaries and Vacancy Rates

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Introduction

The number of states that regulate the practice of the respiratory therapy profession has increased substantially since the first study of professional regulation in respiratory therapy conducted by the American Association for Respiratory Care (AARC) and Arthur Andersen in 1992. The number of states that regulate the practice of respiratory therapy through licensure increased from 25 in 1992 to 35 in 1996. The number of states regulating the profession of respiratory therapy through certification decreased from 10 to 8 over the same period due to the upgrading of regulatory acts from certification to licensure. The purpose of this study was to update and extend the 1992 study, focusing specifically on the relationship between professional regulation and salaries of respiratory therapy practitioners and between professional regulation and vacancy rates in respiratory therapy departments.

The two forms of state regulation in effect for the respiratory therapy profession, licensure and certification, have very different characteristics. Licensure, the more restrictive form of professional regulation, limits the right to practice the profession of respiratory therapy to only those individuals who meet standards set by the state. Certification, on the other hand, limits only the right to use specific respiratory therapy practitioner titles (e.g., respiratory therapist, respiratory therapy technician) to those individuals who meet standards set by the state. Under licensure, the right to practice in the profession is limited; the supply of individuals who may perform specific acts is limited by regulation through licensure. Under certification, only the right to use specific professional titles is limited; the supply of individuals who may perform specific acts is not limited by regulation through certification.

It is the supply-limiting effect of licensure that raises concerns of wage inflation and labor shortages. Health care organizations and state officials considering respiratory therapy licensure acts may be concerned that by limiting the supply of individuals who may practice respiratory therapy, health care institutions will be forced to increase salaries in order to compete for practitioners from this smaller pool. Additionally, there may be concerns that licensure may place many health care institutions, particularly those with limited financial resources, at a competitive disadvantage when attempting to employ respiratory therapy practitioners and cause vacancy rates to increase in states with respiratory therapy licensure acts. Conversely, there should be little concern over the potential effects of professional regulation through certification on salaries and vacancy rates; certification neither limits the supply of respiratory therapy practitioners nor does it increase demand; therefore, salaries and vacancy rates should be unaffected by certification acts.

There are some factors that may attenuate any potential effect licensure acts could have on salaries and vacancy rates. First, it is plausible that "grandfather" clauses in many licensure acts mitigate any effects of provisions that would tend to decrease the supply of workers. It is also likely, in the long run, that respiratory therapy practitioner educational programs would respond to the need for more trained workers by increasing their capacity and, thus, the supply of workers allowed to provide respiratory therapy.

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The question remains as to whether the supply-limiting effects of licensure in the case of the respiratory therapy profession are countered by supply-increasing provisions, such as "grandfather" clauses, and by rational responses of the respiratory therapy educational establishment. This study focused on this question by examining the relationship between licensure and two indices of the

supply/demand relationship: hourly salaries and vacancy rates. If professional regulation of respiratory therapy practitioners through licensure has adverse effects on employers, one would expect to see significantly higher hourly salaries and higher vacancy rates for respiratory therapists and respiratory therapy technicians who are allowed to practice under licensing acts. Respiratory therapy workers, such as respiratory therapy aides, not typically permitted to practice respiratory therapy under the provisions of licensure acts should, due to a lower demand for their limited services, have significantly lower salaries in licensed states than in nonlicensed states. Since professional regulation through certification does not limit the supply nor increase the demand for respiratory therapy practitioners, there should be no significant association between certification and hourly salaries and vacancy rates.

The survey used in this study was designed by the AARC. Surveys were mailed to all hospitals identified in the American Hospital Association's (AHA) Annual Survey as providing respiratory therapy services (4,528 hospitals). Responses were received from 1,391 respiratory therapy departments, resulting in an overall response rate of 31%. The response rates were as follows: licensure states, 984 hospitals (71% of all responses), certification states, 242 hospitals (17% of all responses), and unregulated states, 165 hospitals (12% of all responses). The large number of hospitals responding to the survey and the large number of respiratory therapy department employees (16,197) included in the analyses leads to concerns that results would be highly statistically significant but represent associations that are of little practical significance. These concerns are due to the fact that as the number of observations in a study increases, the effect size detectable by statistical analysis decreases. Thus, the large number of observations in this study makes it possible to observe real but very small relationships that are statistically significant but are so small as to be of little practical significance. The results of the study should, therefore, be interpreted primarily from the perspectives of size of marginal effects and practical significance of the associations

