Maryland Health Workforce Study Phase One Report: Assessment of Data and their Utility for Modeling Clinician Supply and Demand

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Prepared for:

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EXECUTIVE SUMMARY

Like many other states, Maryland is striving to achieve the triple aim of ensuring access to high quality care, achieving superior outcomes and providing cost efficient care. These efforts take place in a rapidly evolving environment being transformed by the needs of a growing and aging population, evolving care delivery models, emerging technologies and the requirements of the federal Affordable Care Act (ACA). Together, these developments are likely to have substantial effects on demand for and supply of health professionals at national, state and local levels.

Maryland seeks to ensure that Maryland's health care workforce is sufficient in size, skill mix, and diversity to meet statewide and local health care needs. This requires robust data on the current and projected future health workforce, and an understanding of how population characteristics and trends in care use and delivery affect both current and future demand for health care services and providers. With funding support from the Robert Wood Johnson Foundation, IHS Global Inc. (IHS) was engaged to study the Maryland healthcare workforce at State and sub-State levels. The Maryland Health Care Commission (MHCC) served as the project manager in collaboration with the Governor's Office of Health Care Reform and the Governor's Workforce Investment Board. This study is divided into two Phases—each with its own report.

This Phase I report seeks to document types and quality of health workforce data collected—along with their utility for health workforce modeling and planning. It addresses three primary research questions to inform measuring the adequacy of Maryland's current health workforce supply:

- What types of data are needed to monitor and assess the current and future adequacy of health workforce supply in Maryland?
- What data are currently available in Maryland and elsewhere (e.g., federal and commercial sources) and what are their respective strengths and limitations in terms of quality and utility?
- How might any current gaps between data requirements and availability be closed or narrowed?

Study methods employed to inform these research questions include:

- Conducting an environmental scan examining licensure and recertification data elements and data collection efforts carried out by states and private professional organizations;
- Developing a conceptual framework to describe and prioritize types of data elements required and/or useful for workforce monitoring and modeling; and

- Collecting and analyzing health professions' recertification survey data from Maryland's licensure boards.

Key findings include:

A range of data is needed to monitor the adequacy of workforce supply in Maryland at the state and sub-state level

Stakeholders need information to inform decisions about the adequacy of supply—including data on current and projected future clinician supply, data on current and projected future demand and the extent to which vulnerable populations have appropriate access to care. Data collection and analysis spans multiple stakeholder groups, and such data need to be collected in a manner that does not overburden providers, licensure boards, and others. There is substantial variability across the health professions in the types of information collected, their completeness, accuracy, and timeliness.

Uncertainty regarding what the Maryland healthcare markets and workforce will look like in the future suggests that the health workforce data infrastructure should be flexible, include measures that are adaptable to an evolving environment and, where feasible, be linked to State policy objectives (e.g., expanding access to primary care and behavioral health services).

Possible data systems and elements to support monitoring the Maryland health professions range in scope and complexity from adopting the federal recommended minimum data set to implementing a more comprehensive conceptual framework of essential and useful health workforce supply and demand data elements (**Table 1**). Core areas covered in the federal minimum dataset focus on provider supply—including basic demographic data (e.g., age, gender and race); education and training (e.g., degrees earned and types of training and certification); and activity, practice, and employment information (e.g., activities conducted, number of hours worked, and employment settings).

Census files (such as licensure databases) are needed to support research and policy related to provider supply and access to care at the sub-state level. The census file for each profession might include a limited number of core variables (e.g., demographics, activity status, types of services provided, and practice location).

Sample surveys could collect data across a broader spectrum of research questions, such as factors affecting activity status and hours worked, practice patterns, geographic relocation, and specialty choice decisions. Ideally, sample surveys should be conducted on a consistent basis, include longitudinal information, and have sufficient sample size for analysis of key subgroups (e.g., providers serving rural or low-income populations). Because this data collection is more burdensome than the minimum dataset, this information might be collected on a subset of providers.

Sufficient data is generally available for the health professions in Maryland to monitor and assess the adequacy of health workforce supply.

We assessed available licensure data across nine Maryland health professions. We also compared data collected by Maryland licensure boards with the federally recommended minimum data set and a more comprehensive conceptual framework that prioritizes a set of both essential and useful workforce supply and demand data elements that might be collected.

Among Maryland's health professions, physician licensure data is currently the most robust source of information to inform workforce planning and modeling. The licensure survey captures 17 variables considered either essential or useful for purposes of workforce assessment. These include most of the data elements summarized in the conceptual framework presented in this report. The span and breadth of data collected on physicians also compares favorably with information collected by private physician organizations and benchmark states and far surpasses the federal minimum data set recommendations.

Among the eight non-physician professions reviewed, licensure data currently collected appears by and large to satisfy most federal minimum data set recommendations, but falls short of the State's physician licensure data with respect to its utility for workforce assessment and modeling. Among the professions reviewed, the number of licensure data elements collected considered essential or useful for estimating current and modeling future workforce supply range from a low of five (dental hygienists) to a high of nine (psychologists).

One important difference between licensure boards that can publicly report robust supply data and those currently unable to do so (e.g., nursing, dental, and pharmacy) is that the latter currently deploy license management software which are not designed to allow easy data extraction and analysis.

Current Gaps between Data Requirements and Availability can be Closed or Narrowed

Maryland's physician supply data is robust, and although the non-physician licensure boards that we reviewed collect supply data of varying quality and utility, they comply with most federal minimum data set recommendations. Still, there are data gaps that inhibit producing reliable estimates of current and future provider supply at State and sub-State levels.

At a minimum, Maryland's non-physician licensure boards might consider adopting the federal minimum data set recommendations, which would offer the State and licensure boards several potential benefits. These include a more nuanced ability to monitor and assess future trends in workforce supply, distribution, and practice patterns. Adopting this approach would also minimize the implementation burden for State licensure boards and would potentially serve as a springboard towards future implementation of an expanded dataset that incorporates select person-level data elements from both the current physician licensure survey and this project's conceptual framework.

Concurrent with efforts to expand data collection capabilities and resources permitting, Boards might also consider further systems development initiatives, including:

- Purchasing/developing licensure database systems capable of data extraction and analysis.
- Implementing interoperable information technology systems that can be linked together.

