



Target Workforce State Report for

OneCityHealth

Partners for a Healthy NYC

Delivery System Reform Incentive Payment Program
Workforce Strategy Deliverable

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I. Executive Summary

Goals of the DSRIP Target Workforce State Analysis

The state-wide goal of the Delivery System Reform Incentive Payment (“DSRIP”) program is to reduce avoidable hospitalizations and ED visits by the Medicaid population in New York State (“NYS”) by 25% through the transformation and redesign of the existing health care system.

Participating Performing Provider Systems (PPSs) are expected to:

- Create an integrated delivery system across the care continuum,
- Reduce avoidable institutional utilization by 25% over 5 years,
- Enter into value-based payment agreements with payers, and
- Facilitate workforce realignment and training to support system transformation.

To reach these goals, OneCity Health PPS (“OneCity Health”) requires information on the adequacy of its current health workforce supply in its service area and an understanding of how the demand for health care services and health professions is projected to evolve in relation to current supply with the implementation of the DSRIP program. The Target Workforce State Report will be used, in conjunction with the Current State Report to identify gaps between current workforce supply and projected future target state workforce needs and will inform the development of a Transition Roadmap Report to guide workforce realignment and training to close the gap. OneCity Health engaged BDO Consulting (“BDO”) as its workforce vendor, in collaboration with IHS, Inc. (“IHS”) to define the target workforce state through analysis of workforce impacts resulting from factors independent of DSRIP (demographic shifts and effects of health insurance coverage under ACA) and implementation of the DSRIP program.

Development of the OneCity Health Target Workforce State Report was conducted in collaboration with the PPS’s Executive Committee (“Workforce Governance Body”) and included input from multiple stakeholders within the PPS’s partner network as well as external data sources. External data sources included local, state and national surveys, medical claims databases, published literature and IHS’s Health Care Demand Microsimulation Model (HDMM).

OneCity Health is implementing eleven projects under DSRIP, focusing on achieving the provision of high quality, integrated primary, specialty and behavioral health care services in outpatient and community settings with acute care hospitals used primarily for emergent and acute care service delivery. Based on findings from the PPS-sponsored Community Needs Assessment (CNA) the PPS selected five system transformation projects (Domain 2), four clinical improvement projects (Domain 3), and two population-wide prevention projects (Domain 4).

The primary research questions that guided modeling the workforce impact of each DSRIP project include:

1. How many patients will be affected by this intervention?
2. What are the current health care utilization patterns of affected patients, and how will this initiative change care utilization patterns?
3. What mix of providers will be used to implement the intervention and meet future patient demand for services?
4. Will the project as designed materially impact the region's healthcare delivery workforce?

Target Workforce State Summary Findings

Through 2020, the demand for health workers within the OneCity Health network will change as individual DSRIP components are implemented and select external trends, such as demographic changes, outside of the DSRIP program evolve. As a result, it is worth noting that although this analysis has been conducted using the most topical data and sophisticated modeling tools, the total impact on the future healthcare workforce remains uncertain.

Exhibit ES1 summarizes staffing impacts by 2020 of both DSRIP-related projects and demographic and healthcare coverage changes independent of DSRIP across select OneCity Health care settings and key job categories. In some cases non-DSRIP impacts offset or moderate the effects of DSRIP while in other cases they magnify DSRIP workforce impacts. Notable projected impacts across the OneCity Health include:

- By 2020, the combined impacts of a growing and aging population, expanded medical insurance coverage under ACA and DSRIP implementation will increase demand for health care providers modeled by approximately 2,190 - 2,191 full time equivalent (FTEs).
 - Independent of DSRIP workforce, demand is projected to grow by about 1166 - 1167 FTEs.
 - The projected impact of DSRIP implementation alone is estimated to increase demand for health providers modeled by approximately 1,024 FTEs.
- The largest workforce impacts of both DSRIP and changes independent of DSRIP are projected to take place among registered nurses in hospital inpatient settings, and non-nursing care coordinators and primary care providers and support staff in outpatient and community-based settings. Estimated changes in demand among other health professions are less significant.
 - Net demand for registered nurses is estimated to grow by about 237 - 238 FTEs, as anticipated DSRIP related declines of about 216 FTEs, primarily in hospital inpatient settings, are offset by growth in demand for registered nurses due to non-DSRIP related environmental factors (454 FTEs).
 - DSRIP related demand for non-nursing care coordinators is projected to rise by about 625 - 626 FTEs. These positions include community health workers, educators and patient navigators.

- An estimated additional 357 - 358 FTE administrative support staff and 343 FTE medical assistants may also be required in primary care and other outpatient settings to support primary care providers, psychiatrists and other medical and behavioral health specialties to meet both DSRIP related needs and those associated with population growth and aging and expanded medical insurance coverage under ACA.

Target Workforce State Analysis Conclusions

The purpose of this report is to describe the anticipated system transformation and to quantify the estimated DSRIP and non-DSRIP related impacts on future OneCity Health workforce needs. OneCity Health is implementing projects under DSRIP based to a large extent on population healthcare needs identified by the PPS-sponsored CNA.

The demand for health care services and providers within the OneCity Health network will change over time independent of any DSRIP impact. Independent of DSRIP, demand for physicians and other health professions in OneCity Health's service area will grow. As a result, these projections suggest that any DSRIP-related changes in demand need to be taken into account in the context of broader trends affecting the demand for health care services and providers within OneCity Health's service area. In some cases non-DSRIP impacts will likely offset or moderate the effects of DSRIP while in other cases they may magnify DSRIP workforce impacts.

Under DSRIP, large increases are anticipated in numbers of care coordinators, primary care providers and support staff which reflects the enhanced demand for these professions within a transformed delivery system. There will likely also be opportunities to redeploy and train nursing and other staff currently in hospital inpatient and ED settings where service demand is projected to decline to assume roles in outpatient and community-based settings where demand is projected to grow. Although the estimated workforce impacts of several DSRIP projects do not appear significant, they help explain how DSRIP goals, including reductions in inappropriate care use, might be achieved through counseling, improved access to primary and behavioral health services, and better care management for patients with chronic conditions.

One caveat that must be considered in this analysis to inform the target workforce state is that the projections may underestimate the DSRIP impact of certain projects (e.g. Project 2.a.iii: Health Home at Risk, Project 3.b.i: Disease management for CVD and Project 3.d.ii: Expansion of asthma home-based Self-management). The analysis for the above projects was conducted on actively engaged patient populations that were Medicaid only and therefore staffing needs may increase if the projects serve non-Medicaid patients as well.

In conclusion, based on the best available modeling inputs and assumptions, results suggest that implementing DSRIP as designed will impact the OneCity Health network and healthcare delivery workforce, especially when combined with the projected impacts of demographic shifts and expanded health insurance coverage. This information will be used to inform

development of a workforce transition plan and gap analysis intended to guide attainment of the OneCity Health future state.

Exhibit ES1: OneCity PPS Summary of Projected DSRIP Staffing Impacts (FTEs)

Setting and Job Category	Non-DSRIP Impact	DSRIP-related Impact	Total Impact
Primary and Community-Based Settings			
Primary Care Providers	107.5	88	195.5
Cardiologists	17.5	9	26.5
Endocrinologists	5	0	5
Psychiatrists/Psychiatric Nurse Practitioners	15.5	14	29.5
Psychologists	57	0	57
Licensed Mental and Substance Abuse Providers (e.g., Clinical Social Workers, Mental Health Counselors, Psychologists, Addiction Counselors)	0	139.5	139.5
Registered Nurses	57	43.5	100.5
Licensed Practical Nurses	18	0	18
Nurse Aides/Assistants	17.5	0	17.5
Medical Assistants	188.5	154.5	343
Administrative Support Staff	189	168.5	357.5
Emergency Department			
Emergency Physicians	3.5	-30.5	-27
Nurse Practitioners & Physician Assistants	2	-5	-3
Registered Nurses	29	-109	-80
Hospital Inpatient			
Hospitalists	7	-22.5	-15.5
Registered Nurses	367.5	-263	104.5
Licensed Practical Nurses	48.5	-15	33.5
Nurse Aides/Assistants	36.5	-66.5	-30
Care Managers/Coordinators/Navigators/Coaches			
Registered Nurse Care Coordinators and Managers	0	112.5	112.5
Non-Registered Nurses Care Coordinators	0	625.5	625.5
Community Liaisons	0	6.5	6.5
Community Health Workers (Asthma)	0	117	117
Asthma Educators	0	23.5	23.5
Cardiovascular Disease Educators	0	23.5	23.5
Palliative Care Educators	0	10	10
Registered Nurse Total	453.5	-216	237.5
Total FTEs	1,166.5	1,024	2190.5

Exhibit ES2: OneCity PPS Current State Survey Reported Workforce

Job Category	Reported Workforce (FTEs)	Vacancy Rates
<i>Primary and Community-Based Settings</i>		
Primary Care Providers	465	8.6%
Cardiologists	28	8%
Endocrinologists	12	34.2%
Psychiatrists/Psychiatric Nurses	347	14.7%
Psychologists	178	5.8%
Clinical Social Workers	1,900	7.5%
Registered Nurses	3,393	11.5%
Licensed Practical Nurses	492	7.5%
Nurse Aides/Assistants	405	8.4%
Medical Assistants	998	5.7%
Administrative Support Staff	7,549	4.4%
<i>Hospital Inpatient & ED</i>		
Emergency Physicians	241	8.6%
Primary Care Physicians	220	9.1%
Specialists (except Psych)	1,176	6.2%
Residents and Fellows	2,214	-
Physician Assistants	486	5.3%
Registered Nurses	7,699	3.8%
Licensed Practical Nurses	773	5.2%
Nurse Aides	1,442	4.6%
Nurse Practitioners	152	4.5%
<i>Care Managers/Coordinators/Navigators/Coaches</i>		
Nurse Coordinator Leaders	88	61%
Registered Nurse Care Coordinators	382	3.8%
Care Coordinators (non-Registered Nurses)	1,481	6.5%
Asthma Educators	8	30%
Cardiovascular Disease	-	-
<i>Nursing Home/SNFs</i>		
Primary Care Physicians	120	10.8%
Specialists (except Psych)	39	2.5%
Physician Assistants	16	0%
Registered Nurses	851	6.7%
Licensed Practical Nurses	859	6.6%
Nurse Aides	3,036	3.3%
Nurse Practitioners	18	5.5%
Total FTEs	36,888	

Target Workforce State Summary Findings

As previously described, the purpose of the Target Workforce Report is to analyze and project the PPS's anticipated future workforce needs as a result of system transformation through the DSRIP program in addition to non-DSRIP related impacts.

While this report serves to provide a projection of the PPS's target workforce state by the end of the DSRIP program to assist the PPS in the planning and implementation of DSRIP projects, the demand for health care services and providers within the PPS's network will continue to evolve and are likely to change over time, independent of DSRIP impacts. It is anticipated that the demand for physicians in OneCity Health's PPS service area will likely continue to grow due to general population growth. As a result, the workforce projections stated within this report suggest that any DSRIP-related changes in workforce demand should be taken into account in the context of broader trends affecting the demand for health care services and providers within the PPS's service area.

As a result of the DSRIP program, an increase in the demand for care managers, licensed educators, and care coordinators/navigators, which reflects the enhanced demand for these professions as a result of a transformed delivery system, is projected for the PPS. Further, as a result of the PPS's plans to transition care away from the hospital and ED setting to outpatient and community-based settings, there is likely an opportunity for the PPS to redeploy and retrain hospital nursing as well as other staff to these settings where demand is projected to grow.

While the estimated workforce impacts for several of the PPS's DSRIP projects are not projected to have a large impact on the workforce, the projections do indicate how DSRIP program goals, including reductions in inappropriate care use, might be achieved through counseling, improved access to primary and behavioral health services, and better care management for patients with chronic conditions.

Thus, based on the available data as well as DSRIP project inputs and assumptions provided by key PPS stakeholders, the project workforce modeled suggest that there will be some impactful changes of the DSRIP program over the five years. However, these changes are unlikely to materially and/or negatively impact the PPS's network and healthcare delivery workforce, especially when evaluated alongside the projected workforce net gains external to the program.

II. Background and Purpose

OneCity Health Performing Provider System (PPS) is a partner network of NYC health care providers across multiple care delivery settings, involving a mix of health occupations, medical specialties, and support staff, working in concert to create wellness in its citywide service area. In addition to addressing workforce shortages, the DSRIP program requires OneCity Health to undergo system transformation that will inherently impact the health care workforce including the retraining and redeployment of existing staff and the hiring of new staff.

The OneCity Health PPS is comprised of 250 PPS partners (Systems) and was formed to produce meaningful results as part of the DSRIP program goals through a collaborative network of providers. Within these 250 systems, there are over 1,100 individual sites with over 12,000 practitioners participating. The OneCity Health PPS partner network includes the following healthcare providers: Home Care Services Providers, Hospitals, Diagnostic and Treatment Centers, Federally Qualified Health Centers, Mental Health Providers, Home Care Services Providers, Certified Home Health Agencies, Skilled Nursing Facilities, Assisted Living facilities, Health Home agencies and multiple additional partners. Community Based Organizations (CBOs) make up the largest component of providers in OneCity Health's PPS with over 50 CBOs. The purpose of this report is to describe the anticipated transformation of the existing health care system as the PPS implements the chosen DSRIP projects and to quantify the anticipated implications on the PPS's workforce needs. The Target Workforce State analysis described here is part of the DSRIP Workforce Strategy Milestones. This analysis identifies new positions and staffing needs, and informs the PPS's overall workforce strategy throughout the five year program.

OneCity Health engaged BDO Consulting (BDO), in collaboration with IHS, Inc. (IHS), to complete the Target Workforce State Report through the analysis of workforce impacts as a result of system transformation and implementation of clinically integrated programs. The PPS's Target Workforce State Report was created in collaboration with the PPS's Workforce Governance Body and included input from providers within the PPS's partner network.

The target workforce state for OneCity Health, as defined within this report, has been developed to align with DSRIP program goals. It takes into consideration the current state of the workforce as well as the demand for health care services and providers in the PPS's New York citywide service area as a result of general population growth and aging over the next five years. The Target Workforce State Report will be used in the development of a detailed Gap Analysis Report between the PPS's identified Current State Report and Target Workforce State Report to inform development and implementation of the Workforce Transition Roadmap. The approach used to define the PPS's target workforce state as well as summary findings, observations, and considerations are detailed within the body of this report and a technical appendix.

The results of the target workforce analysis include estimates that are based on a combination of modeling inputs. These include the PPS's estimates around potential staffing and anticipated project impacts, PPS patient population demographics and health care service utilization, as well as data points from the literature and published outcomes from similar demonstrations. Several DSRIP projects, however, are innovative and there is limited information on their possible effects. In such instances, assumptions around potential impacts were made in collaboration with the PPS, based on the best information currently available. As such, the estimates in this report are based on assumptions that may change over time, as they are dependent on successful project implementation and funding and budget considerations.

Additionally, although the use of workforce models has been prevalent in estimating workforce planning needs, models have several limitations, one of which is that their results are based on data that may or may not reflect the real time environment of the scenario they are projecting. When the complexity of the NYC market is taken into consideration as well, it must be understood that the findings of this report are estimates and are subject to change.

III. Overview of Target Workforce State Modeling Approach

Modeling the future workforce required under system transformation and taking into account other external trends was accomplished using a combination of existing workforce modeling tools, original data analysis, findings from the published literature, information on the population served and current health care use patterns within New York State and the PPS service area, and expert opinion from PPS project leads and the modeling team. The analysis required modeling the likely impact of each DSRIP project individually and jointly (as many DSRIP projects overlap in terms of participating patients and health utilization goals). The modeling tools and analyses were adapted to reflect the characteristics of the DSRIP target population and the nature of each DSRIP project.

Four key dimensions for modeling the future workforce needs required under the target state include:

1. **Health care services providers and support staff.** The right mix of health care providers and support staff is needed to ensure that patients have access to services and the efficient delivery of such services. Hence, modeling efforts require understanding the types of services that patients will require and the staffing patterns for care delivery. The occupation categories modeled are defined by the Department of Labor's Standard Occupational Classification (SOC) system.
2. **Care delivery settings.** The level of services used and staffing by care delivery setting helps inform where providers and support staff are needed to meet patient service needs and help control health care costs. Key settings include hospital inpatient, emergency, and outpatient/clinic care; ambulatory care at provider offices; and home-based care.

3. **Geography.** The geographic location of providers should be consistent with patient needs to ensure access to care. For OneCity Health, the relevant geographic area covers the population living in the Bronx, Manhattan, Brooklyn and Queens in New York City (with multiple PPS networks serving the citywide Medicaid population).
4. **Evolving needs.** Workforce needs will evolve over time (2015 through 2020) as a result of general population growth and aging. Identifying how these needs will evolve helps to inform the appropriate timing for transitioning from the PPS's current state to the target workforce state.

While OneCity Health's performance metrics are measured on services specifically provided to the Medicaid population, the PPS partner network (e.g., hospitals, clinics, and participating physicians) serves a broader patient population that encompasses Medicaid, Medicare, commercially insured, and uninsured/self-pay patients. Likewise, as the PPS works to transform their service delivery system and payment structure, the New York State DOH expects that the DSRIP program will drive change to other populations of the provider's payer mix. Some DSRIP initiatives will impact both Medicaid and non-Medicaid patients as systematic changes in care delivery are implemented. Therefore, modeling future workforce requires understanding how both DSRIP and non-DSRIP trends will affect the entire patient population.

The target workforce state modeling effort was conducted in collaboration with the PPS's Lead Entity including PPS Leadership, PPS's Workforce Governing Body, Stakeholders and Workforce Committees, Labor partners and included the review of supporting PPS documents including the PPS's Organizational and Project Plan Applications, Community Needs Assessment and Quarterly Implementation Reports submitted to the NYS Department of Health ("DOH"). Through the synthesis and application of all collected data inputs, the target workforce state was modeled to project DSRIP impacts on the current workforce and identify future state workforce needs to reflect proposed PPS system transformation initiatives under DSRIP. Preliminary results were shared with PPS stakeholders and refined based upon informed feedback.