Analysis

Two series of analysis were conducted: the first focused on the salaries of individual employees of respiratory therapy departments and the second focused on the vacancy rates within those departments. The unit of analysis in the salary analysis was the individual employee, and the unit of analysis in the vacancy analysis was the hospital respiratory therapy department. Listwise deletion of incomplete observations caused the number of observations included in the analysis to be slightly lower than the number of respondents.

The analysis may be viewed as occurring in four phases. The first phase was a comprehensive analysis of salary data that included all respiratory therapy department employees. The second phase involved analysis of salary data for the three subgroups of respiratory therapy department workers whose salaries could be affected by professional regulation. These subgroups were respiratory therapists, respiratory therapy technicians and respiratory therapy aides. The third phase was an analysis of vacancy data for individual respiratory therapy departments. The fourth phase included the analysis of vacancy rates for respiratory therapists, respiratory therapy technicians, and respiratory therapy aides within those departments.

The analytical technique used in this study was multiple regression. Multiple regression was chosen in order to statistically control for the effects of multiple intervening variables simultaneously and, thus, isolate the effect of professional regulation on salaries and on vacancy rates. For example, the analysis involving the full sample allows one to examine the relationship between licensure and salary after removing the effects of education, job title, location, and length of time licensure laws had been in effect. Additionally, multiple regression has the advantage of not only assessing the nature of association, but also quantifying the marginal effect of a given factor on hourly salary. For example, a statistically significant regression coefficient for the licensure variable taking the value of 1.25 would indicate that the presence of licensure is associated with hourly salaries in respiratory therapy departments that are generally $1.25 higher in states with licensure than in states without licensure.

The dependent variable in the multiple regression model used in the salary analysis was a cost-of-living-adjusted hourly salary in 1996 dollars. This variable was calculated by adjusting each respiratory therapy department worker's hourly salary for the state-specific Consumer Price Index. This adjustment was undertaken to represent salaries in real buying power increments, thus removing the possibility that relationships found in the study could be associated with the cost of living rather than the effect of professional regulation.

The regression analysis also included variables to control for potentially important effects that could obscure the relationship between professional regulation and the dependent variables of interest: hourly salary and vacancy rates. In the overall analysis of hourly salaries, job title was controlled for through the use of dummy variables for each title. To establish a reference group for the analysis, the variable representing respiratory therapy aides was omitted from the equation. Control for education was accomplished by converting the seven educational options present on the survey into a value for inferred years of education. For example, associate's degree was assigned a value of 14 years of education; high school graduate or GED was assigned a value of 12. Credential status was controlled for through the use of dummy variables for each of the 11 credentialed codes included in the survey. The variable representing the "not credentialed" or eligible to take any National Board for Respiratory Care (NBRC) exam

group was omitted from the equation and, thus, served as the reference.

Regional effects were controlled for through the use of regional dummy variables. Each of the AHA's nine regions within the continental United States was included in the study. The variable representing region nine, Pacific States, was omitted from the equation so as to serve as the reference group. The control variable DURATION was included to control for the length of time licensure laws had been in effect; this variable was calculated as the number of years since the original licensure act was passed in a given state. States that passed licensure acts in 1996 were considered as having licensure in effect for the entire year. The two independent variables of interest, CERT and LICENSE, were dummy variables, respectively indicating the presence of certification and licensure regulation in a given state. The dummy variable representing the absence of professional regulation in a given state, NO ACT, was omitted from the equation to serve as the reference group.

The dependent variable in the respiratory therapy department vacancy rate analysis was the number of vacancies present in the department. The independent variables of interest, LICENSE and CERT, were determined in the same manner as in the salary analysis. Likewise, the same regional control variables were included in the vacancy analysis as were present in the hourly salary analysis. An additional control variable, STAFF, was included in this analysis to control for the size of the respiratory therapy department. STAFF was calculated as the total number of funded full time equivalent (FTE) positions present in the department. Definitions of all variables included in the region models are shown in Table 1.

