

The Pharmacist Workforce in the U.S.:

Supply, Distribution, Education Pathways, and State Responses to Emergency Surges in Demand

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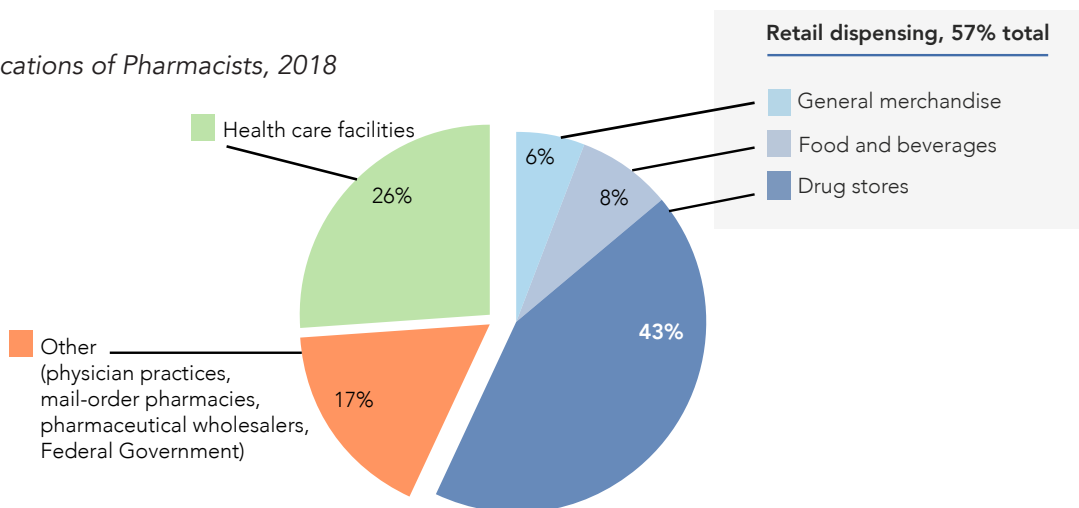
Practice Scope and Settings

Pharmacists provide a broad spectrum of services depending on their practice setting and scope-of-practice laws within their state.¹ The traditional role of pharmacists is to dispense prescription medications and advise patients and health care practitioners on how to maximize the benefits and minimize the risks of prescription medications, including medication safety, drug contraindications and interactions.² However, pharmacists are increasingly used in a variety of ways, taking on roles such as medication therapy management, chronic disease management, patient education, health promotion, and disease prevention.^{1,3,4}

Within some of these roles, pharmacists may work directly with patients to conduct health and wellness screenings, provide flu shots and other immunizations, and counsel patients about stress management, smoking cessation, nutrition, exercise, and chronic disease management.^{1,2} In other roles, pharmacists may work with inpatient and outpatient care teams including attending hospital rounds with physicians and the health care team to recommend medications, overseeing the dosage and timing of medication delivery, and providing transition of care.^{5,6}

Figure 1 shows the distribution of work locations of pharmacists according to the U.S. Bureau of Labor Statistics: 57% work in retail settings, 26% work in hospitals, clinics and other health care facilities, and the remaining 17% work in varied settings, including academia, Internet or mail-order pharmacies, pharmaceutical wholesalers, or the U.S. Federal Government (e.g., Food and Drug Administration (FDA), Indian Health Services, Federal Bureau of Prisons, and Department of Veterans Affairs).^{3,7}