The complexity of this modeling effort required the use of data from multiple sources and the use of modeling tools. Data used in the analysis comes from local, state and national surveys (e.g., Behavioral Risk Factor Surveillance System [BRFSS]), medical claims databases (e.g., New York's Statewide Planning and Research Cooperative System [SPARCS]), published literature, and IHS's Health Care Demand Microsimulation Model (HDMM). An overview of the HDMM and key data sources is provided below, with additional detail on modeling individual DSRIP projects discussed in *Appendix*.

A. Health Care Demand Microsimulation Model

The workforce model described within this subsection is unique in its approach, breadth and complexity. Health workforce projection models have been used for decades to assist with workforce planning and to assess whether the workforce was sufficient to meet current and projected future demand (or need) at the local, regional, state, and national levels. The model described applies a microsimulation approach where individual patients are the unit of analysis. This model is used by the Federal Bureau of Health Workforce to model physicians, advanced practice nurses, physician assistants, nurses, behavioral health providers, and other health occupations at the national and state level.¹ The model has been used by states to assess the adequacy of provider supply at the state, regional, and county level.²

The model has also been used by professional associations and other organizations to analyze trends and policies with workforce implications.³ In addition, the model has been used at the local level to help hospitals and health systems with market assessment and workforce planning.

The HDMM models demand for health care services and providers. Demand is defined as the health care services and workforce that are likely to be used based on population characteristics, care utilization and delivery patterns. The logic model describing the HDMM and a summary description of its major components are depicted below in *Exhibit 1*. The HDMM is comprised of three major components:

1. A population database with demographic, socioeconomic and information regarding health risks and disease prevalence for each person in a representative sample of the population being modeled (e.g., the population in in Brooklyn, Bronx, Manhattan and Queens);
2. Health care utilization patterns that reflect the relationship between patient characteristics and health care use; and

¹ See various reports published at <http://bhpr.hrsa.gov/healthworkforce/supplydemand/index.html>

² See, *Florida Statewide and Regional Physician Workforce A: Estimating Current and Forecasting Future Supply and Demand*. Prepared for the Safety Net Hospital Alliance of Florida. 2015. <http://safetynetsflorida.org/wp-content/uploads/Jan-28-IHS-Report-PDF.pdf>

³ Examples include:

The Complexities of Physician Supply and Demand: Projections from 2013 to 2025. Prepared for the Association of American Medical Colleges. Washington, DC: Association of American Medical Colleges; 2015. <https://www.aamc.org/download/426242/data/ihsreportdownload.pdf>

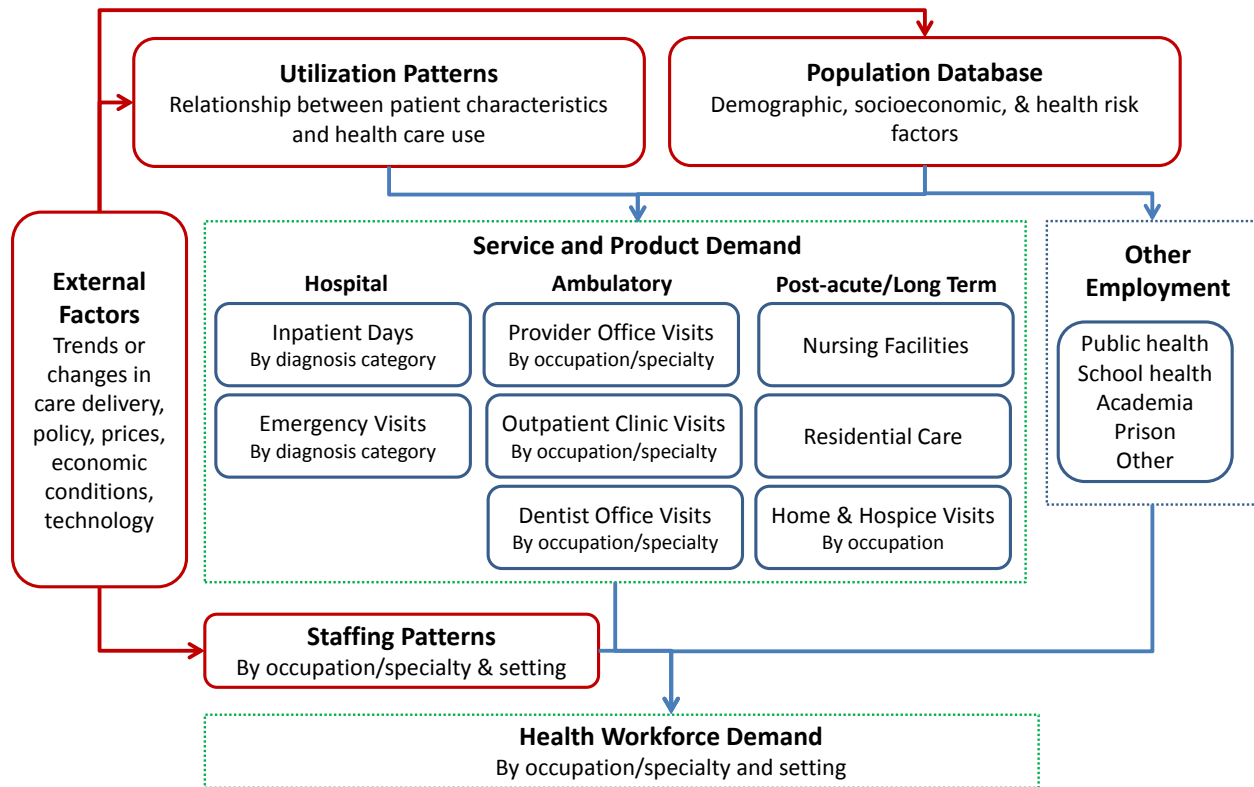
Dall TM, Gallo PD, Chakrabarti R, West T, Semilla AP, Storm, MV. An Aging Population and Growing Disease Burden Will Require a Large and Specialized Health Care Workforce by 2025. *Health Affairs*. 2013; 32:2013-2020.

Dall TM, Chakrabarti R, Storm MV, Elwell EC, and Rayburn WF. Estimated Demand for Women's Health Services by 2020. *Journal of Women's Health*. 2013; 22(7): 643-8.

Dall TM, Storm MV, and Chakrabarti R. Supply and demand analysis of the current and future US neurology workforce. *Neurology*. 2013; 81(5): 470-478.

- Staffing patterns that convert estimates of health care service demand to estimates of provider demand.

Exhibit 1: Health Care Demand Microsimulation Logic Model



- Preparing the Population Database.** The database prepared for the HDMM contains a representative sample of the population in each borough. The population profile in this representative sample is comprehensive of all insurance types (Medicare, Medicaid, commercial, and uninsured); population demographics (age, sex, race, and ethnicity); household income level; health risk factors including body weight status (normal, overweight, and obese); current smoker status; and presence or history of chronic disease (hypertension, coronary heart disease, diabetes, arthritis, asthma, history of heart attack, history of stroke, and history of cancer). For modeling purposes, estimates for the Medicaid population were scaled to the approximately 635,000 Medicaid beneficiaries attributed to OneCity Health. Estimates for the Medicare, commercially insured, and uninsured populations were scaled using estimates of the PPS’s market share for each payer type based on published data from New York State’s Statewide Planning and Research Cooperative System (SPARCS).

Information to create and validate this database comes from both New York-specific sources such as EpiQuery: NYC Interactive Health Data, New York’s Department of Health, and national sources such as the Center for Disease Control and Prevention’s

Behavioral Risk Factor Surveillance System⁴ and the Census Bureau's American Community Survey (ACS)⁵. Summary prevalence statistics of health risk factors for the created population file were compared to published sources to ensure the sample is representative of the population across Brooklyn, Bronx, Manhattan and Queens. Population projections (by county) through 2020 are from the Cornell Program on Applied Demographics in Ithaca, NY.⁶

- 2. Developing Health Care Utilization Forecasting Equations.** Patterns of health care services utilization behavior reflect patterns for people with similar demographics, insurance status and health risk factors in the pooled 2009-2013 files (n~169,000) of the Agency for Health Care Research and Quality's Medical Expenditure Panel Survey (MEPS). MEPS is nationally representative of the U.S non-institutionalized population. Several hundred prediction equations are built into the simulation model. Each prediction equation was estimated using regression⁷ analysis, with separate prediction equations for each combination of care delivery setting, medical specialty, and children versus adults. The dependent variables in the regressions reflect annual use of health care services, while the explanatory variables consists of the demographic characteristics, health risk factors, medical conditions, and socioeconomic factors described previously. Applying these prediction equations to the population in Brooklyn, Bronx, Manhattan and Queens produces estimates of the current and projected future demand for health care services by care delivery setting, given the characteristics and health risk factors among the community modeled.

Aggregating these estimates across individuals provides an estimate of the level of health care services that would be used by a national peer group of the population in across the four boroughs (excluding Staten Island). Estimates of health care utilization from this national peer group were compared to actual health care use statistics to calibrate the model (reflecting that health care use patterns of people in the four boroughs can differ from national patterns, controlling for demographics, disease prevalence, and other health risk factors). Also, the population in the four boroughs (excluding Staten Island) might receive some care outside the four, and some care provided in the PPS service area is for patients who reside outside of the four boroughs.

- 3. Modeling Full Time Equivalent (FTE) Staffing to Meet Demand for Health Care Services.** The number and mix of health care professionals required to provide the level of health care services demanded is influenced by how the care system is

⁴ <http://www.cdc.gov/brfss/>

⁵ <https://www.census.gov/programs-surveys/acs/>

⁶ <https://pad.human.cornell.edu/counties/projections.cfm>

⁷ Poisson regression was used to model annual numbers of physician office and outpatient visits with a particular provider type, inpatient days per hospitalization and annual home health/hospice visits. Logistic regression was used to model annual probability of hospitalization and emergency department use for approximately 24 diagnosis categories defined by primary diagnosis code (e.g., hospitalization for a cardiovascular condition).

organized, how care is reimbursed, provider scope of practice requirements, economic constraints, and technology as well as other factors. The HDMM applies staffing patterns measured in terms of provider-to-workload measures (e.g., FTE family physicians per 1,000 office visits, or FTE emergency physicians per 1,000 ED visits). The model was further adapted to New York State by calibrating (scaling) demand projections by physician specialty to equal the state average level of care in 2014. Hence, the baseline demand projections reflect the level and mix of services in each county if that county’s population had care use and delivery patterns consistent with the average across New York for a similar patient mix. Staffing levels associated with individual DSRIP projects, described later, came from the published literature and PPS documents.

B. Common Modeling Inputs and Assumptions across DSRIP Projects

While each DSRIP project has its unique modeling assumptions and data inputs, common modeling assumptions and inputs apply across some projects. These include parameters for identifying the PPS’s market share of service utilization and provider staffing patterns and productivity.

Parts of the future state analysis were modeled at the borough/county level due to availability of data on the population and prevalence of disease and other health risk factors. OneCity Health’s citywide market share was calculated by payer type (Medicaid, Medicare, and other) using inpatient discharge data provided by the PPS.⁸ *Exhibit 2* summarizes the PPS’s market share of inpatient discharges by borough by payer. In lieu of information specific to utilization patterns in other care settings, a working assumption was made that a similar market share would be applied to other care delivery settings (e.g., emergency and ambulatory care).

Exhibit 2: Estimated OneCity Health Inpatient Market Share by Payer (2014)

Borough	Medicaid	Medicare	Other
Bronx	60%	30%	6%
Kings	69%	29%	14%
Manhattan	59%	9%	3%
Queens	70%	28%	7%

Exhibit 3 summarizes information about anticipated staffing patterns and provider productivity used for modeling these impacts across DSRIP projects. Data and Input from the PPS stakeholders were the primary source used to model the potential workforce implications of various DSRIP projects. When PPS-specific data was unavailable, other data sources were used including the National Ambulatory Medical Care Survey (NAMCS, national data), the

⁸ These numbers exclude psychiatry and rehab

National Hospital Ambulatory Medical Care Survey (NHAMCS, national data), and the Medical Group Management Association (MGMA).

Exhibit 3: Model Inputs: Estimated PPS Provider Staffing Patterns and Productivity

Modeling Input	Parameter	Source
Proportion of primary care office visits seen by:		
Primary Care Physician	97.1%	1
Nurse Practitioner	3.1%	1
Physician Assistant	4.6%	1
Proportion of emergency department visits seen by:		
Emergency Physician	92.4%	2
Nurse Practitioner	3.5%	2
Physician Assistant	4.6%	2
Annual patient visits per FTE provider (productivity):		
Primary Care Physician	2,993*	3
Primary Care Nurse Practitioner	2,548*	3
Primary Care Physician Assistant	2,936*	3
Emergency Physician	1,973	3
ED-based Nurse Practitioner	2,572	3
ED-based Physician Assistant	1,910	3
Hospitalist (assume 1 patient encounter/day)	2,008	3
Annual ratio of total patient visits/days per FTE provider:		
Note: not all patients will necessarily see this provider during their visit/stay.		
Office-based visits per FTE Registered Nurse	4,469	4
ED visits per FTE Registered Nurse	612	4
Inpatient days per FTE Registered Nurse	168	4
Inpatient days per FTE Licensed Practical Nurse	2,939	4
Inpatient days per FTE Nurse Aide	667	4
Support staff:		
Direct Medical Support	1.75 x PCP	5
Direct Admin Support	1.25 x PCP + 0.75 x BHP	5

Notes: FTE=full time equivalent, PCP=primary care provider, BHP=behavioral health provider. Sources: ¹ 2012 National Ambulatory Medical Care Survey; ² 2011 National Hospital Ambulatory Medical Care Survey; ³ 2014 Medical Group Management Association median visits/FTE provider (with * indicating the number was scaled by 80% to reflect differences in average panel size between MGMA providers and PPS desired panel size).⁴ National health care use (visits, days) ÷ FTE providers in that setting, 2013.⁵ Cherokee Health Systems. http://c.ymcdn.com/sites/www.tnpca.org/resource/resmgr/Leadership_Conference_2014/IntegrationofBehavioralHealth.pdf

Based on analysis of the NHAMCS, patients who visit a primary care provider are seen by a physician in 97.1% of visits, by a nurse practitioner (NP) in 3.1% of visits, and by a physician assistant (PA) in 4.6% of visits. Note that the sum of these percentages exceeds 100%,

reflecting that some patients will be seen by multiple providers during the visit. Analysis of the NHAMCS provides estimates of the providers seen by a patient during each ED visit.

The MGMA reports that median patient encounters per year by one Family Medicine physician providing ambulatory services in the Eastern Region of the U.S. are 3,741. This number suggests that every 3,741 office visits equates to approximately one physician FTE.⁹ Note that a General Pediatrician in the Eastern Region has a similar number of annual patient encounters of 3,725 per year. Likewise, MGMA data suggest that the median number of patient encounters per emergency physician in the Eastern Region is 1,973 patient encounters per year. Estimates for NPs and PAs in primary care settings are based on MGMA estimates in the Eastern Region, while NP and PA productivity in emergency care settings are based on national medians as the sample size was too small to obtain estimates for the Eastern Region.

Feedback from OneCity Health leadership found that the MGMA data overstates the number of patient encounters for PCPs in their networks. Patients cared for by PPS partners might have higher acuity than the typical patient panel of providers covered by the MGMA survey. Also, the recommended panel size for the typical MGMA primary care physician is 1,900-2,000, whereas PPS providers under a patient-centered medical home model have recommended panel sizes of 1,500-1,800. Hence, for modeling purposes the MGMA productivity numbers for PCPs were scaled down to 80%. After discussion with PPS leadership, a patient panel size of 1,500 was used for a more accurate representation of the workforce.

For some occupations, national ratios were used to estimate staffing levels. For example, dividing total national office visits by estimates of FTE registered nurses practicing in an office setting suggests that one nurse FTE is required for every 4,469 visits (reflecting that not every patient visit involves a nurse). Similar national ratios were estimated for staffing levels of nurses in hospital settings.

IV. Impact of External non-DSRIP Related Factors on Workforce

The demand for health care services and providers within the PPS network will change over time independent of the anticipated DSRIP impact. For example, a growing and aging population will impact health care utilization and care delivery over time and will influence how the PPS and its partners provide care to patients within the network.

Using the HDMM, the projected change in demand for physician specialties and other health occupations in New York City boroughs was simulated based on projected population characteristics independent of DSRIP across all patients regardless of insurance status. These projections were scaled to OneCity Health based on its estimated market share of each borough's discharges by payer (*Exhibit 4* and *Exhibit 5*).

⁹ Provider compensation: 2014 report based on 2013 data. Data extracted from MGMA DataDive.

Much of the calculated increase is driven by the growing and aging Medicare population, which is not captured as part of the DSRIP program (primarily Medicaid and Uninsured). *Exhibit 4* summarizes the projected impact between 2015 and 2020 of changing city-wide demographics on physician demand by specialty.¹⁰ The projections illustrate that across the four relevant boroughs (Bronx, Brooklyn, Manhattan, and Queens) total physician demand is projected to grow by approximately 1,106 FTEs between 2015 and 2020 independent of the effects of DSRIP. The PPS's share of total physician demand growth is projected to be approximately 281 FTEs and the PPSs demand for primary care specialties independent of DSRIP is projected to grow by approximately 87 FTEs based on current market share assumptions. These projections suggest that any DSRIP-related changes in physician demand need to be understood in the context of broader trends affecting the demand for health care services and providers.

¹⁰ Inpatient market share was used as a proxy for total market share, as the PPS's outpatient and emergency department market share of borough-wide utilization were unavailable.