Another initial step to narrow or close current supply gaps is developing a standardized set of key data elements to be included in State licensure databases. Then, acknowledging the need for flexibility, consider which data elements should be consistent across professions and which might vary by type of professional.

Conclusion

A primary conclusion of this study is that Maryland has a relatively robust data collection system for clinician supply that complies with most federal minimum data collection initiatives and compares favorably with benchmark states. We conclude that, overall, Maryland currently has data systems, collection capabilities, and data elements that, while not optimal, are sufficient to support workforce analysis.

There are areas for improvement, however, with those health professions having weaker data collection potentially learning from those professions having stronger data collection and reporting capabilities. Looking to the future, Maryland might consider improving the overall utility of the current system by collecting a limited number of additional workforce variables that can help inform provider behavior (e.g., intention to retire) and patient access to care (e.g., proportion of time spent providing care to Medicaid or Medicare populations).

There also are numerous potential benefits if Maryland were to develop an early warning system to monitor adequacy of workforce supply at statewide and local (county) levels. Such information can help inform and monitor programs and policies to train, attract, and retain health professions in the State and in historically underserved communities.

I. INTRODUCTION

Maryland is striving to achieve the triple aim of ensuring consumer access to high quality healthcare services, achieving superior outcomes, and providing cost efficient care. These efforts are taking place in an environment being transformed by structural changes brought about by evolving care delivery models, a growing and aging population, emerging technologies, and the requirements of the federal Affordable Care Act (ACA). Together, these developments may have a dramatic impact on demand for and supply of health professionals at the national, state, and local levels.

Reliable indicators of key health marketplace features are needed by federal, state and local policymakers; training institutions; consumers; employers; payers; providers and other stakeholders to monitor and address issues related to maldistribution and adequacy of health workforce supply. An accurate picture of the current state of the health workforce at the State and at the sub-state level is essential to achieving these aims in Maryland. Workforce shortages may reduce access, while surpluses may increase healthcare costs (through induced demand) and create other inefficiencies. Achieving balance between supply and demand for the health professions requires having the right number and mix of health professionals in the right place at the right time.

IHS Inc. (IHS) has been engaged to assess the quality and utility of data available to study the Maryland healthcare workforce at the state and sub-state levels. This study is divided into two Phases—each with its own report. This Phase I report addresses three primary research questions intended to inform measuring the adequacy of Maryland's current health workforce supply:

- What types of data are needed to monitor and assess the current and future adequacy of health workforce supply in Maryland?
- What data are currently available in Maryland and elsewhere (e.g., federal, state and other sources) and what are their respective strengths and limitations in terms of quality and utility?
- How might any current gaps between data requirements and availability be closed or narrowed?[1]

[1] This report focuses primarily on health professions' recertification surveys and minimum data sets.

In addition, this report summarizes the components of a potential early warning system to monitor adequacy of workforce supply at statewide and local levels, including potential indicators of over- or undersupply of health professions.

The Phase II report presents estimates of current supply and demand for select health professions at the state and county levels. The report discusses the implications of study findings for key Maryland stakeholders as they pertain to future market trends. Phase II report research questions include: (1) Are there specialties where Statewide supply and demand currently are not in balance? If so, which specialties, and what is the estimated gap between supply and demand? (2) Are there local geographic imbalances in adequacy of supply? If so, which specialties, which locations, and what is the estimated gap between supply and demand? (3) What are the potential implications of health care reform, emerging care delivery models, market consolidation and other market factors on Maryland's health workforce supply and demand?

The overarching goal of Phases I and II is to conceptualize a data collection and forecasting system designed to provide an updated picture of the current and projected future adequacy of supply of health professionals in Maryland.

The remainder of this report summarizes Phase I study methods and potential approaches to defining workforce adequacy; discusses availability of data required and gaps in the data; provides suggestions to improve data resources; and summarizes features of a possible early warning system for identifying and tracking workforce issues.

II. PHASE I WORKFORCE STUDY METHODS

To provide a rough benchmark to compare Maryland against other states, an environmental scan was conducted that examined the licensure and recertification data elements and data collection efforts carried out by different states and selected organizations for nine healthcare professions. The assessment focused on data elements pertinent to estimating supply and demand for health professions, as well as data elements indicating patient access to services and providers.

To illustrate the scope and breadth of these efforts, which vary widely across states and professions, data elements collected by Maryland on physicians were compared to benchmark states and private organizations. Data elements collected for non-physician professions, although more limited in scope, were examined across Maryland licensure boards. Our scan found that these non-physician professions collected a subset of the more robust data elements currently being captured in Maryland's physician survey. To provide additional

context, current data collection efforts in Maryland were also compared against the recommended data elements in the federal minimum data set.

The environmental scan attempted to compare licensure data for non-physician professions collected in other states with data collected in Maryland. However, we found a great deal of variation in data collection methods (e.g., paper applications, password protected licensure renewal forms), limited data collection and analysis capabilities, and many of the same data gaps discussed later for a number of the Maryland health professions.

For Maryland data, the licensure boards served as primary sources for the professions analyzed. Following guidelines and stipulations set out in the data use agreement and data management plan, we conducted internal data compilation and analysis activities. Findings were summarized in tables that include:

- A conceptual framework describing and prioritizing types of data elements required and/or useful for workforce monitoring and modeling; and
- Tables illustrating data elements available in Maryland across health professions compared to benchmarks.

Analysis and synthesis of this data allowed for an assessment of Maryland health profession's data availability, quality and utility to support workforce planning.

III. ASSESSMENT OF DATA AVAILABILITY, QUALITY AND UTILITY

What Data Are Needed to Monitor the Adequacy of Workforce Supply in Maryland?

Historically, much of the work to define adequacy of health workforce supply has been directed towards physicians and registered nurses. In recent years, however, much more attention has been given to professions such as pharmacists, physician assistants, advanced practice nurses, mental health professions, and various allied health specialties.[2] Although a number of

[2] Examples of recent work include: Sessions JK, Valgus J, Barbour SY, Iacovelli L. Role of oncology clinical pharmacists in light of the oncology workforce study. *Journal of Oncology Practice.* 2010;6:270-272.