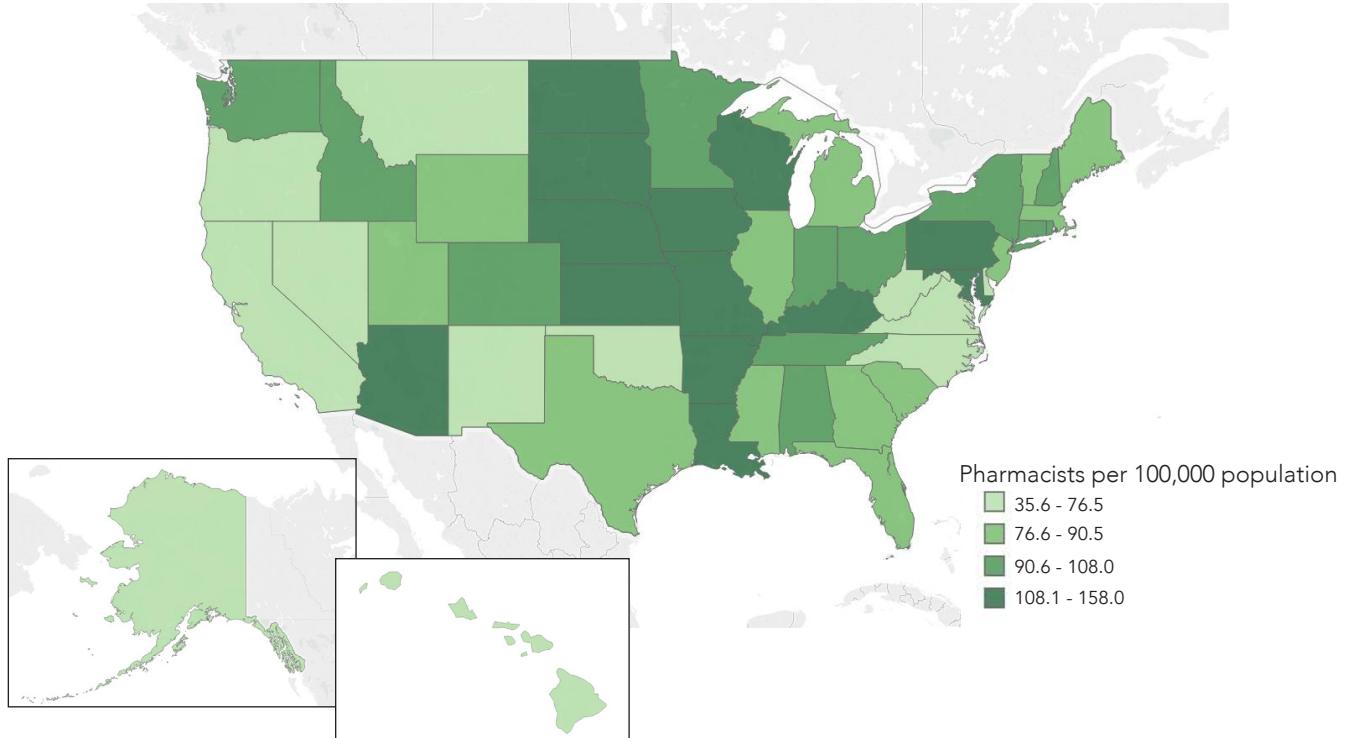
Figure 1. Work Locations of Pharmacists, 2018