Exhibit 4: Projected Impact of Changing Demographics on Physician Demand, 2015 to 2020

		OneCity Health PPS FTE Growth					
	Specialty	4-Borough FTE Growth ^a	Bronx	New York	Queens	Kings	Total
Primary Care	Total Primary Care	334	21	6.5	32.5	26.5	86.5
	Family Medicine	93	6.5	1	9	7.5	24
	Internal Medicine	193.5	10.5	2.5	19.5	15.5	48
	Pediatrics	42.5	3.5	3	3.5	3	13
	Geriatrics	5	0.5	0	0.5	0.5	1.5
	Hospitalists (Primary Care trained)	30	1.5	0.5	3	2	7
Medical Specialties	Allergy and Immunology	11.5	0.5	-1.5	1	1	1
	Cardiology	69.5	4	1	7	5.5	17.5
	Critical care/Pulmonology	16.5	1	0	2	1	4
	Dermatology	21.5	1	0.5	2	2	5.5
	Endocrinology	18.5	1	0.5	2	1.5	5
	Gastroenterology	32	2	0.5	3	2.5	8
	Infectious disease	7	0.5	0	1	0.5	2
	Hematology and Oncology	30	2	0.5	3	3	8.5
	Nephrology	27.5	2.5	0.5	3	2.5	8.5
	Pediatric Subspecialty	7	1	0.5	0.5	0	2
	Rheumatology	11	1	0	1	1	3
Surgery	General Surgery	30.5	2	0.5	3	2.5	8
	Colorectal Surgery	1	0	0	0	0	0
	Neurological Surgery	8	0.5	0	0.5	0.5	1.5
	Ophthalmology	40.5	2	0.5	4	3.5	10
	Orthopedic Surgery	35	2	0.5	3	3	8.5
	Otolaryngology	18.5	1	0.5	1.5	1.5	4.5
	Plastic Surgery	11	0.5	0	1	1	2.5
	Thoracic Surgery	8	0.5	0	1	0.5	2
	Urology	20.5	1	0.5	2	1.5	5
	Vascular Surgery	5	0.5	0	0.5	0.5	1.5
Other	Obstetrics and Gynecology	35.5	-0.5	0.5	5	2.5	7.5
	Anesthesiology	41.5	2	0.5	4.5	3.5	10.5
	Emergency Medicine	12	1	0	2	0.5	3.5
	Neurology	25.5	1.5	0.5	2.5	2	6.5
	Other Medical Specialties	36	2.5	0.5	3.5	2.5	9
	Pathology	4.5	0.5	0	0.5	0	1
	Physical Med and Rehab.	21	1.5	0.5	2	1.5	5.5
	Psychiatry	52	5	-1	6.5	4.5	15
	Radiology	83.5	4	1.5	7.5	7.5	20.5
	Total	1105.5	66.5	15	111.5	88	281

Note: a Full time equivalent growth for Bronx, Brooklyn, Manhattan, and Queens.

Exhibit 5 summarizes projected growth in city-wide FTE demand between 2015 and 2020 for select health professions, as well as the growth in demand for providers in the PPS network. Similar to the approach for developing PPS-specific physician FTE demand projections, these were scaled to the PPS based on its estimated city-wide inpatient market share.¹¹

Independent of the effects of DSRIP, demand for registered nurses is projected to be strong, growing by about 2,213 FTEs across the four boroughs between 2015 and 2020. Strong growth in demand is also likely among nurse and home health aides and various therapist and technologist titles. Applying the PPS market share to applicable settings, registered nurse demand will grow by about 486 FTEs. Smaller impacts on future PPS demand across care settings are likely to be seen for a range of health occupations (e.g., technicians, therapy aides).

Exhibit 5: Projected Growth in Demand for Select Health Workers Between 2015 to 2020 Based on Changing Demographics and Expanded Insurance Coverage

Health Profession	4-Borough FTE Growth ^a	OneCity Health Network				Total
		Inpatient	Emergency	Ambulatory	Home Health	
Registered Nurse	2,213	367.5	29	57	32.5	486
Licensed Practical Nurse	538.5	48.5	-	18	8.5	75
Nurse Aide	1,134	84.5	-	17.5	7	109
Home Health Aide	380.5	-	-	-	94.5	94.5
Pharmacist	121.5	-	9.5	22.5	-	32
Pharmacy Technician	150	-	9	30.5	-	39.5
Pharmacy Aide	18.5	-	0.5	4.5	-	5
Psychologist	192	-	-	57	-	57
Chiropractor	31	-	-	8.5	-	8.5
Podiatrist	13	-	-	3	-	3
Dietitian	46	5.5	-	2	-	7.5
Optician	17.5	-	-	4.5	-	4.5
Optometrist	11.5	-	-	3	-	3
Occupational Therapist	450.5	82.5	-	22.5	1.5	106.5
Occupational Therapist Aide	76	13.5	-	4.5	-	18
Occupational Therapy Assistant	119	13.5	-	13.5	0.5	27.5
Radiation Therapist	15.5	3	-	1	-	4
Radiological Technologist	69	-	4.5	13	-	17.5
Respiratory Therapist	45	8	0.5	3	-	11.5
Respiratory Therapy Technician	5.5	1	-	0.5	-	1.5
Medical Clinical Technician	27.5	-	1.5	6	-	7.5
Medical Clinical Lab Technologist	129	27.5	-	6	-	33.5
Medical Sonographer	123.5	28	-	4	-	32
Nuclear Medicine Technologist	238.5	8	55.5	1.5	-	65

Note: ^a Full time equivalent growth for Bronx, Brooklyn, Manhattan, and Queens.

*The sum across settings might not equal the total column due to rounding.

¹¹ Inpatient market share was used as a proxy for total market share, as the PPS outpatient and ED market share of borough-wide utilization were unavailable.

V. Anticipated PPS Workforce Impacts by DSRIP Project

OneCity Health is implementing eleven projects under DSRIP. These projects focus on the provision of high quality, integrated primary, specialty and behavioral health care in outpatient and community settings with acute care hospitals used primarily for emergent and acute care service delivery. Based on findings from the PPS-sponsored community needs assessment (CNA) the PPS selected five system transformation projects (Domain 2), four clinical improvement projects (Domain 3), and two population-wide prevention projects (Domain 4).

A. Project 2.a.i: Creation of an Integrated Delivery System

OneCity Health is implementing an Integrated Delivery System (“IDS”) and transforming healthcare delivery through an organized and collaborative network of providers. These include primary, behavioral, specialty, long-term and post-acute care providers as well as social service and community-based providers. All PPS providers are included in the IDS, and OneCity Health is partnering with 4 Health Homes (HH) that will subcontract with community based organizations to enhance enrollment, early intervention, and outreach efforts in the coverage of the population. Additionally, the IDS will include care transitions in hospital inpatient and ED, care management for super-utilizers and enhanced PCMH care management staff. The IDS goals are to increase PC/PCMH capacity by up to 10% by DY5, including additional staffing, expanded hours of operation and increased scope of onsite services, such as point-of-care testing and specialty services.

A review of literature on this topic suggests that better health care integration can allow some services performed by specialists to instead be performed by generalists, some services currently performed by physicians to be performed by non-physicians, and thus reduced duplication of tests.¹² For purposes of projecting target workforce needs, it was assumed that better integration of the delivery system does not have an independent effect on health workforce needs (other than the addition of Health Information Technology personnel to implement network integration). However, the IDS is necessary for the PPS’s other DSRIP projects to be successful in identifying and risk stratifying patients to provide interventions and coordinate and manage care for these patients.

¹² Weiner, JP, Blumenthal, D, Yeh, S. The Impact of Health Information Technology and e-Health on the Future Demand for Physician Services. Health Affairs. November 2013. 32:11
http://www.michigan.gov/documents/mdch/The_Impact_of_Health_Information_Technology_and_e-Health_on_the_Future_Demand_for_Physician_Services_441001_7.pdf

B. Domain 4 Projects - Project 4.a.iii: Strengthen Mental Health and Substance Abuse Infrastructure Across Systems and Project 4.c.ii: Increase Early Access to, and Retention in, HIV care

The analysis within this report does not separately model the two population-wide prevention projects. One project is strengthening mental health and substance abuse infrastructure. While this project is not explicitly modeled, the goals and impacts of this project are in some cases aligned with other clinical improvement projects that are modeled (e.g., integrating primary care and behavioral health services) including strengthening team settings and care coordination. OneCity Health is focused on implementing training to screen children in middle schools for behavioral health issues as part of Project 4.a.iii: Strengthen Mental Health and Substance Abuse Infrastructure Across Systems.

The workforce impact related to the increased access to and retention of HIV care has not been separately modeled in this analysis. In collaboration with seven New York City PPSs, OneCity Health will implement a program focused on developing common approaches and resources, addressing identified gaps in HIV care spanning the New York City boroughs (Project 4.c.ii: Increase Early Access to, and Retention in, HIV Care). The PPSs' HIV Collaborative include strengthening screening and linkage infrastructure, identification and treatment of patients eligible for pre-exposure prophylaxis treatment, and enhancement of peer support programs for HIV patients.

Although the Domain 4 projects are likely to have some workforce impact, there is not enough information at this time to make informed assumptions about the population-wide projects' potential impacts on the PPS's workforce as a result of implementing this project independent of the impacts of the other projects modeled.

C. Approach to Modeling DSRIP Projects

Subsequent sections within Section IV describe the modeling approach and assumptions used to project the workforce impacts of the PPS's remaining six system transformation and clinical improvement projects. The Appendix also provides additional details regarding the data and assumptions leveraged to model workforce impacts. However, to inform the approach in modeling the PPS's target workforce state, the following primary research questions were leveraged to guide the modeling of the PPS's projected workforce impacts for each DSRIP project:

1. How many patients will be affected by this intervention?
2. What are the current health care utilization patterns of affected patients, and how will this initiative change care utilization patterns?
3. What mix of providers will be used to implement the intervention and meet patient demand for services?

Within each section the projected workforce impacts for each DSRIP project are calculated and summarized based on the utilization of health care services by the anticipated actively engaged patients likely to be impacted by each intervention as well as the level of anticipated changes in how future care delivery will be staffed to meet patient care needs.

The results presented in this report have been calculated based upon project impact assumptions that the projects will be implemented in line with the PPS's submitted project implementation plans. As such, any deviation from the plan will likely produce results different from those shared within this report. Additionally, although literature and clinical studies were used to inform DSRIP project assumptions pertaining to the projected workforce impact, it is necessary to note that the published outcomes from these studies are not entirely in line with the project requirements within the DSRIP projects that the PPS's has chosen to implement. Therefore the workforce impacts described throughout this report are estimations and leveraged to simulate estimated workforce needs within the PPS's network.

D. Project 2.a.iii: Health Home at Risk Intervention Program

The project goals for the Home Health at Risk Program include proactively managing individuals to support self-management, assessment, care plan development, education and facilitate linkages to primary care providers and community services. Through this project, OneCity Health and its partners will work to extend care management services to individuals who have one chronic disease and are at risk of worsening health and who are likely to benefit from care management due to characteristics such as social risk factors. In addition, the Health Home at Risk program will accept uninsured patients with two or more chronic diseases, who are ineligible for Health Home services due to their insurance status.

OneCity Health will work with both Health Home and Patient Centered Medical Home (PCMH) teams in creating partnerships that offer care management and care coordination services. The PPS plans to significantly expand care management services and is partnering with up to 4 NYSDOH designated Health Home (HH) lead agencies that will subcontract with community-based organizations to enhance enrollment, early intervention and outreach efforts to the targeted population.

The number of engaged participants from the targeted population is estimated to grow from approximately 12,700 in 2017 to 63,500 by 2020 assuming current phase-in assumptions remain unchanged (*Exhibit 6*).

The following assumptions and inputs were used to model the workforce implications of this project:

- It is assumed the participants in the Health Home at Risk project are at **moderate risk** for Health Home eligibility. These individuals are lower risk and do not meet the criteria for the intensity of services than those already enrolled in the existing Health Homes program. Individuals with a single chronic disease are lower risk but uninsured

patients may be at equal or higher risk of increasing health care utilization compared to the Health Home population.

- For the following assumptions, results from the New York Chronic Illness Demonstration project were used as inputs, in particular, for the group with a risk score of 0.3 - 0.5 (representing a moderate risk population), and the results reported from year 2 of the demonstration (as there appears to be a higher degree of uncertainty associated with the year 1 results). Results from the demonstration suggest, in comparison to non-participants, that participants experience:
 - A 3.7% decline in inpatient days.
 - A 4.2% decline in ED visits.
 - A 1.8% increase in primary care visits.
 - A 2% increase in specialty outpatient visits.
- The analysis uses the following assumptions about care coordinator and nurse coordinator caseloads:
 - Each care coordinator will have an active case load of 65 patients; patient's active enrollment is 6 months during the year, so each care coordinator is responsible for approximately 125 patients per year.
 - One nurse coordinator (assume a registered nurse) oversees 5 care coordinators (non-registered nurses, including licensed practical nurses, social workers, and community health workers).

The projected PPS workforce impact associated with achieving the DSRIP goals of this initiative under current modeling assumptions and data inputs is detailed in *Exhibit 6*. Estimated changes in health care utilization by 2020 following project implementation may include:

- Approximately 19,000 fewer inpatient days.
- Primary care visits may increase by 12,700 visits.
- ED visits are estimated to decrease by 6,300.

The distribution of staffing impacts by care settings and job titles most likely to be affected by 2020 include:

- **Care coordinators providing care management:** Approximately 508 FTEs associated with care management may be required.
- **In outpatient/office settings:** An estimated FTE increase of 8-9 primary care providers, 11 direct administrative support, 15 direct medical support FTEs, and 4-5 additional registered nurses.
- **In the ED setting:** A decline of approximately 3 FTE emergency physicians, 10 registered nurses, and a small impact on demand for nurse practitioners and physician assistants.
- **In the inpatient setting:** The projected FTE impact is largest for registered nurses with an expected decline of 113 FTEs. Further a decline is expected for nurse aides/assistants (-28 FTEs), hospitalists (-9-10) and licensed practical nurses (-6).

Exhibit 6: Home Health at Risk: Projected Impact

Health Profession	2017	2018	2019	2020
Number of actively engaged patients	0	12,700	25,400	63,500
Projected DSRIP impact				
Hospital inpatient days	0	-3,800	-7,600	-19,000
Primary care visits	0	2,500	5,100	12,700
Emergency visits	0	-1,300	-2,500	-6,300
Workforce FTE implications				
Office/outpatient				
Primary Care Providers	0	1.5	3.5	8.5
Direct Medical Support	0	3	6	15
Direct Admin Support	0	2	4.5	11
Registered Nurses	0	1	1.5	4.5
Emergency Department				
Emergency Physicians	0	-0.5	-1	-3
NPs and PAs	0	0	0	-0.5
Registered Nurses	0	-2	-4	-10.5
Inpatient				
Hospitalists	0	-2	-4	-9.5
Registered Nurses	0	-22.5	-45.5	-113.5
Licensed Practical Nurses	0	-1.5	-2.5	-6.5
Nurse Aides/Assistants	0	-5.5	-11.5	-28.5
Care Coordinator/Care Managers¹³				
Non-Registered Nurse Care Coordinators	0	102	203	508
Registered Nurse Care Coordinators	0	20	41	102

The analysis suggests that by 2020, Health Home at Risk, Project 2.a.iii's greatest impact on the OneCity Health's workforce will be on the FTEs associated with care coordination and care management activities (a combined 508 FTE estimated increase in demand), as well as registered nurses within inpatient facilities (an estimated 114 decrease in FTEs). In the office and outpatient settings, there may be an approximately 8-9 FTE primary care providers required, offset by approximately 13 FTE fewer physicians and/or nurse practitioners and physician assistants in hospital (inpatient and emergency) settings. As the number of actively engaged patients increase through Demonstration Years 2018 - 2020, the number of hospital inpatient and emergency department FTEs will decline while FTEs required in ambulatory

¹³ IHS assumption: Care coordination/care manager FTEs from 2.b.iii, 3.a.i, 3.b.i and 3.d.iii are modeled under this project. However the analysis is conducted only on the actively engaged numbers from Project 2.a.iii to avoid double counting patients who may qualify for more than one of these projects.

settings is projected to increase. This will occur because of risk factor reductions in the population and appropriate patient self-management with their chronic conditions.

E. Project 2.b.iii: ED Care Triage for At-Risk Populations

Many patients who visit the emergency department have non-urgent conditions which could have been treated in a less expensive setting. OneCity Health's implementation of an ED Triage program will reduce Potentially Preventable Visits (PPVs) through the following program goals:

- Identify ED patients who would be better served by a primary care provider who can provide continuity of care.
- Link patients without a primary source of care to a primary care provider (PCP).
- Referring patients to Health Homes and Home Care Services as appropriate.
- Educate patients on appropriate use of ED services.

OneCity Health has already piloted projects in several PPS EDs for patients with non-emergent/urgent illnesses. Based on the experience gleaned, this program will provide evidence-based care management support and provide at-risk patients with transitional support before scheduling a PCP appointment. Patients presenting with non-urgent conditions in the ED will be identified and linked to care managers, navigators, and PPS partners for follow up. More PCPs will enhance access by providing extended office hours for their practices and open access scheduling for easier off hours scheduling.

The statewide target is to reduce avoidable ED use among the Medicaid population by 25% within five years. Working towards this goal, OneCity Health's initial focus for Project 2.b.iii is neighborhoods with the highest rates of PPVs. OneCity Health is focusing on patients with one or more ED visits and reinforcing standard processes for linking patients to follow-up primary care, including processes to identify patients at greatest need of this follow-up. We are implementing care management to assist patients identified as high risk in the ED care setting with their transitions to the community setting. At-risk patients that require more intensive management services post discharge and individuals with high PPV ED Observed to Expected (O/E) ratios will also be targeted.

The target population for this project are Medicaid and uninsured patients with one or more ED visits who are at-risk of developing chronic conditions or patients requiring more intensive ED care management services post discharge. Program components include PPS connectivity to community PCPs, especially patient centered medical homes (PCMHs), home health providers and other resources; provision of care management support; and intensive ED care management provided to at-risk patients.

For patients without a primary care provider presenting with minor illnesses, patient navigators will assist the patient to secure an appointment with a PCP. For patients with a PCP, patient navigators will assist the member in scheduling a timely appointment.

