# CLIA Waiver Pharmacy Growth

**How Does Broadening Scope of Practice Affect the Pharmacist Labor Market?**

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Edward J. Timmons and
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*October 2016*

MERCATUS WORKING PAPER

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*Edward J. Timmons and Conor S. Norris. "CLIA Waiver Pharmacy Growth: How Does Broadening Scope of Practice Affect the Pharmacist Labor Market?" Mercatus Working Paper, Mercatus Center at George Mason University, Arlington, VA, October 2016.*

**Abstract**

The United States faces a forecast of continuing growth in the demand for health care and an insufficient supply of primary care physicians to meet this need. The Clinical Laboratory Improvement Amendments of 1988 (CLIA) grant pharmacies the ability to apply for a waiver (CLIA waiver) to perform routine medical testing on patients without direct physician supervision. In this study, we estimate the effect that the spread of CLIA waiver pharmacies has had on the labor markets for pharmacists and lab technicians. Our results suggest that the spread of waivers has had no measurable impact on the pharmacist and lab technician labor markets. Our results suggest that pharmacists and lab technicians are able to accommodate basic testing into their existing workload without needing to work more hours. If pharmacies can accommodate routine testing with little disruption, broadening the scope of practice for pharmacists may alleviate rising costs of providing health care in the United States.

*JEL* code: J44

Keywords: occupational licensing, occupational regulation

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**How Does Broadening Scope of Practice Affect the Pharmacist Labor Market?**

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Demand for health care in the United States continues to grow. A report from the US Department of Health and Human Services projects a shortage of 20,400 primary care physicians in 2020.[1] Unless the supply of primary care physicians grows significantly, nonphysician practitioners will need to play an increased role in the provision of health care. The roles of physician assistants and nurse practitioners, for example, have expanded in recent years, with most states granting such professionals prescription-writing privileges for controlled substances.[2] Other healthcare professionals who should see an increasing role are pharmacists. Pharmacists have always played an important role in the provision of health care—by dispensing drugs and advising patients as well as other healthcare practitioners on the proper use of prescription and over-the-counter drugs.[3] Significant changes in federal regulations have allowed pharmacists to play a new role in the provision of health care—performing routine medical testing on-site without direct physician supervision. More specifically, the Clinical Laboratory Improvement Amendments of 1988 (CLIA), which were implemented in 1992, granted health facilities (including pharmacies) the ability to conduct

[1] Health Resources and Services Administration, "Projecting the Supply and Demand for Primary Care Practitioners through 2020," US Department of Health and Human Services, November 2013.
[2] Edward Timmons, "Healthcare License Turf Wars: The Effects of Expanded Nurse Practitioner and Physician Assistant Scope of Practice on Medicaid Patient Access" (Mercatus Working Paper, Mercatus Center at George Mason University, Arlington, VA, January 2016).
[3] For information about the role of pharmacists, see the website of the American Association of Colleges of Pharmacy at http://www.aacp.org/resources/student/pharmacyforyou/Pages/roleofapharmacist.aspx.

low-risk medical tests (for example, testing for strep throat or blood glucose levels) on-site without federal regulatory oversight.[4]

Although such CLIA waivers have allowed pharmacists to expand their role in the provision of health care, significant barriers remain at the state level. As a result, the number of pharmacies that have the authority to perform routine medical tests varies tremendously from state to state. In this paper, we will estimate the effect that liberalizing pharmacists' scope of practice has had on the labor market for pharmacists as well as the market for health care. We match data obtained from the Centers for Disease Control and Prevention (CDC) on the number of pharmacies in each state that have CLIA waivers with data on the pharmacist and lab technician labor markets from the American Community Survey (ACS).

We will begin this paper by examining the spread of CLIA waivers over time. We successfully obtained information from the CDC documenting the date on which each CLIA waiver was granted to a US pharmacy. Using this information, we calculate the number of pharmacies with CLIA waivers in each state in each year (as opposed to a snapshot at a particular point in time).[5] We find little evidence that broader scope of practice for pharmacists has affected the labor markets (in terms of wages or hours worked) for pharmacists and lab technicians. Our results suggest that broadening the scope of practice for pharmacists results in little disruption in the labor markets for these professionals: pharmacists and lab technicians appear to be capable of integrating routine medical testing into their existing workload. Before turning to our results, we provide some background on CLIA waivers and the existing literature on the effects of medical licensing.

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[4] A full list of the low-risk medical tests that can be conducted by such health facilities under CLIA is available from the Food and Drug Administration at http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfClia/analyteswaived.cfm.
[5] To our knowledge, this is the first study to present this information.