Rozensky RH. The institution of the institutional practice of psychology: health care reform and psychology's future workforce. *American Psychologist.* 2011;66:797.

Bazargan N, Chi DL, Milgrom P. Exploring the potential for foreign-trained dentists to address workforce shortages and improve access to dental care for vulnerable populations in the United States: a case study from Washington State. *BMC Health Services Research*. 2010;10:336.

Virginia Department of Health Professions Healthcare Workforce Data Center. Virginia's Physician Assistant Workforce: 2010 - 2011. 3-1-2013.

Wanchek TN, Rephann TJ, Wanchek T. Effects of a proposed rural dental school on regional dental workforce and access to care. *Rural and Remote Health*. 2013;13.

common data elements apply across professions, the framework and selected measures used to define adequacy vary by health profession and employment setting.

For example, some measures (e.g., tracking vacancy rates) apply well to professions whose workforce is typically employed (e.g., nurses). However, such measures may not apply well to professions such as dentists who are largely self-employed. As a result, different measures of adequacy may be needed for various professions and delivery settings.

Another issue to consider is the high level of uncertainty regarding what the national and Maryland healthcare markets and workforce will look like in the future. Therefore, investments in data resources, indicators, and the health workforce data infrastructure in general, should be flexible, should include measures that are adaptable to a fluid and evolving environment and, where feasible, be linked to key state policy objectives (e.g., expanding access to primary care and behavioral health services).

As state and local policy makers, educators, and healthcare professionals ask increasingly sophisticated questions about the health workforce and its interconnections with evolving models of care, cost, quality and access, they will need increasingly sophisticated data sets to make informed decisions without overburdening licensure boards, licensees, and other stakeholders. However, there is currently a great deal of variability across the health professions and states in the types of information collected, their completeness, accuracy, and timeliness. For example, Maryland's Board of Physician's 11-page license renewal survey contrasts markedly in numbers of questions asked and depth of information collected compared with the California Medical Board's limited one-page survey.

Options to support monitoring the Maryland health professions range in scope from complying with the federally recommended minimum data set to adopting a more comprehensive conceptual framework of health workforce supply and demand data points, as described in **Table 1** (see appendix).

Developing a common minimum dataset that informs critical national health workforce policy analysis across or within health professions is an approach adopted by the federal Health Resources and Services Administration (HRSA). HRSA is collecting standardized data for a limited number of supply-related metrics for large health professions. Core areas covered in the minimum dataset include basic demographic data (e.g., age, gender and race); education and training (e.g., degrees earned and types of training and certification); and activity, practice and employment information (e.g., activities conducted, number of hours worked and employment settings). This minimum dataset will facilitate comparison of statistics across states and health professions.

Expected benefits of HRSA's limited minimum dataset include the timely ability to monitor and assess trends in workforce supply, distribution, and practice patterns to enable more accurate

workforce projections and guide the development of programs and policies. Possible limitations include:

- Lack of comprehensive data to adequately explain complex health and health care supply and demand issues and trends; and
- Limited information regarding factors influencing health professions' activity status, geographic relocation, and hours worked decisions.
- No data related to patient access to care (e.g., proportion of provider time dedicated to Medicaid patients).

The conceptual framework described in **Table 1** summarizes and prioritizes a comprehensive set of workforce supply and demand data elements synthesized from the literature and based on extensive experience in health workforce modeling by this report's authors. It also provides a summary assessment of the utility of each data element for modeling the adequacy of health workforce supply. Adopting this conceptual framework would address most of the concerns associated with the limited federal minimum data set. However, the resources required to implement and maintain all of the key elements in this framework might prove onerous for some of Maryland's licensure boards.

These factors suggest that Maryland health professions may benefit through an expanded minimum dataset that supports health workforce research and policy. Such a dataset might include both census files and sample surveys for the various health professions.

- **Census files** (such as licensure databases) are needed to support research and policy related to access to care at the sub-state level. The census file for each profession might include a limited number of core variables (e.g., demographics, activity status, types of services provided, and practice location).
- **Sample surveys** would collect data across a broader spectrum of research questions, such as factors affecting activity status and hours worked, practice patterns, geographic relocation, and specialty choice decisions. Ideally, sample surveys should be conducted on a consistent basis, include longitudinal information, and have sufficient sample size for analysis of key subgroups (e.g., rural or low-income populations). Illustrative examples of survey questions that inform workforce supply data needs are presented below in the discussion of gaps in current supply data that might be narrowed or closed. Such information might, for example, be collected on a subset of providers during the licensure renewal process.

To help inform Maryland's future health workforce planning data needs, we examined health professions' licensure and other data collected by a sample of other states and professional organizations. Tables 2 through 6 present a high-level summary of sources of health professions' workforce supply and demand data currently available in Maryland compared to

selected benchmark states, private organizations, and a federally recommended minimum data set. Table 7 summarizes current gaps in State licensure data and Table 8 summarizes and compares across health professions data provided for analysis by their respective Boards. In summary, with detail presented in the Appendix:

- **Table 1** presents a conceptual framework summarizing key data elements for workforce supply and demand analysis and their utility.
- **Table 2** summarizes and compares licensure data elements currently collected by Maryland health professions.
- **Table 3** compares Maryland's physician licensure data against that collected by selected states. North Carolina, California, Texas, and Oregon were chosen for this benchmark comparison as an environmental scan suggests that their physician licensure and recertification data appear to be among the nations most comprehensive.
- **Table 4** compares Maryland's physician licensure data against that collected by selected private organizations, including the American Medical Association and the recommended data set developed by the Federation of State Medical Boards.
- **Table 5** compares physician licensure data available in Maryland and selected benchmark states to the federally recommended minimum data set.
- **Table 6** compares non-physician health profession licensure data available in Maryland to the federally recommended minimum data set.
- **Table 7** summarizes current gaps in Maryland person level licensure data by non-physician health profession.
- **Table 8** summarizes and compares across Maryland health professions data elements provided for analysis by their respective Boards.

What Data is Currently Available in Maryland and Elsewhere to Monitor and Assess Adequacy of Health Workforce Supply?

