NEW JERSEY ECONOMIC DEVELOPMENT AUTHORITY

University Hospital Study

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INNOVA | Healthcare Solutions

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SECTION 1: EXECUTIVE SUMMARY

SCOPE AND APPROACH

The Innova Group was engaged by the New Jersey Economic Development Authority (NJEDA) to conduct this study to be submitted to the Governor, the Legislature, and the UH Board of Directors. The scope of this study is to review the recently developed Master Facilities Plan (MFP) for University Hospital (UH) while considering community health needs in the City of Newark and how the new facilities at UH would complement existing healthcare services and facilities in the region. UH is the principal teaching hospital for Rutgers New Jersey Medical School and Dental School, New Jersey's only public hospital, and one of only three Level 1 Trauma Centers in the state.

Based on the scope and time frame for this study, we prepared an approach that focused primarily on inpatient beds and emergency room bays since these were the driving elements of the UH MFP. This was a highly interactive process which included multiple meetings with representatives from UH, NJEDA, and the Governor's office as well as interviews with key stakeholders.

KEY FINDINGS

The NJEDA defined the Study Area for this report to consist of 20 Zip Codes in and around the City of Newark. This area has a population of approximately 700,000 residents and is the home for five acute care hospitals.

Current Healthcare Resources

The five acute care hospitals in the Study Area vary in size, organizational type, and function. While core services overlap, they serve the community in different ways. UH is the largest and serves as both the primary academic medical center and safety-net hospital for the region. Currently, the five hospitals maintain approximately 1,500 acute care beds which were 68% occupied in 2022 (similar to occupancy levels nationally). The five hospitals maintain 268 ED bays (excluding hallway positions) and treat over 300,000 ED patients per year, which would require 281 ED bays at national average levels of throughput.

Four Federally Qualified Health Centers (FQHCs) also serve the Study Area from 21 locations. These centers, which serve as the backbone for the primary care safety net, coordinate with area hospitals for patient care.

Population and Community Health

The Study Area population is projected to grow by less than 1% over the next five years but the 65+ population, which utilizes hospital services the most, is projected to grow by 11%, an increase of ~11,000 people. The area population is younger, more economically challenged, and more racially diverse than state and national averages, requiring additional attention to economic accessibility, accommodation for cultural and language differences, and healthcare disparity concerns.

The population's health status is generally worse than the State in total. Indicators such as obesity, teen birth rates, infant mortality rates, and age-adjusted death rates are often impacted by social determinants of health related to the characteristics of the community at large. Community health needs assessments from area hospitals identified the most pressing community health needs as: lack of mental health services, shortage of affordable housing, lack of transportation for medical services, community crime and safety, and racism and discrimination.

Service Demand Assessment and Forecast

Study Area residents generated an adult average daily census (ADC) of ~1,000 for NJ Hospitals in 2021. The five Study Area hospitals have a 64% share of this market and UH alone has an 18% share. Pediatric inpatient volume is relatively low and is primarily newborns. The out-migration is primarily from the zip codes outside of Newark,

especially in the northeast of the Study Area, where there is access to hospitals. The outmigration is largely offset by inmigration from towns such as Elizabeth.

Total Study Area inpatient admissions are forecasted to grow by approximately 5% over the next five years. When applying forecasted bed demand against currently maintained beds, the five Study Area hospitals have a forecasted net surplus of approximately 290 total beds by 2027. Most of the surplus is for one underutilized hospital. UH has a forecasted shortage of med/surg, ICU/CCU, and psychiatric beds.

Total Study Area ED visits are forecasted to grow by 8% over the next five years, with behavioral health visits increasing by 17%. Based on current capacity, the five Study Area hospitals have a forecasted net shortage of approximately 36 ED bays by 2027. Planned ED expansions at two area hospitals (including UH) are underway which will eliminate this net shortfall by 2024 by adding a total of 35 ED bays.

University Hospital Master Facilities Plan

The MFP calls for a $1.8 billion investment over eight years to modernize and expand the UH facilities. Key drivers and attributes of the plan include site & circulation improvements; facility infrastructure replacement/ repair (including safety and code compliance); and modernization/functional improvements (e.g., converting semi-private and quad occupancy inpatient rooms to private and converting ED hallway beds to true treatment bays).

The major facility components of the plan are a large new medical office building for faculty practices and outpatient services; a new acute care tower which supports contemporary clinical services and allows for decompression of patient care and staff space; and a major renovation to the existing hospital to upgrade the infrastructure and re-build remaining inpatient units and ED at modern standards.

Notably, the MFP does not add substantial key room capacity to the hospital. Rather it replaces, modernizes, and right-sizes the existing capacity. According to MFP documents, the main UH facility is 44 years old, and the average age of the infrastructure is over 30 years. Noted deficits include compromised mechanical & plumbing, non-compliant/insufficient patient care and staff capacity, and buildings with aging exterior envelopes that are not fully sprinklered and violate current life safety codes.

Additionally, the hospital is functionally obsolete. Most of the clinical departments are undersized for the volumes, have rooms that are smaller than current codes or practice, and lack support and storage space. Just to "right size" the facility for the current key rooms would require the facility to be about 30% larger than it is today, according to commonly used metrics shown in the MFP. Some rooms, such as operating rooms, are below the sizes necessary to provide the most modern technology typically seen in an academic medical center. For example, some operating rooms are 365 net square feet (NSF) large compared to 600+ NSF (or even 800+ NSF for the most advanced services) in new construction. The Labor & Delivery Rooms are 165 NSF compared to 365 clear floor area required by the Facilities Guidelines Institute (FGI, which serves as code minimums in most states).

The Average Age of Plant (an accounting measurement of accumulated depreciation/annual depreciation) at UH is much higher than the state at 21 "years" versus 13 for the state median: reflecting an historical underinvestment in capital projects. In fact, UH's AAP is older than the bottom quartile of hospitals in New Jersey according to Apollo reports from the NJ Healthcare Facilities Financing Authority.

CONCLUSIONS AND RECOMMENDATIONS

Population and Market Demand

Communities which are economically challenged with relatively poor health status, like the Study Area, typically experience higher use of emergency services, more complex acute care needs, and concentrated demand for safety net hospital services – all of which are relevant to UH's proposed MFP.

The level of outmigration for hospital care is not concerning. Most of the outmigration occurs from towns on the borders of the Study Area where other hospitals are geographically convenient and where residents may have employment, primary care, or other connections to the outlying communities. Much of this outmigration is offset by inmigration to the five Study Area hospitals from other areas of NJ. A relatively small portion of Study Area residents out-migrate to New York (~2%).

Healthcare Resources

The current level of inpatient acute care capacity in the Study Area is sufficient to meet the projected needs of the community for the next five years (the time horizon used in the UH MFP). While there is currently a shortage of ED capacity, two expansion projects will eliminate the shortage by 2024.

While there are no impending risks to the loss of unique or sensitive services in the Study Area, an ongoing lack of investment in medical equipment and facilities can result in difficulty for recruiting specialists and could affect the reputation and desirability of the Medical School for students and the teaching hospitals, ultimately impacting the ability to provide some advanced services.

The most prevalent high-cost service which may represent unnecessary duplication based on insufficient volumes is cardiac surgery, for which SMMC and UH do not meet typical minimums.

There are no crucial gaps in hospital-based services offered in the Study Area – it seems to be well served by all levels of inpatient and emergency care services. However, there is a need for more community-based services to address mental health and substance use issues as well as the obesity and diabetes prevalence in the community.

University Hospital Master Facilities Plan

The methods used to forecast inpatient beds and emergency department bays in the UH MFP align with industry practices, and the analyses in this report align with the results shown in the MFP.

Utilization forecasts underlying the MFP are reasonable and within industry standards. The utilization projections, and the resulting facilities sizing, assume that UH does not increase its inpatient market share. The proposed number of inpatient beds and ED bays in the facilities plan aligns with the utilization forecast.

While a new, improved facility could draw patients selectively to UH, there will be limited capacity to accept greater volumes. Therefore, it should have limited impact on the volumes of the other hospitals in Newark. Other hospitals in the market have completed recent improvements as well, so the MFP will help UH avoid losing market share to more up-to-date facilities.

The increase from 63 to 111 ED bays might seem dramatic, but the ED uses 100 beds today: with 37 of the stations being makeshift "hallway stations," and the increase in actual ED bays will help solve a city-wide ED bay shortage.

The high-level square footage "block sizes" used to convert the key room types are within the ranges typically used in the industry. The actual size, layout, and operational model for each department will be developed during the design phase of the project.

From a financial perspective, the MFP establishes the first step in developing a practical plan to balance capital needs vs. capital availability by providing an estimated cost for a comprehensive solution to UH's facility needs. Going forward, an iterative process of matching available funding with refined capital needs will be required. To fund the MFP, UH will rely heavily on funding from the State because it has limited financial capability from other sources including cash and investment balances, debt capacity, and philanthropy.

Going forward, additional assessments could provide the State with greater clarity on facility demand and cost. It would be prudent to do a 10-year forecast considering changes in market share, such as recapturing outmigration volumes or modeling the impact of a hospital closure or new market entrant on demand for beds and ED bays. In terms of project costs, the MFP team explored 14 scenarios, 3 of which were deemed viable based on the priorities of UH. Each of the 3 scenarios were $1.8B or more. It could be useful for the State to understand if any of the 11 initially discarded scenarios were substantially less costly, and if so, what compromises must be made to achieve a lower cost.

SECTION 2: INTRODUCTION

ENGAGEMENT OVERVIEW

Background and Objectives

University Hospital (UH) located in Newark, New Jersey is a public institution of healthcare and an instrumentality of the State of New Jersey (the State). It is the principal teaching hospital for Rutgers New Jersey Medical School and Dental School. UH is New Jersey's only public hospital and one of only three Level 1 Trauma Centers in the state. UH recently developed a Master Facilities Plan (MFP) to address the needs of its community and the aging infrastructure of its facilities. This report references the March 2023 MFP version which was updated in May 2023.