Supply and Distribution

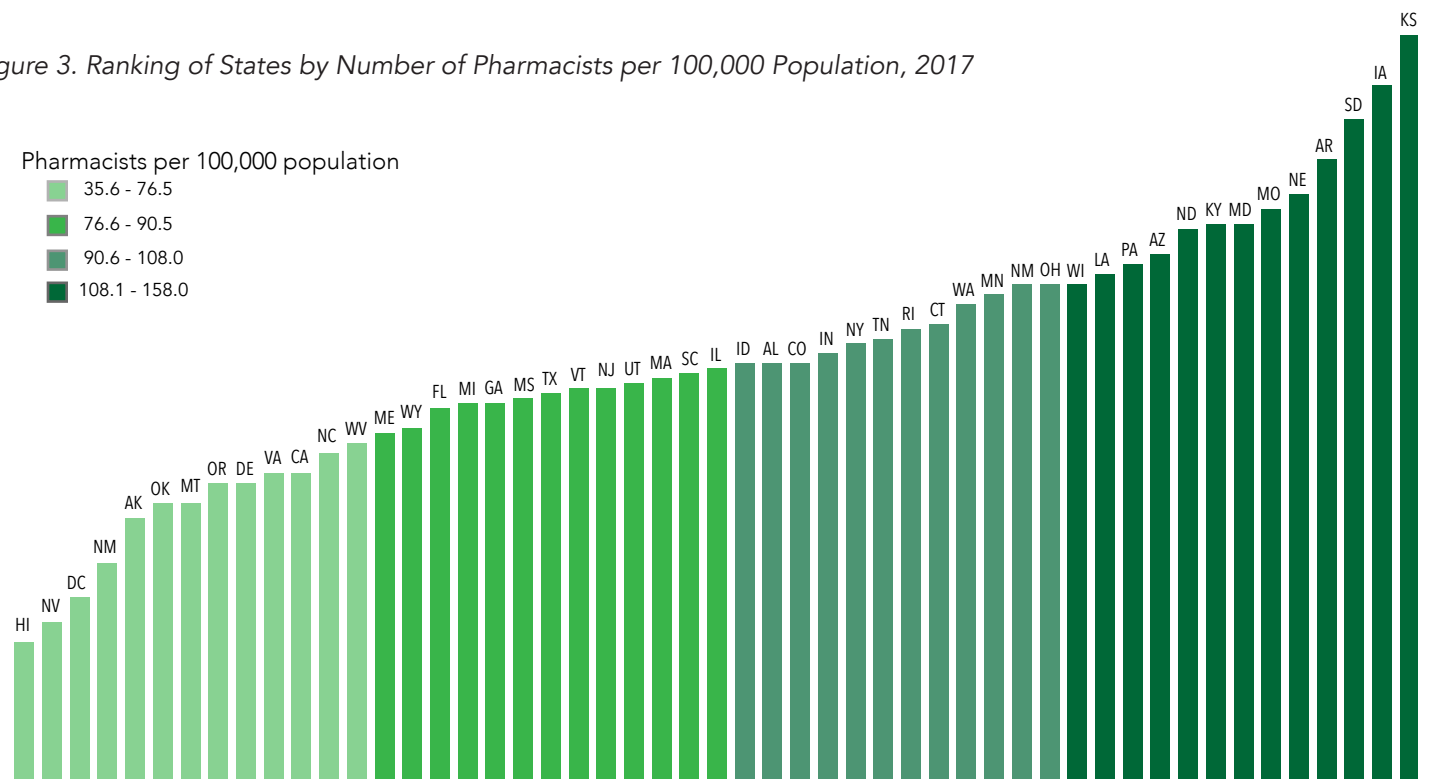
An estimated 387,000 licensed pharmacists practiced in the U.S. as of October 2019.^{8,9} **Figure 2** shows the number of pharmacists per 100,000 population in each state and **Figure 3** shows state ranking by the number of pharmacists per 100,000 population in 2017.¹⁰

Figure 2. Pharmacists per 100,000 Population by U.S. State, 2017



Due to small sample sizes, estimates should be interpreted with caution in 11 states (WV, ID, NE, RI, SD, NH, NV, ME, VT, ND, HI) and are unreliable in 4 states (AK, DE, MT, WY) and the District of Columbia.

Figure 3. Ranking of States by Number of Pharmacists per 100,000 Population, 2017



Due to small sample sizes, estimates should be interpreted with caution in 11 states (WV, ID, NE, RI, SD, NH, NV, ME, VT, ND, HI) and are unreliable in 4 states (AK, DE, MT, WY) and the District of Columbia.

In 2017, the median age of pharmacists was 41.9 years and over half of pharmacists were female (56.7%). The percentage of pharmacists who were White was similar to the U.S. population (70.0% vs. 73.0%), while there was only half the representation of Black pharmacists compared to the U.S. population (7.2% versus 12.7%), and nearly four times greater representation of Asians (20.2% vs. 5.4%). Only 4.3% of pharmacists were Hispanic regardless of race compared to 17.6% in the U.S. population.^{11,12}

Education and Credentialing

A four-year professional degree, the Doctor of Pharmacy (PharmD), is currently the minimum educational requirement for a pharmacist's license.³ Prior to 2000, the Bachelor of Pharmacy (BPharm) was the accepted entry-level degree. Those holding a bachelor's degree in pharmacy who graduated before 2005 are eligible to register for a pharmacist license.^{13,14}

In 2019, approximately 140 accredited PharmD programs were operating in the U.S.¹⁵ To become licensed, states require a variety of tests and certifications. After graduating from a PharmD program, pharmacists complete the North American Pharmacist Licensure Exam (NAPLEX), a national test of pharmacy skills and knowledge, and the Multistate Pharmacy Jurisprudence Exam (MJPE) or another state-specific test on pharmacy law.³ In addition to the NAPLEX and MJPE, state-specific written and practical exams may be required for licensure.³ Additionally, pharmacists may earn certification in specific knowledge areas. For example, a pharmacist may become a Certified Diabetes Educator by completing training offered by the National Certification Board for Diabetes Educators.³ Pharmacists may also complete an optional residency or fellowship if they wish to specialize. Thirteen pharmacy specialties are currently available including cardiology, infectious disease, oncology, critical care and pediatrics.¹⁶