**Background and Discussion of Pharmacy CLIA Waivers**

Why did CLIA waivers for pharmacies arise in the United States? Significant advances in medical technology—most notably handheld devices that personnel with limited medical training can operate—facilitated CLIA legislation.[6] In the specific case of strep throat testing, pharmacy personnel who have CLIA waivers can administer rapid antigen detection (or rapid strep) tests, which studies find are incredibly accurate (nearly 100 percent) in correctly identifying streptococcal pharyngitis.[7] The literature studying the effects of pharmacy CLIA waivers is very limited. Michael Klesper and colleagues provide a snapshot of CLIA waiver pharmacies in May 2015.[8] An earlier paper by Paul Gubbins and colleagues ponders the ability of CLIA waivers to influence the healthcare market. The authors conducted a survey of 194 licensed pharmacists from 40 states in 2002 and find that 85 percent of the respondents were not aware of privileges to perform CLIA-waived testing.[9] In line with this result, testing for infections in pharmacies has only recently begun to occur, but has shown promising results in its early stages.[10]

How do pharmacies obtain CLIA waivers? Pharmacies (except those located in the state of Washington) that are interested in obtaining a CLIA waiver must first complete the Application for Certification Form (CMS-116).[11] Pharmacies are also required to meet state-

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[6] Devery Howerton et al., "Good Laboratory Practices for Waived Testing Sites" (Morbidity and Mortality Weekly Report 54, no. RR-13, Centers for Disease Control and Prevention, Atlanta, GA, 2015).
[7] Jeremie F. Cohen et al., "Rapid-Antigen Detection Tests for Group A *Streptococcal* Pharyngitis: Revisiting False-Positive Results Using Polymerase Chain Reaction Testing," *Journal of Pediatrics* 162, no. 6 (2013): 1282–84.
[8] Michael E. Klepser et al., "U.S. Community Pharmacies as CLIA-Waived Facilities: Prevalence, Dispersion, and Impact on Patient Access to Diagnostic Testing," *Research in Social and Administrative Pharmacy* 12, no. 4 (2016): 614–21.
[9] Paul O. Gubbins et al., "Point-of-Care Testing for Infectious Diseases: Opportunities, Barriers, and Considerations in Community Pharmacy," *Journal of the American Pharmacists Association* 54, no. 2 (2014): 163–71.
[10] Donald Klepser et al., "Innovative Pharmacist-Physician Collaborative Point-of-Care Management Program for Group A Streptococcal Pharyngitis," *Journal of the American Pharmacists Association*, forthcoming.
[11] The form is available for download at https://www.cms.gov/Medicare/CMS-Forms/CMS-Forms/Downloads /CMS116.pdf.

specific requirements and to pay a certificate fee of $150 every two years.[12] The requirements for obtaining a CLIA waiver vary substantially from state to state. As a result, confusion exists even within the pharmacist community about what tests pharmacies are allowed to perform with a CLIA waiver in each state.[13] In Washington State, pharmacies are exempt from CLIA. If pharmacies can successfully obtain a Washington Medical Test Site license, they are automatically granted a CLIA certificate of waiver.[14] California requires an additional annual fee of $113 as well as the completion of three additional state forms.[15] California is also one of just 11 states that require clinical lab personnel to obtain a license.[16] The bordering state of Nevada also requires lab assistants to obtain a license and additionally requires that the lab's director be a medical doctor or osteopath.[17]

Significant variation in the protocol for obtaining a federal CLIA waiver has resulted in numerous differences across states with respect to the number of pharmacies able to obtain waivers. Figure 1 (see page 15) depicts changes in the number of pharmacies in each state with CLIA waivers from 1999 to 2014. In 1999, nine states and the District of Columbia did not have a single pharmacy with a CLIA waiver. Texas was the only state to have more than 50 pharmacies (59 to be exact) with CLIA waivers. By 2014, Hawaii was the only state that had no pharmacies with CLIA waivers. Washington State, Illinois, California, and Texas all

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[12] Centers for Medicare and Medicaid Services, "How to Apply for a CLIA Certificate," last modified May 3, 2016, https://www.cms.gov/Regulations-and-Guidance/Legislation/CLIA/How_to_Apply_for_a_CLIA_Certificate_International_Laboratories.html.
[13] Hilary McCants, "Role of Pharmacist-Provided Point of Care Testing," *Journal of the American Pharmacists Association* 55, no. 6 (2015): 574–76.
[14] An application packet is available from the Washington State Department of Health at http://www.doh.wa.gov/portals/1/Documents/Pubs/505038.pdf.
[15] Information is available on the California Department of Public Health's website at https://www.cdph.ca.gov/programs/lfs/Pages/CLIAFederalCertifiedLaboratory.aspx.
[16] See American Society for Clinical Pathology, "State Licensure of Laboratory Personnel" (ASCP Policy Statement 05-02, American Society for Clinical Pathology, Chicago, 2005).
[17] See the website of the Nevada Division of Public and Behavioral Health at http://dpbh.nv.gov/uploadedFiles/dpbhnvgov/content/Reg/HealthFacilities/Advisory_Councils/HIRC/Agendas/2015/LaboratoryRequirements_GlucoseTesting.pdf.

have more than 500 pharmacies with CLIA waivers (Texas currently has more than 1,000 such pharmacies).

Certainly population matters and is an important variable to consider when discussing state-to-state differences. But even without any further analysis, some interesting details emerge. First, geography seems to matter. CLIA waiver pharmacies are small in number in both the northeast and the state of Nevada. Second, the ease with which a pharmacy can obtain a CLIA waiver seems to matter. As of the beginning of 2016, Nevada has just two pharmacies with CLIA waivers; presumably the relative difficulty of obtaining the CLIA waiver is influencing this number. A simple comparison of California and Washington State is also telling. As noted previously, it is considerably easier to obtain a CLIA waiver in Washington than in California. Even though California's population is five times as large as that of Washington, for most of the years in our period of study Washington has had more CLIA pharmacies than California has had. In 2004, for example, California had only 80 pharmacies with CLIA waivers, and Washington had 113. Not until 2014 did California have more CLIA pharmacies than Washington.