Once fully implemented, approximately 8.6% of the PPS’s attributed lives are anticipated to participate in this intervention. For modeling, the following assumptions were used:

- Numbers of Medicaid attributed lives that are targeted to take part in this program (from PPS) grows from 32,640 in 2018 to 54,390 in 2019.
- Average annual number of potentially avoidable ED visits per engaged beneficiary is 4 and successfully diverted ED visits is 1 (25%).¹⁴
- 50% of patients for whom a visit with a primary care provider is arranged will follow through with a primary care visit.¹⁵
- Care managers/care coordinators for this DSRIP project are modeled under the Health Home at Risk Intervention Program.
- Probability that during the ED visit patient will see an emergency physician (88.7%), a nurse practitioner (5.8%) or a physician assistant (12.3%) are based on national averages from the National Hospital Ambulatory Medical Care Survey (NHAMCS).
- Annual encounters per emergency physician (1,973) is based on MGMA medians for the Eastern Region while annual encounters per emergency nurse practitioner (2,572) and per emergency physician assistant (1,910) are national medians from MGMA.

By 2020, the net projected impact associated with a 25% reduction in ED use among the population modeled is detailed in *Exhibit 7*, and include:

- ED Visits may decrease by approximately 54,400 visits. With more patients being directed to a PCP, an additional 27,200 primary care visits are estimated.

Examining the FTE effect by setting, projected changes in utilization suggest the following:

- **In office/outpatient settings:** An increase in an estimated 12 primary care provider FTEs, 21 direct medical support, 15 administrative support, and 6 registered nurses FTEs.
- **In the ED setting:** An expected decline of 24-25 emergency physician FTEs, 89 registered nurse FTEs, and slightly fewer nurse practitioners and physician assistant FTEs.

Exhibit 7: Emergency Department Triage: Projected Impact

	2017	2018	2019	2020
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¹⁴ Source: ED Care Management, CMMI Health Care Innovation Award, program update slides for Dec 2-3, 2015 CMS site visit. Notes: High utilizers of ambulatory care sensitive conditions in the NYC Health + Hospitals ED care management intervention had 3+ ED visits within 12 months. For patients with at least one ED visit during the period September 2014 to June 2015, 10% of patients had 5 or more ED visits during 10-month period studies.

¹⁵ A synthesis of the literature reports that for nine studies with an ED-based intervention to connect patients to a primary care provider the rate of successful follow-up with a PCP ranged from 39% to 65%, with an average follow-up rate of 53% when weighted by intervention sample size. The populations participating in these interventions, however, varied greatly—e.g., patients admitted for a specific condition such as asthma, urban patients, rural patients, children, elderly, uninsured, and insured. See Table 1 in Katz et al. Comparative Effectiveness of Care Coordination Interventions in the Emergency Department: A Systematic Review. *Annals of Emergency Medicine*. Vol 60(1): July 2012, pp 12-23.

Engaged patients successfully and appropriately redirected to PCMH after triage	0	32,640	54,390	54,390
Projected DSRIP impact				
ED visits	0	-32,600	-54,400	-54,400
Primary care visits	0	16,300	27,200	27,200
Office/Outpatient				
Primary Care Providers	0	7.5	12	12
Direct Medical Support	0	13	21.5	21.5
Direct Admin Support	0	9	15.5	15.5
Staff Registered Nurses	0	3.5	6	6
Emergency Department				
Emergency Physicians	0	-14.5	-24.5	-24.5
Nurse Practitioners	0	-0.5	-1	-1
Physician Assistants	0	-2	-3.5	-3.5
Staff Registered Nurses	0	-53.5	-89	-89

F. Project 2.b.iv: Care Transitions to Reduce 30 Day Readmissions

The objective of this DSRIP project is to reduce Potentially Preventable Readmissions (PPRs) to hospitals by providing a 30-day supported transition period after a hospitalization for patients at high risk of readmission due to modifiable risk factors.

For OneCity Health, patients at risk for readmission will be provided with transition care management for a period of 30 days post-discharge. Patients will be identified based on referrals from clinical teams, supplemented by data on utilization history and by structured criteria that support clinical review of patient histories. OneCity Health will implement the project through the development of Transition Management Teams (TMTs). The TMTs will work closely with hospital staff and psychiatric and substance abuse peers to create a comprehensive plan for patients who are at a high risk of returning to the hospital within weeks of being discharged. The teams, which are provided by H+H Health and Home Care Division as well as from the PPS's community based partners, will be made up of a registered nurse, social worker, and community liaison who work closely together to ensure that patients have follow-up PCP appointments, transportation, supplies, medications and that social determinants of health are addressed. In addition, TMTs will refer patients to Health Homes if criteria is met, work with the patient's MCO in order to identify additional resources and ensure that all identified goals are addressed including all social determinants of health. The team will ensure that communication with patients care team members happen on an on-going basis and that care plans are kept up to date and address goals and current issues. It is expected that patients will graduate after 30 days and that those individuals who have unmet goals will be linked to longitudinal care management programs.

All PPS hospitals will support the project by retraining and redeploying staff as care transition managers who will assist with arranging follow-up appointments with primary care providers and other required services through expanded and enhanced centralized scheduling systems.

To model the potential workforce implications of this DSRIP project, the following questions were analyzed:

1. What is the underlying rate of readmission for targeted patients in the absence of intervention?
2. By how much is the intervention anticipated to reduce readmissions?
3. By how much will total inpatient days be reduced due to reduced readmissions?
4. By how much will emergency department services be reduced due to readmissions (as some readmissions will be through the ED)?
5. By how much will visits to primary care or specialist providers change due to the intervention?
6. What is the level and mix of providers to implement this intervention?

The estimated volume of hospitalizations by diagnosis category for Medicaid beneficiaries through 2020 in the PPS service area and the average length per stay comes from the microsimulation model. To estimate underlying rates of readmission for high-risk patients, national rates for the top 10 conditions with the most all-cause 30-day readmission rates for Medicaid patients were used (see Appendix A-5). Together these top 10 conditions account for about one third (34%) of total Medicaid readmissions. The rates range from a high of 30.4% readmission for patients with an original admission diagnosis of congestive heart failure (CHF), to 8.4% readmission for patients with an original diagnosis of “other complications of pregnancy.”

To estimate the potential impact of the care management intervention on readmissions, we reviewed literature on successful interventions targeted at reducing readmissions (see Appendix Exhibit A-6 for a summary of findings). When multiple studies showed findings for the same medical condition, we averaged results across studies to derive an estimate for modeling. The findings used for modeling are the following:

- **Cardiology-related readmissions** (heart failure, myocardial infarction): The percent reduction in readmission rate is 37% based on the averaged results from studies 1-4 (Appendix Exhibit A-6).
- **Pulmonology-related readmissions** (chronic obstructive pulmonary disorder, pneumonia): The percent reduction in readmission rate is 37% based on the averaged results from studies 5, and 6-8.
- **Diabetes-related readmissions**: The percent reduction in readmission rate is 31% based on study 9.
- **Behavioral health (mental health and substance abuse)**: The percent reduction in readmission rate is 23% based on the averaged results from studies 11-14.

We calculated the overall readmission rate from the published findings, both with and without the care transition intervention, and adjusted for the projected frequency and mix of hospitalizations for the population covered by OneCity Health. The findings suggest this DSRIP initiative could reduce readmission from an initial level of 24.5% down to 17.1% (30 percent reduction). These estimates are based on national published data and adapted to OneCity Health's target population. Note that rates observed from the Bronx Consortium intervention are similar which reported that care transition reduced readmissions from 26.3% down to 17.6% (33 percent reduction).¹⁶

For modeling the following inputs and assumptions were made:

- A team composed of a registered nurse, licensed clinical social worker and community liaison will screen 100 patients each month, for a potential 1200 a year, but more likely 770 patients¹⁷
- Patients will receive transition care for 30 days following discharge.
- Medical and surgery unit distribution of caseload: 50%/25%/25% for registered nurses, licensed clinical social worker and community liaison¹⁸
- Behavioral health setting distribution of caseload: 35%/30%/30% for registered nurses, licensed clinical social worker and community liaison¹⁹
- Of the actively engaged patients, 50% are in the behavioral health setting²⁰

Furthermore, it is assumed that 50% of avoided readmissions would have been through the emergency department (thus having workload implications for the emergency department as well as workers in an inpatient setting). *Exhibit 8* details the projected annual impact of this program, upon complete implementation, by 2020

- Readmissions will decline by approximately 1,300.
- Inpatient days will decline by approximately 6,700 days.
- ED visits will decline by approximately 600 visits.

Examining the FTE effect by setting, estimated changes in utilization suggest the following:

- **Care coordinators providing care management:** An increase of 24 care coordinators including a mix of 10-11 registered nurses, 7-8 social workers, and 6-7 community liaisons.
- **In the ED setting:** The projected impact on overall workforce FTEs is small.
- **In the inpatient setting:** A decline in FTEs of approximately 40 registered nurses, 10 nurse aides, 3-4 hospitalists, and 2-3 licensed practical nurses.

¹⁶ Interventions Help Prevent Readmissions. *Hosp Case Manag* 2013 Sep;21(9):122, 127-8.

<http://www.ahcmedia.com/articles/64645-study-interventions-help-prevent-readmissions>

¹⁷ A FTE provider may work approximately 48 weeks per year, so the provider is anticipated to work with approximately 770 discharged patients annually

¹⁸ OneCity provided input

¹⁹ OneCity provided input

²⁰ OneCity provided input

According to analysis findings, Project 2.b.iv: Care Transitions to Reduce 30 Day Readmissions greatest impact on OneCity Health’s workforce FTEs will be on registered nurses and nurse aides employed in inpatient settings, reflective of decreasing readmissions and inpatient days. The impact on the ED is expected to be minimal, while care coordination efforts will require about 24 FTEs.

Exhibit 8: Care Transitions to Reduce 30 Day Readmissions: Projected Impact

Year:	2017	2018	2019	2020
Number of actively engaged patients	0	11,300	18,800	18,800
Projected DSRIP impact				
Readmissions	0	-800	-1,300	-1,300
Inpatient days	0	-4,000	-6,700	-6,700
Emergency visits	0	-400	-600	-600
Workforce FTE implications				
<i>Emergency Department</i>				
Emergency Physicians	0	0	-0.5	-0.5
Nurse Practitioners and Physician Assistants	0	0	0	0
Registered Nurses	0	-0.5	-1	-1
<i>Inpatient</i>				
Hospitalists	0	-2	-3.5	-3.5
Registered Nurses	0	-24	-40	-40
Licensed Practical Nurses	0	-1.5	-2.5	-2.5
Nurse Aides	0	-6	-10	-10
<i>Total Care Coordinators</i>				
Registered Nurse Care Coordinators (Transitional Care Nurses)	0	6	10.5	10.5
Non-Registered Nurse Care Coordinator (Transitional Coordinator/Social Workers)	0	4.5	7.5	7.5
Community Liaisons	0	4	6.5	6.5

G. Project 2.d.i: Implementation of Patient Activation Activities

OneCity Health is one of two New York City PPSs to qualify and elect to pursue “Project 11” or the Patient Activation Activities project. This project focuses on uninsured and Medicaid beneficiaries not utilizing or underutilizing the health care system and works to engage these individuals to utilize primary and preventive care services. OneCity Health will initially focus on patients with chronic illness, immigrants, and the undocumented – as these groups have been shown to have lower insurance rates and irregular contact with the healthcare system. Project goals include closing gaps in care identified by the PPS CNA and improving outcomes of uninsured and low and non-utilizing Medicaid beneficiaries in the PPS service area.

To achieve these goals, OneCity Health will employ the following approaches:

- Outreach and patient identification
- Eligibility determination and enrollment in healthcare coverage
- Patient activation and Education
- Community and provider linkages to care for all patients
- Increase screening and referrals at the community level for people with care management needs

The project approach will leverage existing provider and community-based staff to improve patient engagement, strengthen existing and develop new partnerships with entities providing primary care and preventive services and increase the use of these services. By using Patient Activation Measures (PAM) to identify a patient's stage of activation, OneCity Health can customize the beneficiary's care plan based on the level of activation.

Core project components with workforce demand implications are the impact of newly activated patients and patients newly enrolled in healthcare coverage, an estimated 55,000 uninsured and Medicaid recipients previously not utilizing, underutilizing or inappropriately using the healthcare system. New access will likely increase service demand for primary care and preventive services and some specialty care and reduce inappropriate ED use and hospitalizations. In the short term (1-5 years) this initiative will likely increase use of health care services. In the long term the goal is to reduce avoidable disease onset and the associated use of health care services associated with such disease. Projected project effects by care setting include:

- **Ambulatory care settings (Health Homes, FQHCs, other):** Staffing among PCPs, PCMH care managers, behavioral health counselors and other care coordinators to accommodate increased numbers of enrolled uninsured and Medicaid patients at PCMHs, Health Homes and other ambulatory care settings.
- **Primary care physician settings:** Increased numbers of referrals due to better care management will require staffing increases among PCP providers to accommodate increased numbers of new patients.
- **Emergency department settings:** Outreach to establish a usual source of care with a primary care provider can help reduce avoidable emergency visits.
- **Inpatient care settings:** In the longer term, prevention has the potential to reduce or delay onset of chronic disease and the associated use of health care services associated with such disease.

Exhibit 9 summarizes the utilization across care settings for non-emergency health care needs, as reported by the CNA that surveyed community members across the four boroughs, a predominantly Medicaid and uninsured group.²¹

Exhibit 9: Distribution of Care Setting Utilization: status quo

²¹ OneCity Health Community Assessment. <http://www.onecityhealth.org/community-needs-assessments/>

DSRIP Goals	Setting	Brooklyn (n=547)	Bronx (n=517)	Manhattan (n=578)	Queens (n=450)
Encourage appropriate use	Primary care doctor's office	55.4%	49.5%	49.7%	64.2%
	Community family health center	13%	14.3%	15.9%	4.4%
	Private clinic	8.6%	7.4%	8.5%	11.6%
	Hospital based clinic	13.5%	18%	14.7%	6.9%
	Pharmacy	2.4%	3.1%	0.2%	4%
	Drug treatment center	0.2%	1%	0.9%	0.2%
	Mental health center	0.4%	0.4%	0.5%	0.9%
Neutral	Specialist doctor's office	8.8%	6.4%	3.8%	12.2%
	Urgent care	1.7%	1.6%	0.5%	3.6%
Discourage inappropriate use	Emergency department	6.2%	6.4%	2.6%	4.7%

Findings from Greene and Hibbard's study on the relationship of patient activation and health-related outcomes were used for modeling assumptions and inputs for this project, as follows:

- The study group in the lowest income tercile (\$10,618 - \$22,653) was used as a proxy for the Medicaid and uninsured population. Results for this specific group were used as inputs.
- The difference in health-related outcomes between a patient who was level 1 activated (the lowest: individual does not believe patient role in care is important) and one who was level 2 activated (the second lowest level of activation) was used to present more conservative projections. Impacts were as follows:
 - A decline of 15.3% in ED visits.
 - A 19.1% decline in hospitalizations.
- Separate from the study, it's assumed that an activated patient has 2 additional primary care visits a year.²²

Exhibit 10 summarizes modeling results and projected target state impacts of this DSRIP clinical improvement project. By 2020 the net projected annual utilization impact is the following:

- Approximately 1,993 fewer emergency visits.
- Approximately 1,071 fewer inpatient days.
- Approximately 71,500 additional primary care visits.

²² IHS assumes 70x% of patients participating in this intervention already have a primary care provider-- so we assume 30% will have 2 additional PC visits/year and 70% will have 1 additional PC visit/year

Additional projected impact includes:

- **Care coordinators providing care management:** An increase of 110 care coordinator FTEs.
- **In primary care settings:** An increase in the following FTEs: 32 primary care providers, 56 direct medical support staff, 40 administrative support staff and 16 registered nurses.
- **In the ED setting:** Minimal estimated change in demand for emergency department staff FTEs is expected.
- **In the inpatient setting:** An expected decline of 13 FTE registered nurses accompanied by small impacts on other inpatient staff.

Exhibit 10: Patient Activation: Projected Impact

	2017	2018	2019	2020
Number of actively engaged patients	11,000	55,000	55,000	55,000
Projected DSRIP impact				
Inpatient days	-400	-2,100	-2,100	-2,100
ED visits	-400	-2,000	-2,000	-2,000
Primary care visits	14,300	71,500	71,500	71,500
Workforce FTE implications				
Primary Care Providers	6.5	32	32	32
Direct Medical Support	11.5	56.5	56.5	56.5
Direct Admin Support	8	40	40	40
Staff Registered Nurses	3	16	16	16
Emergency Department				
Emergency Physicians	0	-1	-1	-1
NPs and PAs	0	0	0	0
Staff Registered Nurses	-0.5	-3.5	-3.5	-3.5
Inpatient				
Hospitalists	0	-1	-1	-1
Staff Registered Nurses	-2.5	-13	-13	-13
Licensed Practical Nurses	0	-0.5	-0.5	-0.5
Nurse Aides/Assistants	-0.5	-3	-3	-3
Non-registered nurse Care Coordinator (e.g. licensed practical nurses, Social Workers, Medical Assistant)	22	110	110	110

By increasing patient activation, OneCity Health is expected to increase screening and preventive services, as well as enable patients to better manage existing conditions. Therefore, the results indicate a corresponding rise in partner primary care service demand and additional FTEs to meet this need.

H. Project 3.a.i: Integration of Primary Care and Behavioral Health Services

To address the needs of individuals with co-morbid physical and behavioral health (BH) needs, OneCity Health intends to better integrate behavioral health and primary care services by pursuing three models:

- Model 1: Increasing the physical co-location of behavioral health providers into primary care sites.
- Model 2: Co-locate primary care services at behavioral health sites.
- Model 3: Implementing the Improving Mood-Providing Access to Collaborative Treatment (IMPACT) model for depression across the PPS service area.

The target population for the two models is Medicaid beneficiaries age five and older who receive primary care at committed pediatric and adult partner sites. These sites include NYC Health + Hospitals facilities, SUNY primary Clinic Site, Community-Based BH sites, thirty three FQHCs (Look-Alike designation) and six Diagnostic and Treatment Centers that have met 2014 NCQA Level 3 PCMH certification.