In 2019, more than 5,000 pharmacists entered pharmacy residencies across the U.S., a 40% increase in residency positions since 2014.¹⁷ The Board of Pharmacy Specialists reports that 42,710 licensed pharmacists had active specialty certifications as of July 2019.¹⁸ The number of new pharmacy graduates entering the workforce grew from 11,736 in 2009-2010 to 14,884 in 2018-2019 (**Table 1**).¹⁹ By 2030, the supply of active pharmacists is projected to increase by 36%.²⁰

Table 1: Total Number of Doctor of Pharmacy Degrees Conferred, 2010-2019

Year	Number of Institutions	Total Number of Degrees* Awarded	Percent Change from Previous Year
2009-2010	95	11,736	—
2010-2011	100	12,335	5.1%
2011-2012	107	13,007	5.4%
2012-2013	113	13,369	2.8%
2013-2014	117	13,884	3.9%
2014-2015	122	14,261	2.7%
2015-2016	126	14,664	2.8%
2016-2017	127	14,804	1.0%
2017-2018	132	14,934	0.9%
2018-2019	134	14,884	-0.3%

*Degree type: Doctor of Pharmacy (PharmD) degree awarded as first professional degree. Other types of pharmacy degrees (MS or PhD) not included. Data source: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Expansion of Pharmacists' Scope of Practice and COVID-19 Emergency-Related Workforce Capacity

Pharmacists' roles have evolved and expanded in the last decade. In addition to dispensing, pharmacists' roles in patient care and on health care teams have grown in recent years. Pharmacist organizations have been increasingly engaged in legislative initiatives, policy changes and lobbying efforts to increase the range of services that pharmacists can provide.^{4, 21} For example, in 2019 alone, more than 100 pieces of legislation across 34 states were introduced to enhance pharmacists' scope of practice.⁴ These include changes such as expansion of statewide protocols allowing pharmacists to dispense certain medications and medical tests without a formalized prescriber relationship and expansion of standing orders authorizing pharmacists to carry out a physician order for a specific population without a prescription.

The COVID-19 pandemic highlights opportunities to further expand the role of pharmacists to ease pressure on hospitals and clinics. Given the diverse and visible settings in which pharmacists work (e.g., grocery and drug stores), pharmacists may be uniquely positioned to provide accessible, efficient community care and consistent information during health emergencies. Pharmacists may also have a frontline role in essential pandemic services in rural and underserved areas given that an estimated 90% of Americans live within five miles of a pharmacy²² and that pharmacists may be the only health care provider immediately accessible to these populations.

Below we describe pharmacists' *current*, *evolving*, and potential *future* roles in the COVID-19 pandemic response.

Current Pharmacist Roles in the COVID-19 Response

Pharmacists are actively engaged in the following COVID-19 activities:

- Providing patients with the most current information, and correcting mis-information, about COVID-19 prevention and management.²³
- Serving as a key resource to providers, patients and the public in evaluating the literature related to new or repurposed medications for COVID-19.²⁴
- Assisting patients and their providers in obtaining off-label medications to treat COVID-19. For example, remdesivir, a broad-spectrum antiviral medication, initially evaluated as a treatment for Hepatitis C, Ebola and Marburg viruses, has received FDA emergency use authorization for COVID-19.^{24,25}
- Managing medication shortages. Hospitals have experienced shortages of anesthetics, muscle relaxants, painkillers, and sedatives needed for patients placed on ventilators.²⁶ Pharmacists are working with nurses to minimize drug waste, including re-writing crash cart protocols to ensure that unused medications are not thrown away; negotiating with wholesalers to find potential sources of drugs in shortage; and collaborating within the health system to transport medications to locations where they are most needed.²⁷
- Increasing engagement in using telehealth to manage chronic care and COVID-19 medication education under expanded telehealth rules.²⁸

Evolving Pharmacist Roles in COVID-19 Response

Ensuring that COVID-19 tests are available and accessible in community settings are key requirements for safely reopening society and local economies, according to the National Governors Association *Roadmap for Recovery*.²⁹ Given their presence in the community, pharmacists can play an important frontline role in delivering COVID-19 tests. In April 2020, the U.S. Department of Health and Human Services authorized pharmacists to order and administer FDA-approved COVID-19 antigen and antibody tests.³⁰

