
Strategies for Expanding Primary Care Capacity in California

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Abstract/Overview

California is facing an imminent shortage of primary care clinicians. Demand for full-time equivalent primary care clinicians in California is projected to increase substantially between 2016 and 2030 due to growth and aging of the population and changes in the volume and intensity of the use of health care services. Although there has been rapid growth in the nurse practitioner (NP) and physician assistant (PA) workforces, their numbers are small relative to the number of physicians, and many NPs and PAs do not practice in primary care settings. In addition, the distribution of primary care clinicians across regions of the state is uneven, and Latinos, African Americans and Native Americans are underrepresented among them. These findings raise questions about whether California could do more to increase the size of the primary care workforce and improve geographic distribution and racial and ethnic diversity. This report presents a conceptual framework for classifying primary care workforce development initiatives that have been implemented by California, other states and the federal government. The framework was derived from a review of literature on primary care workforce development and interviews with experts in health workforce research and policy. It consists of four components: (1) enhance the primary care education pipeline, (2) improve recruitment and retention of primary care clinicians, (3) maximize the existing primary care workforce and (4) leverage data to inform primary care workforce strategies. Examples of specific strategies for implementing each component of the framework are provided, along with questions policymakers should ask when considering implementing these strategies.

This report is the third in a series of reports from Healthforce Center at the University of California, San Francisco (UCSF). The first, *California's Primary Care Workforce: Current Supply, Characteristics, and Pipeline of Trainees*, presented the most current information on the supply, distribution and characteristics of allopathic physicians (MDs), osteopathic physicians (DOs), NPs and PAs who provide primary care in California. The second, *California's Primary Care Workforce: Forecasted Supply, Demand, and Pipeline of Trainees, 2016-2030*, described findings from forecasts of future supply and demand for primary care clinicians.

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Research Report

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Research Report

Executive Summary

California is facing an imminent shortage of primary care clinicians; the number of physicians completing primary care residencies in California does not appear to be adequate to replace primary care physicians who are likely to retire in the coming decade. Demand for full-time equivalent primary care clinicians in California is projected to increase by 12 percent to 18 percent between 2016 and 2030 due to population growth and aging and changes in the volume and intensity of the use of health care services. Although there has been rapid growth in the nurse practitioner (NP) and physician assistant (PA) workforces, their numbers are small relative to the number of physicians, and many NPs and PAs do not practice in primary care settings. In addition, the distribution of primary care clinicians across regions of the state is uneven, and Latinos, African Americans and Native Americans are underrepresented among them.

These findings raise questions about whether California could do more to increase the size of the primary care workforce and improve geographic distribution and racial and ethnic diversity. This report presents a framework for classifying primary care workforce development initiatives that have been implemented by California, other states and the federal government and presents evidence regarding their effectiveness; it is the third in a series of reports from Healthforce Center at UCSF. The first report presented the most current information on the supply, distribution and characteristics of allopathic physicians (MDs), osteopathic physicians (DOs), NPs and PAs who provide primary care in California.¹ The second report described findings from forecasts of future supply and demand for primary care clinicians.² The goal of this third report is to offer options for addressing the primary care workforce challenges identified in the first two reports. It builds on previous work on this topic by presenting a conceptual framework that can be used to separate primary care workforce development initiatives into four broad categories. The framework provides common language that stakeholders across sectors can use to develop a comprehensive and multipronged approach to address primary care workforce shortages in California.

Methods and Conceptual Framework

We conducted an extensive literature review to identify policies and practices that California, other states and the federal government have implemented to address primary care workforce shortages. In addition, we conducted 19 key informant interviews with experts in health workforce research and policy and representatives from physician, NP and PA professional organizations between May and June 2017. We also drew upon our knowledge of primary care workforce initiatives in California and programs administered by the federal government.

¹ Coffman JM, Geyn I, Himmerick K (2017). *California's Primary Care Workforce: Current Supply, Characteristics, and Pipeline of Trainees*. San Francisco, CA: Healthforce Center at UCSF.

² Spetz J, Coffman J, Geyn I (2017). *California's Primary Care Workforce: Forecasted Supply, Demand, and Pipeline of Trainees, 2016-2030*. San Francisco, CA: Healthforce Center at UCSF.

Using our literature review and interview notes, we identified the most common strategies that organizations used to meet primary care workforce needs. We used these findings to develop a conceptual framework of strategies for expanding primary care capacity at the state level that separates strategies into four overarching categories:

- Enhance the primary care education pipeline.
- Improve recruitment and retention of primary care clinicians.
- Maximize the existing primary care workforce.
- Leverage data to inform primary care workforce strategies.

The four overarching categories and examples of strategies within each category are described below.

Strategy 1: Enhance the Primary Care Education Pipeline

One important strategy for addressing California's primary care workforce needs is to train more of the desired primary care clinician types and prepare them to practice effectively in outpatient settings. The numbers of NP and PA training programs have expanded across the United States, and some states have also substantially increased the numbers of physicians they train; however, simply training more primary care clinicians will not be sufficient to address California's primary care workforce needs. Investments need to be targeted to support training in primary care in underserved areas of the state, interdisciplinary training and recruiting students likely to provide primary care in underserved areas upon graduation.

Some medical schools have developed programs that reduce the length of training for primary care physicians, which enables them to produce primary care physicians more quickly and reduces the cost of medical education for students. Examples include combined bachelor's and medical degree programs that reduce the length of these levels of education from eight years to six and programs that reduce the length of medical school from four years to three.

Some NP and PA training programs, medical schools and residency programs have implemented initiatives that provide specialized coursework, structured clinical training experiences and mentoring for trainees who are interested in providing primary care; some of these initiatives, such as teaching health centers, focus on preparing trainees to care for medically underserved populations. NP residency programs have also been established to enhance the preparation of NPs for clinical practice.

In addition, training curricula and experiences should be tailored to prepare students for primary care careers in a health care system that increasingly relies on interdisciplinary teams to provide care. Physicians, NPs and PAs should be trained alongside one another and persons in other occupations found in primary care settings to prepare them for team-based practice.

The maldistribution of primary care clinicians in California and the underrepresentation of Latinos, African Americans and Native Americans among them indicate a need to focus on preparing and recruiting students who are most likely to practice in underserved areas. Multiple studies have found that health professionals who grew up in rural areas are more likely to practice in rural areas and that underrepresented minorities are more likely to practice in communities that have high percentages of persons in underrepresented racial and ethnic groups.

Strategies for increasing the numbers of health professions students from rural areas and underrepresented racial and ethnic groups can be grouped into two major categories: recruitment and preparation. Recruitment strategies include establishing admissions policies that prioritize admission of students from rural areas and underrepresented racial or ethnic groups, creating a welcoming environment for underrepresented students and

providing financial aid to underrepresented students from low-income families to help them pay for their education. Preparation strategies include career pathways for K – 12 students that focus on exposure to health careers and college readiness and undergraduate-level programs that provide academic and psychosocial support to help students complete an undergraduate degree in a health profession or to successfully complete the prerequisites for admission to professional school. Other preparation strategies include post-baccalaureate programs and programs that help international medical graduate (IMGs) prepare for admission to a residency program in a primary care specialty in exchange for practicing in an underserved area upon completion of residency. Recruitment and preparation strategies can be combined to form a “grow your own model” that targets persons from particular underserved rural or urban areas.

Strategy 2: Improve Recruitment and Retention of Primary Care Clinicians

Expanding primary care training capacity and recruiting persons likely to practice in underserved areas are necessary but not sufficient conditions for improving the geographic distribution of primary care clinicians; additional strategies are needed to provide incentives for primary care clinicians to practice in these areas and support clinician recruitment and retention. Public and/or philanthropic funding for financial incentives is an important component of compensation packages because primary care practices that care for underserved populations often struggle to offer salaries that are competitive with those offered by practices that serve the middle and upper income brackets.

Loan repayment is the most popular financial incentive strategy; the federal government and many states including California operate programs under which the student loans of primary care physicians, NPs and PAs are repaid in exchange for their practicing in an underserved area. Other recruitment strategies include grants to physicians to establish practices in underserved areas and grants to primary care practices in underserved areas for recruiting additional physicians; a few states have established tax credits for primary care clinicians who practice in underserved areas. Many states also partner with the federal government to offer H1B visas and J-1 visa waivers, which enable IMGs who have completed residency in the United States to remain in the country immediately after completing residency instead of returning to their home countries.

Financial incentives can be challenging to implement if an employer is recruiting a primary care clinician from another state. Anecdotal reports from community health centers (CHCs) suggest that some have lost candidates they attempted to recruit from other states due to the length of time needed to obtain licensure in California. Participation in the National Council of State Boards of Nursing’s Advanced Practice Registered Nurse (APRN) Compact would expedite licensure for NPs. Once 10 states adopt the compact, NPs and other APRNs in participating states would hold a multistate license that would give them the privilege to practice in any participating state without obtaining an additional license.

Regardless of how they are recruited, physicians practicing in underserved areas need competitive compensation and support to cope with changes in reimbursement and care delivery. They also need to be able to take time away from clinical practice so that they can complete continuing education, take vacation leave and care for family members.

Strategy 3: Maximize the Existing Primary Care Workforce

Over the past decade, primary care practices have been called upon to enhance the quality of care for individual patients, improve the health of populations and reduce the per capita costs of health care. In addition, the Affordable Care Act (ACA) ushered in a number of innovations in value-based payment for care provided to Medicare beneficiaries. These new demands on primary care practices require an “all hands on deck” response that encompasses multiple occupations. Innovative care delivery models are emerging that enable primary care

practices to serve more patients and deliver care more effectively. Multiple models of team-based practice have been implemented, including nurse-managed health centers; use of registered nurses (RNs) to coordinate and manage care for patients with complex needs; use of scribes to assist primary care clinicians with documentation and use of medical assistants (MAs), community health workers and community paramedics to educate people with chronic disease about their conditions and help them follow treatment plans. Some of these models involve providing incumbent workers with additional training so that they can assume new roles.

The success of these innovative models hinges on scope of practice regulations that enable health professionals to practice to the full extent of their capabilities, the availability of technology to monitor population health and coordinate care and implementation of payment reforms that incentivize team-based, technology-enabled practice. In many states, scope of practice laws permit NPs to independently evaluate patients, prescribe medications, order and interpret diagnostic tests and initiate and manage treatment; some states also permit PAs to prescribe medications. Among the many technological advances in health care, telehealth is among the most important for primary care because it provides an additional means for primary care clinicians to interact with patients and with specialist physicians, which can improve the quality of care they provide and reduce professional isolation. Value-based and per capita reimbursement are critical for incentivizing primary care practices to function as patient-centered medical homes that coordinate with other providers to provide high-quality care that addresses the full spectrum of patients' medical, behavioral, oral health and social needs and that leverage telehealth, electronic health records (EHRs) and other technologies to the fullest extent possible. By decoupling payment from physician visits and procedures, value-based and per capita reimbursement facilitate investment in hiring new staff to support quality improvement and care coordination activities as opposed to distributing these tasks to physicians, NPs and PAs who may feel overburdened.

Strategy 4: Leverage Data to Inform Primary Care Workforce Strategies

Collecting and analyzing data on the primary care workforce are critical for identifying the size, location and characteristics of the existing workforce and describing gaps in primary care access. In addition to traditional health workforce data, data on cost and quality of primary care should be collected and analyzed to identify models for providing high-value primary care. California has a Healthcare Workforce Clearinghouse, administered by the Office of Statewide Health Planning and Development (OSHPD), that pools data from licensing boards and the Employment Development Department. The clearinghouse is a useful resource, but at present, no data are available about NPs, and only limited data are available about the demographic and practice characteristics of PAs and physicians. No data are available through the Clearinghouse regarding the numbers of MD, DO, NP and PA students and primary care residents and their characteristics.

Some states have established health workforce commissions to analyze data on the primary care workforce and support the transformation of primary care practice. These commissions often make recommendations for allocating resources for primary care workforce and assessing whether investments are achieving desired results. Some commissions have been time limited, while others meet on an ongoing basis. In August 2017, five California foundations that focus on the health sector launched the California Future Health Workforce Commission, which is charged with developing a master plan for addressing the state's high-priority health workforce needs and securing commitments for implementing the plan. The commission's three areas of focus are the primary care and prevention workforce, the behavioral health workforce and the workforce to care for an aging population. The commission plans to issue recommendations and a strategic plan for implementing them in late 2018; as of this writing, it is unknown whether the commission's work will continue past 2018.

Conclusion

A comprehensive agenda for primary care workforce development should encompass strategies within each of the four major categories described in this report. When selecting from this menu of strategies, decision makers should consider them from perspectives including:

- To what extent would the strategy enable California to increase the number of primary care clinicians practicing in California, improve the geographic distribution of primary care clinicians or increase the racial and ethnic diversity of the primary care workforce?
- How quickly could the strategy be implemented?
- How quickly would the investment generate desired outcomes?
- What organization(s) would need to act to implement the strategy?
- What additional resources would be needed to implement the strategy?
- Would the strategy require any changes in state law or regulation?
- What are the perspectives of key stakeholders

Below we list strategies that can expand the primary care workforce and improve geographic distribution, racial and ethnic diversity and preparation for team-based primary care practice in the short (less than five years) and long (more than five years) terms. Once policymakers identify high-priority strategies, collaboration among stakeholders will be critical to successful implementation.