To help ensure the OneCity Health facilities can meet the increase BH demand for services, they will look to increasing staffing levels, increasing office hours, and contracting as needed. In addition, efforts that support more appropriate use of psychiatrists will be implemented so that psychiatrists treat the most serious BH disorders and stable patients are transferred to PCPs with psychiatric consultation available as needed.

The following assumptions and inputs are used in this analysis.

- Approximately 15% of the Medicaid population has unmet behavioral health needs (i.e., not receiving specialty mental health services), and these unmet needs largely consist of mild-to-moderate depressive/anxiety disorders or substance abuse.²³
- 80% of the Medicaid population with unmet behavioral health needs visits a primary care provider during the year.²⁴
- Absent the DSRIP program, 50% of patients with unmet behavioral health needs would have been successfully diagnosed by a PCP and referred to a behavioral health

²³ IHS assumption: for modeling purposes, an estimate of the percentage of Medicaid population may have unmet behavioral health needs was required. Data from the literature around this metric is scarce, but indicates that a 10% may be conservative, as some estimate that 60% to 70% of patients with behavioral health issues leave medical settings without receiving behavioral health treatment <http://www.commonwealthfund.org/publications/newsletters/quality-matters/2014/august-september/in-focus#/#4>. 10% was chosen in order to avoid overestimating effects of the DSRIP program, but this number may underestimate unmet need

²⁴ Nationwide, 86.5% of adult and 93.5% of child Medicaid beneficiaries had contact with a health care professional in the past year. This information is used to guide the IHS assumption that 80% of the Medicaid population with unmet behavioral health needs will visit a PCP. http://ftp.cdc.gov/pub/Health_Statistics/NCHS/NHIS/SHS/2014_SHS_Table_A-18.pdf

provider.²⁵ With this DSRIP project, PCPs will receive additional training and we assume 80% of patients with unmet needs will be diagnosed and referred.

- Absent the DSRIP program, 25% of referred patients will complete the referral.²⁶ Under DSRIP we assume this referral completion rate will double to 50%.²⁷ For comparison, Geisinger reports that after integrating behavioral health across the continuum of care, 85% of patients attended their first office visit with a behavioral health specialist.²⁸
- Behavioral health services will be provided by a licensed clinical social worker, and each provider will manage approximately 75 active patients for approximately 6 months (or approximately 150 patients annually).²⁹
- Any care coordination services required by this population are modeled under the Health Home at Risk Intervention Program.
- In addition to the numbers in the table, we assume that over time the number of engaged patients participating in model 2 will grow to approximately 32,000 and will require approximately 10 - 11 FTEs.

Projected changes in utilization by 2020 (when the project is fully implemented) as a result of program implementation include the following (*Exhibit 11*):

- Approximately 20,900 patients complete a referral to a behavioral health provider who otherwise would not have had a visit, and this population completes approximately 58,700 visits with a licensed clinical social worker.
- BH-related ED visits could decline by about 1,000.
- BH-related inpatient days could decline by about 1,600 days.
- Primary care visits could rise by 7,100.

Based on modeling results summarized above, by 2020 the net projected PPS-wide workforce impact associated with this DSRIP initiative will likely include (*Exhibit 11*):

- **In the outpatient/office setting:** An increase of approximately 139 licensed clinical social worker FTEs (or similarly licensed personnel such as mental health counselors, addiction counselors, or psychologists), 14 FTE increase in psychiatrists/psych nurse

²⁵ Montano CB. Recognition and treatment of depression in a primary care setting. *Journal of Clinical Psychiatry*, Vol 55(12, Suppl), Dec 1994, 18-34.

²⁶ Becker AL. In some primary care offices: The social worker will see you now, Sep 8, 2015.

<http://ctmirror.org/2015/09/08/in-some-primary-care-offices-the-social-worker-will-see-you-now/>

²⁷ IHS assumption of PPS behavioral health referral completion target. New York State added 320,000 beneficiaries to Medicaid in 2014, and an estimated 48,000 (15%) had BH issues (though the portion of these beneficiaries whose BH issues were undiagnosed and unmet is not known).

²⁸ American Hospital Association (2014, February). Integrating behavioral health across the continuum of care. Chicago, IL: Health Research & Educational Trust. <http://www.hpoe.org/Reports-HPOE/Behavioral%20health%20FINAL.pdf>

²⁹ Source indicates caseloads of 100 - 150 patients. IHS chose the higher caseload as the project focuses on population without serious mental health issues, and in that case, presumably, providers are able to see more patients. <https://aims.uw.edu/collaborative-care/team-structure/care-manager>

practitioners, 13-14 FTE additional primary care providers, and a 74 FTE increase in administrative support staff and 23 FTE increase in clinical support staff.

- **In the ED setting:** Minimal anticipated impact on providers.
- **In the inpatient setting:** A 9 FTE decline in registered nurses accompanied by small declines in licensed practical nurses, hospitalists and nurse aides/assistants.

Achieving project goals will increase access to behavioral health services and, modeling results suggest, a corresponding rise in BH care providers and associated support staff FTEs. While a reduction in workforce FTEs in the ED and hospital inpatient settings is also anticipated, the projected impact in these settings is small, supporting the project goal that most of the care in this project will be received in a primary care setting.

Exhibit 11: Integration of Behavioral Health into Primary Care: Projected Impact

	2017	2018	2019	2020
Population modeled	634,800	634,800	634,800	634,800
Population with unmet BH needs	95,200	95,200	95,200	95,200
Population with unmet BH needs visiting PCP	76,200	76,200	76,200	76,200
Population screening positive for BH needs absent DSRIP	38,100	38,100	38,100	38,100
Population screening positive for BH needs with DSRIP	40,400	51,800	60,900	60,900
Screened population completing BH referral absent DSRIP	9,500	9,500	9,500	9,500
Screened population completing BH referral with DSRIP	11,600	22,100	30,500	30,500
Change in population receiving BH counseling	2,100	12,600	20,900	20,900
Health care use impact of DSRIP				
Encounters with BH care manager	5,900	35,200	58,700	58,700
Primary care visits	700	4,300	7,100	7,100
BH-related ED visits	-100	-600	-1,000	-1,000
BH-related inpatient days	-200	-900	-1,600	-1,600
Workforce FTE implications				
Office setting				
Licensed Clinical Social Worker	14	84	139.5	139.5
Psychiatrists/Psych Nurses	1.5	8.5	14	14
Primary Care Providers	1.5	8.5	13.5	13.5
Direct Medical Support	2.5	15	23.5	23.5
Direct Admin Support	7.5	45.5	74.5	74.5
Staff Registered Nurses	0	1	1.5	1.5
Emergency Department				
Emergency Physicians	0	-0.5	-0.5	-0.5
Nurse Practitioners or Physician Assistants	0	0	0	0
Staff Registered Nurses	0	-1	-1.5	-1.5
Inpatient				
Hospitalists	0	-0.5	-1	-1
Staff Registered Nurses	-1	-5.5	-9	-9
Licensed Practical Nurses	0	-0.5	-0.5	-0.5
Nurse Aides/Assistants	0	-1.5	-2.5	-2.5

I. Project 3.b.i: Evidence-based Strategies to Improve Management of Cardiovascular Disease

OneCity Health plans to pursue a multi-solution approach to address major cardiovascular disease (CVD) risk factors in New York City. This includes improving prescribing and adherence to aspirin prophylaxis among eligible patients, improving blood pressure control by updating and strengthening implementation of HTN guidelines, improving cholesterol control by updating current cholesterol management, supporting adherence to current

treatment guidelines and increasing smoking cessation by enabling PCPs to support adherence to standard counseling and treatment for tobacco use disorder. The targeted patient population will include all uniquely attributed adult patients (ages 18+ years) with cardiovascular conditions based on a defined set of ICD-10 diagnosis codes.

The following assumptions and inputs are used in this analysis based upon:

- Quality improvement in primary care management will decrease CVD-related emergency visits by 20%.³⁰
- Quality improvement in primary care management will decrease CVD-related inpatient hospital days by 39%.³¹
- Quality improvement in primary care management will increase visits to PCPs by 1 and cardiologists by 0.5 annually.³²
- Health coaches in this program will be used in the ratio of 1:2000.
- Any care coordination services required by this population are modeled under the Health Home at Risk Intervention Program.

Exhibit 12 summarizes modeling results and projected impacts. By 2020 the net projected PPS annual utilization impact associated with this DSRIP clinical initiative is the following:

- 1,300 fewer ED visits.
- 5,300 fewer Inpatient days.
- 47,300 additional primary care visits.
- 23,700 additional visits to cardiologists.

Additional projected impact includes:

- An estimated increase of 24 Certified CVD Educator FTEs or staff to support this role (OneCity may leverage other staff to address this need in its care model).
- **In outpatient/office setting:** An increase of 23 additional primary care FTEs, 69 direct medical and administrative support staff FTEs, 16 additional staff registered nurse FTEs, and 9 FTE cardiologists.
- **In the ED setting:** A slight decrease in emergency department staff.
- **In inpatient settings:** A decrease in demand for hospital inpatient staff—including approximately 31 fewer registered nurse and 8 fewer nurse aides/assistants FTEs.

In terms of workforce implications, the analysis suggests that the greatest impact of this project on workforce will be in outpatient settings. When the additional FTE requirements associated with primary care providers, cardiologists, direct medical and administrative support staff and staff registered nurses are combined, approximately 116 FTEs may be

³⁰ Katch H et al. The role of self-efficacy in cardiovascular disease self-management: a review of effective programs. *Patient Intelligence* 2010;2 33-44.

³¹ <https://hpi.georgetown.edu/agingsociety/pubhtml/management/management.html>

³² IHS assumption

needed. The project also has impact in the inpatient setting, with staff registered nurse FTEs decreasing by approximately 31. There is minimal impact in the ED setting.

Exhibit 12: Cardiovascular Disease Management: Projected Impact

	2017	2018	2019	2020
Number of actively engaged patients	0	28,400	47,330	47,330
Projected DSRIP Impact				
Emergency visits	0	-800	-1,300	-1,300
DRSIP impact on inpatient days	0	-3,100	-5,200	-5,200
Additional visits to PCP	0	28,400	47,300	47,300
Additional visits to cardiologist	0	14,200	23,700	23,700
Workforce FTE implications				
<i>Outpatient/Office setting</i>				
Primary Care Providers	0	14	23	23
Direct Medical Support	0	24	40	40
Direct Admin Support	0	17	28.5	28.5
Staff Registered Nurses	0	9.5	16	16
Specialists (Cardiologist)	0	5.5	9	9
<i>Emergency Department</i>				
Emergency Physicians	0	-0.5	-0.5	-0.5
Nurse Practitioners and Physician Assistants	0	0	0	0
Staff Registered Nurses	0	-1	-2	-2
<i>Inpatient</i>				
Hospitalists	0	-1.5	-2.5	-2.5
Staff Registered Nurses	0	-18.5	-31	-31
Licensed Practical Nurses	0	-1	-2	-2
Nurse Aides/Assistants	0	-4.5	-8	-8
<i>Cardiovascular Disease Educators/Health Coaches 1:2,000 patients</i>	0	14	23.5	23.5

J. Project 3.d.ii: Expansion of Asthma Home-based Self-management Program

OneCity Health PPS identified a high number of asthma-related ED visits which can be attributed to high rates of smoking as well as lack of primary care access across the four boroughs. To mitigate risk and decrease asthma rates, the PPS plans to implement an integrated asthma self-management program and evidence-based best practices to control asthma-related symptoms and educate patients on asthma triggers.

OneCity Health is implementing the asthma self-management program to target adults, children, and the families/caregivers of children with new or existing asthma diagnoses.

Primary project interventions intended to address identified gaps and provide opportunities to mitigate and decrease rates of asthma include:

- Increasing PC/PCMH capacity by up to 10% by 2020, including additional staffing, expanded hours of operation, and increased scope of onsite services, such as point-of-care testing and specialty services;
- Implementing evidence-based practice clinical guidelines for asthma management at each PCMH site;
- Developing home-based assessment and self-management programs in conjunction with community-based partners who provide community health worker services to reduce home environmental triggers.
- Tracking population outcomes via an asthma registry.

Strategies to be employed include:

1. Instituting evidence-based asthma management protocols for primary care providers (PCPs) to help reduce asthma exacerbations;
2. Conducting outreach to PCPs to ensure they are aware of and can easily refer asthma patients to the home-based visiting program;
3. Establishing protocols to link asthma patients who visit the ED with PCPs and care coordination services via PCMHs or the Health Home;
4. Establishing IT systems to transmit data between the CHW and to the PCP to integrate the asthma action plan and data collected during asthma home visits into a care planning tool and the patient's medical record; and
5. Implementing clinical guidelines across PCMH partners modeled on the National Asthma Education and Prevention Program's guidelines.

The following assumptions and inputs are used in this analysis.

- NY SPARCS data on ED use for asthma, and estimates of the number of children with asthma in each borough, suggests that in 2013:
 - Asthma ED visits/year per 100 children with asthma averaged 48 in the Bronx, 21 in Brooklyn, 27 in Manhattan, and 14 in Queens.
 - Asthma hospitalizations/year per 100 children with asthma averaged 8 in the Bronx, 4 in Brooklyn, 4 in Manhattan, and 3 in Queens.
 - Average length of stay per asthma hospitalization among the Medicaid population averaged 2.97 in the Bronx, 3.3 in Brooklyn, 3.58 in Manhattan, and 2.88 in Queens.
- PPS input is that asthma management is likely to decrease asthma-related emergency visits by 10-12% among program participants. For the purposes of modeling impact a

10% ED visit reduction was used. Sensitivity analysis suggests that the ED workforce impact changes little when a larger reduction is assumed.³³

- An asthma management intervention among the Medicaid population in North Carolina found a 34% decrease in asthma-related hospitalizations, and this estimate was used for DSRIP modeling.³⁴ Sensitivity analysis suggests that the inpatient workforce impact changes little when this impact assumption is increased or decreased.
- Asthma management will decrease urgent primary care visits (i.e., unscheduled visits to a primary care provider) by 5% (approximately 1.8 visits/year).³⁵
- Any care coordination services required by this population are modeled under the Health Home at Risk Intervention Program.
- Asthma educators will work with 500 patients a year³⁶
- Community health workers will work with 100 patients a year³⁷

Exhibit 13 summarizes modeling results and projected target state impacts of this DSRIP clinical improvement project. By 2020 the net projected annual utilization impact associated with this initiative includes:

- A reduction of 300 visits in the ED.
- 530 fewer inpatient days.
- 2,100 fewer urgent (unscheduled) primary care visits.

Additional projected impact by care setting includes:

- Increased need for 23 FTE asthma educators/health coaches.
- **In primary care settings:** Minimal staffing changes required.
- **In the ED setting:** Minimal staffing changes required.
- **In the inpatient setting:** Minimal staffing changes required.

³³ For comparison, a physician asthma care education program experienced a reported 18% reduction in ED use among children with asthma. <http://www.ncbi.nlm.nih.gov/pubmed/16740859>

³⁴ <http://www.nga.org/files/live/sites/NGA/files/pdf/031403DISEASEMGMT.pdf>

³⁵

http://pediatrics.aappublications.org/content/117/6/2149?sso=1&sso_redirect_count=1&nfstatus=401&nftoken=00000000-0000-0000-0000-000000000000&nfstatusdescription=ERROR:+No+local+token

³⁶ OneCity provided estimate

³⁷ OnceCity provided estimate

Exhibit 13: Asthma Management: Projected Impact

	2017	2018	2019	2020
Medicaid target population with asthma	580	4,670	9,350	11,690
Projected DSRIP impact				
Emergency visits	-10	-120	-240	-300
Inpatient days	-30	-210	-420	-530
Urgent office visit to primary care provider	-100	-840	-1,680	-2,100
Workforce FTE implications				
Office/Outpatient				
Primary Care Providers	0	-0.5	-1	-1
Direct Medical Support	0	-1	-2	-2
Direct Admin Support	0	-0.5	-1	-1
Staff Registered Nurses	0	0	-0.5	-0.5
Emergency Department				
Emergency Physicians	0	0	0	0
Nurse Practitioners & Physician Assistants	0	0	0	0
Staff Registered Nurses	0	0	-0.5	-0.5
Inpatient				
Hospitalists	0	0	0	-0.5
Staff Registered Nurses	0	-1.5	-2.5	-3
Licensed Practical Nurses	0	0	0	0
Nurse Aides/Assistants	0	-0.5	-0.5	-1
Asthma Educators/Health Coaches	1	9.5	18.5	23.5
Community Health Workers	6.0	46.5	93.5	117.0

Analysis results suggest that implementing this DSRIP initiative will have minimal impact on the workforce providing direct medical care to this asthma population.

K. Project 3.g.i: Integration of Palliative Care into the PCMH Model

Palliative care is a specialized form of medical care for individuals with serious illnesses, with the goal to provide relief from the symptoms and stress of their condition to develop improved quality of life for both patients and their families. Focusing on pain and symptom control, communication and coordination, family/caregiver and emotional support, palliative care allows patients and their families to understand their treatment options and develop end of life plans as necessary.

This project was chosen for implementation as findings from the CNA indicated that many residents hospitalized with at least one chronic condition could benefit from palliative services. The CNA also concluded that the prevalence of chronic conditions that could benefit from palliative services outweighs the availability of such services, a deficiency that will only worsen with time, given the aging population. The target population will be attributed patients, aged 18 and older, who are eligible for a primary palliative care intervention, with eligibility criteria specified by diagnosis based on ICD-10 codes of chronic diseases that could benefit from palliative care (e.g., cancers, advanced depression, stroke, etc.). The main focus is on training and education for PCPs and staff on palliative care. The

PPS will focus on providing training and education related to strengthening and enhancing primary care teams' skills and abilities in advanced illness management in primary care delivery settings.

The following assumptions and inputs are used in this analysis:

- A 24.5% all cause readmission rate.³⁸
- 50% of the readmissions come through the ED.³⁹
- 6.1 days as the average length of stay.⁴⁰
- Readmission rates in the target population may decrease by 31% following the intervention.⁴¹

Exhibit 14 summarizes modeling results and projected target state impacts of this DSRIP clinical improvement project. By 2020 the net projected annual utilization impact associated with this DSRIP clinical initiative is potentially the following:

- 1,400 fewer readmissions.
- 9,000 fewer inpatient days.
- 700 fewer ED visits.