Pharmacist licensing requirements vary from state to state. All states require applicants to pass two exams (the North American Pharmacist Licensure Examination and the Multistate Pharmacy Jurisprudence Examination) and obtain a doctor of pharmacy degree. States also set minimum age requirements (ranging from 18 to 21 years) and specify the number of hours of education or training that must be completed (ranging from 300 hours in Washington to 2,150 hours in New Mexico). A handful of states discount or do not accept pharmacist training obtained overseas or from certain states. In our period of study (2000–2014), the most notable change in pharmacist licensing requirements was mandatory doctoral training, which became effective on January 1, 2003. This change occurred at the federal level, and as a result, the state and time fixed effects that we include in our regressions control for these noted differences in pharmacist licensing requirements.

**Existing Evidence of the Effects of Medical Licensing**

It is generally understood that occupational licensing increases the prices of services and the wages of professionals. Little evidence shows that it enhances the quality of services delivered to consumers.[18] The wage increases are likely a result of the barriers to entry erected by occupational licensing. Such barriers impose a significant burden on aspiring professionals.[19] Morris Kleiner and Alan Krueger find that licensing increases the earnings of professionals by 19 percent.[20] More recent estimates using longitudinal data from 1979 to 2010 suggest that the effect of licensing on earnings may be much smaller after controlling for union membership.[21] These findings for all licensed professions match up well with results from investigations of the effects of licensing on medical professions. A study investigating the effects of optician licensing on optician earnings finds evidence of a premium similar in magnitude to that observed by Kleiner and Krueger.[22] Similar results are found in a study estimating the effects of the licensing of massage therapists.[23]

Our study specifically focuses on the effects of liberalizing the scope of practice for a medical profession. The number of studies exploring this specific aspect of licensing is smaller,

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[18] Department of the Treasury Office of Economic Policy, Council of Economic Advisers, and Department of Labor, "Occupational Licensing: A Framework for Policymakers," White House, July 2015.
[19] Dick M. Carpenter II et al., *License to Work: A National Study of Burdens from Occupational Licensing* (Arlington, VA: Institute for Justice, May 2012).
[20] Morris M. Kleiner and Alan B. Krueger, "Analyzing the Extent and Influence of Occupational Licensing on the Labor Market," *Journal of Labor Economics* 31, no. S1 (2013): S173–202.
[21] Maury Gittleman and Morris M. Kleiner, "Wage Effects of Unionization and Occupational Licensing Coverage in the United States," *ILR Review* 69, no. 1 (2016): 142–72.
[22] Edward Timmons and Anna Mills, "Bringing the Effects of Occupational Licensing into Focus: Optician Licensing in the United States," *Eastern Economic Journal*, forthcoming. Also available as a working paper from the Mercatus Center at George Mason University.
[23] Robert Thornton and Edward Timmons, "Licensing One of the World's Oldest Professions: Massage," *Journal of Law and Economics* 56, no. 2 (2013): 371–88.

but generally speaking, studies find that expanded scope of practice potentially leads to cheaper health care without sacrificing quality. Morris Kleiner and colleagues, for example, find that a more restrictive scope of practice increases physician earnings and reduces the number of hours that nurse practitioners work but has no noticeable effect on the quality of service (as measured by infant mortality and malpractice insurance premiums).[24] A working paper recently published by the Mercatus Center finds that restricting the scope of practice of physician assistants (not permitting them to prescribe controlled substances) increases the cost of outpatient Medicaid claims by 11 percent.[25]

In this study, we investigate the effects that the spread of CLIA waivers in the United States has had on the pharmacist and lab personnel labor markets. In the sections that follow, we discuss the data used for our empirical analysis, as well as the methods and results of our investigation.

## Data and Estimation Strategy: Pharmacist and Lab Technician Labor Markets

To better understand the effect of the spread of CLIA waiver pharmacies in the United States, we investigate the effects of the spread of CLIA waivers on the labor markets for pharmacists and lab technicians. We also restrict our sample to pharmacists and lab technicians who report their earnings. We use data obtained from the Integrated Public Use Microdata Series (IPUMS) database for the 2000 to 2014 ACS.[26] Table 1 (page 17) displays the summary statistics for the

[24] Morris Kleiner, et al., "Relaxing Occupational Licensing Requirements: Analyzing Wages and Prices for a Medical Service" (NBER Working Paper 19906, National Bureau of Economic Research, Cambridge, MA, February 2014).
[25] Edward Timmons, "Healthcare License Turf Wars: The Effects of Expanded Nurse Practitioner and Physician Assistant Scope of Practice on Medicaid Patient Access" (working paper, Mercatus Center at George Mason University, Arlington, VA, January 2016).
[26] Steven Ruggles et al., *Integrated Public Use Microdata Series: Version 6.0* (machine-readable database) (Minneapolis: University of Minnesota, 2015).

variables in our sample. We report summary statistics stratified by the mean number of CLIA pharmacies per 1,000 residents. In our sample, the mean of CLIA pharmacies per 1,000 residents is 12.5, and we report summary statistics for observations below and above this mean. The ACS surveys include information on individuals' age, race, gender, educational attainment, and labor market outcomes as found the in Census Bureau's long survey form. Using the consumer price index, we adjusted wages to 2014 dollars. Our sample of pharmacists includes 35,018 pharmacists and 45,011 lab technicians. Pharmacists in states with more CLIA waiver pharmacies appear more likely to have a PhD, but that factor does not seem to have an effect on mean earnings or hours worked. Lab technicians appear to earn slightly more in states with below the average number of CLIA waiver pharmacies, but such technicians also work slightly longer hours.