The State's fiscal year 2023 budget provided funding to the New Jersey Economic Development Authority (NJEDA) to prepare a report regarding the UH MFP to be submitted to the Governor, the Legislature, and the UH Board of Directors. The requirements for the report are to "study and plan for new health care facilities at the [UH] site to meet community health needs in the City of Newark [and to] take into consideration how new facilities would complement existing healthcare services and facilities in the Region."

The NJEDA issued a request for proposal, and ultimately engaged The Innova Group, to develop a study within a 60-day timeframe to include:

- An assessment of the health care services in the Region
- An inventory of hospitals and currently available hospital services in the Region
- An assessment of current and projected future patient population in the Region, and how patients are currently meeting and will meet their hospital service needs in the Region
- An assessment of the current and projected future hospital services in the Region and how these services are currently meeting and will meet patients' needs within the Region
- An assessment of plans of hospitals within the Region to expand services and/or facilities to meet the community needs
- A review of the UH facility plan and how the plan addresses the community needs in light of other expansion plans in the Region
- Recommendations that would meaningfully address any duplication or excess capacity, or insufficiency of necessary health care services identified in the study

Study Approach and Data Sources

To address the scope of work requested by the NJEDA within the required time frame, The Innova Group prepared an approach that focused the assessments primarily on inpatient beds and emergency room bays since these were the driving elements of the UH MFP. This was a highly interactive process which included multiple meetings with representatives from UH, NJEDA, and the Governor's office and interviews with key stakeholders. Area hospitals were also given the opportunity to verify and complete information about their facilities based on surveys sent to them. We developed a multistep work plan that included the following activities:

- *Step 1: Project Initiation:* Our first step was to establish the foundation for the project by developing a project schedule, requesting and reviewing data, and conducting interviews with NJEDA and UH representatives to gain insight into the goals, priorities, and issues related to the UH MFP
- *Step 2: Healthcare Resources Assessment:* This assessment provided the "supply-side" basis for understanding capabilities in the Study Area. Tasks in this step included developing an inventory of facilities

and services including both hospitals and Federally Qualified Health Center (FQHC) facilities and identifying excess capacity (duplication of services) or service insufficiency (gaps in key services)

- *Step 3: Patient Population Assessment:* This assessment provided the "demand-side" basis for understanding resource needs. Components included demographic analysis, market share analysis, a review of patient migration trends into and out of the Study Area, and projected healthcare services demand
- *Step 4: Hospital Services Assessment:* The hospital services assessment incorporated both current and anticipated future demand for inpatient and emergency department services in the Region along with hospital capabilities to meet that demand
- *Step 5: UH Master Facilities Plan Assessment:* The purpose of this assessment was to determine whether the MFP addresses current and future needs of patients in the Region by testing the sizing of the proposed facility key rooms (especially inpatient beds and ED bays) and developing recommendations
- *Step 6: Conclusions and Recommendations:* The final step was to summarize our conclusions and recommendations

In conducting the analyses associated with this report, we relied upon a variety of both publicly available and proprietary data sources. Individual tables and exhibits are sourced accordingly. Key data sources used in this report include the following:

- General Information
  - Service area zip codes provided by the New Jersey Economic Development Authority
  - Gensler Facilities Master Plan Study: Published March 2023 and updated in May 2023
  - American Hospital Directory: Data as of March 22, 2023
  - Medicare.gov Hospital Compare website based on HCAHPS January 2023 Public Report (April 2021 – March 2022 discharges)
  - B-2 2021-2022 file: CY 2022, most current year for maintained and licensed bed counts
  - UH, NBIMC and CMMC CHNAs: 2022, most current year
- Population
  - ESRI 2022 dataset
- Benchmarks
  - Emergency Department Benchmarking Alliance (EDBA): similar volume ED cohorts; 2021 data
- Baseline Volumes
  - B-2 2021-2022 file for market patient bed days, market admissions: 2022, most current year
  - New Jersey Discharge Data Collection System, Office of Health Care Quality Assessment, New Jersey Department of Health
  - Hospital Profile Worksheets: Sent to Study Area hospitals to review and complete
  - Market Emergency Department: CY 2021, most recent year
  - Market Inpatient: CY 2021, most recent year
  - FY22 Internal (NO PL) dataset for UH inpatient volumes
  - FY22 UH internal data for ED volumes
  - NY State Hospital Discharge Data Set: FY 2019 and FY 2020
- Projected Volumes
  - Sg2: local market- UH Primary Service Area; 5 years (2021-2027)
  - Healthcare Advisory Board (HCAB): local market, 4 scenarios (5 years 2021-2027)

An important caveat is that each of the datasets could have different baseline years and slightly different data definitions. It is important to read the source of the data when reviewing tables and exhibits, since the same variable (such as bed count or patient census) might be different among various analyses due to different sources. In addition, the public data sets could have out of date information. For example, see the Appendix that compares the bed counts documented for UH in the B2, the actual UH license, and the actual staffed beds reported to The Innova Group for this study. Unless otherwise indicated, data are represented calendar years.

Study Area Definitions

The NJEDA defined the study area for this engagement (the Study Area) to include 20 zip codes in Newark and surrounding towns as shown below

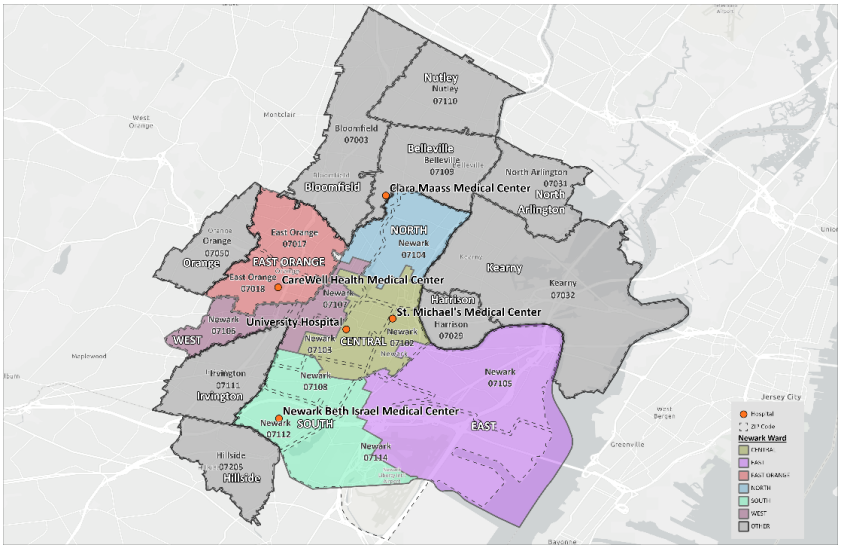
Table 1: Study Area Zip Codes

Zip Code	Town	Zip Code	Town
07003	Bloomfield	07105	Newark
07017	East Orange	07106	Newark
07018	East Orange	07107	Newark
07029	Harrison	07108	Newark
07031	North Arlington	07109	Belleville
07032	Kearny	07110	Nutley
07050	Orange	07111	Irvington
07102	Newark	07112	Newark
07103	Newark	07114	Newark
07104	Newark	07205	Hillside

The NJEDA also specified the following five hospitals to be included in the study, along with area FQHCs:

- University Hospital (UH)
- Clara Maass Medical Center (CMMC)
- Newark Beth Israel Medical Center (NBIMC)
- St. Michael's Medical Center (SMMC)
- CareWell Health Medical Center in East Orange (CHMC)

Exhibit 1: Study Area Map Including "Wards & Oranges" and Surrounding Towns

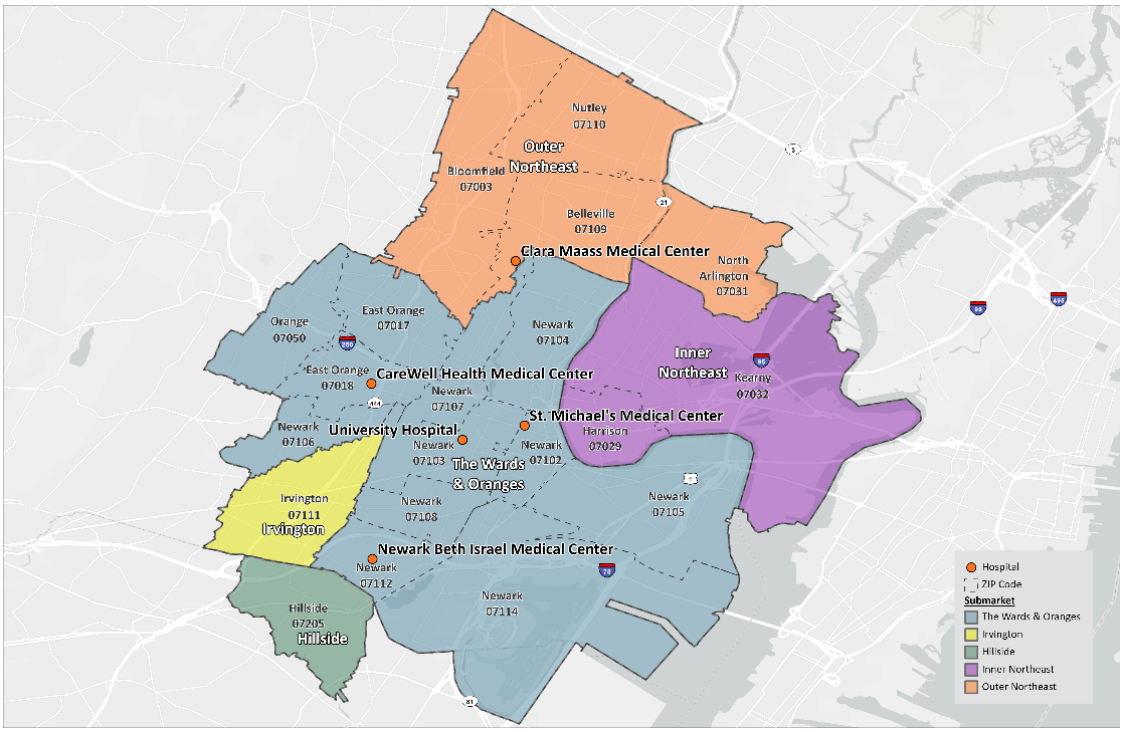


Source: NJEDA zip code list; Esri 2022

The Innova Group divided the Study Area into five submarkets to better understand the submarket populations and their care-seeking behaviors:

- The Wards & Oranges (contains all hospitals)
- Irvington
- Hillside
- Inner Northeast
- Outer Northeast (CMMC on border)

Exhibit 2: Map of Service Area Hospitals and Submarkets



Source: NJEDA zip code list; Esri 2022

University Hospital Master Facilities Plan Overview

The University Hospital Master Facilities Plan, developed in 2022 by the architecture firm Gensler along with planning support from the consulting firm Guidehouse, and with involvement of University Hospital leadership and staff and extensive community engagement, results in a $1.8 billion investment to modernize the facilities and patient care at University Hospital.