To help address this research question, we compared health professions' licensure data collected by Maryland with publicly available licensure and other data collected by a sample of states and private physician organizations. We also compared Maryland's licensure data with the federally recommended minimum data set and a conceptual framework for a comprehensive set of data elements that might be collected as summarized in **Table 1**. Our findings are organized below by physician and non-physician health professions.

1. Physicians

Maryland's physician licensure data is a rich source of information for workforce planning purposes with many variables of moderate to high utility for modeling captured in the physician

data (**Tables 3 and 4**). Its span and breadth compares favorably with licensure information collected by selected private physician organizations, the benchmark states, and other Maryland health professions.

In comparing Maryland's physician licensure data to data collected by selected private physician organizations, we found that although there are several categories where the American Medical Association (AMA) or the Federation of State Medical Boards collect more data elements (e.g., current employment and work setting), in general, Maryland collects more information directly relevant to physician workforce planning (e.g., activity status) (**Table 4**).

The federally recommended minimum data set requirements are purposefully limited in order to secure buy-in from states that may not have similarly robust data collection capabilities as Maryland and the benchmark states, while still collecting information sufficient to support workforce planning. Data collected through Maryland's physician licensure process surpasses the federal minimum data set requirements and is able to satisfy most of the recommended elements (**Table 5**).

Maryland physician data also includes several data elements not captured by other sources that we reviewed. These include physicians' use of health technology and participation in public and/or private insurance programs. Both are useful indicators and have implications for productivity, physician supply, and access to care for vulnerable populations.

Other organizations that collect data on physicians include associations such as the AMA, the American Osteopathic Association, certifying organizations such as the American Board of Internal Medicine, associations representing individual medical specialties, and private institutions (such as the Optum Provider 360 database which is data collected by insurance companies that maintain data on providers in their network and by hospital systems that maintain data on providers who are employed by the hospital or who have hospital privileges). Our assessment is that for physicians, the data being collected by Maryland is superior to these other data sources for purposes of workforce assessment and modeling. The data collected by Maryland is more recent and complete because of the nature by which the data is collected (i.e., questionnaires at time of recertification versus voluntary participation in periodic surveys).

Another source of data on providers is patient billing data collected by the Centers for Medicare and Medicaid Services (CMS). Each provider that directly bills CMS has a unique National Provider Identifier (NPI). CMS data can be useful to determine the degree to which physicians are providing services to the Medicaid and Medicare populations, and where those services are being provided.

2. Other Maryland Health Professions

Table 2 compares licensure data elements currently collected from nine health professions in Maryland (physicians, RNs and LPNs, dentists, dental hygienists, pharmacists, psychologists, social workers, physician assistants, and counselors & therapists) based on data furnished by their respective licensure boards. There is substantial variability across professions in comprehensiveness and types of workforce data collected and reported.

Excluding physicians, the total number of licensure data elements currently collected by individual health professions ranges from a low of 11 (dental hygienists) to a high of 16 (nurses, dentists, and counselors & therapists). More importantly, the number of data elements collected that may be considered either essential or useful for estimating current and modeling future workforce supply range from a low of five (dental hygienists) to a high of nine (psychologists).

Regarding types of data collected, all Maryland boards from which data were received collect provider demographic information that is essential or useful for supply forecasting purposes (e.g., gender, year of birth). Most professions, with the exception of dentists and dental hygienists (who primarily work in an office setting but who might also work in Federally Qualified Health Centers and public health settings), also collect essential information about employment type and work setting. However, among non-physician professions, it appears that little or no data is currently collected describing work activities and distribution (e.g., patient care hours per week). Such data is useful for estimating current full time equivalent supply by profession.

Table 6 presents an assessment of licensure data collected from among eight non-physician professions in Maryland and their current ability to satisfy federal minimum data set recommendations. The licensure data currently collected appears by and large to satisfy most federal minimum data set recommendations. All Maryland health professions reviewed collect the following recommended federal minimum data set elements:

- Counts of licensed professionals.
- New licensees.

Based on assessment of licensure data currently available, it appears unclear in several instances whether or not certain professions (i.e., dentists and dental hygienists) are able to track other selected minimum data set elements (e.g., number of personnel employed by hospitals and other types of health care facilities)—though oral health professions largely practice in office-based settings.

It should also be noted that professions with limited data collection and reporting capabilities (e.g., nursing, dental, pharmacy) use license management software that is not purposed for ease of data extraction and analysis.

In addition to data collected by Maryland during the certification/recertification process, other data sources include professional associations and health care employers (e.g., hospitals, nursing homes). One potential national data source is the American Community Survey (ACS) sponsored by the U.S. Census Bureau. For some health professions the sample size for Maryland may be sufficient to analyze and monitor trends in labor force participation patterns and hours worked. Still, the small sample size for many health professions prevents meaningful tracking of trends over time.

How Might Gaps between Data Requirements and Availability be Closed or Narrowed?

1. How Might we Narrow or Close Current Workforce Supply Data Gaps?

Our assessment of Maryland health professions' licensure data suggests that the availability of data informing workforce supply varies across the professions. Physician supply data is notably robust. It compares favorably to physician licensure data elements collected by benchmark states, other Maryland health professions, federal minimum data set recommendations, and the essential/useful supply variables summarized in our theoretical framework of workforce supply elements.

In comparison, the non-physician licensure boards that we reviewed, while generally complying with most federal minimum data set recommendations, collect supply data of varying quality and utility**. Table 7** below summarizes current gaps in Maryland person level licensure data by non-physician health profession. It also differentiates between data that is not collected and data that is collected by Boards but could not be provided electronically due to resource constraints, use of paper applications or license management software not originally designed for data extraction and analysis.

Table 8 describes and compares across non-physician health professions the licensure data elements actually provided to support this study. By excluding data that could not be provided for reasons cited above (e.g., resource constraints, data abstraction challenges) this table summarizes current readily accessible data available to support workforce analysis.

An initial step to narrow current supply gaps would include developing a standardized set of key indicators to be included in provider census files, such as state licensure databases. Then, acknowledging the need for flexibility, consider which data elements should be consistent across professions and which might vary by type of professional (e.g., all professions might be

asked primary and secondary types of services provided, but the potential responses might vary by type of professional).