Although examining means is informative, regression analysis allows us to better control for state-to-state differences and to estimate more formally the effect of the spread of CLIA waivers on the pharmacist and lab technician labor markets. We estimate the effects that the number of CLIA pharmacies has had on the earnings of pharmacists and lab technicians using the following equation:

$$ln(hourlywages_{ist}) = \alpha + \beta(C_{st}) + \boldsymbol{I_{ist}}\boldsymbol{\gamma} + \boldsymbol{S_t}\boldsymbol{\tau} + \boldsymbol{Y_s}\boldsymbol{\mu} + \varepsilon_{ist},$$

where hourly wages are reported by the surveyed individual *i* living in state *s* at time *t*. We use a similar specification for hours worked by each professional. *C* is a variable representing the number of CLIA pharmacies in the state divided by the state population (in thousands of persons) at time *t* in that year. The number of CLIA pharmacies (as noted previously) was obtained from the CDC. The variable ***I*** is a vector of individual control variables that are generally understood to impact earnings. These variables include age, age$^2$, race, ethnicity, and gender. Age is a proxy for experience, which should increase earnings at a slower rate as experience increases. In the pharmacist regressions, we include a PhD dummy variable to control for differences in education.

***S*** and ***Y*** represent vectors of state and time fixed effects, respectively, that control for unobserved heterogeneity causing differences in pharmacists' earnings. Including the time and state fixed effects allows us to emulate a difference-in-differences (DID) estimation. The DID framework allows us to estimate the effect of changes in the number of CLIA pharmacies within states. Given the number of years in our sample, we find it unlikely that the standard parallel paths assumption of DID estimation is met. To account for this problem, we also report estimations that include both linear and quadratic state-specific time trends.

The results of our earnings estimations are reported in table 2 (page 18), and the hours worked estimations are reported in table 3 (page 19). Columns 1 and 2 of each table report simple DID results, including fixed effects and linear and quadratic trends, respectively. In table 2, we find no evidence that the spread of CLIA pharmacies is affecting the labor markets for pharmacists and lab technicians. We also find little evidence in table 3 that the spread of CLIA pharmacies is affecting the number of hours that pharmacists and lab technicians are working. This result is consistent with preliminary time and motion studies that have examined whether routine influenza testing burdens pharmacists. Donald Klesper and colleagues find that routine testing can be incorporated into pharmacists' existing work schedules with little disruption.[27]

Our results suggest that pharmacists and lab technicians are able to accommodate routine medical testing without working longer hours. Perhaps, however, our results are downwardly biased as a result of unobserved changes in the healthcare market. To address this possibility, in

[27] Donald Klesper et al., "Time and Motion Study of Influenza Diagnostic Testing in a Community Pharmacy," *Innovations in Pharmacy* 5, no. 2 (2014): 1–8.

addition to standard DID estimation (two-way fixed effects), we also performed triple-difference estimations to control for unobserved changes within the industry that might affect the labor markets for pharmacists and lab technicians. We included optometrists and podiatrists—two types of medical professionals with education requirements similar to those of pharmacists—with the pharmacist sample. The total size of the sample (pharmacists, optometrists, and podiatrists) thus increased to 41,188. We merged opticians with the lab technician sample, thus increasing the total size of the sample to 88,372. We then added occupation dummy variables (*OD*) for pharmacists and lab technicians, the occupations of interest. By interacting the occupation dummy variable with the number of CLIA pharmacies per person, we created a new variable in the regression ($C \times OD$). The coefficient on this interaction term ($\beta_c$) represents the triple-difference estimator:

$$ln(hourlywages_{ist}) = \alpha + \beta_a\,(C_{st}) + \beta_b\,(OD_{ist}) + \beta_c\,(C_{st} \times OD_{ist}) + \boldsymbol{I_{ist}}\,\boldsymbol{\gamma} + \boldsymbol{S_t}\,\boldsymbol{\tau} + \boldsymbol{Y_s}\,\boldsymbol{\mu} + \varepsilon_{ist}.$$

Columns 3 and 4 of tables 2 and 3 report the results of these estimations. We focus our attention on the first three rows of each table. When interpreting the results of the triple-difference estimation, we note the coefficient ($\beta_a$) on the number of CLIA pharmacies (*C*), the coefficient ($\beta_b$) on each occupational dummy variable (*OD*), and the coefficient ($\beta_c$) on the interaction term ($C \times OD$). In table 2, beginning with the first coefficient ($\beta_a$), we do find some evidence that pharmacists earn more (0.2 percent) and that lab technicians earn less (−0.3 percent) for each CLIA pharmacy per 1,000 residents. Although statistically significant, the coefficient is quite small. We also find that both pharmacists and lab technicians earn more than their respective comparison group when we examine the coefficient on the occupation dummies ($\beta_b$). In this case, pharmacists earn in excess of 20 percent more than podiatrists and optometrists, and lab technicians earn in excess of 20 percent more than opticians. Turning to the interaction term ($C \times OD$), we again find evidence of statistically significant coefficients ($\beta_c$): −0.2 percent and 0.3 percent for pharmacists and lab technicians, respectively. As with the coefficient estimates on the number of CLIA pharmacies, the economic significance is quite small. In addition, the coefficients on $C$ and $C \times OD$ for both professions offset one another with opposite signs. On net, it would appear that the spread of CLIA waiver pharmacies has had no effect on the wages of pharmacists or lab technicians. Table 3 supports this result: the coefficients on $\beta_a$ and $\beta_c$ are statistically insignificant for both pharmacists and lab technicians. We find some evidence that pharmacists work more hours (about 1.5 more hours) per week than do podiatrists and optometrists. Taken together, our results generally support the hypothesis that pharmacists can accommodate routine medical testing in their usual work hours. The spread of CLIA pharmacies has not had a measurable effect on either the wages or the hours worked of pharmacists and lab technicians.