Type of Strategy	Short-term Strategies (less than 5 years)	Longer-term Strategies (More than 5 years)
Enhance Education Pipeline	<p>Implement admissions policies for NP and PA education programs, medical schools and residency programs that prioritize admitting students who are likely to practice in underserved areas and diversify the health care workforce</p> <p>Provide academic, financial and psychosocial support for trainees interested in primary care careers, trainees from underrepresented racial/ethnic groups, trainees from disadvantaged backgrounds and trainees interested in practicing in underserved areas</p> <p>Increase the number of primary care physicians, NPs and PAs who complete clerkships and residencies in primary care practices that care for medically underserved persons</p> <p>Expand post-baccalaureate programs</p> <p>Expand programs that prepare international medical graduates to provide primary care in underserved areas</p>	<p>Provide academic, financial and psychosocial support for K – 12 and college students from disadvantaged backgrounds and underserved areas who are interested in health care careers</p> <p>Expedite training time for primary care clinicians</p> <p>Expand scholarships for medical, NP and PA students that are contingent on providing primary care in an underserved area following completion of training</p>

Type of Strategy	Short-term Strategies (less than 5 years)	Longer-term Strategies (More than 5 years)
<p>Improve Recruitment and Retention</p>	<p>Expand programs that repay student loans contingent on practicing in an underserved area following completion of training</p> <p>Provide financial incentives for primary care clinicians to establish or join practices in underserved areas, such as tax credits, income guarantees and housing loans</p> <p>Adopt the APRN Compact, which would enable NPs recruited from other participating states to practice in California without obtaining an additional license</p> <p>Utilize J-1 visa waivers and H-1B visas to recruit IMGs to practice in underserved areas</p> <p>Provide primary care clinicians more opportunities for time away from work and professional development</p>	<p>Provide competitive compensation to primary care clinicians, especially those who care for underserved populations</p>
<p>Maximize the Existing Workforce</p>	<p>Adopt new team-based models of primary care, including nurse-managed clinics</p> <p>Hire more RNs, licensed vocational nurses (LVNs), MAs, health coaches, scribes, community health workers, paramedics, etc. and integrate them into primary care teams</p> <p>Train incumbent workers in primary care practices to assume new roles such as scribes and health coaches</p> <p>Align payment incentives to promote team-based care and use of telehealth technologies and adopt the Interstate Medical Licensure Compact to enable physicians in other states to provide telehealth services to Californians.</p> <p>Replace fee-for-service reimbursement with value-based and per capita reimbursement to reward primary care clinicians for improving health outcomes</p>	<p>Change state laws governing supervision and scope of practice to enable NPs and PAs to provide a wider range of services under less supervision</p> <p>Implement value-based reimbursement on a widespread basis</p>

Type of Strategy	Short-term Strategies (less than 5 years)	Longer-term Strategies (More than 5 years)
Leverage Workforce Data	<p>Increase investment in collection, analysis and dissemination of data on the primary care workforce, especially NPs and PAs</p> <p>Collect, analyze and disseminate information about innovative models for providing primary care</p> <p>Use data to make decisions about primary care training capacity and training locations</p>	

Policymakers in California should review the menu of strategies presented in this report and identify those that are most feasible and those that will have the greatest impact on primary care workforce capacity. To assess the effects of different strategies, California could conduct a study similar to one that Washington State commissioned to compare alternatives for alleviating shortages of primary care physicians in rural areas. That study found that the only single policy intervention that was sufficient to counterbalance the projected shortage was reallocating primary care services from physicians to NPs and PAs.³ Conducting a similar study in California would enable policymakers to determine whether to prioritize expanding numbers of NPs and PAs and their scope of practice or to focus on other strategies. Similar methods could be used to assess the effects of different strategies for increasing the racial, ethnic and linguistic diversity of California's primary care clinicians and improving their geographic distribution.

³ Friedberg MW, Martzolf G, White C, et al. *Evaluation of Policy Options for Increasing the Availability of Primary Care Services in Rural Washington State*. Santa Monica, CA: RAND Corporation.

Research Report

Introduction

California is facing an imminent shortage of primary care clinicians; the number of physicians completing primary care residencies in California does not appear to be adequate to replace primary care physicians who are likely to retire in the coming decade. Demand for full-time equivalent primary care clinicians is projected to increase at a rate of 12 percent to 18 percent between 2016 and 2030 due to population growth, population aging, expanded insurance coverage and the volume and intensity of services used per person.¹⁻⁵ Although there has been rapid growth in the nurse practitioner (NP) and physician assistant (PA) workforces, their numbers are still small relative to the numbers of physicians, and many NPs and PAs do not practice in primary care settings. In addition, the distribution of primary care clinicians across regions of the state is uneven, and Latinos and African Americans are underrepresented among them.

These findings raise questions about whether California could do more to increase the number of primary care clinicians and improve their geographic distribution and racial and ethnic diversity. Labor market forces alone are insufficient to meet these needs, as studies of physician workforce distribution have found that most physicians locate in regions with an abundant supply of physicians.^{6,7} Although NPs and PAs are more likely to practice in rural areas of California than are primary care physicians, regions of the state that have the most abundant supplies of primary care physicians have some of the highest ratios of NPs and PAs to population.⁸

This report presents a framework for classifying primary care workforce development initiatives implemented by California, other states and the federal government and presents evidence of their effectiveness. It is the third in a series of reports from Healthforce Center at UCSF. The first report presented the most current information on the supply, distribution and characteristics of allopathic physicians (MDs), osteopathic physicians (DOs), NPs and PAs who provide primary care in California.⁸ The second report described findings from forecasts of future supply and demand for primary care clinicians.⁹ The goal of this third report is to describe options for addressing the primary care workforce challenges identified in the first two reports. It builds on previous work on this topic, including a report commissioned by the California Primary Care Association (CPCA) that describes emerging issues, challenges and opportunities to build primary care workforce and capacity in the state of California. Based on our synthesis of relevant literature and interviews with key informants in other parts of the United States, we present a conceptual framework that divides primary care workforce development initiatives into four broad categories. Within each category, we describe multiple strategies and present concrete examples of initiatives that have been implemented in California and that could be expanded, as well as initiatives launched by other states that could be replicated in California.

Methods and Typology of Strategies

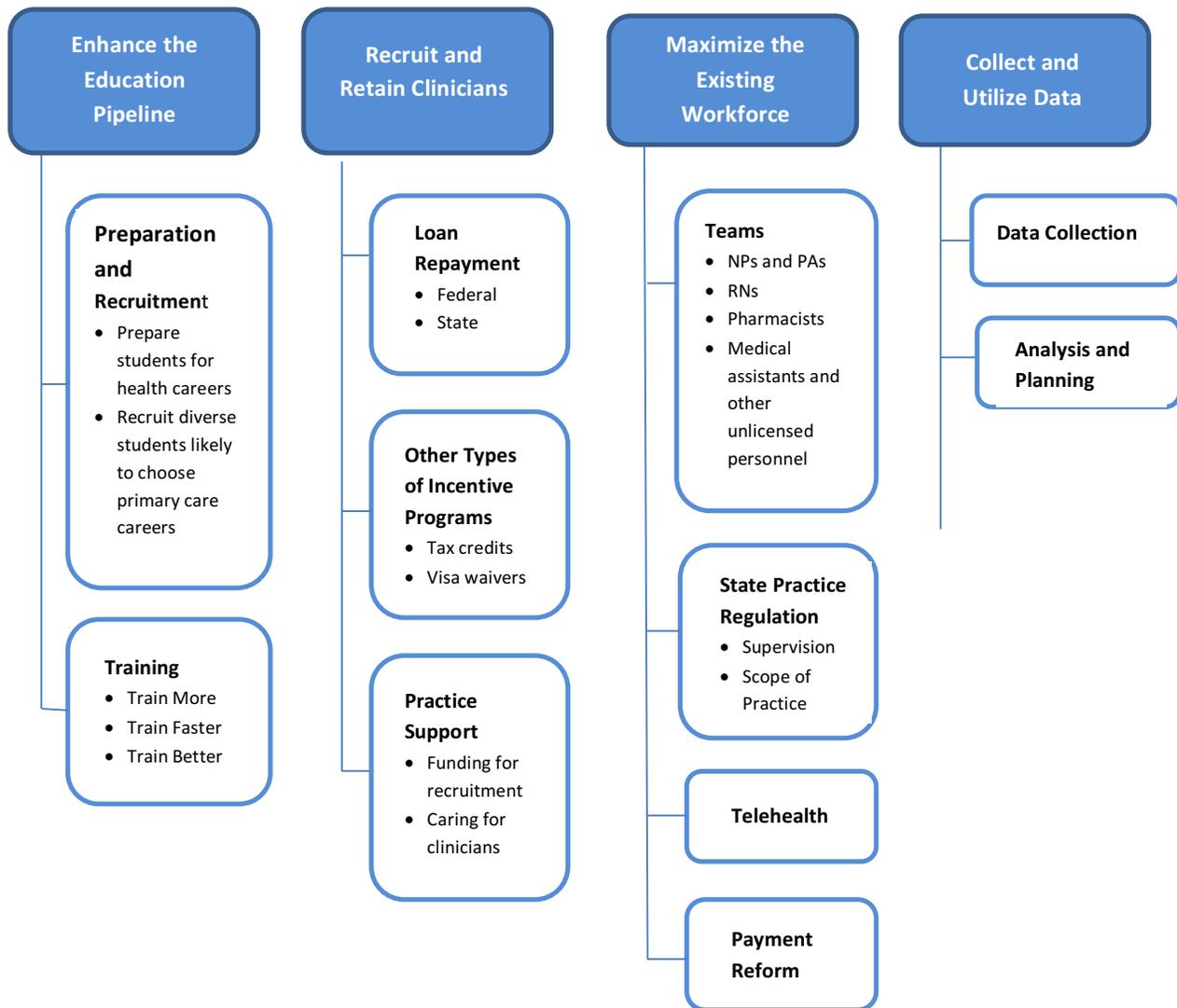
We conducted an extensive literature review to identify policies and practices implemented in other states to address primary care workforce shortages. In addition, we conducted 19 key informant interviews between May and June 2017. Interviewees were representatives of state health workforce research centers, nonprofit health research organizations, medical educational institutions, federal health departments and professional associations for physicians, nurses and physician assistants. We also drew upon our knowledge of primary care workforce initiatives in California and primary care workforce programs administered by the federal government.

Using our literature review and interview notes, we identified the most common strategies that California, other states and the federal government are using to meet primary care workforce needs. Based on the strategies we identified, we generated a typology that categorized four overarching strategies for expanding primary care capacity at the state level (Figure 1):

- Enhance the primary care education pipeline.
- Improve recruitment and retention of primary care clinicians.
- Maximize the existing primary care workforce.
- Leverage data to inform workforce strategies.

In the following sections, we describe each strategy, present examples of implementation of the strategy in California or other states and, where available, discuss evidence of effectiveness. Where information is available, we also describe outcomes of innovative programs. Additional details about examples of strategies described in each section are presented in Appendix A.

Figure 1: Typology of Strategies for Expanding Primary Care Capacity



Strategy 1: Enhance the Education Pipeline

The first two reports in this series revealed that primary care clinician supply is inadequate in most regions of California and that shortages are likely to persist through 2030; primary care clinicians are also poorly distributed across the state and do not reflect the racial and ethnic diversity of the state's population. Expanding and improving education is critical for increasing the supply of clinicians who can meet the demands of California's population. Enhancements in preparation, recruitment, and training are needed across the education pipeline to enable the education system to train the right people, in the right places, with the right skills to deliver a primary care workforce that meets the state's needs.

This chapter is divided into two sections. The first section addresses expanding and improving primary care training; the second section concerns recruiting and preparing racially and ethnically diverse primary care trainees who are likely to practice in underserved areas of California. In this report, training encompasses education received while enrolled in a medical school or an NP or PA education program as well as training received during residency. Physicians are required to complete a residency to obtain a license to practice medicine; residency training is optional for NPs and PAs.

1.1: Expanding and Improving Training

Expanding training capacity is the most straightforward solution to addressing primary care workforce shortages in the long term. Our estimates suggest that expanding the clinician education capacity in California for physicians, NPs and PAs by 3 to 7 percent could ameliorate shortages in the long term.⁹

Capacity can be expanded via increased enrollment and opening new training programs, both of which are occurring in California. A new osteopathic medical school (Touro University) opened in the late 1990s, and during the early 2000s, UC modestly increased enrollment at its medical schools through the Programs in Medical Education (PRIME). The number of medical school graduates will also increase in the coming years as students enrolled in the newly opened UC Riverside and California Northstate University medical schools begin to graduate. The Kaiser Permanente School of Medicine is scheduled to open in Pasadena, California, in the fall of 2019, the California University of Science and Medicine is opening a new medical school in the Inland Empire and two universities are seeking approval to open osteopathic medical schools in Fresno County.^{10,11}

The number of NP training programs and graduates in California is difficult to track because the Board of Registered Nursing does not systematically collect and report data on NP education programs. In addition, NP training is increasingly available online and accessible across state borders.

In response to advanced degree requirements, two PA programs housed in community colleges have closed (Moreno Valley College in 2016 and San Joaquin Valley College in 2015),¹² and the closures resulted in a decline in the number of graduates of PA education programs. Since 2014, the number of PA programs in California has doubled (from 7 to 15), and enrollment has expanded in several existing programs.¹³ The number of graduates is expected to increase as students begin graduating from new and expanded PA programs.

One challenge facing educators is to ensure that didactic and clinical training are expanded in concert with each other. Concerns regarding the adequacy of clinical sites and qualified preceptors (particularly in primary care) have grown among clinical educators as capacity expands.¹⁴⁻¹⁶ Medical school deans have also expressed concerns about growth in medical school enrollment outpacing growth in graduate medical education (GME), a concern substantiated in the literature.^{14,17} Current strategies for coping with the limited supply of qualified preceptors include using simulation (including standardized patients), academic-practice partnerships that allow a

preceptor to supervise multiple students, using technology to obtain input from faculty not present at the clinical training site and providing continuing medical education credits and financial incentives for primary care clinicians to serve as preceptors.