A Master Facilities Plan is a long-range framework for growth & development on a campus. It is not detailed departmental design. Rather it provides the “scope & scale” and the “blocking and stacking” of spaces: showing approximate size, adjacencies, connectivity, phasing and feasibility. In addition, the plan intends to establish a direction for the likely cost of the project and use an iterative process to estimate capital needs versus capital availability. Detailed operational visioning and design occur at later phases—and the block sizes are intended to be sufficient to accommodate a variety of operational models that are established in later phases of plan development.

Key drivers and attributes of the plan include:

- **Site & circulation improvements**
  - Creating a welcoming campus that physically engages the surrounding community and provides parks and green space
  - Developing better connections and flow across the hospital, medical school, and medical office buildings
- **Facility infrastructure replacement/repair**
  - Replacing or repairing old mechanical, electrical and plumbing infrastructure that has insufficient capacity, does not meet current codes, and is in poor condition
- **Modernization/functional improvements**
  - Converting semi-private and quad occupancy inpatient rooms to all private inpatient rooms
  - Converting hallway beds in the Emergency Department to true treatment rooms
  - Increasing the size and capabilities of the operating rooms
  - Improving adjacencies and flow within and among many departments, including the outpatient medical office building
  - Developing appropriate staff support spaces to meet the needs of an increasingly burdened and burned-out staff

The major facility components of the plan are:

- A placeholder **large new medical office building** or ambulatory care center (ACC) to hold the faculty practices and outpatient diagnostics & treatment services: final occupants and capacity is still to be determined, but the plan is to expand the capacity for outpatient services
- **A new acute care tower** with medical/surgical beds, critical care beds, and interventional services (OR, cardiac cath, etc.) that creates contemporary clinical services and adds capacity to allow for decompression of the existing hospital and conversion to all private inpatient rooms
- **A major renovation to the existing hospital**, to upgrade the infrastructure and re-build remaining inpatient units and ED at modern standards but in the existing building envelope

Notably, the Master Facilities Plan does not add substantial capacity to the hospital. Rather it replaces, modernizes, and right-sizes the existing hospital capacity. The ACC is sized at approximately 30% larger square feet versus the existing buildings it replaces. The occupants are not fully developed at this time, but the larger footprint is placeholder to allow for outpatient growth.

KEY HEALTHCARE PLANNING CONCEPTS

The healthcare demands of a population include more than just hospital care. Preventative services, outpatient services, mental health services, diagnostic services, rehabilitative services, post-acute services and social services are all important to the health and wellbeing of a community. This report focuses specifically on a subset hospital/acute care demand: inpatient beds and emergency department bays, since those are the primary clinical services in the UH MFP. But the hospital is often the “downstream” receiver in the healthcare continuum: social determinants of health (such as secure and safe housing, access to healthy food, and consistent employment) along with the quality and capacity of outpatient and preventative services, have a direct impact on the acute care demand of a population.

The acute care “utilization rate” (such as inpatient days per 1,000 age-adjusted population) can vary dramatically based on the quality, capacity, and access to other components of the healthcare continuum. This report assumes that the general overall age-adjusted acute care utilization of the population in Newark is

relatively unchanged, given that UH alone is unable to make meaningful changes to the overall health and social status of the population.

Macro Healthcare Trends Impacting Hospital Forecasts

While the report assumes a relatively stable age-adjusted acute care utilization rate for factors that are largely outside of the control of the hospital, it does account for other macro trends affecting hospital demand. The 5-year forecasts in this report use insight from two companies: Sg2 and the Healthcare Advisory Board. These two companies use researchers, clinicians, epidemiologists, and economists to estimate the impact of variables such as those below on care demand:

- Aging and population growth/decline
- Disease burden/chronic disease management/epidemiology
- The impact of technology on the shift from inpatient to outpatient care and the shift from outpatient to virtual or home-based care; or on new kinds of service
- The potential result of policy changes including the influence of insurance expansion and payment reform on access to care/denial of services
- The relationship between care management efforts and acute care utilization
- The effect of the economy and consumerism on care-seeking behavior

For example, Sg2's national forecasts updated in 2022[1] include the following expectations of upward and downward effects on inpatient demand.

Upward or flat effect on inpatient demand:

- Rising patient acuity/complexity
- Slowing down of the shift from inpatient care to outpatient
- Endemic Covid-19

Downward effect on inpatient demand:

- Expanded care at home capabilities
- Record enrollment in Medicare Advantage plans (that tend to manage care tightly)

Nationally, Sg2 predicts a 2% increase in inpatient discharges over 10 years and an 8% increase in inpatient days in 10 years due to increasing acuity. They also predict only a small decline in emergency department volume nationally, with the assumption that the transition of low acuity visits from emergency departments to urgent care will begin to hit a floor. They likewise predict nationally meaningful growth in all sites of service for surgery: ambulatory surgery centers (25% 10-year growth); hospital outpatient departments (18% 10-year growth); and inpatient surgery (4% 10-year growth).

The trends/forecasts above are at a *national* level. The forecasts applied in the body of this report are at a local level and account for the local demographics.

[1] Source: Sg2 Webinar 2022 IoC Forecast Highlights

Understanding Inpatient Bed and ED Bay Demand

This report focuses on two major acute care functions: inpatient beds and emergency department beds.

Inpatient Beds

In the hospital setting, the word "bed" has several different definitions and different nomenclature is used throughout this report:

- Staffed bed – available and has staff assigned
- Maintained bed – used in New Jersey public reporting and seems to have a definition that is generally equivalent to staffed
- Available bed – physical space & infrastructure exists but not staffed; can be converted to use quickly
- Licensed bed – allowed number of beds per the State of New Jersey. Might not have a physical space
- It is important to note that licensed bed counts can be misleading: many hospitals nationwide have more licensed beds than actual available or staffed beds. These beds exist on "paper only," and are not actually available for care

Similarly, the word "patient" has more than one meaning. Three different types of patients may occupy a bed within a hospital:

- Inpatients – arrive mostly through the emergency department and the operating rooms
- Observation & short stay patients – billed as outpatient but could be in a bed for up to 48 hours. Often indistinguishable from inpatients, but they are not reported in most state datasets. Frequently, 10-15% of adult and even more of pediatric "inpatients" are actually in observation status—and they might not be included in the publicly reported statistics
- Outpatients – patients using an inpatient bed for outpatient services such as infusion or dialysis. Could be in an inpatient bed for several hours

Some of the New Jersey public reports, such as the New Jersey Department of Health B-2 Quarterly Inpatient Utilization Report, commonly known as the B-2 Report, ask to include "same day medical" and "same day surgical" activity in the inpatient units, however the New Jersey Department of Health stated that the publicly reported volumes exclude observation care (even though "same day medical" and "same day surgical" is often a subset of observation care.) For the purposes of this report, a conservative assumption would be that all calculated inpatient occupancy rates are based on at least somewhat understated "patient days," and perhaps understated by as much as 10% or more.

Exhibit 3: Hospital Bed and Occupant Types

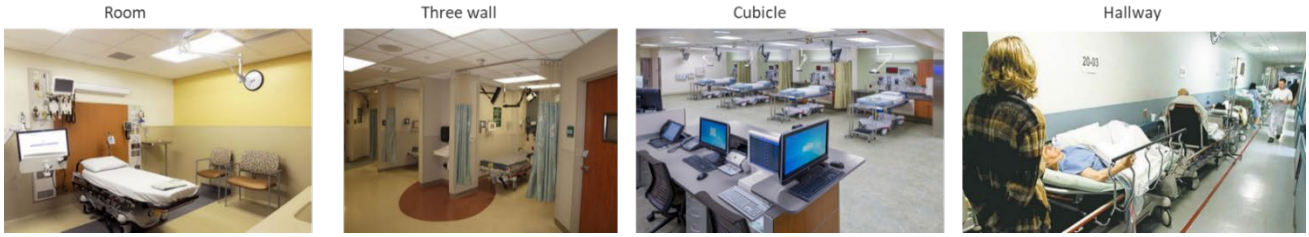
In addition, there are different quality/capabilities/staffing expertise of different beds in a hospital. Common examples include:

- *Medical/Surgical (or M/S):* is the basic level of inpatient care and is staffed by nurses with competences to care for this complexity of care and a nurse-to-patient ratio reflective of that complexity. Rooms are also designed with infrastructure to support that complexity of care
- Within M/S, there could be specialty units, such as those that care mostly for cardiac patients, mostly for orthopedic patients, etc.
- *Intermediate Care (or Stepdown):* is a level of care that is in between M/S and critical care (ICU). The patients are more complex, often have specially trained nurses, and have a lower nurse to patient ratio. The rooms can often be equipped similarly to an M/S room
- Within intermediate, there could be specialty units, such as those that care mostly for cardiac patients, mostly for neurology patients, etc.
- *Critical Care (ICU):* is the highest level of care, has specifically trained nurses, a lower nurse to patient ratio, and specific facility design and infrastructure requirements. The rooms, for example, have more patient gasses and often require visibility of the patient from the hall
- Within critical care, there could be specialty units, such as those that care mostly for cardiac patients, mostly for neurology patients, mostly for transplant patients, etc.
- *Pediatrics:* specifically staffed rooms to support pediatric care. Can be pediatric M/S level or pediatric critical care level (PICU). PICU rooms have specific design requirements compared to general pediatric rooms
- *Obstetrics:* specifically designed and staffed rooms to support childbirth, mother & baby care, and antenatal diagnoses
- *Nursery/Newborn Care*: specifically designed and staffed bays and/or rooms to care for newborns. Can be general level of care ("normal newborn nursery"), intermediate level of care for babies with some additional clinical needs ("special care nursery") or critical care of various levels of complexity ("neonatal intensive care unit/NICU"). NICU's can be level 1,2,3 or 4—depending on the complexity and acuity of the patients the hospital is licensed to care for
- *Psychiatric*: specifically designed rooms and units with specially trained staff to care for patients with various levels of mental health and substance use disorder issues. The units can be designated with different levels of security ("locked" or "unlocked"), sometimes different specialties/disease focus, or different age groups—such as a pediatric psychiatric unit
- *Rehabilitation:* these are beds that are specifically designed, with specifically trained staff, and often with separate licensure type to care for patients needing acute physical rehabilitation (not to be confused with substance use disorder rehabilitation)

Emergency Department Bays

There are various terms for the care stations in the emergency department (ED): bed, bay, room, treatment station, etc. For this report, we use the word "bay" to indicate a legitimate treatment area that includes the necessary gases and infrastructure for proper diagnosis and treatment. Emergency departments can include private rooms, three wall rooms, curtain cubicles, and rooms with more than one bed. As long as those areas have a proper clinical set up for patient care, it is considered a "bay." Many ED's, including University Hospital, have "hallway beds" or "hallway chairs." These hallway beds are usually just overflow "patient parking areas" without true diagnostic and treatment capabilities. For this report, the hallway beds and chairs are not considered part of the inventory—but are counted separately.

Exhibit 4: Example Emergency Department Bay Types



In addition, the ED is often (but not always or necessarily) compartmentalized into different acuity zones. Typical examples include:

- *Fast Track/Vertical/Rapid Assessment:* for lowest acuity patients that typically could be seen quickly and possibly in an urgent care or physician office setting if access were available
- *Main*: for a majority of patients of various acuities, including those that are discharged and admitted to the hospital
- *Observation:* for patients who need a longer stay to determine their diagnosis and/or whether they should be admitted to the hospital
- *Pediatrics:* for younger patients
- *Behavioral Health/Crisis:* specifically designed rooms to be safe for patients with mental health needs
- *Trauma:* for the most urgent/acute patients, usually arriving via ambulance. These rooms are specifically designed and equipped to manage a range of clinical demands
- Some hospitals are designated as specific trauma centers and must meet specific clinical and physical space guidelines to be licensed as a trauma center. There are various levels of trauma designation. UH is a Level 1 trauma center: designated meet the needs of the most complex patients

Finally, there are a range of dispositions from the ED:

- *Discharged or "treat & release:"* for patients who leave the ED under medical advice after their visit is complete
- *Admitted:* patients who are admitted to the inpatient floors after their ED visits. Importantly, many state data sets (including those used in this report) exclude the admitted patients from the volume—thus understating the workload that occurred in the ED
- *Observation:* patients who are admitted to observation status—either in the ED itself or to an inpatient unit—after being seen in the ED
- *Incomplete Care:* when a patient leaves the ED without completing their care or being discharged by a medical professional. Some patients leave before even being seen, some leave after being triaged and/or having completed an initial medical screening exam (MSE), and some people leave midway through their visit—but against medical advice

Calculations of Inpatient Bed Demand and ED Bay Demand

Part 1: Estimates future "workload" demand, such as inpatient days, emergency department visits, and surgeries. To project future inpatient days (or emergency department visits or surgeries, etc.) for an individual hospital in a market, the source of demand can be thought of as a pie. Some factors affect the "size of the overall pie" (total market demand) and some factors affect the size of an individual hospital's "slice" of the pie.

As described earlier in this report, factors contributing to the total market demand (size of the pie) include variables such as:

- Aging and population growth/decline
- Disease burden/chronic disease management/epidemiology
- The impact of technology on the shift from inpatient to outpatient care and the shift from outpatient to virtual or home-based care; or on new kinds of service
- The potential result of policy changes including the influence of insurance expansion and payment reform on access to care/denial of services
- The relationship between care management efforts and acute care utilization
- The effect of the economy and consumerism on care-seeking behavior

The Master Facilities Plan used total market estimates from Truven Analytics, which no longer sells forecasts to health systems. This report uses similar companies: Sg2 (the company used by University Hospital) and the Healthcare Advisory Board (the company used by The Innova Group).

The size of each hospital's future "slice of the pie" can vary based upon factors such as:

- Re-alignment of volumes within a health system
- Re-alignment of volume across competing systems/hospitals
- Re-alignment of volume in and out of the geographic market (in and out migration)

Part 2: Converts clinical demand into spaces. Although it may seem intuitive that 100% occupancy would be ideal and most profitable for hospitals, this is not the case. If the occupancy is too low, then staff and facilities are not being utilized efficiently. However, if the occupancy is too high, patients can get backed up into the emergency department or operating rooms due to lack of a properly staffed, cleaned, and available bed/room. It is a common national challenge that hospitals are on "divert status," where they cannot accept ambulances due to excessively high occupancy. Or as seen in the peak of the Covid-19 pandemic, there was a need for some "structural capacity" to allow for peaks in demand.

Several variables contribute to conversion of patient days to inpatient demand:

- Average daily census (ADC) – number of patients at midnight on average
- Monthly/seasonal peaks – allow for seasonal peaks such as winter (or summer in a resort)
- Daily peaks – many patients arrive and depart in the daytime, and there needs to be capacity for that overlaps
- Compatibility – not all beds are fungible. Some beds/rooms are suitable for critical care, while others are not. Some beds/rooms are staffed with clinicians of a certain specialty—such as cardiology or neurology. And when there is a preponderance of semi-private rooms, some beds are simply not usable due to either gender incompatibility or the need to have a private room for infection control

The inpatient days are converted to bed demand using the following formula:

(Inpatient Days/365) / Occupancy Target = Bed Demand

Example: 8,000 ICU patient days

1. 8,000/365 = 22 Average Daily Census
2. 22 Average Daily Census / 75% Occupancy Target = 29 Beds Demanded

Ideal occupancy planning ranges based on industry experience (and as required by Certificate of Need in some states) are displayed in the following below.

Table 2: Typical Range of Hospital Bed Planning Occupancies

Level of Care	Low	High
Medical/Surgical	80%	85%
Intermediate	80%	85%
Critical Care	65%	75%
Pediatrics	65%	75%
Neonatal & Nursery	65%	75%
Obstetrics/Post-Partum	65%	75%

Of note, the Master Facilities Plan used more conservative (but acceptable, within range) targets than those applied in this report. Thus, for the same number of patient days, the Master Facilities Plan would calculate slightly higher bed demand than in this report.

Table 3: Comparison of Hospital Bed Planning Target Occupancies

Level of Care	UH MFP	Current Report
Medical/Surgical	80%	85%
Intermediate	80%	80%
Critical Care	70%	75%
Pediatrics	70%	75%
Neonatal & Nursery	70%	75%
Obstetrics/Post-Partum	65%	75%
Psychiatric	80%	90%

Likewise, emergency department bays cannot be filled 100% of the time. There are natural peaks and valleys during the day (more demand at 8PM than at 2AM), there are seasonal peaks such as “flu season,” and there is simply a randomness to care that is 100% unscheduled. Emergency department visits are converted to ED bays either through a room utilization target (a percent utilization by level/type of care or an annual visits per room per year target) or through a statistical analysis using peaks and confidence intervals. The Master Facilities Plan used occupancy targets by level of care (80% for the general adult, behavioral health, and pediatric rooms, 70% for trauma rooms, and 85% for low acuity “fast track” room). This report uses a “triple peak” statistical model of peak month volume, at the peak 12-hour shift, and applying a 90% confidence interval. See the Appendix for more detail on the ED room demand model used in this report.

SECTION 3: CURRENT HEALTHCARE RESOURCES ASSESSMENT

Key observations and conclusions from this section are as follows:

- The five hospitals in the Study Area vary in size, organizational type, and function. While core services overlap, they serve the community in different ways. UH is the largest and serves as both the primary academic medical center and safety-net hospital for the region. Two other hospitals are operated by one of the largest health systems in NJ and the other two are operated by separate for-profit corporations
- The Newark-Union MSA has had 11 hospital closures since 1999, a reduction in two-thirds of its total hospital inventory
- Currently, the five hospitals maintain approximately 1,500 acute care beds which were 66% occupied in 2022 compared to 67-73% (depending on region) nationally as of 1/13/22 per the American Hospital Association dataset. UH had the highest occupancy at 77% and CareWell Health had the lowest at 34%. The ratio of hospital beds per 1,000 population is lower than State and US averages
- Medicaid is the largest payor class in the Study Area for inpatient admissions, compared to most markets where Medicare is the largest payor. UH carries the greatest percentage of charity/self-pay and Medicaid patients whereas CMMC and NBIMC have the greatest percentage of commercial cases
- The five hospitals maintain 267 ED bays (excluding hallway positions) and treat over 300,000 ED patients per year, which would require 281 ED bays at national benchmark levels of throughput
- UH has struggled with quality ratings and measures but has improved its performance in recent years and is on an upward trajectory
- Fourteen urgent care centers are active in the Study Area, although the number of exam rooms and providers in those care centers is not known
- Four FQHCs also serve the Study Area from 21 locations. These centers, which serve as the backbone for the primary care safety net, coordinate with area hospitals for patient care
- Health Professional Shortage Area (HPSA) scores for the Study Area indicate a very high shortage for mental health and dental professionals, but a moderately low shortage of primary care providers

HOSPITALS

The five Study Area acute care hospitals vary in size, organizational type, and function. UH is the largest (by revenues and employees), followed closely by NBIMC. The two smallest hospitals in the Study Area are operated by proprietary for-profit organizations. Three of the hospitals (UH, SMMC and NBIMC) are teaching hospitals, but UH has the largest teaching program by far.