**Conclusion**

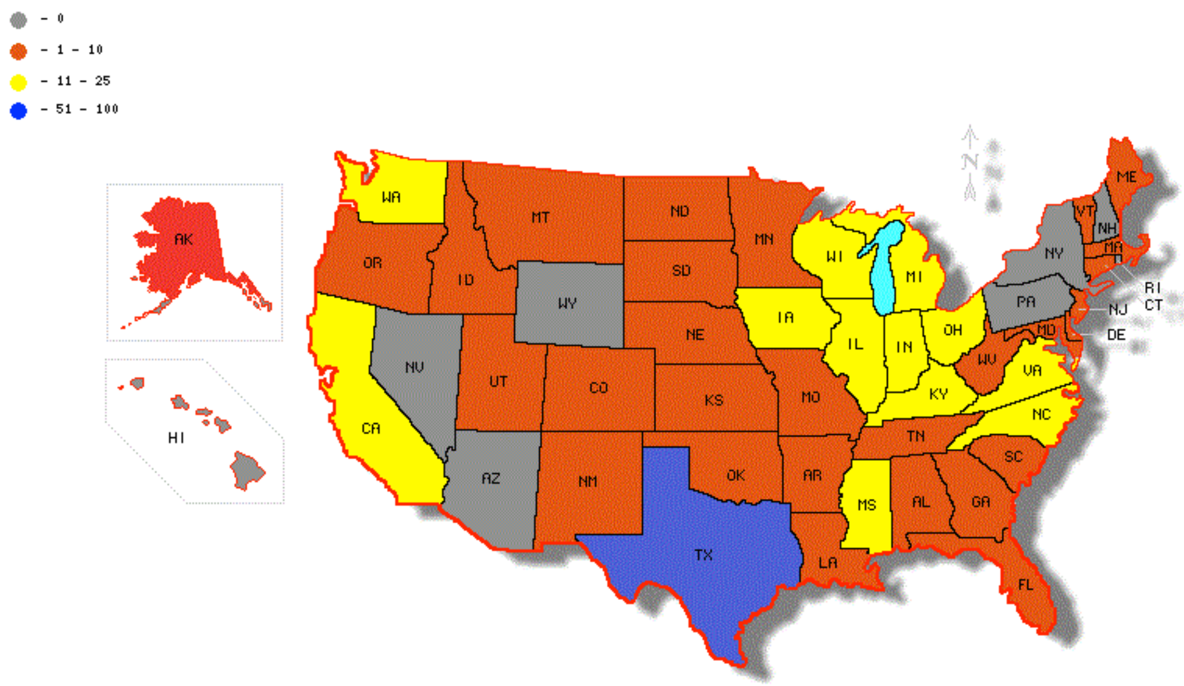
In this paper, we document the spread of CLIA waiver pharmacies in the United States and examine its effects on the pharmacist and lab technician labor markets. We find no evidence that the spread of CLIA waivers has affected pharmacist or lab technician labor market outcomes. The implications of this finding are that pharmacies can accommodate routine medical testing into current job duties without creating pressures for pharmacists and lab technicians to work longer hours, a factor that might have caused the cost of delivering testing within pharmacies to rise.

The potential for the spread of CLIA waivers may not yet be realized. Until recently, states that have large footprints of CLIA waivers have used blood glucose testing but have generally not taken advantage of other testing that could be performed (e.g., for strep throat). In states that present barriers to obtaining CLIA waivers, this growing potential may be stymied.