At a minimum, Maryland's non-physician licensure boards might consider adopting the federal minimum data set recommendations. As noted above, this would require certain professions (i.e., dentists and dental hygienists) to collect licensure data for numbers of personnel employed by types of work settings. It would also require additional clarification regarding data availability (e.g., counts of pharmacists)

Implementing federal minimum data set recommendations would narrow, but not close, current workforce supply data gaps. It would, however, offer the State and the licensure boards several potential benefits. These include establishing a more timely ability to monitor and assess trends in workforce supply, distribution, and practice patterns. Implementing the minimum data set would also minimize the burden for the licensure boards and potentially serve as an interim step towards a more comprehensive approach. For example, Maryland health professions may benefit through an expanded dataset that, to the extent appropriate, incorporates data elements from the current physician licensure survey (e.g., hours worked).

The current physician licensure supply data supplemented by person-level data elements summarized in **Table 1** might serve as a resource to initiate this process.

Selected examples of survey questions informing workforce supply data needs might include:

- What is the number of health care providers, by specialty or profession?
- How many providers are entering and exiting the workforce annually, by specialty or by profession?
- What are their credentials and experience?
- What are their demographic and socio-economic characteristics?
- How are they distributed geographically?
- In what settings are they practicing?
- What are their hours of work and productivity?
- What is their labor force participation and what are their retirement plans?
- What is the statewide capacity for training new entrants?

Improvements to available sample survey data on the health professions might begin by building on the existing data collection infrastructure. Towards that end, health workforce policy makers and researchers in Maryland might consider collaborating with nearby federal agencies that sponsor national surveys, such as the Department of Labor, Census Bureau, Agency for Healthcare Research and Quality, and National Center for Health Statistics to improve the data available for workforce research.

2. How Might We Narrow or Close Current Workforce Demand Data Gaps?

Measuring workforce demand requires data that includes information on population demographics, prevalence of health care conditions, utilization patterns, and socio-economic factors (e.g., insurance coverage and income). Examples of workforce demand data needs include:

- Demographic and socio-economic characteristics of the population;
- Population demand for health care services by setting and geography;
- Variations in health status and service demand by demographic and socio-economic characteristics, education, income, and insurance status; and
- Implications of emerging care models (e.g., ACOs, medical homes, value based insurance design, team based care), new technologies, and other market trends on demand for services and the health professions.

Maryland stakeholders might suggest that research be conducted on several issues that are necessary to improve our understanding of health professions demand. These include:

- Understanding the long-term effects of state and sub-state levels of governmental support of training programs and other investments in the health workforce on the health care system;
- Assessing the effects on demand for FTE clinicians of emerging approaches to meeting population health care needs (e.g., disease prevention strategies, improved access to primary care, team care approaches, and ACO and medical home models); and
- Understanding the key drivers of current care patterns (e.g., available supply and mix of professionals of different types, available supply of professionals in urban and rural settings, health insurance coverage and reimbursement policies, malpractice laws, and available practice guidelines) to understand the responsiveness of demand in altering these drivers of care.

For example, to support research on the cost-effectiveness of care teams, claims data would need to be enhanced to indicate when a non-physician clinician provides services. To support research on key demand drivers, data sources need to provide more information on prices, reimbursement policy details, and health insurance coverage limits.

IV. DEVELOPING AN EARLY WARNING MONITORING SYSTEM

This may be an appropriate time for Maryland to consider developing an early warning system to monitor adequacy of workforce supply at statewide and local levels. An example of an early warning system for healthcare professionals is the Aggregate Demand Index maintained by the

Pharmacy Manpower Project, Inc.[3] This system collects data on a monthly basis from individuals who participate in the hiring of pharmacists and assesses the level of difficulty in filling vacant positions.[4]

Developing such a system requires several steps. These include:

- Developing a process to identify key workforce adequacy indicators;
- Identifying and, where necessary, developing data sources to periodically collect and measure these indicators;
- Acquiring the capacity to conduct research on how changes in these indicators affect health care service provision and workforce requirements at state and local levels.

The initial phase of development should include identifying key stakeholders and their needs for informing programs and policies. This phase should also assess whether measures for an early warning system could be added to existing surveys or use the existing data infrastructure (e.g., medical claims).

Whenever possible, measures included in the monitoring system should apply to multiple professions (e.g., nurses, primary care physicians) and assure adequate sample size for rural populations and providers. Monitoring a broader range of indicators in a small number of sentinel sample sites would provide more detail on factors underlying observed trends in the adequacy measures. Investments in data source development would likely be necessary to produce this monitoring system as many desired measures are not easily extracted from current data sources.

Examples of potential early warning indicators of health profession under-or-oversupply include:

- Changes in the proportion of providers accepting new Medicaid and Medicare patients;
- Changes in the proportion of households reporting difficulty accessing provider services, or those that lack a medical home (e.g., using annual data collected through the Center for Disease Control and Prevention's Behavioral Risk Factor Surveillance System);
- Changes in the length of non-urgent appointment wait times for primary and specialty care.

[3] http://www.pharmacymanpower.com/

[4] Categories for tracking demand for pharmacists include: 5 = High demand: difficult to fill open positions; 4 = Moderate demand: some difficulty filling open positions; 3 = Demand in balance with supply; 2 = Demand is less than the pharmacist supply available; 1 = Demand is much less than the pharmacist supply available.

- Changes in population and patient health outcomes (e.g., percentage of infants and young children receiving well-child care, and adults over age 40 with diagnosed diabetes who had eye and foot examinations, cancer screening rates).
- Changes in volume of non-emergent use of emergency department services and the number of ambulatory care sensitive conditions;
- Changes in vacancy rates and length of time for healthcare providers and organizations to fill open positions;[5]
- Changes in provider hours worked per week and availability of on-call physicians;
- Changes in providers' intention to retire;
- Changes in provider compensation;
- Changes in scope of practice (e.g., physicians in one specialty starting to provide services historically provided by physicians in another specialty);
- Changes in clinician mix (e.g., change in mix of physicians, nurse practitioners, and physician assistants);
- Changes in disease prevalence; and
- Changes in patient satisfaction levels in hospital and ambulatory care settings.

Some of the above indicators could be available at the sub-state (e.g., county) level, with other indicators only available at the state level.