Despite authorization, pharmacists report challenges to routine testing, including a shortage of test kits and reagents, a lack of clarity on which tests to buy, limited training on test administration, and little information on reimbursement.^{29,31} In addition, before pharmacies can perform point-of-care COVID-19 testing, they need to obtain a Clinical Laboratory Improvement

Amendments (CLIA) Certificate of Waiver from the Centers for Medicare & Medicaid Services.³⁰ Alternatively, pharmacies can collect and send specimens to a reference lab for testing without the required CLIA certificate.³² Several states, including New Hampshire, Oregon, and Minnesota have additional state-specific regulations, such as document retention and training requirements, before COVID-19 testing can take place.^{32,33}

Regulatory and logistical hurdles aside, as of September 10, 2020 point-of-care COVID-19 testing is available, with growing capacity, in specific pharmacies in a limited number of states and locations.³³

Future Pharmacist Roles in COVID-19 Response

Routine childhood vaccine rates have decreased during the stay-at-home recommendations.³⁴ As states reopen, pharmacists could have a role in helping the public catch up on general immunizations as a way to relieve the burden on primary care providers.³⁵ Additionally, COVID-19 vaccines are currently being tested with unprecedented global cooperation and speed. Experts anticipate that a COVID-19 vaccine could be ready for distribution as early as 2021.³⁶ Ideally, researchers, policymakers and industry will begin working together now, before these vaccines are available, to ensure efficient and equitable distribution.

Pharmacists may be well-suited to play a key role in COVID-19 vaccine administration given their accessibility and long-standing history of providing community vaccinations. Pharmacist advocacy groups and professional associations have begun actively preparing for this role by developing joint, national policy recommendations aimed at allowing pharmacists to administer all FDA-approved vaccines, including COVID-19 vaccines, without a prescription from another provider.³⁵ Currently, each state has different immunization guidelines and, even within states, the type of vaccines that pharmacists can administer vary because of differing protocols between pharmacies and partnering physicians.³⁵ Pharmacy advocacy groups are also proactively laying the groundwork for reimbursement. The (future) COVID-19 vaccine will be covered by Medicare Part B, but provider reimbursement by state Medicaid programs and private payers has not yet been determined.³⁷

Examples of State and National Approaches for Emergency Increases to the Pharmacist Workforce

Re-activate licenses for pharmacists who have recently left practice.

- Massachusetts,³⁸ North Carolina³⁹

Emergency authorization for out-of-state reciprocity licenses.

- The National Association of Boards of Pharmacy (NABP) Passport⁴⁰ provides temporary authorization and facilitates 19 states to efficiently grant emergency licensure to pharmacists, pharmacy technicians, interns, and pharmacy businesses practicing in another state.

Expedite student transition into practice.

- Indiana (Purdue University): Fourth-year PharmD students can pursue licensure exams 30 days early and are eligible to work as graduate pharmacists until fully licensed.⁴¹
- New Jersey (Rutgers University): All fourth-year students who have completed curricular requirements will graduate early.⁴²

Remote processing of prescription drug orders and review processing.

- National: A majority of states allow temporary, out-of-pharmacy remote prescription drug order entry and review by a licensed, registered or certified pharmacist, for a pharmacy licensed and located with the state.³⁹

Extend license expiration dates.

- Vermont: Retired pharmacists and those with expired licenses returning to the workforce to help in a state of emergency do not have to apply for a temporary license if expired within the past 3 years.³⁹
- Arizona: License renewal and continuing education deadlines extended by six months unless they can be completed online.³⁹