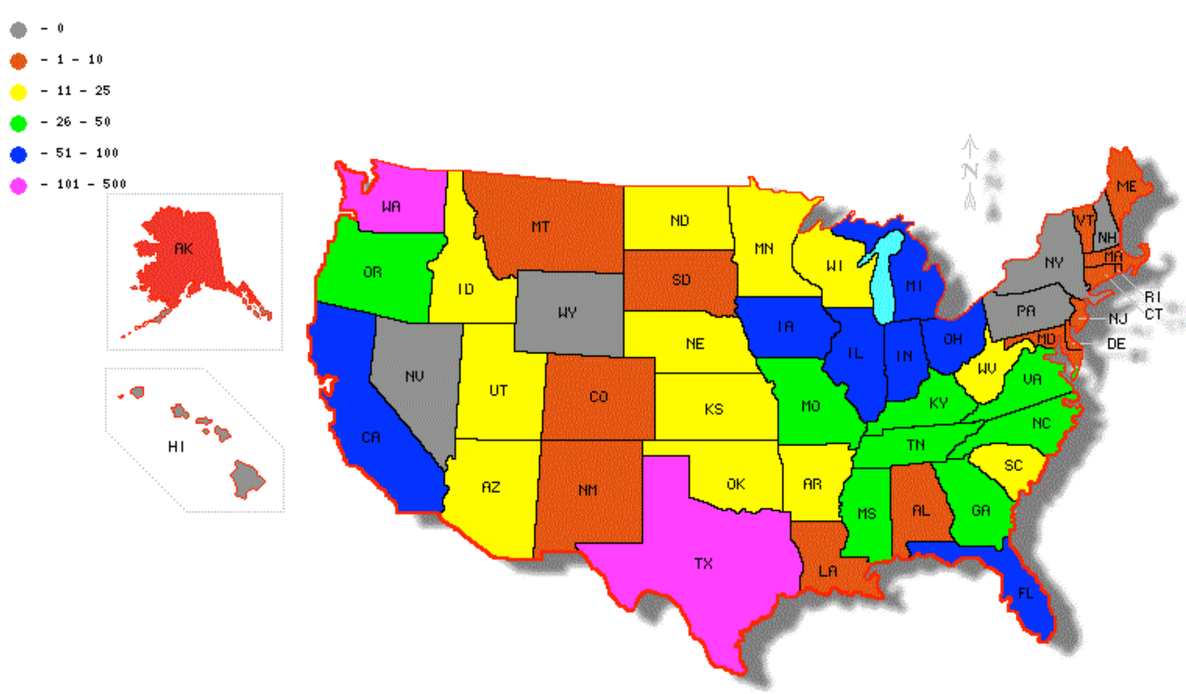
It is not likely that a single nonphysician healthcare professional can serve as a substitute for a physician. A mix of professionals, including pharmacists, can help bring health care to those who need it most. States that currently make it onerous for pharmacists to obtain CLIA waivers (e.g., Nevada) should consider relaxing restrictions to allow pharmacies to expand their role in the provision of healthcare services. Expanding the roles of existing professionals should allow the provision of health care to expand without significantly expanding cost—and this seems to be the right prescription for what ails the US market for health care.