While these indicators may be sensitive to adequacy of supply, they also will be sensitive to changes in government regulations, payment policies, market consolidation, and other health care market trends (including changes in demand for services). Thus, interpreting trends in these indicators will require assessment of other changes in the health care market.

Some workforce changes could be analyzed using medical claims (e.g., change in scope of practice), although much of this information likely could be obtained from surveys of physician practices and healthcare facilities and population surveillance and health monitoring conducted by public health departments.

It is likely that an early warning system would be most effective and efficient if built on an existing data infrastructure. This infrastructure would include data collected at state and local levels by government entities, such as public health departments and organizations charged with regulatory oversight of health systems. It would also include data from private sector organizations, such as certification bodies overseeing licensure renewal processes, along with

[5] About 20 states collect information on nursing vacancy rates. These existing systems might be a starting point for monitoring vacancies for nursing.

other information publicly available to researchers, government decision makers and other public and private stakeholders. Other potential system features might include:

- Establishing a timeline for periodically updating indicators (e.g., annually or biennially) in accordance with data availability and the needs of the end users.
- The framework for measuring undersupply or oversupply may vary with the characteristics of the locality (e.g., rural locality, referral location).
- Measuring data metrics consistently over time so that trends can be monitored.
- Some measures may be standardized across health professions while others will require customizing by health profession (e.g., vacancy rates are an appropriate measure for nurses, but not for physicians).

Finally, in addition to monitoring trends across a dashboard of measures and indicators, an early warning system should include information that explains to stakeholders why trends are occurring and prioritizes them for possible follow-on research and policy intervention.

V. CONCLUSION

As Maryland moves forward to plan and implement robust health reform initiatives, building the data infrastructure to support a healthcare workforce sufficient to meet state and local healthcare needs is essential. This report assessed current licensure board data collection and reporting capabilities compared to a number of federal and state data sources for use in modeling health workforce supply and demand. Based upon this assessment we conclude that, overall, Maryland currently has data systems, collection capabilities, and available data elements sufficient, but not optimal, to support workforce analysis.

Looking to the future, Maryland might consider improving the overall utility of the current system by collecting additional workforce variables; developing systems capable of supporting data collection, extraction and analysis; and developing an early warning system to monitor adequacy of workforce supply at statewide and local levels.

There are numerous potential benefits if Maryland were to develop an early warning system to monitor adequacy of workforce supply at statewide and local (county) levels. Such information can help inform and monitor programs and policies to train, attract, and retain health professions in the state and in historically underserved communities.

APPENDIX: DATA ASSESSMENT AND COMPARISON TABLES

Table 1: Conceptual Framework for Key Workforce Supply and Demand Data Elements

	Current Supply and Demand		Forecasting Future Supply & Demand		
	Essential variables	**Useful variables**	**Essential variables**	**Useful variables**	**Utility for Workforce Modeling**
Supply Data Elements					
Person-level data					
Activity status	•		•		Required to estimate active supply by profession and geographic area
Occupation (e.g., physician, nurse)	•		•		
Specialty board/certification	•		•		
Work location (geographic)	•		•		
Patient care hours worked per week	•		•		Useful for estimating full time equivalent (FTE) supply
Resident/fellow	•		•		Some physician workforce studies separately track residents and fellows
Work location (care delivery setting)		•		•	Useful for measuring supply by care delivery setting
Age		•	•		Useful for modeling retirement patterns and hours worked patterns
Gender		•		•	
Race/ethnicity		•		•	Useful for understanding demographic composition of workforce
Hours by activity (admin, research, patient care, etc.)		•		•	While hours in patient care is essential to modeling current supply, understanding how providers allocate their time can improve supply modeling for non-patient care activities
Highest educational attainment		•		•	For some professions (e.g., nursing), it is useful to track education level
Future plans (retirement)		•	•		Useful for modeling attrition from the workforce
States where license is held		•			Useful for calculating proportion of patient care time spent in state
Year first licensed in the state				•	Useful for analyzing characteristics of providers new to the state workforce
Area-level data					
Average wages				•	Average wages is an input to a person's earnings potential, which affects workforce participation patterns
Overall unemployment rate				•	For professions such as nursing, propensity to be in the workforce inversely related to overall state of economy

	Current Supply and Demand		Forecasting Future Supply & Demand		
	Essential variables	**Useful variables**	**Essential variables**	**Useful variables**	**Utility for Workforce Modeling**
Number and characteristics of people leaving the workforce					Useful for modeling the propensity to exit the workforce
Training pipeline					
Number and characteristics of newly licensed providers			•		Useful for modeling accessions to the state workforce
Demand Data Elements					
Population characteristics, by geographic location					
Population size/demographics	•		•		Basic population data, by age and sex, is essential. Race/ethnicity provides additional information on healthcare use patterns. Data on health risk behavior(e.g., smoking) and prevalence of chronic disease helps to calculate more precise estimates of demand for healthcare services
Population health risk/disease characteristics		•		•	Essential information for projecting future demand
Population socioeconomic characteristics (incl. insurance type)		•		•	Additional information on the population and how it relates to healthcare use patterns can improve demand estimates
Population projections			•		Population projections provide the basis for forecasting future demand for healthcare services and providers
Trends in disease prevalence				•	Presence of disease influences health care use patterns
Health care use patterns					
Current patterns, by patient characteristics	•		•		Use of health care services is highly correlated with patient characteristics (especially age, disease prevalence, and insurance status)
Future patterns under emerging care delivery models				•	Understanding how emerging care delivery models (e.g., Accountable Care Organizations) will affect health care use and delivery patterns will improve demand projections
Health care delivery patterns					
Current provider-to-patient ratios (e.g., RNs per inpatient day) or other productivity measures	•		•		Measure of number of providers divided by a workload measure such as number of visits or number of inpatient days