Table 1. Definition of Variables

Dependent Variables	**Definitions**
RHSALARY	Real Hourly Salary in 1996 Dollars
VACANCY	Number of FTE Vacancies
Independent Variables	**Definitions**
DIRECT	Director Job Title
ADIRECT	Assistant or Associate Director Job Title
MANAG	Manager Job Title
SUPER	Supervisor or Assistant Supervisor Job Title
THER	Respiratory Therapist Job Title
TECH	Respiratory Therapy Technician Job Title
RTAIDE	Respiratory Therapy Aide Job Title (Reference Job Title)
CLER	Clerical Staff Job Title
ETECH	Equipment Technician Job Title
OTITLE	Other Job Title
RRT	Registered Respiratory Therapist Credential
CRTT	Certified Respiratory Therapy Technician Credential
RPFT	Registered Pulmonary Function Technologist Credential
CPFT	Certified Pulmonary Function Technologist Credential
RRTRPFT	Combined RRT and RPFT Credentials
RRTCPFT	Combined RRT and CPFT Credentials
CRTTRPFT	Combined CRTT and RPFT Credentials
CRTTCPFT	Combined CRTT and CPFT Credentials
GTECH	Graduate of Technician Program Not Credentialed
GTHER	Graduate of Therapist Program Not Credentialed
INELIG	Not Eligible for NBRC Credential (Reference Credential)
NENG	New England Region
ESCENT	East South Central Region
MATL	Mid Atlantic Region
ENCENT	East North Central Region
SATL	South Atlantic Region
WNCENT	West North Central Region
WSCENT	West South Central Region
MOUNT	Mountain Region
PACIFIC	Pacific Region (Reference Region)
LICENSE	Licensure Act in Place
NOACT	No Form of Professional Regulation in Place (Reference Group)
CERT	Certification Act in Place
EDYEARS	Number of Years of Education
DURATION	Number of Years Licensure Act in Place
STAFF	Number of Funded Staff Positions

Results

Regulation and Salaries

The results of the overall analysis of hourly salary may be seen in Table 2. The coefficients of LICENSE and CERT are positive and statistically significant, indicating a positive association between professional regulation and hourly salary. The coefficients for LICENSE and CERT indicated that in 1996 respiratory therapy department employees in states with licensure and those in states with certification respectively made 59 and 54 cents per hour more than did similar employees in states with no form of professional regulation.

Table 2. Multiple Regression Analysis of Real Hourly Salary for Respiratory Therapy Department Employees

Variable	B	SE	T-Ratio	Significance Level
CONSTANT	2.766	.434	6.374	.000
DIRECT	7.021	.254	27.645	.000
A DIRECT	5.073	.335	15.147	.000
MANAG	5.682	.293	19.392	.000
SUPER	4.460	.251	17.744	.000
THER	2.026	.226	8.967	.000
TECH	1.424	.223	6.397	.000
CLER	.923	.254	3.633	.000
ETECH	.621	.339	1.830	.067
OTITLE	3.167	.268	11.817	.000
RRT	3.757	.183	20.580	.000
CRTT	2.129	.177	12.038	.000
RPFT	2.769	.519	5.335	.000
CPFT	2.976	.513	5.801	.000
RRTRPFT	3.970	.322	12.335	.000
RRTCPFT	3.656	.268	13.633	.000
CRTTRPFT	2.129	.595	3.580	.000
CRTTCPFT	2.256	.460	4.900	.000
GTECH	.084	.269	.313	.754
GTHER	.919	.262	3.506	.000
NENG	-.973	.188	-5.179	.000
ESCENT	.047	.160	.291	.771
MATL	.101	.153	.660	.509
ENCENT	.280	.131	2.144	.032
SATL	.839	.131	6.401	.000
WNCENT	-.665	.152	-4.382	.000
WSCENT	-.0050	.139	-.036	.971
MOUNT	-1.720	.180	-9.541	.000
LICENSE	.594	.120	4.958	.000
CERT	.542	.120	4.498	.000
EDYEARS	.417	.029	14.243	.000
DURATION	.017	.009	1.845	.065
	R^2 = 0.327		N = 16,101	

Education and Salaries

As one would expect, there is a positive association between years of education (EDYEARS) and hourly salary with an increase of 42 cents per hour in salary for each year of education. For example, considering only the effects of education, a respiratory therapy worker with a bachelor's degree would make 83 cents per hour more in real terms than would a worker with an associate's degree.