Efforts to sustain expansion of primary care residency training in California have been hampered by lack of sustained funding from the federal government. In 2010, the Health Resources and Services Administration (HRSA) awarded \$168 million from the Prevention and Public Health Fund established by the ACA for the Primary Care Residency Expansion program; the goal of this program was to expand and improve residency training in family medicine, general internal medicine and general pediatrics. Eighty residency programs in 28 states, including California, received funding for five years in the amount of \$80,000 per resident per year; as of 2015, the program was projected to support the training of an additional 900 primary care physicians nationwide. However, the program was not continued beyond 2015, and a survey of grant recipients found that many would not be able to sustain expansion of their residency programs after their HRSA grants expired.¹⁸

The future of another federal grant program – the Teaching Health Center Graduate Medical Education (THCGME) program – has been also uncertain because Congress has only authorized funding for a few years at a time. Enacted as part of the ACA, THCGME provides grants to federally qualified health centers (FQHCs) and GME consortia that operate residency programs in family medicine, general internal medicine, general pediatrics, internal-medicine pediatrics, obstetrics-gynecology and psychiatry and fellowship programs in geriatrics.¹⁹⁻²¹ There are 57 teaching health centers (THCs) in 27 states and the District of Columbia that enroll over 700 residents.²² HRSA estimates that 83 percent of THC residents train in a medically underserved community.²³ California has six THCs that operate eight residency programs, six in family medicine, one in pediatrics and one in psychiatry. Four of these residency programs were in existence prior to the availability of THC grants, and four are new programs. Three THCs are located in the San Joaquin Valley, one in the Inland Empire, one in San Diego and one in Shasta County; these six THCs enroll over 100 residents.²⁴ The THCGME program was recently reauthorized through the end of federal fiscal year 2018-2019.²⁵ California's allocation of \$100 million in state funds for health workforce training, expected in fiscal years 2017-2018, 2018-2019 and 2019-2020, includes \$17 million for THCs.

Train in High-Need Locations

Simply increasing the number of primary physicians, NPs and PAs trained will not be sufficient to address California's primary care workforce challenges. The location, pace, and content of primary care training also need to change.

Investments in primary care training in California need to be targeted to support training in underserved areas of the state because multiple studies have concluded that primary care clinicians are likely to practice where they are trained.²⁶⁻²⁹ California's Song-Brown program strives to achieve that goal. This program was established in 1973 to increase the number of primary care clinicians in the state.³⁰ It provides grants to PA education, family NP education, RN education and residency programs in family medicine, general internal medicine, general pediatrics and obstetrics-gynecology. Preference is given to programs that train residents or students in underserved areas of California and that have strong track records of recruiting underrepresented minorities and of placing graduates in underserved areas. In 2017, Song-Brown provided grants to 51 primary care residency programs (42 in family medicine) and 18 family NP and PA education programs.; The program has funded more residents in recent years because it has had a larger budget due to a \$21 million grant from The California Endowment and a one-time allocation of \$4 million in 2014-2015 to expand the numbers of residency programs in family medicine, general internal medicine, general pediatrics, and obstetrics/gynecology. The California state budget for fiscal year 2017-2018 includes \$33 million for distribution during the current fiscal year and an additional \$33 million

was included in the Governor's budget proposal for fiscal year 2018-2019.³¹ The California Area Health Education Centers (AHEC) program also supports training of family medicine residents and health professions students in CHCs and safety net hospitals in underserved areas.

Given that the Song-Brown program is well established and has a track record of funding primary care training programs in underserved areas of the state, an important strategy for expanding training in these areas is to ensure that Song-Brown receives adequate funding and that the criteria it uses to award grants create sufficient incentives to expand existing training programs and establish new programs in underserved areas including rural areas.

One strategy California does not currently pursue is targeting Medicaid (Medi-Cal in California) funds to support primary care training, although stakeholders are exploring this option. Currently, Medi-Cal payments to teaching hospitals in California include funds to offset the cost of GME, but these funds are bundled with funds for provision of patient care, which makes it difficult to determine how much funding is going to GME or to influence how funding is distributed across primary care specialty residency and fellowship programs. In 2015, 42 states and the District of Columbia made an estimated \$4.26 billion in Medicaid payments for GME.³² Most states do not allocate Medicaid GME funding based on physician workforce needs, but there are a few exceptions, including Michigan, New Mexico and Tennessee. Most notably, New Mexico adjusts a formula that its Medicaid program uses to pay FQHCs for patient visits to support developing new primary care residency programs and expanding existing primary care residency programs at FQHCs^{33,34} (see Appendix A for details).

Train Faster

Reducing the amount of time needed to train physicians could also reduce the pending shortages by producing graduates more quickly. Physician training time can be expedited by combining undergraduate and medical school or by accelerating medical school completion. Examples include combined bachelor's and medical degree programs that reduce the length of these levels of education from eight years to six or seven and accelerated medical school programs that reduce the length of medical school from four years to three.

Combined Bachelor's to Doctor of Medicine Programs

California has one combined bachelor's to doctor of medicine program that reduces the length of training. The College of Health Sciences at California Northstate University offers a combined pre-med to MD program that can be accelerated to six or seven years by condensing the undergraduate coursework to two or three years.³⁵ Outcomes of this program are unknown because it is a new program at a new medical school that has yet to graduate its first class of students.

Other medical schools across the United States have combined BS/MD programs that reduce the length of training. One of the oldest is the Sophie Davis Biomedical Education Program at the City University of New York. A noteworthy feature of the Sophie Davis program is that it focuses on preparing youth from disadvantaged backgrounds, many of whom are the first people in their families to go to college, and it requires graduates to practice in an underserved area for two years after completing residency.³⁶ Students who complete a three-year bachelor's curriculum are admitted to the CUNY School of Medicine to complete the MD degree. The program enrolls an average of 70 students per year,³⁶ and 97 percent of students have completed an MD degree³⁷ (see Appendix A for more details).

Accelerated Medical School

In partnership with Kaiser Permanente Northern California, the UC Davis School of Medicine implemented a new three-year pathway for students committed to primary care careers, the Accelerated Competency-based Education in Primary Care program, in 2014.³⁸ Preference for admission is given to persons who have experience in primary care or community health, speak a language other than English, are the first in their family to obtain a bachelor's degree or graduated from a high school in a county in northern California served by Kaiser Permanente. The curriculum is organized so that students complete a longitudinal primary care clerkship at a Kaiser Permanente medical center throughout medical school instead of the traditional medical school curriculum of two years of didactic education followed by two years of clinical education. This program is funded by a \$1 million grant from the American Medical Association (AMA) and enrolls six students per year, two thirds of whom are underrepresented or socioeconomically disadvantaged or both. The first cohort of graduates is currently completing their first year of residency at primary care internal medicine residency programs in northern California. Additional primary care specialties may be added in the future.

The UC Davis School of Medicine is one of 13 medical schools in the United States and Canada that participate in the Consortium of Accelerated Medical Pathway Programs. The consortium was formed by the Josiah Macy Jr. Foundation in 2015, and it aims to study several aspects of accelerated MD degree programs, including financial, regulatory and competency matters.³⁹ Some of these programs focus exclusively on preparing trainees to practice as primary care physicians. Among U.S. medical schools that had graduates as of 2016, accelerated MD degree program graduates performed as well as or better than their peers from four-year medical schools on the U.S. Medical Licensure Examination and on evaluations of their clinical performance. Additional information about one of the consortium members, the Texas Tech University SOM Family Medicine Accelerated Track Model, is included in Appendix A.⁴⁰

Train Better

Trainees need positive primary care role models during training to counteract the “hidden curriculum” that privileges medical and surgical specialties over primary care.⁴¹ Studies of medical students have found that the factors most likely to influence specialty choice were types of procedures and techniques, exposure to positive role models and ability to balance work and personal life.⁴² Programs also need to train students and residents to address the needs of underserved populations.

Preparation to Practice in Underserved Areas

UC's PRIME program is a good example of training that focuses on meeting the needs of California's underserved populations in both rural communities and urban areas. The PRIME curriculum combines specialized coursework, structured clinical experiences and advanced independent study.⁴³ PRIME currently enrolls 342 students (65 percent are underrepresented) in programs at six UC campuses.⁴³ Each program has a specific area of focus based on faculty expertise and the needs of the community the campus serves; areas of focus include rural practice and practice in diverse urban communities. Expanding PRIME and implementing similar programs at private medical schools may help to increase the number of physicians who practice in underserved areas. Legislation has been introduced that would appropriate \$9.35 million to increase the number of UC medical students who are enrolled in PRIME (Assembly Bill [AB] 2597). For purposes of increasing the number of primary care clinicians in underserved areas, an important limitation of existing PRIME programs are that they do not focus on primary care. However, the model could be adapted prioritize recruiting students who are interested in providing primary care in underserved areas and enhancing opportunities for students to receive primary care training in underserved areas and mentoring from primary care physicians who practice these areas.

Other examples of medical school programs that focus on preparing physicians to practice in urban or rural underserved areas include the Louisiana State University School of Medicine's Rural Scholars Track⁴⁴ and Thomas Jefferson University's Urban Underserved Program and its Physician Shortage Area Program (located in Pennsylvania).⁴⁵⁻⁴⁹ These programs are described in greater detail in Appendix A. Teaching health centers also prepare primary care physicians for practice in underserved areas because residents enrolled in residency programs based at THCs complete most of their outpatient training in an FQHC.

NP and PA Residency Programs

Historically, the conversation about postgraduate training was dominated by GME; much less attention has been given to clinical training for NPs and PAs. During the early years of the professions, most NPs and PAs were second-career students with extensive experience in the health care sector (e.g., military combat medics trained to become PAs and experienced RNs trained to become NPs). NP and PA education programs were designed to be brief and rely heavily on experiential learning in an apprenticeship model both before formal training and after graduation.

Today, new graduates from PA and NP programs are younger and less experienced than their predecessors.⁵⁰ In addition, mounting pressures of pay-for-performance reimbursement models and productivity demands have decreased opportunities for informal mentoring and on-the-job training. Some employers have developed residencies, fellowships or informal on-boarding experiences for PAs and NPs to shift a portion of the cost of training to the employee via lower salaries and lower productivity expectations during on-boarding periods. Interviewed employers expressed that NP and PA education is too short to gain sufficient knowledge and that mentored clinical experiences and residencies can serve as a bridge in transforming new graduates into highly skilled clinicians.⁵¹⁻⁵³ In 2015, the National Nurse Practitioner Residency and Fellowship Training Consortium (NNPRFTC) was created to offer accreditation for postgraduate NP training programs. As of 2017, NNPRFTC had accredited 50 programs across the country.⁵⁴

California has nine NP residency programs, which are located in Arcata, Berkeley, Lemoore, Los Angeles, Oakland, Redding, San Francisco and Santa Rosa. The first such program in California was launched by UCSF and UCLA in 2012 in partnership with Glide Health Services clinic in San Francisco and the Union Rescue Mission clinic in Los Angeles. The program has since split into two programs that are housed within the San Francisco and the Greater Los Angeles VA medical centers, with academic affiliations with UCSF and UCLA, respectively. The U.S. Department of Veterans Affairs (VA) runs five additional NP residencies in Idaho, Ohio, Texas, Connecticut and Washington.⁵⁵ All are operated under the auspices of VA's Centers of Excellence in Primary Care Education (CoEPCE). The VA NP residencies are 12 months in duration and support trainees with a stipend and benefits; as of August 2016, 59 NP residents had completed these programs. An evaluation of VA CoEPCE found that NP residency graduates demonstrated substantial progress in primary care competencies and that 41 percent of graduates had become VA employees.⁵⁵

Shasta Community Health Center's NP/PA Post Graduate Primary Care Fellowship program provides 12 months of training experience to help newly licensed NPs and PAs transition to the provider role.⁵⁶ The program includes specialty rotations, targeted training on clinical skills and procedures and didactic education sessions designed to develop leadership, communication and quality improvement skills.

NP and PA residency programs do not have long track records, but preliminary findings are promising. Establishing additional residency programs in areas of California with the greatest need for primary care clinicians may encourage more NPs and PAs to pursue careers in primary care and will ensure that they are better prepared for practice.

1.2: Preparing and Recruiting Rural and Other Underrepresented Students for Primary Care Careers

Developing the primary care workforce begins with K – 12 and college-level career pathways that prepare people for admission to graduate-level training programs for physicians, NPs and PAs. The maldistribution of primary care clinicians and underrepresentation of African Americans, Latinos and Native Americans indicate a need to focus on recruiting students from underrepresented racial and ethnic groups and students from rural areas because they are more likely to practice in underserved areas than are primary care clinicians from other backgrounds.

Our discussion of these strategies begins with those that can increase the racial and ethnic diversity of primary care clinicians within the shortest period of time and ends with those that will take longer to increase racial/ethnic diversity in the primary care workforce. Strategies that can yield results quickly are critical to meeting immediate needs, whereas strategies that take longer to implement, such as those focused at the K – 12 level, are needed to substantially increase the numbers of primary care clinicians from underrepresented racial and ethnic groups.

Recruiting and Preparing Spanish-speaking International Medical Graduates

The recruitment and preparation strategies that yield results most quickly are those that target persons who can be ready to enter residency within a year or two. The International Medical Graduate program at UCLA provides an example of a creative approach to increasing diversity and addressing the problem of physician maldistribution and the shortage of Spanish-speaking physicians.⁵⁷ This pre-residency program is a pathway to obtaining U.S. licensure for bilingual English-/Spanish-speaking IMGs from Latin America who trained at medical schools approved by the Medical Board of California and who are committed to practicing in underserved areas. The program is open to bilingual IMGs who are U.S. citizens, permanent residents or permanent refugees who have completed medical school or a non-U.S. residency program within the past five years. The curriculum consists of courses in English for health professionals, courses in basic and clinical sciences and clinical observation. Graduates are required to complete a family medicine residency program in California and to practice in an underserved area of the state for at least two years following completion of residency. Since 2007, the program has trained 117 IMG physicians and placed them in family medicine residency programs throughout California. It could be expanded to train additional Spanish-speaking IMGs.