Table 4: Overview of Study Area Hospitals

Indicator	CMMC	CHMC	NBIMC	SMMC	UH
Facility Type	Short-Term Acute Care	Short-Term Acute Care	Short-Term Acute Care	Short-Term Acute Care	Short-Term Acute Care
Type of Control	Voluntary Nonprofit	Proprietary, Corporation	Voluntary Nonprofit	Proprietary, Corporation	Government, State
System / Parent	RWJ Barnabas	EOH Acquisition Group	RWJ Barnabas	Prime Healthcare	State of New Jersey
Size: 2021 Total Net Revenues ($M)	$364	$104	$723	$209	$786
Total Employees	1,306	503	2,708	899	3,243
Teaching Hospital Status	-	-	Major	Minor	Major
Primary University Affiliations	-	-	RNJMS, NYCOM*	NY Medical College	Rutgers NJ Medical School
# Interns / Residents	-	-	176 FTE	79 FTE	306 FTE

* Rutgers NJ Medical School, NY College of Osteopathic Medicine.
Sources: American Hospital Directory as of March 22,2023, individual hospital websites, 2021 Cost Reports, New Jersey Department of Health

Not all hospitals are created equal, nor should they be. Each hospital meets different needs within the community. For instance, UH offers Level I trauma and comprehensive stroke services whereas NBIMC is the children's hospital and leading transplant center. UH, NBIMC and CMCC provide obstetrics, NICU, inpatient pediatrics, oncology, neurosurgery, and wound care. Although CHMC and SMCC provide fewer specialty services than the other three area hospitals, they are important healthcare resources for the community. CHMC is a primary stroke center and offers wound care. SMMC provides cardiac surgery, oncology services and robust emergency services.

Table 5: Inventory of Key Programs & Services: Study Area Hospitals

Program/Service	CMMC	CHMC	NBIMC	SMMC	UH
Obstetrics	x		x		x
Neonatal ICU	9 bassinets Level II		69 bassinets Level IV		28 bassinets Level III
Pediatric ICU			15 beds		4 beds
Inpatient Pediatrics	22 beds		31 beds CHoNJ*		10 beds
Trauma Center			Level II pediatric		Level I adult & pediatric
Cardiac Surgery			x	x	x
Oncology	x		x	x	x
Neurosurgery	x		x		x
Stroke Center	primary	primary	primary		comprehensive
Organ Transplant			kidney, heart, lung, pancreas		liver
Wound Care Center	x	x	x		x

*Children's Hospital of New Jersey
Sources: B2 Quarterly Utilization files provided by NJDOH, UH internal records, individual hospital websites

While there are currently five hospitals in the Study Area, there were 11 in the Study Area before 1999 and a total of 16 in the Newark-Union MSA. In total, 11 regional hospitals have closed since 1999, six of which were located directly in the Study Area. The table below displays the year of each hospital closure. This pattern of hospital closures mirrors nationwide trends.

Table 6: Hospital Closures in and Around the Study Area

Year	Number of Hospitals	Hospital Name(s)
1999	2	Montclair Community Hospital and St. Mary's Hospital (Orange)*
2000	1	Elizabeth General
2003	1	West Hudson Hospital*
2004	1	Hospital Center at Orange*
2006	1	Irvington General Hospital*
2007	1	Union Hospital
2008	3	Columbus Hospital (Newark)*, Muhlenberg Regional Medical Center (Plainfield) and St. James Hospital (Newark)*
2012	1	St. Clare's Sussex

* Indicates hospital was located in Study Area – all others located elsewhere in the Newark-Union MSA
Source: The Innova Group Research, State of New Jersey Department of Health

Quality and Patient Satisfaction Indicators

When comparing quality and patient satisfaction between hospitals, two common sources are The Centers for Medicare & Medicaid Services (CMS) Care-compare website and The Leapfrog Group.

The CMS hospital Inpatient Quality Reporting Program reports both overall star ratings and patient survey ratings. The overall star rating is based on how well a hospital performs across different areas of quality, such as treating heart attacks and pneumonia, readmission rates, and safety of care. Each hospital is given an overall star rating ranging from one to five stars (with one being the poorest and five being the best rating).

The patient survey rating is based upon the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey administered to a random sample of adult patients. HCAHPS scores are intended for use at the hospital level to produce comparable data on the patient's perspective that allows objective and meaningful comparisons between hospitals on domains that are important to consumers. The patient survey rating is also based on a scale of one to five stars.

The Leapfrog Group also collects, analyzes and publishes hospital data on safety and quality. Leapfrog assigns Leapfrog Hospital Safety Grades to nearly 3,000 general acute-care hospitals across the nation twice annually. The Leapfrog Hospital Safety Grade uses more than 30 national performance measures from CMS, the Leapfrog Hospital Survey, and information from other supplemental data sources. Taken together, those performance measures produce a single letter grade representing a hospital's overall performance in keeping patients safe from preventable harm and medical errors.

The exhibit below displays the CMS Hospital Quality Reporting Program overall star rating and patient survey ratings as well as the Leapfrog Hospital Safety Grades in spring of both 2023 and 2020.

Table 7: Summary of Quality and Patient Satisfaction Ratings: Study Area Hospitals

Metric	CMMC	CHMC	NBIMC	SMMC	UH
CMS Overall Star Rating	★★★★	★	★★	★★★	★
CMS Patient Survey Rating	★★	★	★★	★★★	★★
Leapfrog Spring 2023 Safety Grade	B	C	B	A	C
Leapfrog Spring 2020 Safety Grade	C	D	A	A	D

See the Appendix for additional details on CMS ratings
Sources: Medicare.gov Hospital Compare website (based on HCAHPS January 2023 Report) and Leapfrog Hospital Safety Grade website (hospitalsafetygrade.org)

CMMC was rated the highest of the five Study Area hospitals in CMS's overall star rating (4 stars) whereas CHMC and UH both had the lowest overall rating with one star. SMMC had the highest patient survey rating (3 stars) while CHMC had the lowest with one star.

According to the Leapfrog Safety Grades, SMMC currently has the highest grade. UH and CHMC have Leapfrog Safety Grades of C, which is the lowest score among the hospitals. However, it is worth noting that UH has steadily improved its rating from an F in 2018, and a D in 2020 to a C in 2023, putting it on an upward trajectory.

Inpatient Bed Inventory and Volumes

The New Jersey Department of Health gathers utilization statistics of inpatient services and outpatient data. The B-2 Quarterly Inpatient Utilization Report, or commonly known as the B-2 Report is filed on a quarterly basis by the licensed New Jersey health care facilities. The table below displays the number of maintained beds (set up and staffed) as well as licensed beds (allowed by the State but may not have a physical space) reported in the 2022 B-2 file. In total the five Study Area hospitals maintain approximately 1,500 acute care beds including 106 neonatal intermediate and intensive care (NICU) bassinets.

UH, NBIMC, and CMMC have the greatest number of beds, providing over 75% of the maintained beds in the market. Of the 2,202 licensed acute care beds in the market, approximately 70% are maintained. CHMC maintains the highest percentage of their licensed acute beds at 95% whereas SMMC maintains the lowest percentage (41%).

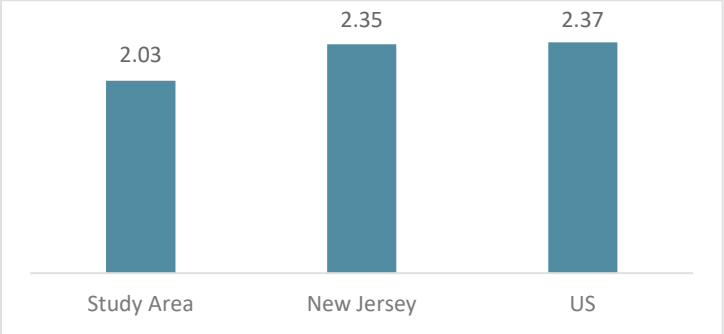
Table 8: 2022 Maintained | Licensed Acute Bed Inventory: Study Area Hospitals

Bed Type	CMMC	CHMC	NBIMC	SMMC	UH*	Total
Med/Surg	200 I 340	151 I 160	256 I 391	97 I 281	187 I 270	891 I 1,442
ICU/CCU	24 I 32	13 I 15	64 I 88	30 I 36	43 I 73	174 I 244
Peds	22 I 22	-	31 I 40	-	39 I 60	92 I 122
OB	13 I 27	-	32 I 32	-	54 I 30	99 I 89
Psych	42 I 42	37 I 37	42 I 45	20 I 41	34 I 34	175 I 199
NICU	9 I 9	-	23 I 23	-	14 I 14	46 I 46
NICU Step-Down	-	-	46 I 46	-	14 I 14	60 I 60
Total	**310 I 472**	**201 I 212**	**494 I 665**	**147 I 358**	**385 I 495**	**1,537 I 2,202**

Maintained = set up and staffed beds available on the last day of a quarter. Licensed = number of beds licensed by the state
Only maintained bassinets are reported for NICU and NICU Step-down
CHMC also has 16 substance use disorder beds, which are not included in the counts above
*Internal data provided by UH shows different UH bed counts -see Appendix for detail
UH ICU licensed bed count includes 62 adult ICU beds and 11 Pediatric ICU beds. ICU/CCU. Maintained bed count also includes Pediatric ICU beds
Source: B2 Quarterly Utilization files provided by NJDOH

Overall, the Study Area carries a lower number of acute care hospital beds per 1,000 population than NJ and US averages as shown below. Although many factors play into the need for beds (age of population, distance from other MSAs, etc.) these data would suggest that the Study Area does not have an excess of beds.