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Literature Cited

1. The Policy Surveillance Program - The Law Atlas. Pharmacist Scope of Practice. <http://lawatlas.org/datasets/pharmacist-scope-of-practice-1509023805>. Accessed May 2020.
2. Toklu HZ, Hussain A. The changing face of pharmacy practice and the need for a new model of pharmacy education. *J Young Pharm*. 2013;5(2):38-40.
3. U.S. Bureau of Labor Statistics. Pharmacists: Occupational Outlook Handbook. <https://www.bls.gov/ooh/healthcare/pharmacists.htm>. Accessed May 2020.
4. Pollack SW, Skillman SM, Frogner BK. Assessing the Size and Scope of the Pharmacist Workforce in the U.S. Center for Health Workforce Studies, University of Washington, Sep 2020.
5. Manolakis PG, Skelton JB. Pharmacists' contributions to primary care in the United States collaborating to address unmet patient care needs: the emerging role for pharmacists to address the shortage of primary care providers. *Am J Pharm Educ*. 2010;74(10):S7.
6. Smith M, Bates DW, Bodenheimer TS. Pharmacists belong in accountable care organizations and integrated care teams. *Health Aff (Millwood)*. 2013;32(11):1963-1970.
7. Kosteva D. How to maneuver through the Federal pharmacy job application process. *Pharmacy Times*, March 3, 2016.
8. Numbers vary due to data source.
9. American Association of Colleges of Pharmacy. 2019 NABP E-Profile Aggregate Data. https://www.aacp.org/sites/default/files/2019-10/NABP%20E-profile%20Aggregate%20Analysis%20Report_Oct2019_final.pdf. Accessed May 2020.
10. Integrated Public Use Microdata Series. Harmonized census and American Community Survey (ACS) Data. <https://ipums.org/projects/ipums-usa/d010.v8.0>. Accessed June 2020.
11. American Community Survey. Steven Ruggles SF, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas and Matthew Sobek,. IPUMS USA: Version 10.0 [dataset]. Minneapolis, MN: IPUMS, 2020. <https://doi.org/10.18128/D010.V10.0>.
12. American Community Survey. ACS Demographic and Housing Estimates, <https://data.census.gov/cedsci/table?d=ACS%205-Year%20Estimates%20Data%20Profiles&tid=DP05&tid=ACSDP5Y2017.DP05>.
13. Accreditation Council for Pharmacy Education. Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree, 2011. <https://www.acpe-accredit.org/pdf/FinalS2007Guidelines2.0.pdf>. Accessed May 2020.
14. Washington State Department of Health. Pharmacist License Requirements. <https://www.doh.wa.gov/LicensesPermitsandCertificates/ProfessionsNewReneworUpdate/Pharmacist/LicenseRequirements>. Accessed May 2020.
15. American Association of Colleges of Pharmacy. Academic Pharmacy's Vital Statistics. <https://www.aacp.org/article/academic-pharmacies-vital-statistics>. Accessed May 2020.
16. Board of Pharmacy Specialities. Speciality Councils. <https://www.bpsweb.org/about-bps/specialty-councils/>. Accessed May 2020.
17. American Society of Hospital Pharmacists. ASHP's Pharmacy Residency Match Meets Increased Need for Postgraduate Training. <https://www.ashp.org/news/2019/04/10/ashpspharmacyresidency-match-meets-increased-need-for-postgraduate-training?loginreturnUrl=SSOCheckOnly>. Accessed May 2020.
18. Board of Pharmacy Specialities. Annual Report: BPS Board Certified Pharmacists. 2018. <https://board-of-pharmacy-specialties.dcatalog.com/v/2018-Annual-Report/>. Accessed May 2020.