Credentialing and Salaries

There were consistent positive and statistically significant associations between the presence of NBRC credentials and hourly salary. The only credential group that did not demonstrate a significant positive and statistically significant difference between themselves and the worker group ineligible for NBRC credentials was the group consisting of noncredentialed respiratory therapy practitioners who were eligible for the Certified Respiratory Therapy Technician (CRTT) credential. For example, due to the effect of credentials alone, Registered Respiratory Therapists (RRTs) made $3.76 more per hour than did ineligible workers, and CRTTs made $2.13 more per hour than did ineligible workers.

Region and Salaries

There were four geographic regions with statistically different real hourly salary rates than the Pacific region. The coefficients indicate that respiratory therapy department workers in AHA designated New England, West North Central, and Mountain regions made significantly less than did respiratory therapy department workers in the Pacific region. For example, workers in the West North Central region made approximately 67 cents per hour less than did workers in the Pacific region. Respiratory therapy department workers in the South Atlantic and East North Central regions had real hourly salaries that were significantly larger than those working in the Pacific region.

Job Title and Salaries

Table 3 summarizes the results of regression analysis performed using only those workers who had the title of respiratory therapist and held an associate's degree and an RRT credential. As was the case in the overall analysis, the coefficients of the variables LICENSE and CERT are positive, however, unlike the overall analysis, the coefficient of the LICENSE variable approaches but does not achieve significance at the conventional 0.05 level of significance. The coefficient of the CERT variable indicates a positive and statistically significant association between the presence of certification in a given state and the real hourly salary of respiratory therapists. For example, RRTs working in states with the certification form of professional regulation (CERT) made 88 cents more per our than did therapists working in

states without any form of professional regulation. The results observed in the regional control variables are generally consistent with the results observed in the overall analysis with the statistically significant coefficients taking the same sign, as was the case in the overall analysis.

Table 3: Multiple Regression Analysis of Real Hourly Salary for Respiratory Therapists

Variable	B	SE	T-Ratio	Significance Level
CONSTANT	14.592	.226	64.647	.000
NENG	-2.182	.336	-6.504	.000
ESCENT	.027	.269	.102	.919
MATL	.013	.259	.050	.960
ENCENT	-.095	.210	-.453	.650
SATL	.530	.209	2.540	.011
WNCENT	-.523	.255	-2.047	.041
WSCENT	-.020	.245	-.080	.936
MOUNT	-2.184	.326	-6.708	.000
LICENSE	.384	.201	1.912	.056
CERT	.875	.196	4.472	.000
DURATION	.016	.017	.954	.340
	R^2 = 0.039		N = 4347	

Table 4 summarizes the regression analysis results for respiratory therapy technicians holding a CRTT credential and having some college but not a degree. The coefficient of the LICENSE variable is positive and significant, indicating a positive association between the presence of licensure and the real hourly salary of CRTTs. The magnitude of the coefficient indicates that CRTTs in licensed states made 97 cents more per hour than did CRTTs in unregulated states. Unlike the overall results, the coefficient of the CERT variable is not significant statistically. The regional control variables are generally not significant statistically, the one exception being the coefficient of the MOUNTAIN variable, indicating that technicians in the Mountain region made significantly less ($2.31 per hour) than did CRTTs in the Pacific region.