Additional projected impact includes:

- An increase of 10 additional health coach FTEs.
- **In the ED setting:** Minimal change in demand for emergency department staff.
- **In the inpatient setting:** A possible decline in FTEs: 53 registered nurses, 13 nurse aide/assistants, 4-5 hospitalists, and 3 licensed practical nurses.

Palliative care services are generally lacking in the PPS service area. Although the analysis suggests a large decrease in FTEs counterintuitive to the goals of the project (to increase palliative care services), these are FTEs that are potentially associated with caring for patients who may have had readmissions or longer stays due to poor management of their serious illnesses. As readmissions and LOS decrease, some inpatient FTEs can be redeployed to providing more palliative care.

³⁸ Calculated from the literature, same underlying readmission rate used in the 30-day readmission project

³⁹ IHS assumption

⁴⁰ This reflects the national average hospital length of stay for Medicaid "super-users." <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb184-Hospital-Stays-Medicaid-Super-Utilizers-2012.pdf>

⁴¹ <http://www.ncbi.nlm.nih.gov/pubmed/26270277>

Exhibit 14: Integration of Palliative Care: Projected Impact

	2017	2018	2019	2020
Number of actively engaged patients	490	7,900	15,700	19,700
Projected DSRIP Impact				
Readmissions	-30	-600	-1,100	-1,400
Inpatient days	-230	-3,600	-7,200	-9,000
ED visits	-20	-300	-600	-700
Workforce FTE implications				
<i>Emergency Department</i>				
Emergency Physicians	0	0	-0.5	-0.5
Nurse Practitioners and Physician Assistants	0	0	0	0
Staff Registered Nurses	0	-0.5	-1	-1
<i>Inpatient</i>				
Hospitalists	0	-2	-3.5	-4.5
Staff Registered Nurses	-1.5	-21.5	-42.5	-53.5
Licensed Practical Nurses	0	-1	-2.5	-3
Nurse Aides/Assistants	-0.5	-5.5	-10.5	-13.5
<i>Palliative Care Educators/ Health Coaches 1:2,000 patients</i>	0	4	8	10

L. Skills and Licensure Requirements

As part of OneCity Health’s PPS workforce strategy approach including the development of the PPS’s Current Workforce State Report and Compensation and Benefits Report development, a survey was issued to PPS partners to collect data pertaining to minimum years of experience and degree requirements. Data was collected for licensed care coordinated job titles falling under certain DOH Job Categories⁴² including Clinical Support, Nursing Care Managers /Coordinators, Social Worker Case Management /Care Management, Emerging Titles, and Patient Education to assist with workforce planning. Full details of the PPS partners total reported workforce minimum years of experience and minimum degree requirements pertaining to each job title are included within the PPS’s Compensation and Benefits Report and are summarized below.

For a majority of job titles, a majority of PPS partners reported requiring only 0-2 years of experience including medical assistants, certified asthma educators, registered nurses care coordinators/case managers, licensed practical nurses, care coordinators/case managers,

⁴² New York State Department of Health (NYSDOH) designated job categories are marked as distinct from NYSDOH designed job titles by capitalizing job categories (*note: exception for tables and exhibits*).

patient or care navigators, peer support workers, and “other” emerging titles. This suggests educational programs that train and certify these individuals could be a significant resource for providing needed employees to fill vacant positions.

Certain job titles, however, falling within the social worker case management/care management and patient education categories reported requiring more experience. As an example 3% of partners reported requiring 11-15 years of experience, and 19% reported requiring 6-10 years of experience for licensed clinical social worker titles. 50% of partners required 3-5 years of experience for health coaches.

Further, PPS partner’s also reported degree requirements for the corresponding job titles. For the Clinical Support category, approximately 68% of PPS partners reported requiring a minimum of an associate’s degree for medical assistants, while within the nursing care managers/coordinators category 31% of the PPS partners reported requiring an associate’s degree while approximately 69% reported requiring a bachelor’s degree.

Within the Social Worker Case Management /Care Management category, social worker care coordinators/case managers 38% of survey respondents reported requiring a bachelor’s degree and 42% of the PPS partners reporting a master’s degree requirement for this position.

Degree requirements falling within the Emerging Titles category varied among each position. For the care manager/coordinator position 80% of partners reported a bachelor’s degree requirement. Seventy-four percent of partners reporting indicated a bachelor’s degree was required for peer support workers.

M. DSRIP Support Staffing

Exhibit 17 below documents PPS Central Services Organization (“CSO”) new hires between DY1-DY5 for the provision of DSRIP-related support for the PPS. These positions include but are not limited to administrative support (PPS Executive Director, Project Managers, etc.), IT support (IT Leads, Data Analysts, etc.), HR Support, Finance Support, and Other positions that were created to provide support to the PPS related to DSRIP.

OneCity Health has provided the following table of DSRIP related support hires. Only two of these staff positions are redeployed from existing staff and the rest are new hires.

Exhibit 15: Summary of PPS DSRIP-Related Support New Hire Positions (by headcount)

NYC Health + Hospitals Title	CSO Role/Title	Admin/Project Designation
Director of HCPPA	Senior Director, IT implementation	Admin
Senior Assistant VP	Executive Director - Bronx Hub	Project
Senior Assistant VP	AVP of Clinical Strategy	Admin
Senior Assistant VP	Executive Director - Queens & Manhattan Hubs	Project
Supervisor System Analyst	Data Analyst	Admin
Director of HCPPA	Manhattan Hub Project Manager	Project
Director	Bronx Hub Project Manager + HIV Lead	Project
Director of HCPPA	Director of Communications	Project
Senior Assistant VP	Chief Clinical Officer	Project
Director	Brooklyn Hub Project Manager	Project
Senior Director	Project Manager	Project
Business Analyst	Business Analyst	Project
Assistant Vice President	Head of Strategy & Special Projects	Project
Executive Director (Hosp)	CEO	Admin
Senior Assistant VP	Executive Director - Brooklyn Hub	Project
Director of HCPPA	Queens Hub Project Manager	Project
Systems Analyst (EDP)	Systems Analyst PPS Database Manager	Admin
Associate Director	Business Analyst	Project
Director of HCPPA	Senior Director, Primary Care	Project
Senior Director	Senior Director, City Wide Asthma Project	Project
Assistant Director	Business Analyst	Project
Senior Director	Senior Director, IT Strategies and Implementation	Admin
Executive Secretary	Executive Assistant	Admin
Senior Director	Project Manager	Project
Senior Assistant VP	Care management	Project
Recruiter	Executive Assistant	Admin
Senior Assistant VP	Chief Operating Officer	Admin
Associate Director Operations (Corp)	Operations - Office Administrator	Admin
Director of HCPPA	Brooklyn Hub Project Manager	Project
Executive Secretary	Executive Assistant	Admin
Senior Director	Chief of Staff	Admin
Comm Liaison Worker I-IV	Community Health Worker	Project
Caseworker	Bachelors Social Worker	Project
Coordinator Manager A	Care Manager/Coordinator	Project
HIV/AIDS Case Manager	Care Manager/Coordinator	Project

Social Worker V	Care Manager/Coordinator	Project
Senior HCPPA A	Care Manager/Coordinator	Project
Assistant Director (Hospital)	Care Manager/Coordinator	Project
Total		121 121

VI. Summary of Projected DSRIP and Non-DSRIP Workforce Impacts

The demand for health care services and corresponding workers will change within the OneCity Health provider network as individual DSRIP projects are implemented and also based on trends external to DSRIP (such as changing demographics and expanded medical insurance coverage under the Affordable Care Act).

By 2020, the combined impact of a growing and aging population and expanded medical insurance coverage will increase demand for health providers by approximately 3-6% for the population served by OneCity Health – with the amount differing by health occupation and medical specialty, and with much of this increase driven by the growing needs of the Medicare population. While the DSRIP projects are largely targeted at the Medicaid and uninsured populations, many providers in the PPS network also provide services to the Medicare and commercially insured populations.

DSRIP has the potential to increase demand for services for certain provider types, such as primary care, ambulatory care and behavioral health. Other specific job titles that may see an increased demand are licensed and unlicensed care coordinators, social workers, and health educators. Conversely, DSRIP may also decrease demand for other health facilities like hospital-based staff. Finally, these are projected workforce changes and the actual DSRIP program and non-DSRIP impacts can be influenced by small changes in the parameters of the projections that could significantly affect future healthcare workforce supply and demand.

In the following sections, the projected health workforce impact on the PPS from DSRIP-related activities is summarized. The estimated DSRIP impact is combined with projected non-DSRIP impacts of changing demographics and expanded medical coverage under the Affordable Care Act to present a more comprehensive profile of health workforce demand by 2020.

Exhibit 16 summarizes the total estimated PPS health workforce impacts of individual DSRIP projects across health care professions and care settings.⁴³

The largest projected workforce impacts of DSRIP by 2020 are expected to take place among non-registered nurse care coordinators (+625 FTEs) such as community health workers and social workers. In addition to these non-registered nurse care coordinators, another 117

⁴³ *Exhibit 18* excludes the triage goal associated with a decline in avoidable ED visits (to avoid double counting overlapping services).

community health workers are estimated to be required for the asthma intervention and 6 community liaisons required for the care transitions intervention.

There will be increased requirements for other types of care coordinators and educators/health coaches including 112 FTE registered nurses to serve as care coordinators and coordinator managers and 23 CVD educators and 23 asthma educators.

Other occupations with large increases in requirements by 2020 include medical assistants that provide clinical support (+154 FTEs), clinical and administrative support staff (+168 FTEs), licensed clinical social workers or other similarly licensed personnel (+139 FTEs) and primary care providers (+88 FTEs). By 2020, overall demand for staff registered nurses is projected to decline by about 216 FTEs.

Impacts are likely to primarily affect registered nurses employed in OneCity Health's hospital inpatient settings where demand may decline by about 263 FTEs and emergency settings (-109 FTEs), partially offset by growth among registered nurses in care coordinator and coordinator manager roles (+112 FTEs) and registered nurses in office/clinic settings (+44 FTEs). Demand is projected to decline for emergency physicians by about -30 FTEs and hospitalists by about -22 FTEs.

Expected increases in the numbers of non-registered nurse care managers, licensed educators, and clinical social workers providing behavioral health counseling reflects the important roles of these professions in a transformed healthcare environment. Projected changes in demand among other health professions are smaller.

The projected results assume the DSRIP project plans are carried out as outlined and the current preliminary assumptions that have informed the analysis in this report do not change. However, as the PPS implements each project some model inputs and assumptions may evolve and be updated.

Exhibit 16: Total Estimated DSRIP related Workforce Impacts for OneCity Health (by FTE)

Occupation and Setting	2017	2018	2019	2020
Primary Care Providers	8	63	83	88
Specialist Physicians				
Emergency Physicians	0	-17	-28.5	-30.5
Hospitalists	0	-9	-15.5	-22.5
Cardiologists	0	5.5	9	9
Endocrinologists	0	0	0	0
Nurse Practitioners and Physician Assistants				
Emergency Department	0	-2.5	-4.5	-5
Nursing				
Staff Registered Nurses	-2.5	-111.5	-194	-216
Registered nurse Care Coordinators	0	26	51.5	112.5
Hospital Inpatient	-5	-106.5	-183.5	-263
Emergency	-0.5	-62	-102.5	-109
Office/Clinic	3	31	40.5	43.5
Licensed Practical Nurses				
Hospital Inpatient	0	-6.5	-10.5	-15
Nurse Aides/Assistants				
Hospital Inpatient	-1	-26.5	-46	-66.5
Clinical Support				
Medical Assistants	14	110.5	145.5	154.5
Administrative Support Staff	15.5	113	162	168.5
Behavioral Health				
Psychiatrists/Psychiatric NPs	1.5	8.5	14	14
Psychologists				
Licensed Clinical Social Workers	14	84	139.5	139.5
Care Managers/Coordinators/Navigators/Coaches				
Registered Nurse Care Coordinators and Managers	0	26	51.5	112.5
Care Coordinators (Non-Registered Nurses)	22	216.5	320.5	625.5
Community Liaisons	0	4	6.5	6.5
Community Health Workers (Asthma)	6	46.5	93.5	117
Asthma Educators	1	9.5	18.5	23.5
Cardiovascular Disease Educators	0	14	23.5	23.5
Palliative Care Educators	0	4	8	10

Note: Registered Nurse Care Coordinators and Managers are listed under both the Registered Nurse category and the Care Manager/Coordinator/Navigator/Coach category

A. DSRIP Future State Workforce Staffing Impact Analysis

Exhibit 17 depicts the combined effects on workforce demand in 2020 of both DSRIP impacts and the impacts of changing demographics and expanded insurance coverage under the Affordable Care Act. In some cases non-DSRIP impacts offset or moderate the effects of DSRIP while in other cases they magnify projected DSRIP workforce impacts.

The microsimulation analysis suggests that an additional 453 registered nurses may be needed within the network to meet demand for a growing and aging population and expanded medical insurance coverage under ACA (with much of this growth occurring among the Medicare population and in a hospital inpatient setting). The DSRIP impact on demand for registered nurses is a decline of 216 FTEs (with this decline primarily in hospital inpatient and emergency settings). As a result, the net effect on demand for registered nurses in the PPS network is an increase of approximately 237 FTEs. This net requirements projection is independent of any existing shortages of nurses.

Relative to 2015, OneCity Health's network will require approximately 195 additional FTE primary care providers. This includes approximately 107 FTEs to meet the additional demand for services due to demographic and insurance trends external to system transformation by all patients (Medicaid, Medicare, commercial, uninsured/self-pay) and 88 FTEs due to the DSRIP impact on the Medicaid population. An additional estimated 357 FTE administrative support staff and 343 FTE medical assistants will also be required in ambulatory settings to support growth in demand for primary care providers, behavioral health providers, and specialist physician offices. The demand for behavioral health providers is projected to grow, with close to 140 additional licensed clinical social workers or similarly licensed personnel needed to support integration of behavioral health and primary care, additional 30 psychiatrists or psychiatric nurse practitioners required to support both DSRIP and changing demographics within the PPS network, and an additional 57 FTE psychologists to meet a growing and aging population. In this modeling exercise, the growing demand for psychologists associated with DSRIP was not explicitly modeled (as the modeling assumption was made that clinical licensed social workers would provide the majority of the behavioral health services). However, PPS network providers might hire a mix of behavioral health providers that include mental health counselors, addiction counselors, and marriage and family therapists, in addition to clinical licensed social workers, psychologists and psychiatrists/psychiatric nurse practitioners.

Exhibit 17: Total Workforce Impact of DSRIP (2020)

Occupation and Setting	Non-DSRIP impact on demand (FTEs)	DSRIP impact on demand (FTEs)	Total impact on demand (FTEs)
Primary Care Providers	107.5	88	195.5
Specialist Physicians			
Emergency Physicians	3.5	-30.5	-27
Hospitalists	7	-22.5	-15.5
Cardiologists	17.5	9	26.5
Endocrinologists	5	0	5
Nurse Practitioners and Physician Assistants			
Emergency Department	2	-5	-3
Nursing			
<i>Staff Registered Nurses</i>	453.5	-216	237.5
Registered Nurses Care Coordinators and Managers ^a	0	112.5	112.5
Hospital Inpatient	367.5	-263	104.5
Emergency	29	-109	-80
Office/Clinic	57	43.5	100.5
<i>Licensed Practical Nurses</i>	66.5	-15	51.5
Hospital Inpatient	48.5	-15	33.5
Office/Clinic	18		18
<i>Nurse Aides/Assistants</i>	54	-66.5	-12.5
Hospital Inpatient	36.5	-66.5	-30
Office/Clinic	17.5		17.5
Clinical Support			
Medical Assistants	188.5	154.5	343
Administrative Support Staff	189	168.5	357.5
Behavioral Health			
Psychiatrist/Psychiatric Nurse	15.5	14	29.5
Psychologists	57	0	57
Licensed Mental and Substance Abuse Providers (e.g., Clinical Social Workers, Mental Health Counselors, Psychologists, Addiction Counselors)	0	139.5	139.5
Care Managers/Coordinators/Navigators/Coaches			
Registered Nurses Care Coordinators and Managers ^a	0	112.5	112.5
Care Coordinators and Navigators (Non-Registered Nurses)	0	625.5	625.5
Community Liaisons	0	6.5	6.5
Community Health Workers (Asthma)	0	117	117
Asthma Educators	0	23.5	23.5
CVD Educators	0	23.5	23.5
Palliative Care Educators	0	10	10
Total FTEs	1,166.5	1,024	2,190.5

Note: ^a Registered Nurses Care Coordinators and Managers are listed under both the Registered Nurse category and the Care Manager/Coordinator/Navigator/Coach category but are not counted twice in the totals.

VII. Conclusions and Implications of Target Workforce State Analysis Findings

Modeling the future state of the workforce following the implementation of various DSRIP projects is an immensely complex analysis involving inputs from OneCity Health, literature review, PPS anticipated targets and the best modeling assumptions and data inputs currently available. The results presented in this report are conservative projections based, in part, on outcomes from literature and other sources that may not be completely generalizable to the PPS's patient population and assumptions that may change, and are contingent on project implementation proceeding as planned. Further, the staffing needs identified do not take into account vacancies or shortages that may currently exist in the workforce. The findings of this report must therefore be examined while taking these influencing factors into account.

Defining the Target Workforce State in line with these DSRIP program goals requires information on the current health workforce supply in the PPS service area and how the demand for health care services and health professions is projected to evolve in relation to current supply, the development needs of DSRIP projects and external trends influencing healthcare delivery. Defining this target state and its workforce implications is essential to developing a detailed gap analysis between the current state assessment of the workforce and the projected future state under DSRIP and a workforce transition roadmap for achieving the defined Target Workforce State.