Targeted Recruitment of Medical Students

A second set of strategies involves targeted recruitment of medical students from diverse racial, ethnic and socioeconomic backgrounds. Since the passage of Proposition 209 in the 1990s, medical schools in California have been prohibited from using race or ethnicity as criteria for admission; schools often consider other factors that are associated with racial or ethnic background such as socioeconomic status and ability to speak a language other than English. In addition, UC PRIME recruits students who are interested in caring for underserved populations. However, aside from the UC Davis and UC Merced PRIME programs, no medical schools explicitly recruit students from rural areas. A.T. Still University's Hometown Scholars Program is a new initiative that has potential to benefit underserved areas of California. The program is a partnership between the university and the National Association of Community Health Centers; CHC leaders identify, recruit and endorse community-minded applicants who have qualities that CHCs seek in employees. Candidates endorsed by CHC leaders are guaranteed an interview, and those who are accepted receive a \$2,500 scholarship. Nationwide, seven scholarships have been awarded since 2015, five to osteopathic medical students and two to dental students.⁵⁸ Another important example of a medical school in another state that has implemented programs to increase the number of rural physicians is Thomas Jefferson University's School of Medicine.⁴⁶⁻⁴⁹ Details about these examples can be found in Appendix A.

Post-Baccalaureate Programs

Post-baccalaureate programs increase the number of successful medical school applicants from disadvantaged backgrounds, including underrepresented populations. Programs typically provide intensive preparation for the Medical College Admission Test, courses in basic sciences that are required for medical school admission and guidance regarding the medical school admission process. Some post-baccalaureate programs are open to persons regardless of whether they previously applied to medical school, whereas others are limited to persons who previously applied unsuccessfully. The University of California has established a Postbaccalaureate Consortium that consists of post-baccalaureate training programs at five UC campuses; most campuses combine an intensive summer program with one academic year of study. The programs usually cover the cost of room and board during the summer session and provide a stipend; students are responsible for costs during the academic year but can receive federal financial aid if they are eligible. An evaluation of the UC consortium found that persons who participated in one of the post-baccalaureate programs were substantially more likely to be admitted to medical school than were students who applied to a program but did not attend.⁵⁹ Post-baccalaureate programs in California that focus on preparing persons from disadvantaged backgrounds are funded primarily through grants from philanthropic foundations. They would benefit from more stable funding from state government or the universities that operate them, particularly funds that would enable them to provide more financial assistance to students from disadvantaged backgrounds.

College-Level Programs

Many students from disadvantaged backgrounds who plan to pursue health care careers abandon their goal after entering college. In some cases, their interests change, but research has found that college students from disadvantaged backgrounds often change their plans due to difficulties with courses that are prerequisites for admission to medical school, particularly chemistry.⁶⁰⁻⁶³ Advisors may discourage them from pursuing medical school or graduate training in another health profession instead of counseling them about how to improve their performance. Programs that provide undergraduate pre-health professions students with academic, social and emotional support are critical to increasing the numbers of underrepresented minorities who are competitive applicants to medical schools and NP and PA education programs.

The Biology Scholars Program (BSP), a program at UC Berkeley, is a good example of a college-level program that provides academic, social and emotional support to students from disadvantaged backgrounds.⁶⁴ The BSP admits students who have strong interest in science and display traits associated with successful completion of a degree in science, including persistence and ability to regroup in the face of failure. The program emphasizes peer support as a means for addressing academic and socioemotional challenges; it also connects students to internships. Underrepresented students at UC Berkeley who actively and frequently participated in the BSP had a higher likelihood of admission to medical school than did underrepresented students who did not. Other universities in California that administer similar programs include California State University-Fresno, UC Irvine, UCLA and UC Riverside. A notable feature of UC Irvine's program is its emphasis on provision of community services such as diabetes education, exercise classes and health navigation to gain experience with providing health services. The California AHEC also funds initiatives to educate college and K – 12 students from disadvantaged backgrounds about health careers. The state would benefit from having similar programs at all colleges and universities. Similar programs in other states include the University of Hawai'i Health Careers Opportunity Program,⁶⁵ which is described in Appendix A.

K – 12 Health Career Pathways

Health career pathways programs for K – 12 students enhance their knowledge of career opportunities in primary care and provide support to prepare them for college. Enrichment and support services may include academic support, psychosocial support, mentorship, financial support, exposure to careers in health science, career

shadowing, internships and research opportunities.⁶⁶ In recent years, California has made substantial investments in K – 12 health career pathways. The Career Pathways Trust Program administered by the California Department of Education has invested \$500 million of state funds over the past two years in building these pathways in regions throughout California; some of these funds are being used to develop and sustain programs in the health professions. In addition, the James Irvine Foundation, The California Endowment, The California Wellness Foundation and other funders are investing in K – 12 and college health career pathway development. Specific programs include Partnership Academies for students in grades 10 through 12 that are structured as “schools within schools” that focus on preparing students for careers in health or another field. The academies integrate traditional college preparatory curricula with field trips, work-based learning opportunities and other career technical education. Participation is voluntary, and half of the students enrolled must be deemed to be “at risk.”

Health career pathways programs in which The California Endowment has invested include the UCSF-Fresno Doctors Academy, a “school within a school program” that serves students at three high schools in Fresno County who are interested in careers in medicine and other health professions.⁶⁷ The program provides an accelerated curriculum in math, science and writing; tutoring; clinical and research internships; summer enrichment programs; counseling; mentoring and parent workshops. All 64 students who completed the program in 2017 are attending college.⁶⁸ UCSF-Fresno also operates a Junior Doctor’s Academy program that provides academic enrichment and field trips to colleges, universities, science exhibits and health care facilities to students at three middle schools.

Stanford University’s Medical Youth Science Program provides a different type of health career pathway program. Since 1988, Stanford has provided a free five-week residential program to 24 high school students who are recruited from 250 high schools across California.⁶⁹ The program is led by 10 Stanford undergraduates and provides medical sciences courses, job shadowing in hospitals, research projects and college and career advising. A workshop on college admissions is held each fall for alumni who are applying to college, and information about scholarships, research opportunities and career opportunities is distributed via email. According to a study of the program that was published in 2007, 100 percent of participants had graduated from high school, 99 percent had been accepted to college and 81 percent had graduated from college; among college graduates, 52 percent enrolled in medical school.

1.3: Financial Assistance

Many underrepresented health professions students are from low-income families and have difficulty paying for their education. Providing financial assistance beyond the federal grants and loans available to all college students encourages underrepresented students who are interested in primary care to continue on that path instead of practicing in a more lucrative specialty. Scholarship and loan programs can be combined with a requirement for practice in an underserved area following graduation. For instance, the National Health Service Corps (NHSC) scholarship program awards scholarships to medical, NP and PA students in exchange for practicing in an underserved area for at least two years. The federal government also operates the Scholarships for Disadvantaged Students and Loans for Disadvantaged Students programs, which award funds to health professions schools across the country to provide scholarships or long-term, low-interest loans to disadvantaged students who pursue a degree in allopathic medicine, osteopathic medicine, nursing or other health science.⁷⁰ Ten schools in California currently participate in the scholarship program,⁷⁰ and 11 currently participate in the loan program.⁷¹ Three medical schools in California participate in the federal government’s primary care loans (PCL) Primary Care Loan program for medical students who agree to complete residency training in primary care.⁷² In addition, California’s Health Professions Education Foundation administers the Advanced Practice Healthcare Scholarship, which awards up to \$25,000 per year to students enrolled in training programs in eligible professions, including NPs and PAs; recipients must practice in a medically underserved area for two years

following graduation.⁷³ The provision of scholarships has become more important over time as tuition and fees at health professions schools have risen. If students can reduce the amount of debt they need to assume to finance their education, they may be more willing to become primary care clinicians despite the fact that primary care clinicians earn less than do specialists.

Strategy 2: Recruit and Retain Clinicians

Expanding primary care training capacity and recruiting persons likely to practice in underserved areas are necessary but not sufficient conditions for improving the geographic distribution of primary care clinicians. Additional strategies are needed to provide financial incentives to recruit primary care clinicians to practice in these areas and to develop fulfilling practice environments that facilitate retention.

Primary care practices must be strategic about whom they recruit and the work environments they create for clinicians in order to maximize retention. For primary care practices that serve underserved populations, clinician characteristics associated with retention include belonging to an underrepresented racial or ethnic group, fluency in a second language, growing up in an inner city or rural area and prior interest in underserved practice.⁷⁴ While compensation, cultural isolation in rural areas, poor-quality schools and housing, lack of time away from work (work/life balance) and lack of spousal job opportunities are significant barriers to recruiting rural primary care providers. Growing up a rural community is the factor most consistently associated with retention in rural practice.⁷⁵⁻⁷⁸

Public and philanthropic funding for financial incentives are needed because practices that care for underserved populations often struggle to offer compensation that is competitive with that offered by primary care practices that serve people in the middle and upper income brackets. In addition, most physicians have substantial student loan debt: The Association of American Medical Colleges (AAMC) estimated that in 2017 the median education debt among all U.S. allopathic (MD) medical school graduates was \$192,000; the median among graduates of public allopathic medical schools was \$180,000 and the median among graduates of private medical schools was \$202,000.⁷⁹ The median education debt among 2017 graduates of osteopathic medical schools was even larger: approximately \$247,000 for all graduates, \$218,000 for graduates of public schools and \$253,000 for graduates of private schools.⁸⁰ NP and PA education is less expensive, but many NPs and PAs also incur substantial student loan debt because they are educated at private universities.

Incentives for retention are also needed. Most financial incentives for recruitment require primary care clinicians to practice for a minimum number of years in an underserved area in exchange for assistance. Developing fulfilling practice environments for clinicians is critical for maximizing the likelihood that they will continue to practice in underserved areas after they complete obligated service. They need to have support to practice effectively and to balance clinical responsibilities with professional development and family life.

2.1: Loan Repayment

Loan repayment is the most popular financial incentive strategy for recruiting primary care clinicians to underserved areas. The federal government and many states operate programs under which the student loans of primary care physicians, NPs and PAs are repaid in exchange for practice in an underserved area. The National Health Service Corps (NHSC) is a federal program through the U.S. Department of Health and Human Services (DHHS) that provides loan repayment to primary care physicians, NPs and PAs in communities designated as Health Professional Shortage Areas.⁸¹ Registered nurses, including NPs, are also eligible to apply to the NURSE Corps Loan Repayment Program.

California has four different loan repayment programs for primary care clinicians: (1) the State Loan Repayment Program (SLRP), (2) the County Medical Services Program (CMSP) loan repayment program, (3) the Health Professions Education Foundation (HPEF) Steven M. Thompson Physician Corps Loan Repayment Program (STLRP) and the HPEF Advanced Practice Healthcare Loan Repayment Program (APHLRP). Primary care physicians are eligible for SLRP, CMSP and STLRP, and NPs and PAs are eligible for SLRP, CMSP and APHLRP. Requirements for SLRP are similar to those of NHSC because funds are provided by NHSC.⁸² The

three other loan repayment programs in California use broader definitions of an underserved area than do NHSC and SLRP.⁸³ These broader definitions enable a wider range of primary care practices to benefit and increase the likelihood that loan repayment will be available in a community near a participant's family and friends. The NHSC and state programs in California prohibit primary care clinicians from participating in more than one loan repayment program at a time so that they can maximize the numbers of clinicians who receive awards. Examples of loan repayment programs in other states that are either more flexible than the NHSC and SLRP or that augment these programs are described in Appendix A.

Long-term results of loan repayment programs are mixed. Some studies found that recipients were more likely than non-recipients to contribute disproportionately to the primary care workforces in rural or underserved communities both during and after their service obligations.⁸⁴⁻⁸⁶ Other found that loan repayment recipients are less likely to remain in rural or underserved practice than are their peers without a practice obligation.^{87,88} One challenge cited by key informants is that historically, NHSC participants have limited influence over where they will be placed and may be sent to communities where they do not have a support network of family or friends. State loan repayment programs that offer primary care clinicians a wider choice of locations in which to complete obligated service may be better suited to matching clinicians with communities in which they have ties that encourage long-term retention.

2.2: Other Financial Incentives

Other financial incentives for recruiting primary care clinicians to underserved areas include increasing reimbursement, offering tax credits for practicing in underserved areas, offering grants to physicians to establish practices and offering grants to practices in underserved areas for recruiting additional physicians.

Decrease Primary Care to Specialty Pay Gap

A large gap exists between the incomes of primary care physicians and those of their specialist counterparts in surgical and procedure-oriented medical specialties such as orthopedics and cardiology. The income disparity, which is driven by fee-for-service (FFS) reimbursement that pays physicians more for performing procedures than for assessing patients' needs and helping them to maximize their health, discourages medical school graduates from choosing primary care careers.⁷⁶ Increasing reimbursement for primary care services relative to specialty services may encourage more medical students to enter primary care.^{89,90}

Increasing primary care physician fees is especially important for the Medicaid program (Medi-Cal in California); for the last decade, Medicaid fees have paid approximately 70 cents on the dollar relative to Medicare.⁹⁰ The ACA included an increase in Medicaid primary care physician fees in 2013 and 2014 to the same levels as those of Medicare to encourage physicians to accept newly enrolled Medicaid patients.⁹¹ This increase was funded by the federal government. As of mid-2016, 19 states continued to fully or partially finance higher primary care payments using their own funds and conventional federal matching funds.⁹¹ California did not continue to support the Medicaid fee bump after federal funding ceased in December 2014, but recent actions are promising. In 2017, the California State Legislature appropriated a portion of the funds generated by Proposition 56, a proposition passed in 2016 that increased the excise tax on tobacco products, to provide supplemental payments to physicians who participate in FFS Medi-Cal or Medi-Cal managed care plans.