Table 4: Multiple Regression Analysis of Real Hourly Salary for Respiratory Therapy Technicians

Variable	B	SE	T-Ratio	Significance Level
CONSTANT	12.031	.390	30.846	.000
NENG	-.526	.630	-.835	.404
ESCENT	-.164	.365	-.448	.654
MATL	-.458	.388	-1.180	.238
ENCENT	.214	.334	.639	.523
SATL	.344	.329	1.045	.296
WNCENT	-.500	.367	-1.362	.173
WSCENT	.241	.321	.750	.453
MOUNT	-2.311	.408	-5.659	.000
LICENSE	.972	.278	3.498	.000
CERT	.068	.284	.238	.812
DURATION	-.019	.017	-1.125	.261
	R^2 = 0.047		N = 2141	

The regression results obtained from respiratory therapy aides who were ineligible for NBRC credentials and who had a high school education or GED are summarized in Table 5. The coefficient of the LICENSE variable is positive and significant statistically. The coefficient of 1.518 indicates that respiratory therapy aides made $1.52 per hour more in licensed states than in unregulated states. The coefficient of the CERT variable was not significant statistically. None of the control variables achieved statistical significance.

Table 5: Multiple Regression Analysis of Real Hourly Salary for Respiratory Therapy Aides

Variable	B	SE	T-Ratio	Significance Level
CONSTANT	8.027	1.693	4.741	.000
NENG	.941	1.890	.498	.619
ESCENT	-.259	1.707	-.152	.879
MATL	.651	1.770	.368	.713
ENCENT	.471	1.667	.282	.778
SATL	.338	1.687	.200	.842
WNCENT	-1.310	1.686	-.777	.438
WSCENT	-1.592	1.717	-.927	.355
MOUNT	-.193	2.312	-.084	.933
LICENSE	1.518	.531	2.859	.005
CERT	.918	.520	1.765	.079
DURATION	-.0028	.045	-0.61	.951
	R^2 = 0.12		N = 228	

Results in 1997 Dollars

The hospital and related services inflation rate for the 1997 calendar year obtained from Glenn Pearl, Editor of the ***Rate Controls Monitor*** was 3.2%. Using this rate of inflation to adjust the observed marginal effects to 1997 dollars, the overall marginal effects of professional regulation through licensure and certification were, respectively, 61 cents and 56 cents per hour in 1997 dollars. Similarly adjusted to 1997 dollars, the marginal effect of one year of education was 43 cents per hour and the difference in real hourly salary for an RRT and an employee ineligible for a credential was $3.88. Appendix A provides the marginal effects observed in the overall analysis converted to 1997 dollars.

Regulation and Vacancies

Table 6 contains the results of the regression using the number of vacancies present in a given respiratory therapy department as the dependent variable. Neither the coefficient of the LICENSE variable nor that of the CERT variable is significant statistically, but both of these coefficients do take a positive sign. As one would expect, the coefficient of the department size control variable, STAFF, is positive and significant statistically, indicating that departments with larger staffs tended to have higher numbers of vacancies. The coefficients of two regional control variables, SATL (South Atlantic Region) and ENCENT (East North Central Region), take a positive sign and are statistically significant, indicating that respiratory therapy departments in the South Atlantic and East North Central regions generally had 0.37 and 0.41 more FTE vacancies, respectively, than did similar departments in the Pacific region.

Table 6: Multiple Regression Analysis of Respiratory Therapy Department Employee Vacancies

Variable	B	SE	T-Ratio	Significance Level
CONSTANT	-.171	.196	-.870	.385
NENG	.297	.237	1.252	.211
ESCENT	.268	.217	1.235	.217
MATL	.240	.204	1.174	.241
ENCENT	.409	.176	2.329	.020
SATL	.367	.185	1.990	.047
WNCENT	.110	.184	.599	.549
WSCENT	.323	.186	1.738	.082
MOUNT	.390	.217	1.800	.072
LICENSE	.205	.156	1.315	.189
CERT	.187	.158	1.189	.235
DURATION	.0036	.011	.317	.752
STAFF	.034	.003	11.639	.000
	R^2 = 0.102		N = 1375	