Exhibit 5: Acute Care Hospital Beds (Staffed) per 1,000 Population



Sources: Study area calculated based on 2022 maintained beds and population presented in this report. NJ and US from Kaiser Family Foundation

The Study Area hospitals totaled approximately 61,000 acute care admissions and an average daily census (ADC) of 1,000 in 2022, as displayed in the tables below. NBIMC had the highest volumes in 2022, followed by UH. CHMC had the fewest admissions and lowest ADC.

Table 9: 2022 Inpatient Admissions: Study Area Hospitals

Bed Type	CMMC	CHMC	NBIMC	SMMC	UH	Total
Med/Surg/ICU	12,217	3,088	12,846	5,105	12,685	45,941
Peds	-	-	1,024	-	973	1,997
OB	1,976	-	2,662	-	1,609	6,247
Psych	1,124	581	1,396	298	807	4,206
NICU	386	-	55	-	1,065	1,506
NICU Step-Down	-	-	705	-	354	1,059
Total Acute	**15,703**	**3,669**	**18,688**	**5,403**	**17,493**	**60,956**

Data excludes observation volumes. CMMC data does not include 48 maintained drug and alcohol beds with 485 admits
ICU Admission data includes both adult and pediatric ICU admissions
Source: B2 Quarterly Utilization files provided by NJDOH

Table 10: 2022 Inpatient Average Daily Census: Study Area Hospitals

Bed Type	CMMC	CHMC	NBIMC	SMMC	UH	Total
Med/Surg	167	42	174	50	193	626
ICU/CCU	16	4	65	14	39	138
Peds	-	-	14	-	8	22
OB	13	-	23	-	12	48
Psych	33	23	31	7	33	127
NICU	2	-	3	-	7	12
NICU Step-Down	-	-	28	-	7	35
Total Acute	**231**	**69**	**338**	**71**	**298**	**1,007**

Data excludes observation volumes. CMMC data does not include 48 maintained drug and alcohol beds with ADC of 4.7
Additional days for non-normal newborns in the general mother/baby unit are not counted in hospital census but are captured in market data patient days
Bed day data includes both adult and pediatric ICU admissions, therefore ICU ADC includes both adult and pediatric populations
Source: B2 Quarterly Utilization files provided by NJDOH

Inpatient occupancy rates refer to the percentage of beds that are occupied on average at any point in time or over a period of time. In this study the occupancy rate is the average annual occupancy in 2022, as displayed in the table below. ICU / CCU beds in the market had the highest maintained bed occupancy rate (79%), whereas pediatric beds were the lowest occupied. UH occupancies in adult medical/surgical, ICU, and psychiatry beds were well over planning targets. CHMC has the lowest overall occupancy rate (34%).

Table 11: 2022 Inpatient Occupancy (Maintained Beds): Study Area Hospitals

Bed Type	CMMC	CHMC	NBIMC	SMMC	UH*	Total Acute	Planning Occupancy**
Med/Surg	84%	28%	68%	52%	103%	70%	85%
ICU/CCU	67%	31%	102%	47%	91%	79%	75%
Peds	-	-	45%	-	21%	24%	75%
OB	100%	-	72%	-	22%	48%	75%
Psych	79%	62%	74%	35%	97%	73%	90%
NICU	27%	-	12%	-	47%	26%	75%
NICU Step-Down	-	-	61%	-	49%	58%	75%
Total	**75%**	**34%**	**68%**	**48%**	**78%**	**66%**	

Excludes observation, which could occupy 10-15% additional beds

*Internal data provided by UH shows different UH bed counts, resulting in different occupancy: see Appendix for detail

** Industry standard occupancy percentages provided by Innova

ICU admits, bed days and bed counts include adult and pediatric populations, therefore ICU inpatient occupancy includes both adult and pediatric populations

Source: B2 Quarterly Utilization files provided by NJDOH

As shown in the table below, Medicaid was the largest inpatient payor class for Study Area Hospitals in 2021 - compared to most markets where Medicare is the largest payor class. UH had the greatest percentage of charity/self pay and Medicaid payor admissions among Study Area hospitals. CMMC and NBIMC had the greatest percentage of commercial cases.

Table 12: 2021 Inpatient Payor Mix (Admissions): Study Area Hospitals

Payor Class	CMMC	CHMC	NBIMC	SMMC	UH	Combined
Charity/Self Pay	6%	5%	6%	6%	12%	8%
Commercial	23%	9%	21%	13%	12%	18%
Medicaid	33%	40%	45%	29%	49%	41%
Medicare	36%	45%	25%	52%	23%	31%
Other	2%	1%	3%	0%	4%	2%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

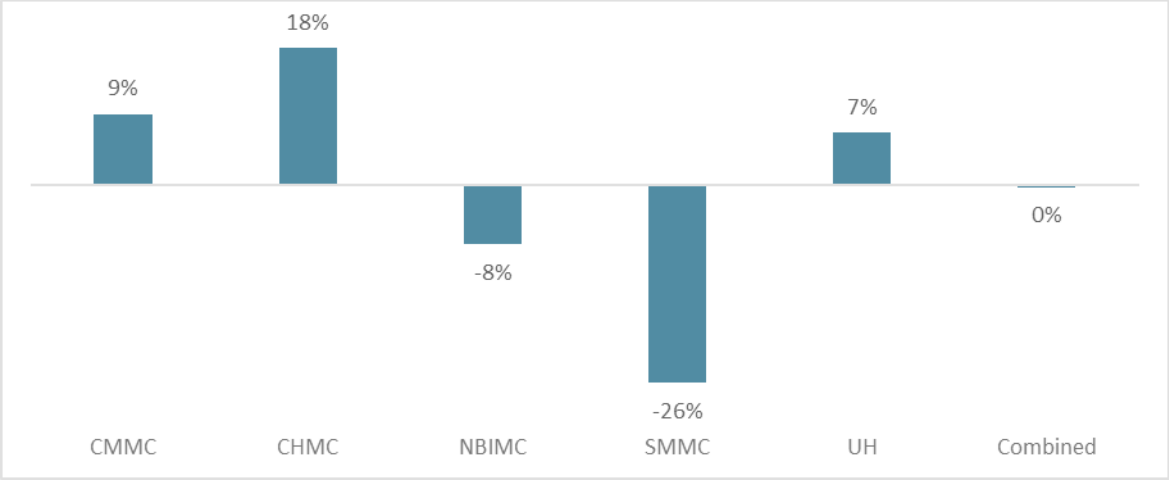
Source: 2021 NJ Annual Cost Report Data. Other = Tricare, Worker's Comp, and other minor payors in the market

Total Volume Trends by hospital 2018 to 2022

Using a different dataset (the Hospital Discharge Dataset) we can see the overall volumes of the hospitals have not shifted greatly over time. Note, these data will not foot exactly to the B2 data, due to the data coming from different sources.

Overall, total ADC for Study Area hospitals in 2022 was similar to 2018. While there were volume swings during years impacted by COVID-19, a comparison between 2018 and 2022 filters out those unique variances. NBIMC and SMMC saw a decline in IP days during this period while other hospitals experienced volume increases.

Exhibit 6: 2018 to 2022 Inpatient Volume Trends (ADC): Study Area Hospitals



Excludes normal newborns. 2022 B-2 data adjusted to approximate Discharge Data Set.
Sources: NJ Hospital Discharge Data Set, B2 Quarterly Utilization files provided by NJDOH

Emergency Department Inventory and Volumes

In this study, the term "bay" is used to represent any space in which a patient is treated (could be a private room, could be a curtained cubicle area, etc.) Please see the previous section that explains the ED treatment station nomenclature. At UH, as well as NBIMC and CMMC, patient beds are located within hallways to increase capacity to meet demand. These hallway "bays" are called out separately from other bays/rooms, since they are not true treatment stations as they typically lack gases, computer terminals, diagnostic equipment, etc. seen in a true treatment bay. The hallway bays are essential "patient parking spots" to hold and observe patients when there are insufficient true clinical ED bays. UH had the highest number of hallway bays in 2022. NBIMC's hallway bays will be offset by their current expansion project by the end of 2023.

Table 13: 2022 Emergency Department Volumes and Inventory: Study Area Hospitals

Indicator	CMMC	CHMC	NBIMC	SMMC	UH	Combined
ED Bays (excl hallway)	58	23*	83	41	63	268
ED Bays w/ hallway	92	-	98	-	100	
2022 ED Visits	72,914	28,524	87,565	37,572	90,123	316,698
2022 ED Admissions (subset)	9,560	4,582	11,209	5,207	11,670	
2022 Admit Rate	13%	16%	13%	14%	13%	
Visits per Room Per Year (excl hall)	1,257	1,240	1,055	916	1,431	1,182
EDBA 2021 Median V/R/Y	1,195	1,175	1,080	1,175	1,080	
Trauma Level	-	-	Level II: peds only	-	Level I: adults, peds	
Helipad	-	-	-	-	Yes	

*Unable to confirm CHMC ED bay count. Used value from 2015 Navigant report prepared for the NJHCFA
EDBA = Emergency Department Benchmarking Alliance. Medians against similar volume ED cohorts; 2021 data. V/R/Y = visits per room per year
Sources: B2 Quarterly Utilization files provided by NJDOH, RWJ Barnabas, University Hospital internal data, SMMC website, 2015 Navigant Report

UH provided roughly 90,000 ED visits in 2022, followed closely by NBIMC. CMMC had over 70,000 visits. The other two hospitals had fewer than 40,000 visits each. UH is the only medical center in the service area with a Level I trauma center and helipad, which contributes to greater volumes and higher complexity of ED care. NBIMC has a Level II pediatric trauma center.

The Emergency Department Benchmarking Alliance (EDBA) medians were used to compare the Study Area hospitals against similar volume ED cohorts. CMMC, CHMC and UH exceeded the EDBA median for visits per room per year. Three of the five area EDs show a deficit of ED beds, with UH being the most constrained.