	Current Supply and Demand		Forecasting Future Supply & Demand		
	Essential variables	**Useful variables**	**Essential variables**	**Useful variables**	**Utility for Workforce Modeling**
Future provider-to-patient ratios under emerging care delivery models				•	Understanding how emerging care delivery models (e.g., Accountable Care Organizations) will affect health care use and delivery patterns will improve demand projections
Adequacy of Supply					
Supply versus demand comparison	•		•		Provides straight-forward measure of supply adequacy
Percentage of providers accepting new patients		•		•	Indicates degree to which new patients can access care
Percentage of providers accepting new Medicaid patients		•		•	Access to care by underserved population
Unfilled, budgeted positions		•		•	Provides indicators of supply adequacy for professions where high proportion of workers are employed
Provider-to-population ratio		•		•	Provides rough indicator of supply adequacy
Compensation levels		•		•	Compensation trends provide an indication of whether the profession is in short supply, and how attractive a profession is relative to other potential career opportunities

Table 2: Comparison of Licensure Data Elements Collected Across Multiple Maryland Professions

	Physicians	Physician Assistants	Nurses RN&LPN	Dentists	Dental Hygienists	Pharmacist	Psychologists	Social Workers	Counselors & Therapists
Demographics									
Education									
Health Professions Degree		•		•		•			
Graduation Year for Health Professions Degree:			•	•		•	•		
Continuing Medical education	•	•		•	•		•	•	•
Highest Degree Obtained			•						
School information			•	•		•	•		
Additional Education information		•							
Provider characteristics									
Gender	•		•	•	•	•	•	•	•
Ethnicity	•		•	•	•	•	•	•	•
Race	•	•	•	•	•	•	•	•	•
Date of birth/age	•		•	•	•	•	•	•	•
Residence	•		•	•	•	•	•	•	•
Email address	•	•		•	•	•	•	•	•
Foreign language						•			
Licensure Information									
Identifiers									
License number	•			•	•	•	•	•	•
National provider number	•								
Additional certifications			•						
Licensed in other profession							•		•
Status									
Active/inactive license status	•		•	•	•				
States where license is held	•		•	•	•	•	•	•	•
Miscellaneous Data									
Character and fitness	•	•	•	•	•	•	•	•	•
Financial interests in healthcare									
Health information technology use	•								

	Physicians	Physician Assistants	Nurses RN&LPN	Dentists	Dental Hygienists	Pharmacist	Psychologists	Social Workers	Counselors & Therapists
Participation in public and/or private insurance	•								
Workman's compensation	•		•	•			•	•	•
Employment									
Employment with federal government	•						•		•
Resident or fellow	•								
Employment type	•		•			•	•	•	•
Unemployment			•				•	•	•
Practice area									
Current Area of concentration	•						•		
Specialty board/certification	•		•	•				•	•
Work setting									
Practice locations	•	•	•				•	•	•
Residency Location									
Practice/Position Setting	•	•	•			•	•	•	•
Hours worked									
Hours worked per week	•		•			•			
Current employment									
Resume/discontinue patient care activities?	•								
Future practice plans									
Active, inactive, retired, or other?		•							
Work activities and distribution									
Patient care hours/wk	•								
Research hours/wk	•								
Teaching/Education hours/wk	•								
Administration hours/wk	•								
Other hours/week									
Employment status		•	•			•	•	•	•

Key:

Useful variable for modeling

Essential variable for modeling

Table 3: Summary of Maryland Physician Licensure Data Elements Collected Compared to Physician Licensure Data Elements in Selected Benchmark States

	Maryland	North Carolina	California	Texas	Oregon
Demographics					
Education					
Health Professions Degree (MD/DO)		•	•	•	•
Graduation Year for Health Professions Degree:				•	
Continuing Medical education (meet requirement)	•				
Highest Degree Obtained				•	
Additional Education information		•	•		
Provider characteristics					
Gender	•	•		•	•
Ethnicity	•	•	•	•	•
Race	•	•	•	•	•
Date of birth/age	•	•		•	•
Residence	•	•		•	
Email address	•				
Foreign language			•		
Licensure Information					
Identifiers					
License number	•	•		•	
National provider number	•				
Status					
Active/inactive license status	•			•	
States where license is held	•				
Miscellaneous Data Elements					
Character and fitness	•			•	
Financial interests in healthcare			•		
Health information technology use	•				
Participation in public and/or private insurance	•				
Employment					
Employment with federal government	•				
Resident or fellow	•				
Employment status/type					•
Practice area					
Current Area of concentration	•		•		
Specialty board/certification	•	•		•	•
Work setting					

	Maryland	North Carolina	California	Texas	Oregon
Practice locations	•	•	•	•	•
Residency Location					•
Practice/Position Setting	•			•	
Hours worked					
Hours worked per week	•	•	•	•	•
Current employment					
Resume/discontinue patient care activities?	•				
Future practice plans	•	•			•
Active, inactive, retired, or other?		•			
Work activities and distribution		•	•		
Patient care hours/wk	•		•		
Research hours/wk	•		•		
Teaching/Education hours/wk	•		•		
Administration hours/wk	•		•		
Other hours/week			•		

Key:

Useful variable for modeling

Essential variable for modeling

Table 4: Comparison of Physician Licensure Data Available in Maryland Benchmarked Against Selected Physician Organizations

	Maryland	AMA	Federation of State Medical Boards
Demographics			
Education			
Health Professions Degree		•	
Graduation Year for Professions Degree		•	
Continuing Medical education	•		
Highest Degree Obtained			
Additional Education information			
Provider characteristics			
Gender	•	•	•
Ethnicity	•	•	•
Race	•	•	•
Date of birth	•	•	
Residence	•	•	
Email address	•	•	
Foreign language			
Licensure Information			
Identifiers			
License number	•	•	
National provider number	•		
Status			
Active	•		
States where license is held	•		
Miscellaneous Data Elements			
Character and fitness	•	•	
Financial interests in healthcare			
Health information technology use	•		
Participation in public and/or private insurance	•		
Employment			
Current employment			
Major professional activity		•	•
Resume/discontinue patient care activities?	•		
Work activities and distribution			•
Patient care hours/wk	•		•
Research hours/wk	•		•
Teaching/Education hours/wk	•		•
Supervision			
Administration hours/wk	•		•
Volunteering (medical related only)			•

Table 5: Assessment of Physician Licensure Data Compliance with Federal Minimum Data Set Recommendations Across Benchmark States