**Figure 1. Number of Pharmacies with CLIA Waivers**

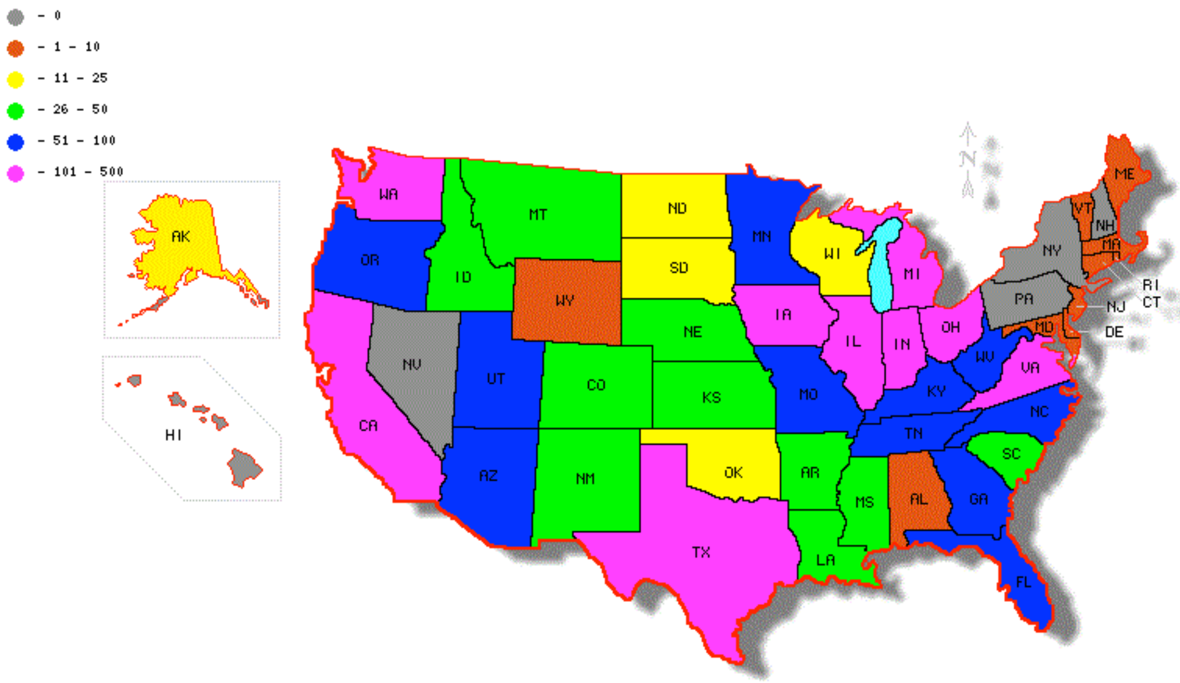
**Panel A. January 1, 1999**



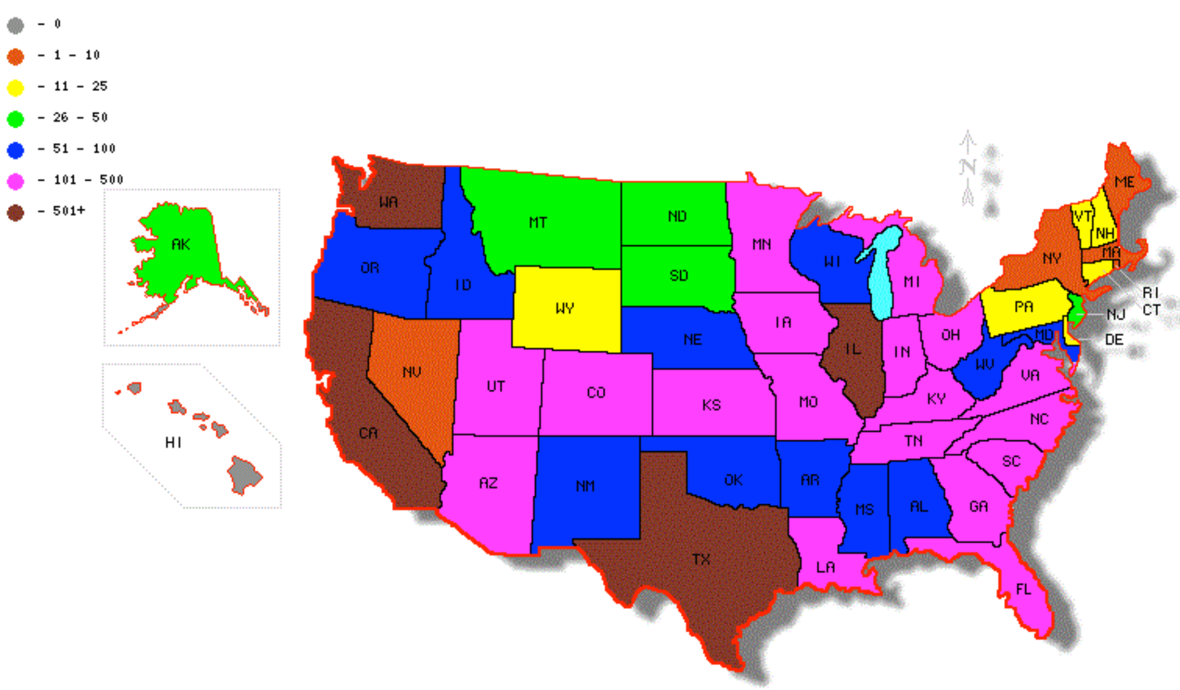

**Panel B. January 1, 2004**



**Panel C. January 1, 2009**




**Panel D. January 1, 2014**




Note: CLIA = Clinical Laboratory Improvement Amendments of 1988.

Source: Data from the Centers for Disease Control and Prevention.

**Table 1. Summary Statistics**

| Above mean (12.5) CLIA pharmacies per 1,000 residents | | | Below mean (12.5) CLIA pharmacies per 1,000 residents | | |
|---|---|---|---|---|---|
| Variable | Mean | Standard deviation | Variable | Mean | Standard deviation |
| *Pharmacists* | | | *Pharmacists* | | |
| State unemployment rate | 6.68211 | 1.965617 | State unemployment rate | 6.478883 | 2.465823 |
| Personal income per capita | 39,607.31 | 5,783.332 | Personal income per capita | 40,032.4 | 7,886.452 |
| PhD dummy | 0.487174 | 0.499854 | PhD dummy | 0.418283 | 0.493289 |
| Hourly wage (2014 $) | 54.2592 | 63.7414 | Hourly wage (2014 $) | 54.14435 | 52.89652 |
| Male | 0.477075 | 0.499493 | Male | 0.489185 | 0.499895 |
| Hispanic | 0.033392 | 0.179665 | Hispanic | 0.031559 | 0.174827 |
| Other minorities | 0.122586 | 0.327973 | Other minorities | 0.193222 | 0.394835 |
| Black | 0.045113 | 0.207559 | Black | 0.045031 | 0.207377 |
| Hours worked | 35.64057 | 14.1588 | Hours worked | 36.10293 | 14.28576 |
| Age | 45.02897 | 14.49778 | Age | 44.80939 | 14.14776 |
| *n* = 13,566 | | | *n* = 21,452 | | |
| *Lab technicians* | | | *Lab technicians* | | |
| State unemployment rate | 6.735252 | 1.979845 | State unemployment rate | 6.401377 | 2.421469 |
| Personal income per capita | 39,668.33 | 5,773.407 | Personal income per capita | 39,976.55 | 7,907.572 |
| Hourly wage (2014 $) | 24.42459 | 23.36337 | Hourly wage (2014 $) | 26.54459 | 50.39077 |
| Male | 0.24355 | 0.429237 | Male | 0.255904 | 0.436376 |
| Hispanic | 0.070115 | 0.255348 | Hispanic | 0.075408 | 0.2640535 |
| Other minorities | 0.122504 | 0.327876 | Other minorities | 0.1792 | 0.3835261 |
| Black | 0.099435 | 0.299255 | Black | 0.112867 | 0.3164358 |
| Hours worked | 33.8259 | 14.79993 | Hours worked | 34.60516 | 14.46583 |
| Age | 44.2546 | 14.27989 | Age | 43.16736 | 13.57813 |
| *n* = 16,473 | | | *n* = 28,538 | | |

Note: CLIA = Clinical Laboratory Improvement Amendments of 1988.