Table 14: 2022 Emergency Department Bay Demand Analysis: Study Area Hospitals

Indicator	CMMC	CHMC	NBIMC	SMMC	UH	Combined
ED Bays (excl. Hallway)	58	23*	83	41	63	268
ED Bays w/ Hallway	92		98		100	
2022 ED Visits	72,914	28,524	87,565	37,572	90,123	316,698
Visits/Room (Bay)/Year (Excl. Hall)	1,257	1,240	1,055	916	1,431	1,182
EDBA 2021 Median V/R/Y	1,195	1,175	1,080	1,175	1,080	
ED Bays Demanded at Median	61	24	81	32	83	281
Current Excess/(Deficit)	***(3)***	***(1)***	***2***	***9***	***(20)***	***-13***

*Unable to confirm CHMC ED bay count. Used value from 2015 Navigant report prepared for the NJHCFFA
EDBA = Emergency Department Benchmarking Alliance. Medians against similar volume ED cohorts; 2021 data. V/R/Y = visits per room per year
Sources: 2022 B2 Files, hospital websites, RWJ Barnabas, University Hospital internal data; SMMC website

Treat & release ED volumes declined by 3% for the Study Area hospitals (including volumes from patients outside the Study Area) between 2018 and 2021. UH & NBIMC declined the most while CHMC gained volume during that time.

Table 15: 2018 – 2021 Treat and Release ED Volume Trends: Study Area Hospitals

Year	CMMC	CHMC	NBIMC	SMMC	UH	Combined
2018	63,700	17,963	78,737	24,776	63,339	248,515
2019	63,945	15,298	81,803	39,507	66,985	267,538
2020	52,882	14,872	57,575	26,875	51,441	203,645
2021	62,541	22,269	69,741	29,695	56,767	241,013
18-21 Difference	(1,159)	4,306	(8,996)	4,919	(6,572)	(7,502)
18-21 % Change	-2%	24%	-11%	20%	-10%	-3%

Excludes ED patients admitted as inpatients
Source: NJ Hospital Discharge Data Set, CY 2021 data; treat & release patients; volume from any location, including outside of the Study Area

UH has a higher percentage of charity care/self-pay ED visits than the other area hospitals. All area hospitals treat a high percentage of Medicaid patients – averaging nearly 50% of overall ED payor mix. SMMC has the highest percent of commercial patients and UH has the lowest.

Table 16: 2021 Payor Mix of Treat & Release ED Visits: Study Area Hospitals

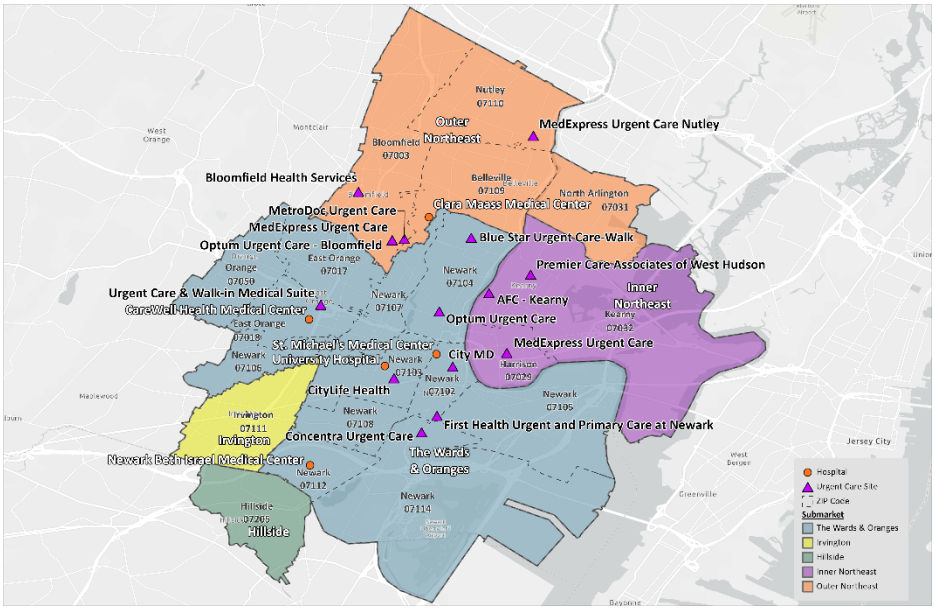
Payor Class	CMMC	CHMC	NBIMC	SMMC	UH
Charity/Self Pay	17%	13%	19%	4%	29%
Commercial	24%	17%	20%	32%	10%
Medicaid	43%	56%	51%	47%	47%
Medicare	13%	12%	8%	17%	9%
Other	3%	2%	2%	0%	5%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

Excludes ED patients admitted as inpatients
Source: NJ Hospital Cost Reports

Urgent Care Centers

In addition to Emergency Rooms, there are an estimated 14 urgent care centers in the Study Area. These centers treat low acuity patients that might otherwise go to an emergency department (or a primary care providers' office). It is unclear from public data sets whether these urgent care centers accept Medicaid. If they do not, they have limited ability to reduce low acuity demand at the Study Area hospitals. Many of the urgent care centers are in Bloomfield/Kearny versus Newark.

Exhibit 7: Map of Study Area Urgent Care Centers



Source: Data Axle, accessed via ESRI; Google search

Table 17: List of Study Area Urgent Care Centers

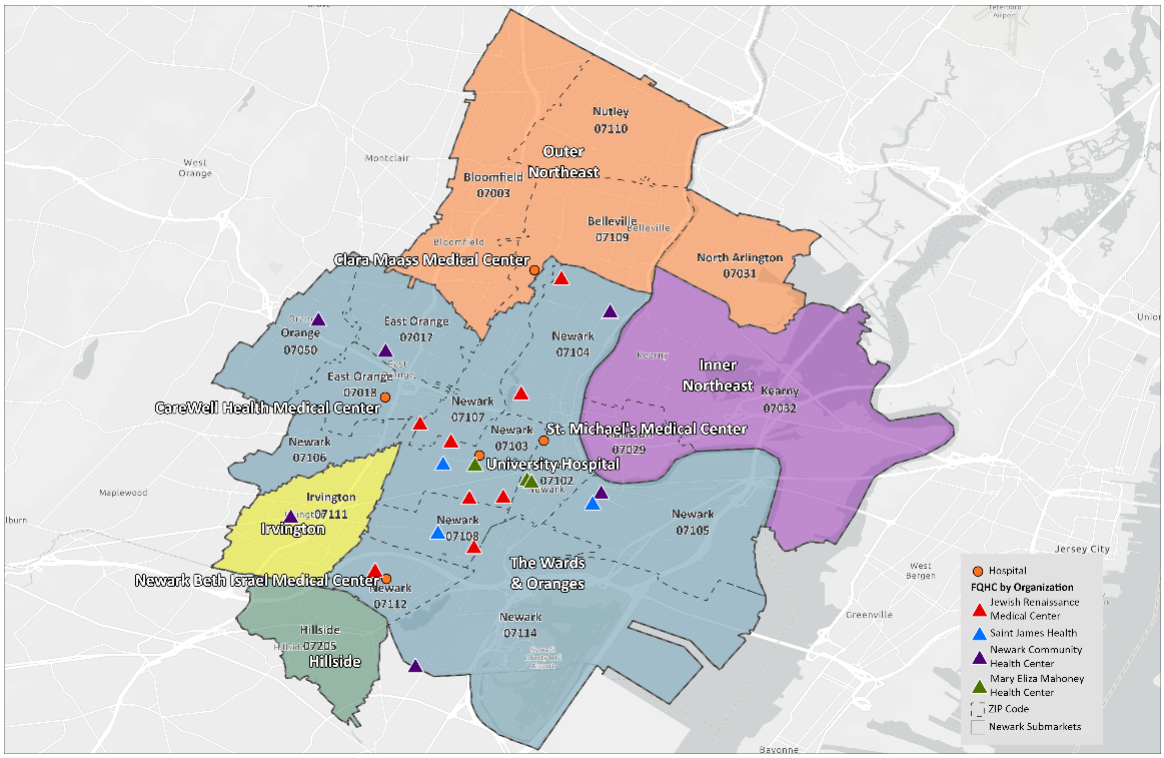
Name	City
MetroDoc Urgent Care	Belleville
MedExpress/Optum Urgent Care	Bloomfield
Bloomfield Health Services	Bloomfield
Optum Urgent Care	Bloomfield
Urgent Care & Walk-in Medical Suite	East Orange
MedExpress Urgent Care	Kearny
AFC - Kearny	Kearny
Premier Care Associates of West Hudson	Kearny
Blue Star Urgent Care-Walk	Newark
Concentra Urgent Care	Newark
City MD	Newark
First Health Urgent and Primary Care at Newark	Newark
CityLife Health	Newark
MedExpress Urgent Care Nutley	Nutley

Source: Data Axle, accessed via ESRI; Google search

FQHCS

The U.S. Health Resources and Services Administration (HRSA) provides equitable health care to the nation's highest-need communities. One of its core programs is a network of Federally Qualified Health Centers (FQHCs) which are safety net providers that deliver core health services typically furnished in an outpatient clinic. FQHCs include community health centers, migrant health centers, health care for the homeless health centers, public housing primary care centers, and health center program "lookalikes." There are four FQHCs in the Study Area with 21 locations.

Exhibit 8: Map of Study Area FQHCs



Notes: Zip codes provided by the New Jersey Economic Development Authority
Source: Esri 2022, New Jersey Department of Health, Individual FQHC websites

Among the four area FQHCs, Newark Community Health Center served the most patients (~47,000) at 7 sites and Mary Eliza Mahoney Health Center (~8,000) at 3 sites.