Flexible Recruitment Support

New York has implemented a recruitment incentive program, Doctors Across New York Physician Practice Support, that allows participating physicians and physician practices to use funds for a variety of purposes. The program provides up to \$100,000 in funding to health care providers to recruit a new physician or enable an

individual physician to establish or join a practice or for education loan repayment. A total of \$4 to 5 million is allocated per year for this program.⁹² Eligible expenses include

- Land or building acquisition for a new practice.
- Renovation or construction for a new practice.
- Equipment or furniture for a new practice.
- Staff salaries for a new practice.
- Income guarantees.
- Investment in partnerships.
- Recruitment or productivity bonuses.
- Relocation reimbursement.
- Professional membership fees.
- Continuing medical education fees.
- Other direct compensation to the physician.^{92,93}

Tax Credits

Five states have established tax credits for primary care clinicians who serve as preceptors for students or residents or who practice in underserved areas; three – Colorado, Georgia and Maryland – have established tax credits for primary care clinicians who serve as preceptors for medical students. Eligibility for the preceptor tax credit varies across the three states; physicians are eligible in all states, NPs are eligible in Colorado and Maryland and PAs are eligible in Colorado. Maryland limits eligibility to clinicians who practice in an underserved area, and Colorado limits eligibility to clinicians in rural areas.⁹⁴

Two states – New Mexico and Oregon – provide tax credits to multiple types of clinicians who practice in rural areas, including primary care physicians, NPs and PAs.⁹⁴⁻⁹⁶ In New Mexico, eligible clinicians can receive \$2,500 per year if they practice in a rural underserved area between 1,040 and 2,080 hours per year and can receive \$5,000 per year if they practice in such an area 2,080 or more hours per week.⁹⁴ Oregon's Rural Practitioner Tax Credit is prorated based on how far a provider practices from a community of 40,000 residents with remote/rural designations, providing a maximum reward of \$5,000. The tax credit was created to supplement the state's loan repayment program, which yielded greater benefit for urban primary care practices than for practices in rural areas. A total of 2,155 clinicians in Oregon (primary and nonprimary care) received tax credits in 2015.⁹⁶

Housing

At least one community health center in California provides housing. Because the San Francisco rental and real estate market can be cost prohibitive for medical residents, North East Medical Services (NEMS), a community health center in the San Francisco Bay Area, developed apartment housing for its residents. NEMS' investment in resident housing is an innovative strategy to attract residents who will ideally choose to practice at the health center in the future.⁹⁴

2.3: Expediting Licensure for Clinicians Recruited from Other States

Financial incentives can be challenging to implement if an employer is recruiting a primary care clinician from another state; anecdotal reports from CHCs suggest that some have lost candidates they attempted to recruit from other states due to the length of time needed to obtain licensure in California. Participation in the National Council of State Boards of Nursing's APRN Compact would expedite licensure for NPs; once 10 states adopt the compact, NPs and other APRNs in participating states will hold a multistate license that would give them the privilege to practice in any participating state without obtaining an additional license. Three states have adopted the APRN Compact as of 2018.⁹⁷

2.4: Visa Waivers

Many states also partner with the federal government to offer J-1 visa waivers for international medical graduates (IMGs) who have completed residency in the United States. These waivers enable IMGs who agree to practice in an underserved area to remain in the United States immediately after completing residency instead of returning to their home countries.

IMGs comprise approximately 25 percent of the U.S. physician workforce and serve a vital role in filling rural primary care workforce gaps in many states.⁹⁸ About 3,000 IMGs enter residency programs in the United States every year, almost all in primary care.⁹⁹ Half have J-1 visas, which require recipients to return to their home countries for two years after they complete residency; other IMGs enrolled in residency programs have H-1B visas.

Upon completion of residency, IMGs with H-1B visas can transfer their H-1B visa status to an employer if they have suitable offers of employment. While FQHCs and other organizations that provide primary care to underserved populations can recruit IMGs with H-1B visas, employers that do not serve these populations can also sponsor these visas. These employers may be able to offer larger compensation packages or more attractive practice locations than can organizations that serve underserved populations.

IMGs with J-1 visas can apply to participate in the U.S. exchange visitor program or the Conrad 30 J-1 visa waiver program; both programs require participants to practice in a medically underserved area for at least three years. DHHS manages the exchange visitor program and applies to the U.S. Citizens and Immigration Service for waivers for eligible applicants. Under Conrad 30 program, each state can request up to 30 waivers each year; California has participated in this program in the past and continues to do so. The Conrad 30 waiver program was first authorized in 1994 and was up for Congressional reauthorization in 2017. The bill garnered rare bipartisan support and was included in the continuing resolution signed by the President earlier this year.¹⁰⁰ Doctors with J-1 visa waivers are a major provider of primary care services in underserved rural communities, although rates of retention at employment sites in rural or underserved areas after completion of a service commitment are not tracked systematically at the national level and have been reported to vary widely.^{101,102}

2.5: Caring for Clinicians

Caring for clinicians has been deemed a fourth facet of a Quadruple Aim along with improving the patient experience of care, improving the health of populations and reducing health care expenditures.¹⁰³⁻¹⁰⁵ Key informants interviewed for this project strongly supported the strategy of addressing burnout and returning joy to practice for primary care clinicians. High-priority determinants of physician satisfaction include delivering high-quality care, minimizing the impact of EHRs on patient care, achieving income stability and fairness and minimizing the burden of regulations.¹⁰⁶ The "care" of clinicians should begin during medical school and continue throughout training so that physicians enter practice equipped to manage psychological stress.

Several informants noted that consolidating small practices (one to two clinicians) into larger primary care organizations or health care delivery systems can be a means to better care for primary care clinicians because larger organizations can provide infrastructure and resources to relieve the financial burden of implementing medical home models, providing chronic disease management support and providing practice coverage for time away from work for continuing education, vacation or family responsibilities.¹⁰⁷ The California AHEC program is an example of a source of guidance for practices interested in improving the care of physicians. It provides some continuing education to support clinicians as well as resources for practices to orient and retain clinicians.¹⁰⁸ Peer groups and professional associations can also be sources of support that can mitigate burnout. Examples of sources of guidance for practice transformation in other states and at the national level are discussed in Appendix A.

Strategy 3: Maximize the Existing Workforce

Over the past decade, primary care practices have been tasked with improving the quality of care for individual patients, improving population health and reducing the per capita costs of health care.¹⁰⁹ In addition, the ACA established a number of value-based reimbursement mechanisms to pay for care provided to Medicare beneficiaries. These new demands, which are coupled with a shortage of primary care physicians, require an all hands on deck response that encompasses multiple occupations. Innovative care delivery models are emerging that allow primary care sites to serve more patients and deliver care more effectively.

3.1: Teams

Evidence is building that care delivered by teams that is coupled with efficient workflow modifications could reduce or eliminate projected primary care physician shortages and transform care. Physicians are well prepared to care for complex patients, make clinical decisions and consult with specialists on difficult cases. These higher-order thinking activities are likely to bring more professional satisfaction than will time spent on administrative duties.^{110,111} Efficiency modifications, particularly around EHR use and task shifting, could free more of a primary care physician's time to be spent on face-to-face patient encounters.¹¹² One widely implemented model of team-based practice is the "teamlet," under which a primary care team comprises a clinician leader (physician, PA or NP), registered nurses (RNs) and/or medical assistants (MAs) who perform expanded roles in health coaching and chronic disease management, and a scheduler. Some teamlets add behavioral health workers or pharmacists.¹¹³

Shifting tasks away from physicians and reliance on other health care workers challenge the central role that physicians have traditionally held in the U.S. health care system.^{114,115} Most physicians in practice today were trained under a model in which physicians were taught that they should make decisions independently and that they should do everything for patients themselves. Some are uncomfortable delegating tasks to other health care workers and skeptical that others could be better able to help patients manage their conditions. The primacy of physician authority and autonomy can conflict with the interdependence required of teamwork, as can the legal risks of delegating tasks. To maximize the potential of team-based practice, medical schools and residency programs will need to train physicians on how to practice effectively in teams.

Nurse Practitioners and Physician Assistants

NPs and PAs have practiced alongside primary care physicians since these professions were established in the 1960s. Traditionally, the primary care physician serves as the team leader who determines which services NPs and PAs will provide. Models of practice range from NPs and PAs having independent panels of patients to joint responsibility for a single patient panel.

Newer models of primary care practice are emerging, such as nurse-managed health centers (NMHCs), under which NPs lead primary care teams; NMHCs focus on providing care to vulnerable populations. According to the National Nurse-Led Care Consortium, NMHCs are often located in places that traditionally lack access to health care, such as public housing, urban and rural communities, Native American reservations, homeless shelters, older adult centers, elementary schools, storefronts and places of worship.¹¹⁶ They combine primary care with community resources to address social determinants of health as well as medical needs. One study found that expanding NMHCs could substantially reduce the projected shortage of primary care physicians in the United States.¹¹⁷ The National Nurse-Led Care Consortium estimates that there are over 200 NMHCs in this country, many of which are affiliated with schools of nursing.¹¹⁶ California's requirement for physician supervision of NPs may constrain the development and expansion of NMHCs in the state.

Registered Nurses

RNs are contributing to population health management for primary care practices because their training focuses on assessing and managing all of the physical, biological, social, psychological and environmental influences on health.¹¹⁸ RNs are also assuming important emerging primary care functions in chronic disease management, complex care management and care coordination. Their contributions are likely to be especially important in California because the state may not be able to produce enough primary care physicians, NPs and PAs to alleviate anticipated shortages.

West County Health Centers, Inc. in Sonoma, California, provides an important example of investment in the role of the RN care manager as a critical member of the primary care team.¹¹⁹ At this CHC, the primary care team consists of a medical provider, an RN care manager, an MA and front office staff. Each team cares for approximately 1,200 patients; the exact number varies depending on the complexity of the patients' health care needs. RN care managers focus on communicating with and supporting patients with complex health needs between office visits. Their responsibilities include providing chronic disease management to patients who are not meeting health targets (e.g., recommended hemoglobin A1C [HbA1C] levels for people with diabetes), managing the care of higher-cost/higher-utilization patients and coordinating transitional care for patients treated in emergency departments or hospitals. Another example of the expanded use of RNs is sharing patient visits between an RN and a physician, NP or PA; an example from Colorado¹²⁰ is discussed in Appendix A.

To maximize the potential of RNs to contribute to primary care teams, RN education programs will need to better prepare students to practice in primary care settings. To a large extent, RN education continues to focus on preparing students to practice in inpatient settings. Nursing educators are aware of this need but often have difficulty finding primary care practices that are willing to serve as clinical training sites.

Pharmacists

Pharmacists can also make important contributions to primary care teams by providing expertise in the use of medications to manage chronic conditions. In some primary care practices, pharmacists run anticoagulation clinics to monitor patients who receive warfarin and other anticoagulant medications.¹²¹ Warfarin dosage has to be titrated carefully because patients who do not receive enough medication are at risk for pulmonary embolism or stroke and patients who receive too much are at risk for bleeding. Having pharmacists monitor patients on warfarin and adjust the dosage as needed frees primary care physicians to care for other patients. Primary care Practices are also utilizing pharmacists to manage patients with hypertension and diabetes. In these practices, pharmacists educate patients about how to manage their conditions, monitor adherence to medication, review test results and adjust medication regimens in consultation with patients' physicians. A large, multisite cluster, randomized controlled trial found that patients with uncontrolled hypertension in primary care practices in which pharmacists provided hypertension management had lower mean blood pressures than did patients in practices in which pharmacists did not provide hypertension management.¹²² A smaller observational study conducted in the Los Angeles area found that persons with poorly controlled diabetes who received care at safety net clinics at which diabetes management services were provided had lower HbA1C levels than did patients who received care at clinics at which pharmacists did not provide this management.¹²³

Medical Assistants and Other Unlicensed Personnel

MAs play an essential role in primary care practices by keeping the patients flowing through the clinics. Traditionally MA work has been limited to rooming patients, taking vital signs and setting up equipment; however, emerging roles include health coach, medical scribe, dual-role translator, health navigator, panel manager, cross-trained flexible role and supervisor.^{124,125} On-site training is a critical component of effective use of MAs in primary

care as most MAs are not prepared in training programs for expanded roles. Providing opportunities for incumbent MAs to obtain training to take on expanded roles and providing higher compensation for MAs in these roles create career ladders that can improve retention. Expanding MA roles has been limited by leadership and clinician resistance to change, costs of additional MA training and lack of reimbursement mechanisms, although some notable examples have been implemented across the country as described in Appendix A.¹²⁵

The emerging roles described in the previous paragraph can be performed by persons who are not MAs; for example, some primary care practices employ college students or recent college graduates as health coaches or scribes. Health coaches assist people with managing their chronic conditions; scribes work in examination rooms with clinicians and record information in EHRs such as patients' medical histories and current symptoms and clinicians' diagnosis and treatment plans. These young people provide valuable services for patients, reduce the amount of time clinicians spend on documentation and gain work experience that makes them more competitive applicants for medical, NP or PA school.

Care Coordination Using Multiple Professions

Care coordination and complex care management are multifaceted concepts referring to the need for meaningful communication and cooperation among health care providers as patients move across care settings such as hospitals, clinics, nursing homes and their own homes. Care coordination efforts have largely focused on high-need, high-cost patients, including people with multiple chronic conditions, who now comprise over one quarter of the U.S. population; this population is more likely to see multiple clinicians, take five or more medications and receive care that is fragmented, incomplete, inefficient and ineffective.