Source: CLIA pharmacy data from the Centers for Disease Control and Prevention. All other data from the 2000–14 American Community Survey.

**Table 2. Difference-in-Differences and Triple-Difference Estimates of the Effects of the Number of CLIA Waiver Pharmacies in Each State on the Wages of Pharmacists and Lab Technicians**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Pharmacists* | | | | |
| CLIA pharmacies per 1,000 residents | 0.00000166<br>(0.0005653) | 0.0008924<br>(0.0011552) | 0.0021472**<br>(0.0009286) | 0.0024726*<br>(0.0013563) |
| Pharmacist dummy | | | 0.230652***<br>(0.0199083) | 0.2292939***<br>(0.0201825) |
| Pharmacist dummy × CLIA per 1,000 residents | | | −0.001989**<br>(0.0008202) | −0.0018636**<br>(0.0008193) |
| Personal income per capita | 0.00000281<br>(0.00000227) | −0.000000462<br>(0.000000984) | 0.0008202<br>(0.00000199) | −0.000000506<br>(0.000000834) |
| State unemployment rate | −0.006751<br>(0.0048351) | −0.0123072*<br>(0.006669) | −0.0047791<br>(0.005106) | −0.0091318<br>(0.0061066) |
| Linear and quadratic time trends | no | yes | no | yes |
| Triple difference | no | no | yes | yes |
| *n* | 35,018 | 35,018 | 41,188 | 41,188 |
| *Lab technicians* | | | | |
| CLIA pharmacies per 1,000 residents | −0.0003494<br>(0.00060330) | 0.000183<br>(0.0007985) | −0.0004523<br>(0.0008927) | −0.0031187***<br>(0.0009298) |
| Lab tech dummy | | | 0.2110824***<br>(0.0143516) | 0.2104596***<br>(0.0142729) |
| Lab tech × CLIA per 1,000 residents | | | 0.0026496***<br>(0.0006684) | 0.0026637***<br>(0.0006591) |
| Personal income per capita | 0.000000194<br>(0.000000928) | −0.000000248<br>(0.00000102) | −0.00000194*<br>(0.00000109) | −0.00000124<br>−0.00000251 |
| State unemployment rate | 0.0051312<br>(0.0043842) | 0.0044448<br>(0.0039397) | 0.0061586**<br>(0.0030359) | 0.0079739**<br>(0.0035055) |
| Linear and quadratic time trends | no | yes | no | yes |
| Triple difference | no | no | yes | yes |
| *n* | 45,011 | 45,011 | 88,372 | 88,372 |

Note: CLIA = Clinical Laboratory Improvement Amendments of 1988.

Source: CLIA pharmacy data from the Centers for Disease Control and Prevention. All other data from the 2000–14 American Community Survey.

**Table 3. Difference-in-Differences and Triple-Difference Estimates of the Effects of the Number of CLIA Waiver Pharmacies in Each State on the Hours Worked of Pharmacists and Lab Technicians**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Pharmacists* | | | | |
| CLIA pharmacies per 1,000 residents | 0.0040014<br>(0.0123564) | −0.0179368<br>(0.0279278) | 0.0245324<br>(0.0189099) | 0.0230452<br>(0.0282365) |
| Pharmacist dummy | | | 1.480244***<br>(0.2618149) | 1.451953***<br>(0.2599048) |
| Pharmacist dummy × CLIA per 1,000 residents | | | −0.0263508<br>(0.0169577) | −0.0251122<br>(0.0168104) |
| Personal income per capita | 0.0000509*<br>(0.0000288) | 0.0000656**<br>(0.0000264) | 0.0000349<br>(0.0000209) | 0.0000456**<br>(0.0000189) |
| State unemployment rate | −0.0080852<br>(0.0743165) | 0.0168159<br>(0.109779) | −0.0053684<br>(0.078263) | 0.0045399<br>(0.1083881) |
| Linear and quadratic time trends | no | yes | no | yes |
| Triple difference | no | no | yes | yes |
| *n* | 35,018 | 35,018 | 41,188 | 41,188 |
| *Lab technicians* | | | | |
| CLIA pharmacies per 1,000 residents | −0.0085238<br>(0.01347830 | 0.0204973<br>(0.0246784) | −0.0261629<br>(0.0168614) | −0.0061744<br>(0.0170693) |
| Lab tech dummy | | | 0.0544809<br>(0.2729833) | 0.0591175<br>(0.277395) |
| Lab tech × CLIA per 1,000 residents | | | 0.0217097<br>(0.0150847) | 0.0213318<br>(0.0152183) |
| Personal income per capita | 0.0000153<br>(0.000029) | −0.00000996<br>(0.000021) | 0.0000637**<br>(0.0000312) | 0.000004<br>(0.0000565) |
| State unemployment rate | 0.1839863*<br>(0.0914043) | 0.2444624**<br>(0.1118273) | 0.0318403<br>(0.0777344) | 0.0617881<br>(0.0630612) |
| Linear and quadratic time trends | no | yes | no | yes |
| Triple difference | no | no | yes | yes |
| *n* | 45,011 | 45,011 | 88,372 | 88,372 |

Note: CLIA = Clinical Laboratory Improvement Amendments of 1988.

Source: CLIA pharmacy data from the Centers for Disease Control and prevention. All other data from the 2000–14 the American Community Survey.