Federal Minimum Data Set Elements	Maryland	North Carolina	California	Texas	Oregon
Current supply					
Basic: Counts of licensed professionals	Available	Available	Available* (although license numbers do not appear to be collected)	Available	Available
Basic: Counts of other health workers	Available	Available	Available	Available	Available
If possible: counts of active vs. inactive professionals	Unclear	Unclear	Unclear	Available	Available* (# active licensed practitioners per county reported)
New licensees	Available* (for professions that require licenses)	Available* (for professions that require licenses)	Available* (for professions that require licenses)	Available* (for professions that require licenses)	Available* (for professions that require licenses)
Numbers of personnel employed by hospitals and other types of health care facilities	Available	Available	Available	Available	Available
Future Supply					
Numbers of student enrolled in and graduated from health care education and training programs	Available*(not in licensure data but collected by state)	Available*(not in licensure data but collected by state)	Available*(not in licensure data but collected by state)	Available*(not in licensure data but collected by state)	Available*(not in licensure data but collected by state)

Table 6: Assessment of Licensure Data Compliance with Federal Minimum Data Set Recommendations Across Maryland Non-Physician Health Professions

Federal Minimum Data Set Elements	Nurses RN&LPN	Dentists	Physician Assistants	Dental Hygienists	Pharmacist	Psychologists	Social Workers	Counselors & Therapists
Current supply								
Basic: Counts of licensed professionals	Available	Available	Available	Available	Available	Available	Available	Available
If possible: counts of active vs. inactive professionals	Available* (aggregate #'s from 'inactive' license applications)	Available* (aggregate #'s from 'inactive' license applications)	Available* (aggregate #'s from 'inactive' license applications)	Available* (aggregate #'s from 'inactive' license applications)	Unclear (not available from this source)	Available* (aggregate #'s from 'inactive' license indication)	Available* (aggregate #'s from 'inactive' license indication)	Unclear (not available from this source)
New licensees	Available	Available	Available	Available	Available	Available	Available	Available
Numbers of personnel employed by hospitals and other types of health care facilities	Unclear (data on type of position is available)	Unclear (not available from this source)	Available	Unclear (not available from this source)	Available	Available	Available	Available
Future Supply								
Numbers of student enrolled in and graduated from health care education and training programs	Available*(not in licensure data but collected by state)	Available*(not in licensure data but collected by state)	Available*(not in licensure data but collected by state)	Unclear	Available*(not in licensure data but collected by state)	Unclear	Unclear	Unclear

Table 7: Summary of Current Gaps in Person Level Licensure Data by Non-Physician Health Profession

Essential (Useful*) Licensure Data	Professions With Data Currently Not Collected/Provided
Activity status	• **Pharmacists**: data not provided by board
Occupation	• **Social workers**: data not provided by board
Specialty board/ certification	
Work location (geographic)	• **Nursing**: data not provided by board • **Pharmacists**: data not provided by board • **Psychologists**: data not collected • **Dentists**: data not provided by board
Patient care hours worked per week	• **Nursing**: data not collected • **Pharmacists**: data not collected • **Professional Counselors**: data not collected • **Psychologists**: data not collected • **Social workers**: data not collected • **Dentists**: data not provided by board • **Physician assistants**: data not collected
Hours by activity (admin, research, patient care etc.)*	• **Nursing**: data not collected • **Pharmacists**: data not collected • **Professional Counselors**: data not collected • **Psychologists**: data not collected • **Social workers**: data not collected • **Dentists**: data not provided by board • **Physician assistants**: data not collected

Work location (care delivery setting)*	• **Pharmacists**: data not provided by board • **Dentists**: data not provided by board
Age	• **Physician assistants**: data not provided by board
Gender*	• **Physician assistants**: data not provided by board
Race/ethnicity*	• **Dentists**: data not provided by board
Highest educational attainment*	• **Dentists**: data not provided by board
Future plans (retirement, coming back to workforce)*	• **Nursing:** data not collected • **Pharmacists**: data not collected • **Professional Counselors**: data not collected • **Psychologists**: data not collected • **Social workers**: data not collected • **Dentists**: data not provided by board • **Physician assistants**: data not collected
States where license is held*	• **Pharmacists**: data not collected • **Professional Counselors**: data not collected • **Dentists**: data not provided by board • **Physician assistants**: data not collected

Table 8: Summary of Licensure Data Elements Provided by Maryland Health Professions

	Physicians	Physician Assistants	Nurses RN&LPN	Dentists	Pharmacist	Psychologists	Social Workers	Counselors & Therapists
Demographics								
Education								
Health Professions Degree						•	•	
Graduation Year for Health Professions Degree:						•	•	
Continuing Medical education								
Highest Degree Obtained		•						•
School information			•					
Additional Education information								
Provider characteristics								
Gender	•		•	•	•	•	•	•
Ethnicity	•	•	•		•	•	•	•
Race	•	•	•		•	•	•	•
Date of birth/age	•		•	•	•	•	•	•
Residence				•	•	•	•	•
Email address								
Foreign language								
Licensure Information								
Identifiers								
License number	•	•		•	•			
License type			•		•			
National provider number	•							
Additional certifications								
Licensed in other profession						•		
Status								
Active/inactive license status				•		•	•	•
States where license is held	•		•			•	•	
Miscellaneous Data								
Character and fitness								
Financial interests in healthcare								
Health information technology use								
Participation in public and/or								

	Physicians	Physician Assistants	Nurses RN&LPN	Dentists	Pharmacist	Psychologists	Social Workers	Counselors & Therapists
private insurance								
Workman's compensation								
Years in workforce			•					
Weeks unemployed			•					
Employment								
Employment with federal government								
Resident or fellow	•							
Employment type	•		•					
Unemployment			•					
Practice area								
Current Area of concentration	•		•	•				
Specialty board/certification	•				•	•	•	•
Work setting								
Practice locations	•	•				•	•	•
Residency Location	•							
Practice/Position Setting	•					•	•	•
Hours worked								
Hours worked per week								
Current employment								
Resume/discontinue patient care activities?								
Future practice plans	•							
Active, inactive, retired, or other?								
Work activities and distribution								
Patient care hours/wk	•							
Research hours/wk	•							
Teaching/Education hours/wk	•							
Administration hours/wk	•							
Other hours/week								
Employment status						•	•	•

Key:

Useful variable for modeling

Essential variable for modeling

Note: Dental hygienist data was not provided