To cope effectively with the challenge of caring for high-cost, high-need persons, high-performing primary care practices assign tasks to team members with the appropriate level of training for the task. Low-complexity activities are typically shifted to licensed practical nurses, MAs and other unlicensed personnel to free RNs and social workers to focus on more complex patients. Successful implementation also involves tailoring approaches to patients' needs and local contexts, building trusting relationships with patients and their primary care providers, matching team composition and interventions to patient needs, offering specialized training for team members who are performing new roles and using technology to facilitate coordination.¹²⁶⁻¹²⁸

The Health Plan of San Mateo has developed an innovative model of health workforce care coordination within a California Medi-Cal managed care plan that includes patients enrolled in Medi-Cal and Medicare.¹²⁸ The health plan employs care coordination technicians, care coordination nurse case managers, dialysis nurse case managers and social workers to coordinate care primarily through telephonic interactions with patients. In addition, NPs conduct home visits to assess high-risk patients and perform in home care until patients are stabilized. Examples from other parts of the country include the Johns Hopkins Community Health Partnership, described in Appendix A.¹²⁹

3.2: Practice Regulation

Supervision and scope of practice for NPs and PAs are determined by four parameters: education and experience, state law, policies of employers and facilities and patients' needs.¹³⁰ State laws and regulations determine which functions health professionals can perform and in what contexts. Medical practice acts in every state give physicians full authority to diagnose and treat all conditions; in contrast, NP and PA authority varies significantly by state. Advocates argue that changes in federal and state laws are needed to remove barriers to allow NPs and PAs to fill the primary care gap and to practice to the full extent of their capabilities.^{131,132} Opponents, including the AMA, argue that "full practice authority" for NPs and PAs poses a risk to patient safety and that NPs and PAs should provide essential patient care "at the discretion of the physician team leader."¹³³

Nurse Practitioners

Full practice authority permits NPs to independently evaluate patients; diagnose including ordering and interpreting diagnostic tests; initiate and manage treatments and prescribe medications.¹³⁴ Key elements of state NP practice acts that provide full practice authority include

- Autonomous practice.
- Ability for NP to function as a primary care provider.
- Independent prescribing.
- Ability to order physical therapy.
- Ability to sign a death certificate.
- Ability to sign handicap parking permits.
- Ability to sign workers' compensation claims.

Twenty-three states and the District of Columbia have enacted full practice authority for NPs. California (along with Michigan, New York and most states in the South) restrict at least one element of NP practice and require oversight of NP practice by another health profession.¹³² California NPs cannot practice autonomously, and the California State Legislature has failed to pass legislation that would give NPs full practice authority, most recently during the 2015-2016 legislative session (SB 323). In California, the NP practice act allows NPs to function as primary care providers, order physical therapy and sign accessible parking permits, but they may not prescribe independently, sign death certificates or sign workers' compensation claims.¹³⁴⁻¹³⁶

Physician Assistants

Although some variation exists in state law, the majority of states allow scope of practice for PAs to be determined at the practice level based on complexity of patient problems common to the practice, the training and experience of the PA and the setting in which care is rendered.^{130,131} The American Academy of Physician Assistants has identified six key elements that should be part of every state PA practice act:

- "Licensure" as the regulatory term.
- Full prescriptive authority.
- Scope of practice determined at the practice level.
- Adaptable collaboration requirements.
- Chart co-signature requirements determined at the practice level.
- Number of PAs a physician may collaborate with determined at the practice level.¹³⁰

Only seven states have PA practice acts that incorporate all six elements (Massachusetts, Michigan, Minnesota, North Carolina, North Dakota, Rhode Island and Vermont).¹³⁷ As of 2017, California state law contains the first four of the six key elements; chart co-signature and the number of PAs a physician may supervise are determined by the state, not at the practice level. Physician supervisors are required to co-sign at least 5 percent of all charts or review 10 charts per month. Additionally, existing California law limits the maximum number of PAs a physician can supervise to four. Legislation to increase the maximum number from 4 to 12 PAs was introduced in the Legislature in 2017, but it has yet to be enacted (AB 1560).^{138,139}

3.3: Telehealth

Telehealth is an important strategy for meeting demand in areas where primary care clinicians are scarce.¹ It has evolved over the past several decades to encompass multiple technologies including secure email, live video and store-and-forward technologies for transmitting and viewing images. Although clinicians often use these technologies to interact with patients, telehealth technologies can also facilitate communication between primary care physicians and specialists. Across the country, health care organizations are using telehealth to improve the quality of care that primary care physicians provide and reduce professional isolation, particularly among rural primary care physicians who may not have many opportunities for in-person interactions with specialist colleagues.

Notable examples include an eConsult and enhanced referral model that was developed at UCSF that allows primary care clinicians to communicate electronically with specialists about focused clinical questions.¹⁴⁰ TUCSF has also implemented a payment model that compensates both primary care and specialist physicians for participation in eConsult.¹⁴¹ Benefits of the model included joint learning between primary care and specialist physicians, more effective referrals, more timely care delivery and increased patient satisfaction. Based on the success of UCSF's model and other e-referral models, the Center for Medicare and Medicaid Innovation (CMMI) awarded a Health Care Innovations Award to the AAMC to establish Coordinating Optimal Referral Experiences to disseminate the model to five other institutions (University of Wisconsin, University of Iowa, UC San Diego, University of Virginia and Dartmouth-Hitchcock).^{140,142}

The University of New Mexico's Project Extension for Community Health Care Outcomes (ECHO) is a different model of telehealth that leverages teleconference technology to increase access to care in rural and underserved areas and de-monopolize specialized medical knowledge and expertise.¹⁴³ Specialists and primary care clinicians in the program co-manage patients with complex diseases virtually, allowing primary care clinicians to rapidly gain deep domain expertise through collaboration with university-based specialists.¹⁴⁴ Researchers have found that the quality of hepatitis C care provided by Project ECHO-trained primary care clinicians is equal to that of care provided by university-based specialists.¹⁴⁵ The Project ECHO model has since been expanded to more than 120 hubs in 23 countries for 60 conditions including pain management, hypertension, diabetes, palliative care, substance use, osteoporosis, HIV, geriatric care, autism and more.¹⁴⁶ Hubs in California include LA Net, San Diego Tuberculosis Control, UC Davis, Irvine and San Francisco medical centers and UCSF Benioff Children's Hospital.

California could expand access to telehealth services if it adopted the Interstate Medical Licensure Compact.¹⁴⁷ Twenty-two states participate in this compact, which allows physicians who are licensed in a participating state to practice across state lines in other states that have adopted the compact. The process of obtaining licensure in multiple states is expedited because information that physicians previously submitted to their states of principal licensure would apply in California. Participating states can also share information about disciplinary actions taken against physicians, which can prevent a physician who has been disciplined by one state from obtaining a license in another participating state. The state's participation in the compact would improve Californians' access to telehealth services because it would expand the pool of potential telehealth providers to include physicians in other states.

3.4: Payment Reform

To support a change in care delivery that addresses primary care workforce deficits, fundamental changes in payment are needed to base reimbursement on the value of care provided instead of the volume of services rendered and to narrow the gap between primary care and specialty clinician compensation. Such changes in payment are essential for achieving the vision of primary care as an entry point of access for long-term, person-

centered, comprehensive and coordinated care in the context of family and community that addresses the full spectrum of patients' medical, behavioral, oral health and social needs.¹⁴⁸⁻¹⁵¹

Value-based reimbursement and per capita reimbursement reward primary care physicians for providing better primary care, which may improve their job satisfaction and can also facilitate team-based practice. FFS reimbursement pays primary care practices for each patient encounter, which incentivizes performance of targeted activities and rewards clinicians for industriousness. FFS does not directly reward enhanced primary care activities such as care coordination or disease management for patients with multiple chronic conditions that cannot be accomplished in a 15-minute visit.¹⁵² In addition, FFS does not provide financial flexibility to redesign and invest in personnel and technology needed to provide enhanced primary care functions. By decoupling payment from physician visits and procedures, value-based and per capita reimbursement facilitate investment in hiring new staff to support quality improvement and care coordination activities as opposed to distributing these tasks to existing team members who may feel overburdened.¹⁵³

Examples of value-based payment include the Medicare Access and CHIP Reauthorization Act (MACRA) final rule.^{154,155} MACRA creates two payment pathways for physicians that will affect payment beginning in 2019, Advanced Alternative Payment Models (advanced APMs) and the Merit-based Incentive Payment System (MIPS).¹⁵⁶ Advanced APMs include the Shared Savings Program, medical home models and innovative episode payment models for cardiac and joint care. The MIPS is a new program for physician practices that do not choose to participate in advanced APMs that will replace several existing payment models and adjust FFS payments to physician practices based on quality and cost performance.¹⁵⁴ Physicians' reactions to MIPS have been mixed, and its full impact on the primary care workforce will not be known for some time.

Other examples include the Conference of Primary Care Programs (CPC Plus), a national advanced primary care medical home model that aims to reduce expenditures for primary care and enhance the quality of care through regionally based multipayer payment reform and care delivery transformation.¹⁵⁷ CPC Plus practices receive a hybrid payment that blends Medicare FFS and global payment for evaluation and management services; this hybrid payment mechanism allows CPC Plus practices the flexibility to deliver care in the manner that best meets patients' needs without being tethered to the 15-minute office visit. Appendix A contains a description of a CPC Plus program in Pennsylvania.

In California, CPCA and the California Association of Public Hospitals and Health Systems (CAPH) have partnered with the California Department of Health Care Services (DHCS) to develop an APM that would transition FQHCs from payments based on the volume of visits provided to value-based payment.¹⁵⁸ In 2015, the governor signed into law SB 147 (Chapter 760, Statutes of 2015), which authorized DHCS to implement a three-year pilot project to test the use of clinic-specific capitation rates to pay FQHCs. The pilot set out to facilitate the provision of nontraditional services, such as email and telephone visits, that are not reimbursed under the existing volume-based payment system. CPCA and CAPH developed a capitation payment preparedness program to help FQHCs prepare to receive capitation payments and are working with individual FQHCs on implementation plans. DHCS submitted a proposal to the Centers for Medicare and Medicaid Services (CMS) for implementing the pilot that included the use of a State Plan Amendment (SPA) as the vehicle to facilitate the demonstration, consistent with the bill language in SB 147; CMS ultimately did not accept the proposal to use solely an SPA. Currently, CPCA and its partners are formulating a new APM proposal that not only addresses the limitations of the previous method but more ambitiously targets the potential for system-wide savings and better alignment with the Triple Aim of improving the patient experience of care, improving the health of populations and reducing health care expenditures.⁹⁴

Strategy 4: Leverage Data to Inform Workforce Strategies

Collecting and synthesizing data to estimate the size and location of the existing primary care workforce and identify gaps in primary care access are critical to addressing workforce shortages. At present, evidence is limited for informing our understanding of who is providing primary care. As demonstrated in the first report in this series, comparing data across professions within California is not a straightforward task due to inconsistent and unreliable data.⁸ A Minimum Data Set that contains consistent information about demographic, training, credentialing and practice characteristics of all types of clinicians who deliver primary care services at state, regional and county levels would enhance workforce research and policy development in California. It would also facilitate the establishment of national databases with consistent core data elements that could be used to compare primary care workforce trends across states.

4.1: Data Collection and Analysis

Under legislation enacted in 2001 (AB 1586), the Medical Board of California administers a survey to physicians when they renew their MD licenses every two years.¹⁵⁹ This survey contains questions about the number of hours physicians work, professional activities, practice location, specialty, board certification, race/ethnicity and languages spoken. Additionally, the California Board of Registered Nursing periodically administers surveys to a sample of nurse practitioners; the latest survey was fielded in early 2017, and a report on findings was published in 2018.¹⁶⁰ The Osteopathic Medical Board of California began surveying its licensees in 2016. The California Physician Assistant Board does not currently survey licensees.

California has attempted to create a central source for collection, analysis and distribution of information on health care workforce employment and education trends, but accomplishments to date have been limited. The Healthcare Workforce Clearinghouse was established in 2007 under Senate Bill 139 (Scott, Chapter 522, Statutes of 2007)¹⁶¹ and is administrated by OSHPD's Healthcare Workforce Development Division. The clearinghouse was envisioned as a searchable database that would bring together data from multiple sources, including licensing boards, the Employment Development Department and educational institutions. At present, the database's capacity is limited. Information on numbers of licensed professionals statewide and by county is not available for MDs, DOs, NPs and PAs or for other licensed personnel who work in primary care settings. The searchable database also does not include data on important variables for workforce planning, including whether licensees provide patient care, the numbers of hours of patient care they provide per week, the settings in which they practice and their specialties. The searchable database also does not contain any data about health professions education and training because the agency that was to have supplied those data, the California Postsecondary Education Commission, was closed in 2011. The clearinghouse also does not contain projections of the future supplies of health professionals, which are critical to determining whether supplies will be adequate to meet projected demand. Although OSHPD staff members have used the clearinghouse data to conduct needs assessments to identify areas of California that are eligible for designation as federal Health Professional Shortage Areas¹⁶² and have created fact sheets for individual professions, these publications represent only a subset of the scope of work envisioned for the clearinghouse.

Some states have more robust health care workforce data initiatives that collect and analyze standardized data across professions. Examples include North Carolina,¹⁶³ New York,¹⁶⁴ and Washington.¹⁶⁵ (see Appendix A for details). In these three states, government agencies partner with academic institutions to collect, analyze and interpret workforce data. Researchers at academic institutions in California have completed a number of important research projects on the state's health care workforce, but these projects have typically been limited to a single profession or group of professions and have often been "one-off" studies that are not updated as new data become available. In addition, aside from work on nursing, most health workforce research in California has been funded by philanthropic foundations or the federal government.

Collecting and analyzing data on the quality and cost of primary care are as important as collection and analysis of data on primary care clinicians' demographic, education and practice characteristics. The greatest reservation decision-makers have about shifting tasks from physicians to other team members is the potential for decreases in quality of care and increases in cost. Robust data on quality and cost at the provider, clinic/hospital and payer levels are critical to making evidence-based decisions about workforce deployment and new models of care. Optimally, cost, quality and access data would be linked together to evaluate outcomes of new team structures and task shifting. Massachusetts' Registration of Provider Organizations program is a first-in-the-nation initiative to collect and publicly report information about cost, quality and access to care for persons served by the state's largest health care system. Measures can be compared across time, between Massachusetts and the nation and between various organizations and institutions within Massachusetts^{166,167} (see Appendix A for more details).