Tables 7, 8, and 9 contain the results of multiple regression analysis using the number of vacancies for respiratory therapists, respiratory therapy technicians, and respiratory therapy aides respectively as dependent variables. In these three analyses, professional regulation, generally, had no statistically significant association with vacancies within the three job title groups. The one exception to the lack of significant associations may be seen in Table 8 which shows that certification (CERT) was positively and significantly associated with respiratory therapy technician vacancies. The coefficient of the CERT variable indicates that respiratory therapy departments in states with certification acts in place, in general, had 0.22 FTE more respiratory therapy technician vacancies than did departments in states without any form of regulation. Professional regulation through licensure (LICENSE) was found to have positive but statistically insignificant associations with the vacancy rates of respiratory therapy technicians and respiratory therapy aides. Table 8 also shows that hospitals located in East South Central (ESCENT), East North Central (ENCENT), South Atlantic (SATL) and West South Central (WSCENT) regions had higher numbers of respiratory technician vacancies than did hospitals in the Pacific region. One interesting, but likely spurious finding may be seen in Table 9: the coefficient of the DURATION variable is statistically significant and takes a negative sign. This finding indicates that the longer a licensure act has been in place, the lower the vacancy rate for respiratory therapy aides. If not a spurious finding, this result may indicate that respiratory therapy departments reduce the number of aide positions over time following the implementation of licensing acts.

Table 7: Multiple Regression Analysis of Respiratory Therapist Vacancies

Variable	B	SE	T-Ratio	Significance Level
CONSTANT	-.113	.133	-.849	.396
NENG	.091	.161	.561	.575
ESCENT	.108	.147	.734	.463
MATL	.169	.139	1.220	.223
ENCENT	.259	.120	2.164	.031
SATL	.209	.126	1.663	.097
WNCENT	.122	.125	.971	.332
WSCENT	.107	.126	.850	.396
MOUNT	.397	.147	2.696	.007
LICENSE	-.0097	.106	-.092	.927
CERT	-.069	.107	-.640	.522
DURATION	.0083	.008	1.064	.288
STAFF	.025	.002	12.631	.000
	R^2 = 0.116		N = 1376	

Table 8: Multiple Regression Analysis of Respiratory Therapy Technician Vacancies

Variable	B	SE	T-Ratio	Significance Level
CONSTANT	-.095	.091	-1.045	.296
NENG	-.030	.110	-.269	.788
ESCENT	.274	.101	2.727	.006
MATL	.100	.095	1.057	.291
ENCENT	.190	.082	2.326	.020
SATL	.224	.086	2.606	.009
WNCENT	.056	.085	.656	.512
WSCENT	.209	.086	2.425	.015
MOUNT	.076	.101	.751	.453
LICENSE	.134	.072	1.847	.065

CERT	.220	.073	3.014	.003
DURATION	.00058	.005	.109	.913
STAFF	.0036	.001	2.682	.007
	R^2 = 0.028		N = 1376	

Table 9: Multiple Regression Analysis of Respiratory Therapy Aide Vacancies

Variable	B	SE	T-Ratio	Significance Level
CONSTANT	-.0019	.018	-.106	.915
NENG	.026	.022	1.205	.229
ESCENT	-.015	.020	-.743	.457
MATL	-.019	.019	-.999	.318
ENCENT	.012	.016	.728	.467
SATL	-.00049	.017	-.029	.977
WNCENT	.0000099	.017	.001	1.000
WSCENT	.032	.017	1.905	.057
MOUNT	.0038	.020	.193	.847
LICENSE	.023	.014	1.635	.102
CERT	.0023	.014	.161	.872
DURATION	-.0026	.001	-2.462	.014
STAFF	.00053	.000	2.016	.044
	R^2 = 0.013		N = 1376	

Discussion

While, in general, regulation of respiratory therapy profession was positively associated with the real hourly salary of respiratory therapy department workers, the marginal effects of regulation were relatively small, and there is reason to believe that some factor other than the provisions of the regulatory acts was the primary cause of the higher hourly salaries. Since certification affects neither the supply nor the demand for respiratory therapy workers, the similar marginal effects of certification and licensure in the overall analysis infer that it was not the restrictions on the practice of respiratory therapy present in licensure acts that caused the variation in hourly salaries.