19. U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2009-10 to 2018-19, comparing institutions dataset. <https://nces.ed.gov/ipeds/>. Accessed July 28, 2020.
20. U.S. Department of Health and Human Services. Health Resources and Services Administration. National Center for Health Workforce Analysis. Allied Health Workforce Projections, 2016-2030: Pharmacists. Published 2018. <https://bhw.hrsa.gov/sites/default/files/bhw/nchwa/projections/pharmacists-2016-2030.pdf>. Accessed June 2020.
21. American Society of Hospital Pharmacists (ASHP). ASHP Policy Positions 1982–2019. <https://www.ashp.org/-/media/assets/policy-guidelines/docs/browse-by-document-type-policy-positions-1982-2017-with-rationales-pdf.ashx>. Accessed May 2020.
22. Qato DM, Zenk S, Wilder J, Harrington R, Gaskin D, Alexander GC. The availability of pharmacies in the United States: 2007-2015. *PLoS One*. 2017;12(8):e0183172.
23. American Society of Hospital Pharmacists. Assessment of Evidence for COVID-19-Related Treatments. <https://www.ashp.org/-/media/assets/pharmacy-practice/resource-centers/Coronavirus/docs/ASHP-COVID-19-Evidence-Table.ashx?la=en&hash=B414CC64FD64E1AE8CA47AD753BA744EDF4FFB8C>. Accessed May 2020.
24. Gross AE, MacDougall C. Roles of the clinical pharmacist during the COVID-19 pandemic. *Journal of the American College of Clinical Pharmacy*.3(3):564-566.
25. Food and Drug Administration. Coronavirus (COVID-19) Update: FDA Issues Emergency Use Authorization for Potential COVID-19 Treatment. <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-issues-emergency-use-authorization-potential-covid-19-treatment>. Accessed May 2020.
26. Silverman E. A New Covid-19 Problem: Shortages of Medicines Needed for Placing Patients on Ventilators. <https://www.statnews.com/pharmalot/2020/03/31/a-new-covid-19-problem-shortages-of-medicines-needed-for-placing-patients-on-ventilators/>. Accessed May 2020. Stat.
27. Lohr R. How Pharmacists Can Navigate Shortages of Critical COVID-19 Drugs. <https://www.advisory.com/daily-briefing/2020/04/09/drug-shortages>. Accessed May 2020.
28. American Society of Hospital Pharmacists. COVID-19 and Telehealth Changes. <https://www.ashp.org/Advocacy-and-Issues/Key-Issues/Other-Issues/Issue-Brief-COVID-19?loginreturnUrl=SSOCheckOnly>. Accessed July 2020.
29. National Governors Association. Roadmap to Recovery: A Public Health Guide for Governors. <https://www.nga.org/wp-content/uploads/2020/04/NGA-Report.pdf>. Accessed May 2020.
30. National Association of Boards of Pharmacy. Pharmacists' Authority to Test for COVID-19. <https://nabp.pharmacy/wp-content/uploads/2020/04/APhA-Pharmacists-Ability-to-Test-COVID19-April-2020.pdf>. Accessed May 2020.
31. Avis D, Choudhary V. Cuomo's Pharmacy COVID Testing Prescription Remains Unfilled. <https://thecity.nyc/2020/05/cuomos-pharmacy-covid-testing-prescription-remains-unfilled.html>. Accessed May 2020.
32. Pharmacy Times. COVID-19 and Pharmacies: Latest Legal Developments. <https://www.pharmacytimes.com/news/covid-19-and-pharmacies-latest-legal-developments>. Accessed May 2020.
33. National Alliance of State Pharmacy Associations. COVID-19 Testing. <https://naspa.us/resource/covid-19-testing/>. Accessed September 2020.
34. Centers for Disease Control and Prevention. Effects of the COVID-19 Pandemic on Routine Pediatric Vaccine Ordering and Administration — United States, 2020. <https://www.cdc.gov/mmwr/volumes/69/wr/mm6919e2.htm>. Accessed July 2020.
35. Joint Statement of American Pharmacists Association et al. Pharmacy Organization's Joint Policy Recommendations to Combat the COVID-19 Pandemic. https://www.pharmacist.com/sites/default/files/files/APHA%20Meeting%20Update/PHARMACISTS_COVID19-Final-3-20-20.pdf. Accessed May 2020.
36. Collins FS, Stoffels P. Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV): An Unprecedented Partnership for Unprecedented Times. *JAMA*. 2020;323(24):2456-2457.
37. Kaiser Family Foundation. FAQs on Medicare Coverage and Costs Related to COVID-19 Testing and Treatment. <https://www.kff.org/coronavirus-covid-19/issue-brief/faqs-on-medicare-coverage-and-costs-related-to-covid-19-testing-and-treatment/>. Accessed June 2020.
38. Massachusetts Bureau of Health Professionals Licensure. COVID-19 Licenses - Board of Registration in Pharmacy. <https://www.mass.gov/service-details/covid-19-licenses-board-of-registration-in-pharmacy>. Accessed May 2020.
39. National Alliance of State Pharmacy Associations. COVID-19 Information from the States. <https://naspa.us/resource/covid-19-information-from-the-states/>. Accessed September 2020.
40. National Association of Boards of Pharmacy. Temporary or Emergency Licensure Facilitated by NABP Passport. <https://nabp.pharmacy/coronavirus-updates/passport/>. Accessed September 2020.
41. Purdue University News. Pharmacy students to graduate early in preparation for future COVID-19 impact. <https://www.purdue.edu/newsroom/releases/2020/Q2/pharmacy-students-to-graduate-early-in-preparation-for-future-covid-19-impact.html>. Accessed September 2020.
42. Rutgers Ernest Mario School of Pharmacy. Rutgers' Ernest Mario School of Pharmacy to Move Up Graduation of New Pharmacists. <https://pharmacy.rutgers.edu/2020/04/03/rutgers-ernest-mario-school-of-pharmacy-to-move-up-graduation-of-new-pharmacists/>. Accessed September 2020.