4.2: Testing New Models of Care

Although California is not at the forefront of efforts to systematically collect standardized data on cost and quality across multiple providers, it has a unique mechanism that can be used to test new models of primary care: OSHPD administers the Health Workforce Pilot Projects (HWPP) program, which allows for waiving state laws that govern scope of practice for health professionals who participate in pilot projects approved by OSHPD. HWPP allows organizations to test, demonstrate and evaluate new or expanded roles for health care professionals or new health care delivery alternatives before the California Legislature makes changes to licensing laws.¹⁶⁸ The program has conducted 173 projects since 1973, and over 50 percent have pertained to expanded roles for nurses.¹⁶⁹

4.3: Workforce Planning

State health workforce commissions have been proposed as a means to support health care workforce transformation at the state level. Commissions are typically tasked with identifying where resources for primary care workforce development should be allocated and whether investments are achieving their goals.²¹

In August 2010, the California Workforce Investment Board established the Health Workforce Development Council (HWDC) to help ensure that the state has the skilled workforce needed to provide all Californians with access to quality health care. The council engaged a broad range of public and private stakeholders to achieve its mission. In 2013, the council issued a report on the state's health workforce development needs and since then has issued a report on "earn and learn" models under which persons are employed in the health care sector while completing training.^{170,171} However, the HWDC no longer meets on a regular basis and no longer has dedicated staff (Robert Redlo, Chair, August 2017).

In August 2017, five California foundations that focus on the health sector launched the California Future Health Workforce Commission. This commission encompasses representatives from higher education and the health care industry and is charged with developing a master plan for addressing the state's high-priority health workforce needs and securing commitments for implementing the plan; the commission's three areas of focus include the primary care and prevention workforce.¹⁷²

A number of other states have developed health workforce commissions to address primary care shortages, including Michigan,¹⁷³ New York,¹⁷⁴ Oregon,^{95,175} South Dakota,^{176,177} Utah^{178,179} and Washington.^{180,181} South Dakota's Primary Care Task Force is one of the most prominent examples of a model that comprehensively addresses state workforce deficiencies and tracks the ongoing success of the initiatives. Further details about South Dakota's task force can be found in Appendix A.

Conclusion and Policy Implications

The conceptual framework we developed for this report provides a mechanism for categorizing strategies that California and other states are using to address primary care workforce needs. Decision-makers may also find it useful to consider strategies from the vantage points of how quickly they can be implemented; strategies that target primary care clinicians who have already completed their training will yield results more quickly than will strategies that focus on training more primary care clinicians and increasing the pipeline of potential trainees from rural areas and underrepresented racial and ethnic groups. Below we identify strategies that can have an impact on the primary care workforce in the short term (in five years or less) and strategies that will take longer to implement (more than five years) but that are important for fully addressing California's needs.

Type of Strategy	Short-term Strategies (less than 5 years)	Longer-term Strategies (More than 5 years)
Enhance Education Pipeline	<p>Implement admissions policies for NP and PA education programs, medical schools and residency programs that prioritize admitting students who are likely to practice in underserved areas and diversify the health care workforce</p> <p>Provide academic, financial and psychosocial support for trainees interested in primary care careers, trainees from underrepresented groups, trainees from disadvantaged backgrounds and trainees interested in practicing in underserved areas</p> <p>Increase the number of primary care physicians, NPs and PAs who complete clerkships and residencies in primary care practices that care for medically underserved persons</p> <p>Expand post-baccalaureate programs</p> <p>Expand programs that prepare international medical graduates to provide primary care in underserved areas</p>	<p>Academic, financial and psychosocial support for K – 12 and college students from disadvantaged backgrounds and underserved areas who are interested in health care careers</p> <p>Expedite training time for primary care clinicians</p> <p>Expand scholarships for medical, NP and PA students that are contingent on providing primary care in an underserved area following completion of training</p>

Type of Strategy	Short-term Strategies (less than 5 years)	Longer-term Strategies (More than 5 years)
<p>Improve Recruitment and Retention</p>	<p>Expand programs that repay student loans contingent on practicing in an underserved area following completion of training</p> <p>Provide financial incentives for primary care clinicians to establish or join practices in underserved areas, such as tax credits, income guarantees and housing loans</p> <p>Adopt the APRN Compact, which would enable NPs recruited from other participating states to practice in California without obtaining an additional license</p> <p>Utilize J-1 visa waivers and H-1B visas to recruit IMGs to practice in underserved areas</p> <p>Provide primary care clinicians more opportunities for time away from work and professional development</p>	<p>Provide competitive compensation to primary care clinicians, especially those who care for underserved populations</p>
<p>Maximize the Existing Workforce</p>	<p>Adopt new team-based models of primary care, including nurse-managed clinics</p> <p>Hire more RNs, LVNs, medical assistants, health coaches, scribes, community health workers, paramedics, etc. and integrate them into primary care teams</p> <p>Train incumbent workers in primary care practices to assume new roles such as scribes and health coaches</p> <p>Align payment incentives to promote team-based care and use of telehealth technologies and adopt the Interstate Medical Licensure Compact to enable physicians in other states to provide telehealth services to Californians.</p> <p>Replace fee-for-service reimbursement with value-based and per capita reimbursement to reward primary care clinicians for improving health outcomes</p>	<p>Change state laws governing supervision and scope of practice to enable NPs and PAs to provide a wider range of services under less supervision</p> <p>Implement value-based reimbursement on a widespread basis</p>

Type of Strategy	Short-term Strategies (less than 5 years)	Longer-term Strategies (More than 5 years)
Leverage Workforce Data	<p>Increase investment in collection, analysis and dissemination of data on the primary care workforce, especially NPs and PAs</p> <p>Collect, analyze and disseminate information about innovative models for providing primary care</p> <p>Use data to make decisions about primary care training capacity and training locations</p>	

Selecting Strategies to Implement

A comprehensive agenda for primary care workforce development should encompass strategies within each of the four major categories described in this report. When selecting from this menu of strategies, decision makers should consider them from perspectives including

- How quickly could the strategy be implemented?
- How quickly would the investment generate desired outcomes?
- What organization(s) would need to act to implement the strategy?
- What additional resources would be needed to implement the strategy?
- Would the strategy require any changes in state law or regulation?
- What are the perspectives of key stakeholders?

To assess the impact of different strategies, California could conduct a study similar to one that Washington State commissioned to compare alternatives for alleviating shortages of primary care physicians in rural areas.¹⁸² The study examined strategies aimed at enhancing the education pipeline, increasing recruitment and retention of primary care clinicians and maximizing the existing health care workforce. The authors found that none of the policy interventions related to enhancing the education pipeline, recruiting and retaining workers or payment reform on their own offset the expected shortage of rural primary care physicians; the only single policy intervention sufficient to counterbalance the projected shortage was reallocating primary care services from physicians to NPs and PAs. Conducting a similar study in California would enable policymakers to determine whether to prioritize expanding numbers of NPs and PAs and their scope of practice or to focus on strategies that increase the number of primary care physicians trained, expand incentives for primary care clinicians to practice in underserved areas and/or leverage the existing workforce in other health care occupations; similar methods could be used to assess the effects of different strategies for increasing the racial, ethnic and linguistic diversity of California's primary care clinicians.

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Appendix A: Description of Primary Care Workforce Strategies Implemented by Other States

Strategy 1: Enhance the Educational Pipeline

Medicaid GME - In 2015, 42 states and the District of Columbia made an estimated \$4.26 billion in Medicaid payments for GME.³¹ Most states do not allocate Medicaid GME funding based on physician workforce needs, but there are a few exceptions. Michigan has two “pools” of Medicaid GME funding, only one of which is allocated to primary care residency programs.¹⁸³ Tennessee provides Medicaid GME funds exclusively to these programs.¹⁸³ In 2013, New Mexico began allocating Medicaid GME funds to a consortium of four family medicine residency programs and in 2014 obtained a Section 1115 waiver from the Centers for Medicare and Medicaid Services (CMS) to redirect Medicaid funds to support developing new primary care residency programs and expanding existing programs based at federally qualified health centers (FQHCs). Medicaid funds are dispensed to FQHCs by adjusting a formula New Mexico uses to pay FQHCs for patient visits. The clinics receive approximately \$150,000 on an annual basis for each residency position.^{33,34}

Combined BS/MD – Since 1973, the City University of New York has operated the Sophie Davis Biomedical Education Program, a combined BS/MD program that prepares inner-city youth and youth from disadvantaged backgrounds for careers in medicine.³⁶ Many students are Latino or African American, and more than half are the first person in their families to go to college. The program has an innovative curriculum that integrates biomedical and social sciences into the baccalaureate curriculum in a manner that enables students to complete a bachelor’s degree in science and a medical degree in seven years instead of the usual eight; students who complete the three-year bachelor’s curriculum are admitted to the CUNY School of Medicine to complete the MD degree. This model substitutes actual performance in courses that are part of a medical school curriculum for performance on the Medical College Admission Test. Students receive extensive academic enrichment and mentoring services. Following completion of residency, graduates are required to practice for two years in an underserved area of New York. Ninety-seven percent of students have completed an MD degree.³⁷

Accelerated Medical School – The Texas Tech University SOM Family Medicine Accelerated Track Model (FMAT) is an accelerated program approved in 2010 by Liaison Committee Medical Education. FMAT’s goal is twofold: to increase the number of primary care/family medicine providers within underserved areas and reduce the cost of medical school.⁴⁰ FMAT decreases student debt load by about \$86,800.¹⁸⁴ The program enrolls 16 students per year and has supported five classes (2013–2017). Of 39 students admitted and enrolled, 4 have been counseled to return to the 4-year program and 2 have chosen to go back; during residency, the 33 students who completed FMAT have performed as well as or better than their peers from four-year medical schools. FMAT is a member of the Josiah Macy Jr. Foundation’s consortium of accelerated medical school programs; other consortium members are New York University, Mercer University School of Medicine, Medical College of Wisconsin (two campuses), McMaster University in Canada, Penn State College of Medicine, University of Louisville School of Medicine, University of Kentucky School of Medicine, Cooper Medical School of Rowan University, Duke University School of Medicine, Ohio State University and UC Davis³⁹

Training Targeted to Practice in Urban Underserved Areas – Thomas Jefferson University runs a multifaceted, longitudinal medical school curriculum known as the Urban Underserved Program (UUP) to address primary care shortages in urban areas. While all medical students at Jefferson have clinical training rotations in underserved urban areas, UUP participants also have faculty mentors from three primary care disciplines (family medicine, internal medicine and pediatrics). Mentors meet with students to review academic progress, service activities and career goals. The UUP curriculum also includes a series of seminars and a community health internship project between years 1 and 2 of medical school. Results of this program indicated that 75 percent of

UUP graduates work in urban areas, 75 percent in an underserved or physician shortage area and 61 percent in a primary care capacity.⁴⁴

Training Targeted to Practice in Rural Areas – The Louisiana State University School (LSU) of Medicine Rural Scholars Track selects five students per year to spend one day per week during the clinical years training with a rural physician with an emphasis on ambulatory primary care.¹⁸⁵ Students who enroll in this program are eligible for tuition exemption for up to four years. To be eligible, students must contractually agree to (1) practice in one of six primary care specialties (family medicine, pediatrics, general internal medicine, medicine/pediatrics, obstetrics-gynecology) or general surgery; (2) return to a rural area in Louisiana to practice upon completion of residency and (3) practice in this rural area for at least five years. The goal for the Rural Scholars Track is that by 2020, the program will produce 101 physicians for rural practice. In 2016, 18 medical students were enrolled, 12 residents in training and 53 physicians in practice. In addition, LSU partnered with HRSA to provide a rural medicine residency program for 18 residency positions with a five-year \$3 million grant, with plans to grow to 24 spots in the next few years.⁴⁵

Targeted Recruitment of Rural Students – The Physician Shortage Area Program (PSAP) at Thomas Jefferson University's School of Medicine, located in Philadelphia, Pennsylvania, is designed to increase the supply and retention of physicians in rural areas. The program gives admission preference to applicants who grew up or spent a substantial portion of their lives in a rural area or small town and intend to practice in a similar area (with priority for those planning to practice family medicine). Since the program began in 1974, more than 300 PSAP physicians have been trained. PSAP graduates are more than eight times as likely as their peers to become rural family physicians, have a retention rate of 79 percent after 11-16 years in practice and account for 21 percent of family physicians practicing in rural Pennsylvania who graduated from one of the state's seven medical schools, even though they represent only 1 percent of graduates from those schools.⁴⁶⁻⁴⁹

College-Level Preparation – University of Hawai'i Health Careers Opportunity Program (HCOP) seeks to increase the number of health professionals serving in areas of need in Hawai'i and the Pacific.⁶⁵ It provides an education pathway for teens and entering college freshman to pursue health careers within the UH system. The program supports students from socially, educationally or economically disadvantaged backgrounds in successfully entering, competing in and graduating from health professions schools. One method HCOP uses is in-residence summer academic and health enrichment programs that engage students through problem-based learning, career exploration and personal development activities.

Strategy 2: Improve Recruitment and Retention of Primary Care Clinicians

2.1: Loan Repayment

MASSACHUSETTS - Several state loan repayment programs in Massachusetts have partnered with CHCs. One example is the Massachusetts League of Community Health Centers CHC Provider Loan Repayment Program, which provides \$50,000 to primary care physicians and \$30,000 to NPs and PAs working in CHCs in exchange for a two-year commitment.¹⁸⁶ This program is separate from the Massachusetts State Loan Repayment Program, and thus, it enables Massachusetts to offer loan repayment to more primary care clinicians.