The supplementary analysis, as well, indicates that the factors other than the provisions of licensure acts increase the hourly salaries of respiratory therapy workers. First, the absence of a statistically significant association between the presence of licensure and the real hourly salary of respiratory therapists, a professional group that should theoretically see an increase in demand with the enactment of licensure, leads one to question the importance of the demand-increasing or supply-limiting effects of licensure in the respiratory therapy profession. The small marginal effect of licensure on the salaries of respiratory therapy technicians, the group theoretically most benefited financially by licensure, relative to its marginal effects for respiratory therapy aides, a group whose salaries should theoretically be adversely affected by licensure, raises suspicions that an intervening variable may be at play in the findings.

One possible explanation for these finding is that the associations between professional regulation and salaries are due to state-specific variations in the scope of practice of respiratory therapy practitioners. One could expect relative uniformity in the scope of practice of respiratory therapy practitioners within a given state due to characteristics of the respiratory therapy programs within the state, which determine the capabilities of respiratory therapy practitioners. Additionally, medical schools within the state and, to a lesser extent, nursing and health services administration schools within a given state would tend to produce graduates with similar expectations for the duties of respiratory therapy practitioners. Given a reasonable level of uniformity within states for both the capabilities of respiratory therapy practitioners and the expected scope of practice for respiratory therapy practitioners by other health care workers, one could expect the sophistication of practice, level of autonomy, and value of contributions to the care of patients associated with respiratory therapy practitioners would also be uniform within states.

It follows that states with preexisting high value-added and high-prestige respiratory therapy professions would tend to have practitioners within those states paid better than those in states characterized by less sophisticated scopes of practice. It may be that respiratory therapy practice acts are enacted in states where the public and other health care professionals see respiratory therapy practitioners, due to advanced scopes of practice in those states, as having an important role in the health care team. These sophisticated scopes of practice may result in respiratory therapy practitioners being seen as more valuable and more critical to the safety of patients than those practitioners in states with less sophisticated scopes of practice. It follows, then, that states with advanced scopes of practice would be more likely to regulate the respiratory therapy profession due to the critical nature of the profession in those states than would states with less sophisticated scopes of practice. It also follows that employers in states with sophisticated scopes of practice would compensate respiratory therapy practitioners for their more sophisticated skills and their greater contributions to patient care than would employers in states with less sophisticated scopes of practice. Therefore, one possible explanation for the findings of this study is that respiratory therapy practitioners with sophisticated scopes of practice are more likely to be highly paid and more likely to practice in states that regulate the profession of respiratory therapy than are practitioners with less sophisticated scopes of practice. This explanation for salary variation among states is consistent with the finding in this study of similar marginal effects of certification and licensure on salaries, of positive associations between regulation and the salaries of unregulated practitioners, and of the absence of an association between regulation and vacancies in respiratory

therapy departments.
There are some issues that should be considered when interpreting and applying the results of this study. First, this study, like all cross sectional research, is limited in its ability to infer causality; it may be that the observed associations are not due to cause and effect relationships. Second, there are some factors, such as respiratory therapy practitioner scope of practice and hospital acuity levels, that could not be controlled for in this study and may serve as intervening variables. Third, the large numbers of respiratory therapy departments and respiratory therapy practitioners included in the study may cause associations without any practical significance to achieve statistical significance; one should, therefore, evaluate the magnitude of the associations to assess their importance.

Conclusions

Professional regulation in the respiratory therapy profession was found to have unstable effects on the hourly salary of respiratory therapy department workers. When all respiratory therapy department workers were considered as a single group, both forms of state regulation had positive but relatively small associations with hourly salary. These associations are deemed small due to the relative magnitude of their marginal effects; NBRC credentials, education, and title were, in general, associated with much higher salaries than were licensure and certification. Additionally, the overall effects of the two forms of professional regulation were very similar with both licensure and certification being associated with real hourly salaries that were fifty to sixty cents per hour higher than in unregulated states.

The association between the two forms of professional regulation and hourly salary varied by professional level. The presence of certification was positively associated with higher real hourly salaries for respiratory therapists but not for technicians and aides. Conversely, licensure was positively associated with the hourly salary of technicians and aides but not for respiratory therapists.

There was no association between either form of professional regulation and overall vacancy rates in respiratory therapy departments. While there were statistically significant associations between vacancy rates and department size as well as some regional effects, neither licensure nor certification was found to be significantly associated with the number of vacancies in respiratory therapy departments.