The demand for health care services and providers within the PPS network will change over time independent of the anticipated DSRIP impact. Independent of DSRIP, this analysis projects that demand for physicians in the PPS service area will grow by approximately 1,105.5 FTEs between 2015 and 2020. Most of this growth stems from a growing and aging Medicare population. The projected PPS share of this city-wide growth in physician demand is approximately 281 FTEs. These projections suggest that any DSRIP-related changes in demand need to be understood in the context of broader trends affecting the demand for health care services and providers.

Although the estimated workforce impacts of several DSRIP projects (e.g., asthma management) may be less significant than others cited above, they help explain how DSRIP goals, including reductions in inappropriate care use, might be achieved through counseling, improved access to primary and preventive health services, and better care management for patients with chronic conditions. However, impact on FTEs may potentially be more pronounced in the numbers, mix and care settings of care managers, licensed educators, and care coordinators/navigators, reflecting the enhanced roles of these professions under DSRIP. These impacts suggest there may potentially be opportunities to redeploy staff from settings where service demand is projected to decline to assume these types of roles.

One contributor to achieving OneCity Health's DSRIP goals will likely be the Implementation of the Health Home at Risk Program. The analysis shows that implementing this project will have a significant impact on health care use and workforce demand due to the 6 month per patient program duration and the resulting demand for a large infusion of care coordinators.

A limitation of the analysis is the potential underestimation of the DSRIP impact of certain projects, in that more FTEs than what the analysis suggests may actually be required. The Health Home at Risk, disease management for CVD and the expansion of home based asthma self-management projects, for instance, focus on a Medicaid only population, but may also serve non-Medicaid patients. Therefore, the staffing requirements for these projects may exceed what the analysis estimates.

In some cases impacts independent of DSRIP will likely offset or moderate the effects of DSRIP while in other cases they may magnify DSRIP workforce impacts. For example, PPS-wide full DSRIP project implementation is anticipated to reduce staff registered nurses demand by about 216 FTEs. However, offsetting growth of approximately 453 - 454 registered nurses FTEs will be required to meet the needs of a growing and aging population. As a result, the net impact is a likely projected 237-238 FTE growth in registered nurses demand. Strong anticipated increases in non-DSRIP related growth in nursing demand may, therefore, counterbalance DSRIP effects on nursing staff.

In conclusion, based on the best available modeling inputs and assumptions, these results suggest that implementing DSRIP as designed will likely materially impact OneCity Health and its workforce, especially when combined with the projected impacts of demographic shifts, expanded health insurance coverage and other possible developments not factored into this analysis. Information from this report will be used to inform development of a workforce transition plan and gap analysis intended to guide attainment of the desired PPS future state.

VIII. Appendix

A. Appendix I. Healthcare Demand Microsimulation Model

This appendix provides technical documentation of the Health Care Demand Microsimulation Model (HDMM) developed by IHS Inc. with contributions to the model development from the Center for Health Workforce Studies at SUNY-Albany and the various organizations for which studies have been conducted using this model. This model was used for several parts of the DSRIP analysis—including estimation of the growing demand for health workers by occupation and medical specialty in the PPS service area independent of DSRIP (e.g., in response to population growth and aging across payer types) to help inform a gap analysis and forthcoming workforce transition roadmap. The model also provided information on average length of stay, average patient use of health care services by setting, and measures of provider productivity (e.g., provider-to-service use ratios) when data from the PPS providers was unavailable. This DSRIP analysis relies on a combination of use of the HDMM, information from the PPS regarding the number and characteristics of the Medicaid lives attributed to the PPS and the health care use patterns of this population, published findings in the literature, and data from external sources such as NY SPARCS.

We provide background information and an overview of the workforce model. Then, we document the data, methods, assumptions and inputs for the three main components of the demand model: the population file, the health care use equations, and the provider staffing parameters. The final section describes work to validate the model and model strengths and limitations. Additional documentation of the model is available online.⁴⁴

This model is the primary source of workforce projections for the federal Bureau of Health Workforce for physicians, nurses, behavioral health providers, allied health providers, and other health occupations.⁴⁵ The model has also been adapted to make supply projections for many states (including ongoing work with the New York Department of Health in collaboration with the Center for Health Workforce Studies), health plans and hospital systems, and professional associations.⁴⁶

⁴⁴ The most detailed information on the model is available at <https://cdn.ihs.com/www/pdf/IHS-HDMM-DocumentationApr2016.pdf>.

⁴⁵ <http://bhpr.hrsa.gov/healthworkforce/supplydemand/simulationmodeldocumentation.pdf>

⁴⁶ An example of a recent application of the model is physician workforce projections for the Association of American Medical Colleges. https://www.aamc.org/download/458082/data/2016_complexities_of_supply_and_demand_projection_s.pdf

Overview

The HDMM, as its name implies, models demand for health care services and providers. Demand is defined as the level and mix of health care services (and providers) that are likely to be used based on population characteristics and economic considerations, such as price of services and people’s ability and willingness to pay for services. The HDMM was designed to also run a limited set of scenarios around “need” for services. Need is defined as the health care services (and providers) required to provide a specified level of care given the prevalence of disease and other health risk factors. Need is defined in the absence of economic considerations or cultural considerations that might preclude someone from using available services.

The HDMM has three major components: (1) a population database with information for each person in a representative sample of the population being modeled, (2) health care use patterns that reflect the relationship between patient characteristics and health care use, and (3) staffing patterns that convert estimates of health care demand to estimates of provider demand. Demand for services is modeled by employment setting. Demand is also modeled by (a) diagnosis category for hospital inpatient care and emergency department visits, and (b) health care occupation or medical specialty for office and outpatient visits. The services demand projections are workload measures, and demand for each health profession is tied to one or more of these workload measures. For example, current and future demand for primary care providers is tied to demand for primary care visits, demand for dentists is tied to projected demand for dental visits, etc. External factors—such as trends or changes in care delivery—can influence all three major components of HDMM.

Population Input Files

The population files contain person-level data for a representative sample of the population of interest. As adapted for modeling DSRIP, we created a population file for each New York county for each person we identify including insurance type, demographics and health risk factors. Creation of the population files starts with merging the following publicly available data:

- **Population files** for each county in New York and population projections through 2020 as obtained from the Cornell Program on Applied Demographics in Ithaca, NY.⁴⁷
- **American Community Survey (ACS).**⁴⁸ Each year the Census Bureau collects information on approximately three million individuals grouped into approximately one million households. For each person, information collected includes: demographics, household income, medical insurance status, geographic location (e.g., state and sub-state [for multi-year files]), and type of residency (e.g., community-based residence or nursing home). Each year HDMM is updated with the latest available file, and HDMM

⁴⁷ <https://pad.human.cornell.edu/counties/projections.cfm>

⁴⁸ <https://www.census.gov/programs-surveys/acs/>

was updated with the 2014 ACS (n=3,132,610 observations) in November 2015. We used ACS data for the population in New York State.

- **Behavioral Risk Factor Surveillance System (BRFSS).**⁴⁹ The Centers for Disease Control and Prevention (CDC) annually collects data on a sample of over 500,000 individuals. This survey is conducted in concert with each state's Department of Health. Similar to the ACS, the BRFSS includes demographics, household income, and medical insurance status for a stratified random sample of households in each state. The BRFSS, however, also collects detailed information on presence of chronic conditions (e.g., diabetes, hypertension) and other health risk factors (e.g., overweight/obese, smoking). One limitation of BRFSS is that as a telephone-based survey it excludes people in institutionalized settings (e.g., nursing homes) who do not have their own telephone. We combined the two latest BRFSS files (2013 and 2014) to create a joint file with close to one million individuals. HDMM was updated with the BRFSS files in November 2015. We used BRFSS data for the population in New York State.
- **National Nursing Home Survey (NNHS).** The Centers for Disease Control and Prevention collected data on a national sample of 16,505 nursing home residents in 2004 (the latest year for which individual data were collected). In addition to demographics, the NNHS collects information on chronic conditions and health risk factors of this population. Use of data on nursing home **residents** is important because this institutionalized population has much poorer health and different health care use patterns compared to their peers living in the community. The statistical match process that combines NNHS with the institutionalized population in ACS, as well as model calibration using current estimates of the size of the nursing home population helps ensure demographic representativeness of the current nursing home population.
- **EpiQuery: NYC Interactive Health Data.** EpiQuery is a web-based tool that provides access to health data collected by New York's Department of Health and other organizations. One of these sources is the New York City Community Health Survey—a telephone survey conducted annually by the DOHMH, Division of Epidemiology, Bureau of Epidemiology Services. This source provides data on the health and health risk factors of New Yorkers by borough. This information was used to calibrate the disease prevalence and health risk factor prevalence rates used in the HDMM.

The HWSM population database merges information from these sources using a statistical matching process that combines patient health information from the BRFSS and NNHS with the larger ACS file that has a representative population in New York. Using information on residence type, we stratified the ACS population into those residing in nursing facilities to be matched to people in the NNHS, and those not residing in nursing facilities to be matched to people in BRFSS (Exhibit A-1). For the non-institutionalized population, we statistically matched each individual in the ACS with someone in the BRFSS from New York from the same gender, age group (15 groups), race/ethnicity, insured/uninsured status, and household

⁴⁹ <http://www.cdc.gov/brfss/>

income level (8 levels). Individuals categorized as residing in a nursing home were randomly matched to a person in the NNHS in the same gender, age group, and race-ethnicity strata. Under this approach, some BRFSS or NNHS individuals might be matched multiple times to similar people in the ACS, while some BRFSS or NNHS individuals might not be matched. The metropolitan and non-metropolitan subsamples from this New York database were then combined with population data for each county based on demographics. Statistics for each county were generated for prevalence of chronic disease and behavioral risk factors, and compared to New York data (from EpiQuery) for model calibration.

Exhibit A-1: Population Database Mapping Algorithm

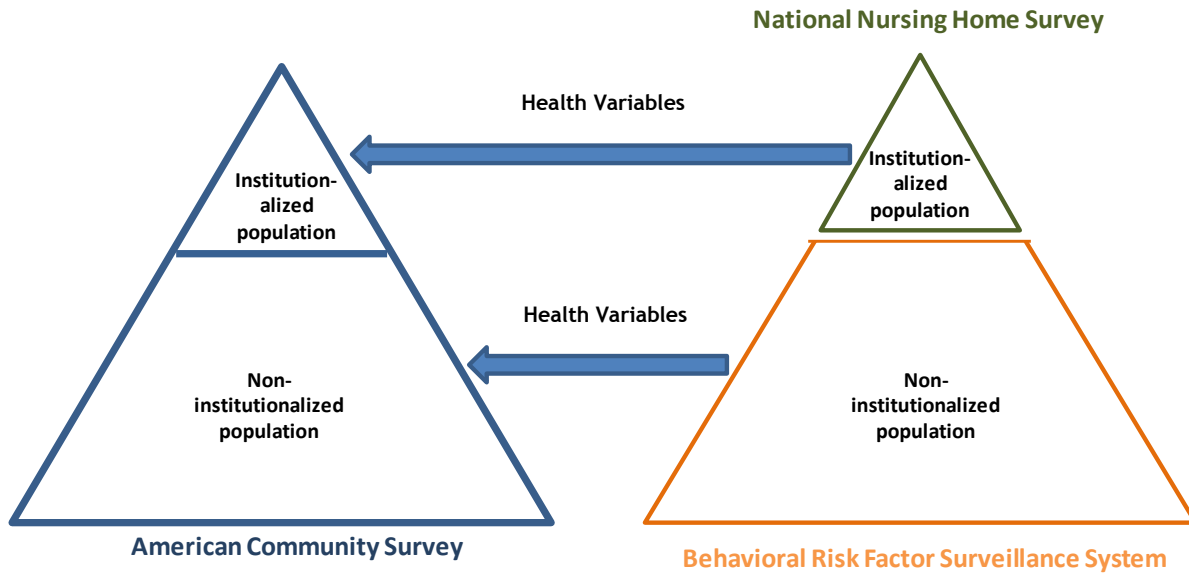


Exhibit A-2 summarizes the population characteristics in the final population database created for each county. This detailed information for each person captures systematic geographic variation in demographics, socioeconomic characteristics, and health risk factors (e.g., obesity, smoking, diabetes and cardiovascular disease prevalence).

Exhibit A-2: Summary of Population Characteristics

Race-Ethnicity: Hispanic, Non-Hispanic black, Non-Hispanic white, Non-Hispanic other race
Gender
Age Group: 0-2, 3-5, 6-12, 13-17, 18-34, 35-44, 45-64, 65-74, 75+ years
Current smoker
Diagnosed with or history of:
Arthritis
Asthma
Coronary heart disease
Diabetes
History of cancer
History of heart attack
History of stroke
Hypertension

Insured (from any source)
Medicaid (insured through Medicaid)
Managed care (insurance plan type)
Family Income: <\$10,000, \$10,000 to <\$15,000, \$15,000 to < \$20,000, \$20,000 to < \$25,000, \$25,000 to < \$35,000, \$35,000 to < \$50,000, \$50,000 to < \$75,000, \$75,000 or higher
Body Weight: Normal, Overweight, Obese
Metro area

•

Health Care Use

Projected future use of health care services, based on population characteristics and patterns of health-seeking behavior, produce workload measures used to project future demand for health care providers. HDMM uses prediction equations for health care use based on recent patterns of care use, but also can model scenarios where health care use patterns change in response to emerging care delivery models or other factors.

Demand Determinants and Prediction Equations

Health seeking behavior is generated from econometrically estimated equations using data from ~170,000 participants in the pooled 2009-2013 files of the Medical Expenditure Panel Survey (MEPS). We pooled multiple years of data to provide a sufficient sample size for regression analysis for smaller health professions and diagnosis categories. Over time, as a new year of data becomes available and is added to the analytic file the oldest year in the analysis file is dropped. We used the 2013 Nationwide Inpatient Sample (NIS), with ~8 million discharge records, to model the relationship between patient characteristics and length of hospitalization by primary diagnosis category.

Poisson regression was used to model annual office visits, annual outpatient visits, annual home health/hospice visits and inpatient days per hospitalization. These regressions were estimated separately for children versus adults. Separate regressions were estimated by physician specialty or non-physician occupations—e.g. dentists, physical therapists, psychologists—for office-based care. Likewise, separate regressions were estimated for occupations providing home health care. The dependent variable was annual visits (for office, outpatient, and home health) and inpatient days per hospitalization (for hospitalizations). The explanatory variables were the patient characteristics available in both MEPS or NIS for hospital length of stay and the constructed population file.

Exhibit A-3 is provided as an example of the regression specifications, with this example showing how patient characteristics are correlated with use of cardiology-related health care services by care delivery setting. The numbers in this table reflect rate ratios (for office and outpatient visits, or inpatient days) or odds ratios (for ED visits and hospitalizations). For all types of cardiology-related care there is a strong correlation with patient age (controlling for other patient characteristics modeled) and being in Medicaid. Having any medical insurance is associated with much greater use of ambulatory care, and if the insurance is Medicaid then there is even greater use of cardiology services across all care delivery settings. For example,

compared to their commercially insured counterparts with similar demographics and health risk factors, patients with Medicaid average 35% more office visits to a cardiologist annually, 42% more cardiology-related outpatient visits, have 64% higher odds of a cardiology-related emergency visit, and have 71% higher odds of a cardiology-related hospitalization. These estimates for the Medicaid population are statistically different from 1 (where a ratio of 1 would indicate no statistical difference with the comparison category).

Obesity increases use of cardiology-related services. Smoking is associated with fewer office and outpatient visits to a cardiologist but higher rates of ED visits (likely reflecting correlation rather than causality in the case of ambulatory care, as smoking is a risk factor for heart disease but could be correlated with aversion to visit a doctor). Lower income is associated with less use of ambulatory care and more use of ED visits and hospitalization. The presence of chronic medical conditions—and especially heart disease, hypertension, and history of heart attack—are associated with much greater use of cardiology services across care delivery settings. When modeling the Medicaid population in each county the HDMM takes into consideration that the Medicaid population often has much greater prevalence of a host of chronic conditions and risk factors relative to their non-Medicaid peer group.

Exhibit A-3: Sample Regressions: Adult Use of Cardiology Services

	Parameter	Office Visits	Outpatient Visits	Emergency Visits	Hospitalization
Race- Ethnicity	Hispanic	0.81**	0.73**	1.03	0.87**
	Non-Hispanic Black	0.78**	0.98	1.45**	1.41**
	Non-Hispanic White	1.0	1.0	1.0	1.0
	Non-Hispanic Other race	0.92**	0.82**	1.09	1.06
	Male	1.11**	1.48**	0.97*	1.07
Age	18-34 years	0.12**	0.13**	0.63**	0.37**
	35-44 years	0.23**	0.52**	0.98	0.80**
	45-64 years	0.52**	0.74**	1.10	1.14*
	65-74 years	0.87**	0.95*	1.12	1.57**
	75+ years	1.0	1.0	1.0	1.0
	Smoker	0.74**	0.75**	1.11	1.06
Diagnosed with	Hypertension	1.56**	1.15**	3.85**	2.71**
	Coronary heart disease	8.54**	9.60**	2.93**	3.96**
	History of heart attack	1.69**	1.63**	2.41**	2.59**
	History of stroke	1.11**	1.18**	3.11**	2.97**
	Diabetes	1.11**	1.37**	1.01	1.16**
	Arthritis	1.09**	1.23**	1.02	0.99
	Asthma	1.08**	1.10**	0.95	18
	History of cancer	1.08**	0.98	0.99	0.93
	Insured	2.48**	1.88**	0.89	1.02
	Medicaid	1.35**	1.42**	1.64**	1.71**
	Managed Care	0.97**	1.06**	1.01	0.99

	Parameter	Office Visits	Outpatient Visits	Emergency Visits	Hospitalization
Household Income	<\$10,000	0.84**	15	1.20**	1.16**
	\$10,000 to <\$15,000	0.89**	0.72**	1.10	1.11
	\$15,000 to < \$20,000	0.90**	1.06	0.86	1.02
	\$20,000 to < \$25,000	0.84**	0.72**	1.15	1.09
	\$25,000 to < \$35,000	0.89**	1.08**	1.18**	1.05
	\$35,000 to < \$50,000	0.89**	0.96**	0.92	0.94
	\$50,000 to < \$75,000	0.93**	1.24**	0.89	0.82**
	\$75,000 or higher	1.0	1.0	1.0	1.0
Body Weight	Normal	1.0	1.0	1.0	1.0
	Overweight	1.06**	1.02	1.16**	1.22**
	Obese	1.11**	1.08**	1.13**	1.26**
	Metro Area	1.31**	1.02	1.04	0.89

Note: Estimates for office and outpatient visits reflect rate ratios from Poisson regression. Emergency and hospitalization reflect odds ratios from logistic regression. ** indicates statistically different from 1 at the 01 level, and * indicates statistically significant at the 05 level.