MICHIGAN - The Michigan State Loan Repayment Program has become one of the largest state loan repayment programs in the nation, with 129 primary care providers in underserved areas.¹⁸⁷ Eligible health professionals, including primary care physicians, NPs and PAs, can receive up to \$200,000 over a period of eight years. Michigan has contributed dollars from the state budget to match federal dollars to establish a sign-on bonus as

part of the Loan Repayment Contract to make the program more attractive. The program has also secured support from employers.

NEW YORK - State loan repayment programs in New York define underserved areas more broadly than do federal programs and fund primary care physicians as well as physicians in other specialties to maximize flexibility of the funds to meet various workforce needs across the state. DANY Physician Loan Repayment provides up to \$150,000 in funding over a five-year period for physicians who commit to a five-year service obligation in an underserved region.⁸¹ A total of \$4 to 5 million is allocated per year for the physician loan repayment program.⁹² In addition, the DANY Primary Care Service Corps program provides up to \$32,000 in loan repayment annually for nonphysician clinicians, including NPs and PAs. Individuals must currently work for a nonprofit facility in a Health Professional Shortage Area and agree to a two-year commitment.¹⁸⁸ A total of \$1 million is allocated per year, approximately one tenth the size of state physician loan repayment programs.

2.5: Caring for Clinicians

NATIONAL – AHRQ has developed a primary care extension model to support practices in incorporating evidence into practice, with emphasis on provider experience and workflow. The model is designed after the agricultural cooperative extension system developed in the early 20th century.¹⁸⁹ The Evidence Now project is using heart health as a topic to apply this model in practice.¹⁹⁰

NATIONAL – In response to the call to increase professional satisfaction for physicians as part of the Quadruple Aim, the American Medical Association developed the STEPS Forward™ resource to support clinicians and practice managers with data and tools to support practice transformation.¹⁹¹ The learning modules present concise evidence-based information to implement elements of practice redesign and to succeed in a value-based payment environment.

NORTH CAROLINA – Area health education centers were developed in the 1970s to address state concerns with health professional retention along with supply, distribution and quality of care. North Carolina's AHEC has remained active, particularly in practice support. The center provides EHR consulting to help providers achieve meaningful use as well as providing on-site quality improvement consulting, workshops, training, webinars, peer-to-peer learning events and group collaboratives to enhance care team satisfaction.¹⁹²

Strategy 3: Maximize the Existing Workforce

3.1: Teams

COLORADO – Clinica Family Health in Denver, Colorado, has developed a primary care RN role that include co-visits, which are patient visits shared between an RN and a primary care clinician.¹¹⁹ The RN co-visit model has improved care team communication and teamwork and increased patient and care team satisfaction. According to the authors of a study of Clinica Family Health, “using RNs on co-visits has helped Clinica improve patient access to same day care by making more appointments available every day,” and “co-visits also provide more time for patient education and discharge instructions and decrease telephone triage and tasking.”

COLORADO – The High Plains Community Health Center redesigned workflow to include expanded roles for MAs with funding from a HRSA Patient Visit Redesign Collaborative. The redesign aimed to shift support tasks away from clinicians (physicians, NPs and PAs) to less-costly MA staff, who were given the title patient facilitator. MAs were cross-trained so that they could rotate between front and back office roles and given a competency check-off list to help them track their progress toward learning required skills. They were assigned to teams that consisted of one primary care clinician and three patient facilitators. The health center created a career path so

that patient facilitators can advance to roles such as community health worker, health coach and patient navigator. The initiative resulted in increased productivity, cost savings and some beneficial patient outcomes, such as an increase in the percentage of patients whose hypertension was controlled.¹⁹³

MULTIPLE STATES – A recent study summarized findings from case studies of the use of MAs in 15 high-performing clinics and medical groups in 13 states.¹²⁵ The authors found that MAs at the case study sites often rotated between new and traditional roles. Relational roles such as health coaching and patient navigation leveraged MAs' communication and language skills (many were bilingual) to improve patient care. Other roles, such as scribing and panel management, involved responsibility for documenting patient visits and analyzing records for panels of patients to identify gaps in care. In other cases, MAs were cross-trained to carry out other technical and administrative work, such as performing phlebotomy or coordinating referrals; many sites created career ladders for MAs. All sites reported positive effects on outcomes such as patient satisfaction, staff engagement, workflow, delivery of recommended primary care services and cost, although the strength of evidence varied across sites.

MARYLAND - The Johns Hopkins Community Health Partnership (J-CHiP) was funded by a \$19.9M CMMI Innovation Grant. The program serves East Baltimore and is a partnership between Johns Hopkins University's Schools of Medicine, Nursing, and Public Health, the university's primary care physician network, its home care service, its managed care organization, five skilled nursing facilities, two acute care facilities, a number of FQHCs and multiple community-based organizations. J-CHiP focuses on strengthening patients' linkages to primary care and improving transitions in care. Community health workers locate and engage eligible patients in their homes or communities and conduct assessments to identify barriers to care. The patient is assigned to a clinic-based team (CBT), which consists of nurses, primary care physicians, behavioral health specialists (primarily licensed clinical social workers) and a volunteer navigation support specialist who is recruited from the community and is paid a stipend to help patients access health and social supports. After an initial comprehensive clinical assessment, the CBT lead works with the patient to create a care plan. Evaluation of the outcomes of the demonstration project is pending, but lessons learned include the needs to establish better collaboration across care settings, engage patients with complex medical conditions, engage providers who are burdened with multiple competing demands and identify information technology and other tools to facilitate and track implementation.¹²⁹

3.4: Value-based Reimbursement

PENNSYLVANIA – The Conference of Primary Care Program (CPC Plus) is a national advanced primary care medical home model that aims to reduce expenditures for primary care and enhance the quality of care through regionally based multipayer payment reform and care delivery transformation. CPC Plus practices receive a hybrid payment that blends Medicare fee-for-service and global payment for evaluation and management services; this hybrid payment mechanism allows CPC Plus practices the flexibility to deliver care in the manner that best meets patients' needs without being tethered to the 15-minute office visit. The Pennsylvania Chronic Care Initiative began as a CPC Plus demonstration project in October 2009 and included 2 commercial health plans and 27 small primary care practice sites.¹⁵⁷ Practice sites were certified PCMHs that implemented learning collaboratives, disease registries, practice coaching, payments to support care manager salaries and practice transformation and shared savings incentives (bonuses of up to 50 percent of any savings generated contingent on meeting quality targets). Pilot sites demonstrated improvements in quality, increased primary care utilization and lower use of emergency department, hospital and specialty care.

Strategy 4: Leverage Data to Inform Workforce Strategies

This section describes examples of states that have more robust health care workforce data analysis and health workforce planning initiatives than California. Examples are listed in the order in which they are mentioned in the main body of the report.

NORTH CAROLINA – The North Carolina Health Professions Data System (HPDS) is part of the Program on Health Workforce Research and Policy, Sheps Center, University of North Carolina at Chapel Hill; HPDS collects and disseminates descriptive data on 19 categories of licensed health professionals in North Carolina.¹⁶³ Established in the 1970s, the Sheps Center performs this work in cooperation with the North Carolina AHEC and the state's independent health professional licensing boards. Data are published annually in a comprehensive data book that is posted online and are used in analyses, presentations and reports.

In addition, three health workforce data tools are supported by the data collection: the Health Professions Data Visualization Tool, the FutureDocs Forecasting Tool and the DocFlows Application; these tools could be replicated in California or other states if the minimum data were collected. The new NC Health Professions Data Visualization Tool contains the most current data on North Carolina health professions, going back to 2000; the tool allows users to visualize, query and download counts of health professionals by county, ratios per population and demographic information. The FutureDocs Forecasting Tool is an interactive, web-based model that estimates the supply of physicians, use of physician services and capacity of the physician workforce to meet future use of health services at the sub-state, state and national levels. DocFlows is a novel web-based application that will improve understanding of physician diffusion. Users will be able to query, download and share maps showing state-to-state moves by residents and actively practicing physicians by specialty; the maps will show all of the states from which a particular state imports or exports its residents and physicians. The application will be created using D3, an open-source JavaScript library.

NEW YORK - The New York Center for Health Workforce Studies, in conjunction with statewide and regional provider organizations, conducts annual surveys of human resources directors from FQHCs, home health care agencies, hospitals and nursing homes across the state. The 2016 surveys asked about the professions and occupations that pose the greatest recruitment and retention problems, as well as emerging care coordination titles and employment trends. Recruitment and retention difficulty are assessed on a 1 (least difficult) to 5 (most difficult) scale.¹⁶⁴

WASHINGTON – Based on the success of the New York survey, a similar survey mechanism has been implemented in Washington State known as the Sentinel Network.¹⁶⁵ Representatives of diverse health care facilities throughout the state (the Sentinels) volunteer to provide information about their health workforce concerns over the previous three to four months. The Sentinel Network is a collaboration between the state's Workforce Board and the University of Washington Center for Health Workforce Studies; the university provides academic expertise and scientific rigor to the project.

MASSACHUSETTS – In 2015, Massachusetts began collecting data through the Registration of Provider Organizations (RPO) program. The RPO program is a first-in-the-nation initiative to collect and publicly report information about the corporate, contracting and clinical relationships of Massachusetts' largest health systems. Cost, quality and access measures can be compared across time, between Massachusetts and the nation and between various organizations and institutions within Massachusetts. The RPO data set, which is designed to be uniform, provider reported, linkable to other data sets and publicly available, provides invaluable data for policymakers, researchers and market participants alike to inform their understanding the current structure and evolving trends in the Massachusetts health care provider market. In 2016, all general acute care hospitals (57) and four specialty hospitals were accounted for in the data, along with 21,678 unique physicians. Based on robust

data collection, the Massachusetts Health Policy Commission produces an annual health trends cost report to examine trends in health care spending and delivery, evaluate progress in key areas and make evidence-based recommendations for strategies to increase quality and efficiency.^{166,167}

SOUTH DAKOTA – South Dakota Primary Care Task Force was convened in 2012 to make recommendations to ensure that all South Dakotans have access to primary care, particularly those in rural areas of the state. Task force members were a diverse group of individuals from across the state representing primary care physicians, NPs, PAs, health systems, hospital administrators, the state’s medical school, the Board of Regents, Aberdeen Area Indian Health Services, medical students, legislators, consumers and state agencies.¹⁷⁶ The group focused on five key areas to strengthen the state’s primary care workforce including capacity of health care educational programs, quality rural health experiences, recruitment and retention, innovative primary care models and accountability and oversight. Achievements to date include state budget approval for one-time startup funds for a rural family medicine residency program to train two new residents per year, implementation of the Frontier and Rural Medicine program that provides third-year medical students with nine months of clinical training in a rural community, expanding financial incentives for recruiting rural clinicians and increasing the number of clinical preceptors for PA and NP trainees.¹⁷⁷

Appendix B: Key Informants

Health Workforce Research Center Leaders

Tom Bacon, DrPH

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Ira Moscovice, PhD

Director, University of Minnesota Rural Health Research Center

Professor, University of Minnesota School of Public Health, Division of Health Policy and Management

Jennifer Nooney, PhD

Senior Study Director, Westat, Inc.

Edward Salsberg, MPA

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Physician Assistant and Nurse Practitioner Workforce Experts**Ruth Ballweg, MPA, PA-C Emeritus**

Professor Emeritus, University of Washington MEDEX Northwest Department of Family Medicine, School of Medicine

Jim Cawley, MPH, PA-C

President, PA Foundation

Professor, George Washington University School of Medicine and Health Sciences, Physician Assistant Studies
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Chris Everett, PhD, PA-C, MPH

Assistant Professor, Duke University, Department of Community and Family Medicine, Physician Assistant Program

Grant R. Martsof, PhD, MPH, RN, FAAN

Professor, Acute and Tertiary Care, University of Pittsburgh School Nursing
Affiliated Adjunct Policy Researcher, RAND Corporation

Professional Organization Research Experts**Michelle Cook, MPH, PhD**

Vice President of Research, American Academy of Nurse Practitioners

Richard Dehn, MPA, PA-C

Professor and Founding Chair, Physician Assistant Studies, Northern Arizona University Physician Assistant Program

Scott Shipman, MD, MPH

Director of Clinical Innovations and Director of Primary Care Affairs, Association of American Medical Colleges
Assistant Professor, The Dartmouth Institute for Health Policy & Clinical Practice

Appendix C: Interview Guide

Study Background:

We are conducting a three-part study about the primary care workforce in California. The first report presents the most current information on the supply of MDs, DOs, NPs and PAs who provide primary care in California. We found that previously identified deficits in California's primary care workforce persist and will be exacerbated in the coming decade because large percentages of MDs and NPs are reaching retirement age. A forthcoming report in this series will forecast the future supply and demand for primary care clinicians.

A third report will discuss strategies for addressing primary care workforce needs. Collectively, these reports will enable stakeholders to assess the adequacy of the current primary care workforce, anticipate future gaps in the primary care workforce, and identify effective policies for addressing these needs.

We would like your assistance assessing primary care workforce development initiatives in states outside California because you have been identified as an expert on this topic.

Study Purpose:

Describe strategies that other states are using to address primary care workforce needs.

Interview Questions:

1. Name:
2. State:
3. Organization and Role:
4. What are the most critical unmet primary care workforce needs in your state?
 - a. How are they being addressed?
5. In addition to these items, are you aware of other types of initiatives to increase the primary care workforce in your state?:
 - a. Have these efforts been successful?
6. Are you aware of any peer-reviewed or 'gray' literature describing these primary care workforce initiatives or their outcomes?
7. Are you aware of any primary care workforce efforts in other states that you would like to see implemented in your state?
8. In your opinion what are the best strategies to address primary care workforce needs at the state level?
9. Are there any other key informants you would you recommend we talk to about this topic?