Logistic regression was used to model annual probability of hospitalization and annual probability of an emergency department visit for approximately two dozen categories of care defined by primary diagnosis code. The dependent variable for each regression is whether the patient had a hospitalization (or ED visit) during the year for each of the condition categories.

Estimating Health Care Use by Care Setting

As noted above, the HDMM generates health seeking behavior from econometrically estimated equations in the pooled 2008-2013 files of the Medical Expenditure Panel Survey. Forecasting equations for healthcare use are then applied to produce estimates of numbers of patient visits and hospitalizations by specialty, occupation and diagnosis by care setting. For example, when modeling demand for psychiatrists the HDMM projects current and future office and outpatient visits to a psychiatrist and emergency visits and hospitalizations for patients with ICD-9 primary diagnosis codes in the 290-319; and 94.1-.59 range under Major Diagnostic Category 19: Mental Diseases and Disorders.

These health care service demand projections, when combined with provider staffing and productivity estimates, provide the basis for estimating current and projecting future demand for FTE behavioral health and other health occupations modeled. To illustrate, below are presented information on methods, workload drivers and data sources for modeling hospital inpatient service demand.

Hospital Inpatient Service Demand

The 2008-2013 MEPS and the 2012 Nationwide Inpatient Sample (NIS) are used to model demand for hospital inpatient services in short-term general acute care hospitals as well as specialty hospitals. Logistic regression quantifies the probability of a person with given characteristics experiencing hospitalization during the year for a wide range of medical conditions, including mental health and substance abuse conditions based on ICD-9 primary diagnosis code groupings (Exhibit A-4).

To model inpatient length of stay the 2012 NIS discharge records were analyzed. Because of the large sample size (over 8 million hospital stays) estimates derived from the NIS are stable. Estimated Poisson regressions generated the expected number of days spent in the hospital conditional on a hospitalization. Explanatory variables consisted of patient age group, sex, race/ethnicity, insurance type, presence of chronic diseases and risk factors among the diagnosis codes, and residence in a metropolitan area. Separate regressions were estimated for each of the mental health and substance abuse condition categories. Combining information on condition specific hospitalization risk and length of stay per hospitalization, HDMM computed each person’s expected number of inpatient days during the year for different types of medical conditions.

Exhibit A-4: Hospital Inpatient Demand Drivers by Condition Code and Profession

Medical condition codes (ICD-9 CM)		Specialty/NPC Profession
Allergy & immunology	001-139, 477, 995.3	Allergy & immunology
Diseases of the circulatory system	390-459; 745-747; 785	Cardiology
Diseases of the circulatory system	426, 427, 780, 785; 3726 <= pr02 <=3734	Clinical Cardiac Electrophysiology
Diseases of the circulatory system	pr02 IN (0060, 3600, 3950)	Interventional Cardiology
Colon & rectal surgery	17.31-17.36, 17.39, 453, 45.26, 45.41, 45.49, 45.52, 45.71-45.76, 45.79, 45.81-45.83, 45.92-45.95, 463, 464, 46.10, 46.11, 46.13, 46.14, 46.43, 46.52, 46.75, 46.11, 46.13, 46.14, 46.43, 46.52, 46.75, 46.76, 46.94, 153-154	Colon & rectal surgery
Diseases of the skin and subcutaneous tissue	680-709; 757; 782	Dermatology
Endocrine, nutritional and metabolic diseases, and immunity disorders	240-279; 783	Endocrinology
Diseases of the digestive system	520-538; 555-579; 751; 787; 42-54	Gastroenterology
General surgery	860-869; 870-904; 925-939; 958-959; 996-999	General surgery
Neoplasms, diseases of the blood and blood-forming organs	140-239, 280-289; 790	Hematology & oncology
Neoplasms, diseases of the blood and blood-forming organs	195.2, 188.9, 174.9, 156, 164.1, 209.24, 155, 162.9,	Radiation Oncology

Medical condition codes (ICD-9 CM)		Specialty/NPC Profession
	183; 92.2 (http://www.donself.com/documents/ICD-10-for-Radiation-Oncology.pdf)	
Infectious and parasitic diseases	001-139, 477, 40.11, 40.3, 40.9	Infectious diseases
Nephrology	580-589; 55.2-55.8	Nephrology
Conditions originating in perinatal period	760-779	Neonatal-perinatal medicine
Neurological surgery	850-854; 950-957; 01-05; 89.13	Neurological surgery
Diseases of the nervous system and sense organs	320-359; 742; 781; 784; 800-804	Neurology
Complications of pregnancy, childbirth, and the puerperium	614-679, V22, V23, V24, 72-75	Obstetrics & gynecology
Ophthalmology	360-379; 8-16; 95-95.4	Ophthalmology
Diseases of the musculoskeletal system and connective tissue; injury and poisoning	710-719; 720-724; 730-739; 805-848; 754-756; 76-84	Orthopedic surgery
Otolaryngology	380-389; 744; 18-29	Otolaryngology
Plastic surgery	904-949; 749; 18.7, 21.8, 25.59, 26.49, 27.5, 27.69, 29.4, 31.7, 33.4, 46.4, 64.4, 78.4, 81-81.99, 82.7, 82.8, 83.8, 85.8, 86.84	Plastic surgery
Mental disorders	290-319; 94.1-.59	Psychiatry
Diseases of the respiratory system	460-519; 748; 786; 35-39	Pulmonology
Diseases of the musculoskeletal system and connective tissue	725-729	Rheumatology
Thoracic surgery	426, 427, 780, 785); 32.6, 34.9, 40.6, 90.4, 35-37	Thoracic surgery
Diseases of the genitourinary system	590-608; 753; 788; 789; 791; 55-64	Urology
Vascular surgery	440-448; 0.4-00.5, 17.5, 35-39	Vascular surgery
Physical Medicine/Rehabilitation	0.4-00.5, 17.5, 35-39; 93	Physical Medicine/Rehabilitation

Health Care Use Calibration

MEPS is a representative sample of the non-institutionalized population, and although the health care use prediction equations are applied to a representative sample of the entire U.S. population parts of the model require calibration to ensure that the predicted health care use equals actual use. Applying the prediction equations to the population for 2011 through 2013 creates predicted values of health care use in those years (e.g., total hospitalizations, inpatient days, and ED visits by specialty category, and total office visits by physician

specialty). For model calibration, we compared predicted national totals to estimates of national total hospitalizations and inpatient days, by diagnosis category, derived from the 2013 NIS. National ED visits and office visits came from the 2011 NHAMCS and 2012 NAMCS, respectively. Multiplicative scalars were created by dividing national estimates by predicted estimates. For example, if the model under-predicted ED visits for a particular diagnosis category by 10% then a scalar of 1.1 was added to the prediction equation for that diagnosis category. Applying this approach to diagnosis/specialty categories, the model's predicted health care use was consistent with national totals for most settings. Setting/category combinations where the model predicted less accurately (and therefore required larger scalars) tended to cluster around diagnosis categories in the ED characterized by lower frequency of visits likely due to a combination of small sample size in both MEPS and NHANES.

For DSRIP modeling, the health care use patterns were further calibrated to the populations in each New York county modeled (using SPARCS data or data from the PPS where available) to reflect that patients in New York can have care use patterns that differ from national peer group.

Health Workforce Staffing Patterns

This section discusses the assumptions and methods used to convert demand for services into demand for health care workers. Demand for health care workers is derived from the demand for health care services. Services provided (e.g., visits, hospitalizations, procedures, or prescriptions written) or demand drivers for services for which there are no survey data (e.g., total population, population over age 75, and school aged children) in each setting were compared with the number of providers working in that setting. For professions that provide services across a wide array of setting (e.g., nurses and therapists), information on the employment distribution of the care providers in the base year from the BLS was used to determine the number of individuals working in each setting.

Assuming that the base year demand for services in each setting was fully met by the available professionals in that setting, the base year staffing ratio was calculated by dividing the volume of service used by the number of health care professionals employed in each setting. For professions that provide services in a single setting, base year utilization was divided by the base year supply to derive the staffing ratio for that profession. The staffing ratio was then applied to the projected volume of services to obtain the projected demand for providers in every year after the base year.

The baseline scenarios in HDMM (used for modeling how care use in each New York County would change over time in the absence of DSRIP) assumed that care delivery patterns remained unchanged over time given the demand for health care services. However, the number and mix of health professionals required to provide the level of health care services demanded is influenced by how the care system is organized and care is reimbursed, provider scope of practice requirements, economic constraints, technology, and other factors. Emerging health care delivery models and advances in technology may alter future health care delivery, changing the relationship between patient characteristics and the probability

of receiving care in a particular setting. The DSRIP modeling used information from the published literature and from the PPS's internal planning documents) to identify how care delivery and staffing will change with implementation of individual DSRIP projects.

HDMM VALIDATION, STRENGTHS, AND LIMITATIONS

Model validation activities continue on an ongoing basis as a long term process evaluating the accuracy of the model and making refinements as needed. For each of four primary types of validation deployed, key short term and long term activities include the following:

- **Conceptual validation:** Through reports, presentations at professional conferences and submission of peer-reviewed manuscripts the model described here continue to undergo a peer-review evaluation of its theoretical framework. Contributors to these models include health economists, statisticians and others with substantial modeling experience; physicians, nurses, behavioral health providers and other clinicians; health policy experts; and professionals in management positions with health systems. Conceptual validation requires transparency of the data and methods to allow health workforce researchers and modelers to critique the model. This report is an attempt to increase the transparency of these complex workforce projection models where work is ongoing to improve the theoretical underpinnings, methods, assumptions, and other model inputs.
- **Internal validation:** The model runs using SAS software. As new capabilities are added to the model and data sources updated, substantial effort is made to ensure the integrity of the programming code. Internal validation activities include generating results for comparison to published statistics used to generate the model (e.g., ensuring that population statistics for the input files are consistent with published statistics).
- **External validation:** Presenting findings to subject matter experts for their critique is one approach to externally validate the model. Intermediate outputs from the model also can be validated. For example, the HDMM has been used to project demand for health care services for comparison to external sources not used to generate model inputs. Results of such comparisons across geographic areas indicate that more geographic variation in use of health care services occurs than is reflected geographic variation in demographics, presence of chronic disease, and health risk factors such as obesity and smoking.
- **Data validation:** Extensive analyses and quality review have been conducted to ensure data accuracy as model data inputs were prepared. Most of the model inputs come from publically available sources (e.g., MEPS, BRFSS, and ACS).

HDMM Strengths and Limitations

The main strengths of the HDMM includes use of recent data sources and a sophisticated microsimulation approach that has substantial flexibility for modeling changes in care use and delivery by individuals or by the health care system. Compared to population-based modeling approaches used historically, this microsimulation model takes into account more detailed information on population characteristics and health risk factors when making national and state-level demand projections. For example, rates of disease prevalence and health related risk factors and household income can vary significantly by geographic area. Such additional population data can provide more precise estimates of service demand at State and county levels compared to models that assume all people within a demographic group use the same level of services.

HDMM simulates care use patterns by delivery setting. Certain populations have disproportionately high use of specific care delivery settings (e.g., emergency care) and lower use of other settings. Setting-specific information on patient characteristics and use rates provides insights for informing policies that influence the way care is delivered. Because the microsimulation approach uses individuals as the unit of analysis, the HDMM can simulate demand for health care services and providers to care for populations in low income categories, populations in select underserved areas, or populations with certain chronic conditions. Using individuals as the unit of analysis creates flexibility for incorporating evidence-based research on the implications of changes in technology and care delivery models that disproportionately affect subsets of the population with certain chronic conditions or health-related behaviors and risk factors. This information also leads to more accurate projections at state and local levels. The microsimulation approach also provides added flexibility for modeling the workforce implications of changes in policy and emerging care delivery models under ACA, important areas of ongoing research.

Limitations of the workforce model largely stem from current data limitations. For example, one limitation of the BRFSS as a data source for modeling demand is that as a telephone-based survey it tends to exclude people in institutionalized settings who typically do not own telephones. Hence, when creating the population files that underlie the demand projections BRFSS data is combined with National Nursing Home Data. Other current data limitations associated with these models include: (1) information on the influence of provider and payer networks on consumer service demand and migration patterns, and (2) information on how care delivery patterns might change over time in response to emerging market factors.

B. Additional Information for Project 2.B.IV: Care Transitions to Reduce 30-day Readmissions

The estimated volume of hospitalizations by diagnosis category for Medicaid beneficiaries through 2020 in the PPS service area and the average length per stay comes from the microsimulation model. To estimate underlying rates of readmission for high-risk patients, we used national rates for the top 10 conditions with the most all-cause 30-day readmission

rates for Medicaid patients (see **Exhibit A-5**). Together these top 10 conditions account for about one third (34%) of total Medicaid readmissions. The rates range from a high of 30.4% readmission for patients with an original admission diagnosis of congestive heart failure (CHF), to 8.4% readmission for patients with an original diagnosis of “other complications of pregnancy.”

Exhibit A-5: Ten conditions with the most all-cause, 30-day readmissions for Medicaid patients (aged 18-64 years)

Principal diagnosis for index hospital stay*	Number of all-cause, 30-day readmissions	Readmissions as % of total Medicaid readmissions	Readmission rate (per 100 admissions)
Mood disorders	41,600	6.2	19.8
Schizophrenia and other psychotic disorders	35,800	5.3	24.9
Diabetes mellitus with complications	23,700	3.5	26.6
Other complications of pregnancy	21,500	3.2	8.4
Alcohol-related disorders	20,500	3	26.1
Early or threatened labor	19,000	2.8	21.2
Congestive heart failure (CHF); non-hypertensive	18,800	2.8	30.4
Septicemia (except in labor)	17,600	2.6	23.8
Chronic obstructive pulmonary disease (COPD) and bronchiectasis	16,400	2.4	25.2
Substance-related disorders	15,200	2.2	18.5
Total	230,200	34.1	20

Similarly, we assessed the published literature on the potential impact of care transition interventions to reduce 30-day readmission—reviewing the literature on Project RED, BOOST and other successful care transition interventions (see Exhibit A-6). When multiple studies showed findings for the same medical condition, we averaged the reduced readmission rate across studies to derive an estimate for modeling.

- **Cardiology-related readmissions** (heart failure, myocardial infarction): The percent reduction in readmission rate is 37% based on the averaged results from studies 1-4.
- **Pulmonology-related readmissions** (COPD, pneumonia): The percent reduction in readmission rate is 37% based on the averaged results from studies 5, 6-8.
- **Diabetes-related readmissions**: The percent reduction in readmission rate is 31% based on study 9.
- **Behavioral health (mental health and substance abuse)**: The percent reduction in readmission rate is 23% based on the averaged results from studies 11-14.

The overall calculated intervention impact is a 30% reduction in readmission rates.

Exhibit A-6: Summary of 30-day Readmission Intervention Impact

Study #	Condition	Pre-Intervention Readmission Rate	Post-Intervention Readmission Rate	% Reduction in Readmission Rate	Source
1	CHF ¹	22.5%	7.7%	-66%	St. Mary's Medical Center (LB) http://www.ahrq.gov/policymakers/case-studies/201522.html
2	CHF ¹	7.6%	5.5%	-28%	St. Mary's Medical Center (SF) http://www.ahrq.gov/policymakers/case-studies/201522.html
3	CHF ¹	15.4%	9.1%	-41%	Memorial Hospital http://www.ahrq.gov/policymakers/case-studies/201507.html
5	CHF, acute myocardial infarction, and pneumonia ¹	26%	15%	-42%	VBMC-Harlington http://www.ahrq.gov/policymakers/case-studies/201420.html
4	CHF ¹		14-16%		
6	COPD ¹	19%	11.7%	-38%	Penn Medicine Chester County Hospital http://www.ahrq.gov/policymakers/case-studies/201506.html
7	COPD ¹	20.6%	11.8%	-43%	Memorial Hospital http://www.ahrq.gov/policymakers/case-studies/201507.html
8	Pneumonia ¹	10%	9.7%	-3%	Memorial Hospital http://www.ahrq.gov/policymakers/case-studies/201507.html
9	Diabetes	16%	11%	-31%	Healy et al. (2013) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3781555/
10	Diabetes	1.79/patient	1.18/patient	-34%	Naylor et al. (2004) ⁵⁰
11	Mixed ¹			-32%	
12	Mixed ¹	18.6%	16.6%	-11%	Nacogdoches Memorial Hospital http://www.ahrq.gov/policymakers/case-studies/201501.html
13	Mixed ¹	23.3%	15%	-36%	VBMC-Brownsville http://www.ahrq.gov/policymakers/case-studies/201420.html

⁵⁰ The transitional care intervention developed by Naylor et al. (2004) targeted patients who were hospitalized for CHF and used highly trained advanced practice nurses (APNs) to administer the intervention. Naylor's intervention was highly structured and effective. The APNs met with patients in the hospital and in their home shortly after discharge to provide intense coaching and education on medications, self-care, and symptom identification. The intervention lasted a total of 12 weeks, and patients were followed for one year. http://www.champ-program.org/static/BROWN%20FULL%20REPORT%203%2013%2009v2_ah2.pdf

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Study #	Condition	Pre-Intervention Readmission Rate	Post-Intervention Readmission Rate	% Reduction in Readmission Rate	Source
14	Mixed (All Payer) ₁	7.5%	6.5%	-13%	Bakersfield Memorial http://www.ahrq.gov/policymakers/case-studies/201522.html
15	Mixed (Medicare) ₁	25%	11.3%	-55%	Bakersfield Memorial http://www.ahrq.gov/policymakers/case-studies/201522.html