Table 18: List of Study Area FQHCs

Organization	# Sites in Study Area	2021 Total Patients
Jewish Renaissance Medical Center*	8	3,957
Newark Community Health Center	7	46,761
Mary Eliza Mahoney Health Center	3	8,185
Saint James Health, Inc.	3	3,645

*Patient count only includes patients from the Study Area
Sources: Esri 2022, NJ Department of Health, Individual FQHC websites, HRSA website (data.hrsa.gov)

FQHC Inventory of Key Programs and Services

The core service provided by FQHCs is primary care for uninsured or underinsured patients. These centers mainly serve minority and immigrant populations. According to HRSA, over 90% of patients for Study Area FQHCs are racial or ethnic minorities and 25%-50% are best served in a language other than English. Primary care services are provided at all FQHCs, but other services vary by location.

Table 19: Study Area FQHC Organization Key Programs and Services

	Jewish Renaissance Medical Center	Newark Community Health Center	Mary Eliza Mahoney Health Center*	Saint James Health, Inc.
Primary Care (Adults and Pediatrics)	x	x	x	x
Women's Health		x	x	x
Behavioral Health	x	x	x	x
Podiatry		x		
Optometry		x		
ENT		x		
Infectious Disease			x	x
Laboratory			x	
Pharmacy				x
Dental Health		x	x	

*Mary Eliza Mahoney Health Center, operated by the City of Newark, was formerly known as Newark Homeless Health Care
Sources: New Jersey Department of Health, Individual FQHC websites

FQHC Coordination for Management of Unnecessary Emergency Visits

In addition to the services listed above, FQHCs serve as patient-centered medical homes (PCMHs) for these populations. In this role, FQHCs provide ongoing case management services which address complex social determinants of health and help to minimize unnecessary emergency department utilization. FQHCs coordinate with area hospitals to identify patients who frequently use the emergency department and, ideally, incorporate case management actions to mitigate this activity.

The extent to which the local FQHCs are successful in providing these services and avoiding unnecessary emergency department utilization is out of the scope of this report, but UH Management reports a high level of "incomplete" care in the ED from FQHC patients —much of which could potentially be avoided though stronger access to social services provided by FQHCs.

UH currently operates an ED diversion program, joint ventured with Blue Cross Blue Shield of NJ, called the "Familiar Faces" program, which identifies patients who frequently use the UH ED for services that could be provided in a primary care setting. This program staffs 8 full-time equivalent staff (FTEs) who provide case management and scheduling services to ensure that all ED patients who need follow-up care or a PCMH assignment are scheduled for a follow-up appointment. Unfortunately, UH reports an extremely high no show rate for these scheduled follow-up appointments.

The Mary Eliza Mahoney Health Center (City of Newark FQHC) leased space on the UH campus to provide an ED diversion program, but ceased operations because it viewed services as being duplicative to the Familiar Faces program.

Health Professional Shortage Areas (HPSAs)

HRSA collects and publishes data on HPSAs, which are areas with a shortage of primary, dental, or mental health care providers. The HPSA Score was developed to determine priorities for assignment of clinicians. The scores range from 0 to 26 where higher scores represent a greater priority. The table below shows the primary care, mental health and dental health HPSA scores for the four FQHC organizations in the Study Area.

Table 20: Study Area FQHC Organization Key HPSA Scores

Organization	Primary Care HPSA Score	Mental Health HPSA Score	Dental Health HPSA Score
Jewish Renaissance Medical Center	6	23	21
Newark Community Health Center	7	21	22
Mary Eliza Mahoney Health Center	7	22	21
Saint James Health, Inc.	9	21	23

Source: Health Resources & Service Administration website (data.hrsa.gov)

Since all four FQHC organizations operate within similar geographic areas, their HPSA scores are very similar with both mental health and dental health scores falling within the top of the range of HPSA scores, indicating that they all have high shortages of mental health and dental health providers. Primary care HPSA scores are not as high, ranging between 6 and 9 representing a moderately low level of primary care provider shortage.

SECTION 4: POPULATION AND COMMUNITY HEALTH ASSESSMENT

Key observations and conclusions from this section are as follows:

- The Study Area population is projected to grow by less than 1% over the next five years but the 65+ population, which utilizes hospital services the most, is projected to grow by 11%, an increase of ~11,000 people
- The Study Area is younger, more economically challenged, and more racially diverse than state and national averages, requiring additional attention to economic accessibility, accommodation for cultural and language differences, and healthcare disparity concerns
- The population's health status is generally worse than the State in total. Indicators such as obesity, teen birth rates, infant mortality rates, and age-adjusted death rates are often impacted by social determinants of health related to the characteristics of the community at large
- Community health needs assessments from the three non-profit hospitals in the area identified the most pressing community health needs as: lack of mental health services, shortage of affordable housing, lack of transportation for medical services, community crime and safety, and racism and discrimination
- The implications for hospitals that serve communities with these characteristics are: higher use of emergency services, more complex acute care needs, and concentrated demand for safety net hospital services

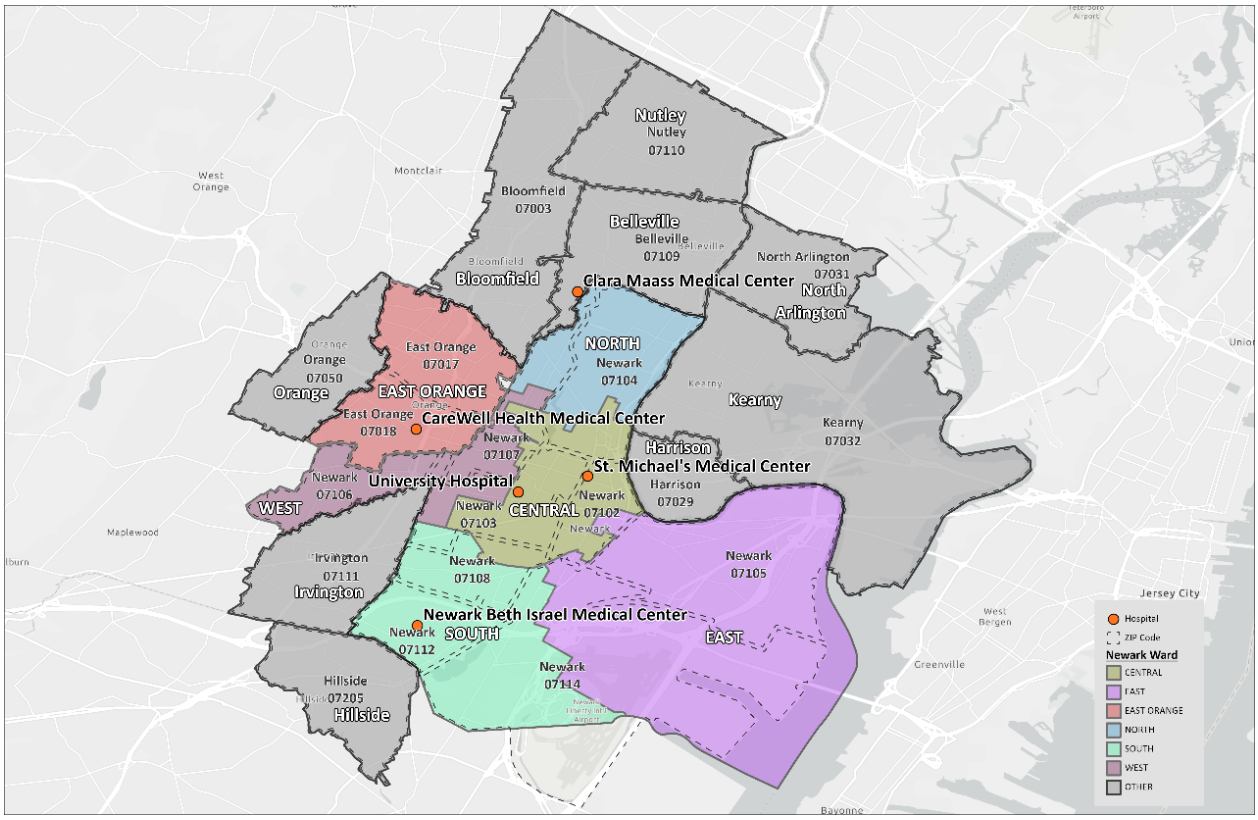
STUDY AREA SUBMARKET DEFINITIONS

The city of Newark is divided into five districts known as wards. East Orange (and Orange) are their own cities but behave as one of the Newark wards for the purpose of this study.

- Central Ward – UH (shared with West Ward), SMMC
- West Ward – UH (shared with Central Ward)
- East Ward – no hospitals
- East Orange – CHMC
- North Ward – CMMC (technically in Belleville and not Newark)
- South Ward – NBIMC

Patients get care at multiple hospitals in the city and not just at the closest hospital to their ward. The Study Area as defined by NJEDA also includes some towns outside of the city of Newark, which are displayed in gray.

Exhibit 9: Map of The Wards & Oranges Submarket



Source: NJEDA zip code list; Esri 2022

It is important to note that meaningful amounts of inpatient volume from outside the Study Area are seen at the five hospitals. In fact, UH defines its Primary Service Area to include more zip codes than defined by NJEDA. A later section describes the inmigration of care from outside the NJEDA defined Study Area.

COMMUNITY DEMOGRAPHICS

Population Estimates and Projections

The Study Area population is projected to increase by more than 4,000 residents, or 0.6% over the next 5 years. The 65+ population is projected to grow by over 11% in the next 5 years with growth of 11,000, while ages 0-44 are projected to decline by over 8,000. The annual growth rates by age group for the market area are comparable to New Jersey and the U.S.

Table 21: Study Area Population Projections

Age Group	Population by Age		5 Year	Annual Growth: 2022 - 2027		
	2022	2027	Growth	Market Area	New Jersey	U.S. Total
0-14	136,338	129,633	-4.9%	-1.0%	-0.7%	0.0%
15-17	28,234	27,307	-3.3%	-0.7%	-1.1%	-0.1%
18-44	278,443	277,911	-0.2%	0.0%	0.1%	0.1%
45-64	168,468	169,832	0.8%	0.2%	-0.9%	-0.9%
65+	97,634	108,704	11.3%	2.2%	2.3%	2.4%
Total	**709,117**	**713,387**	**0.6%**	**0.1%**	**0.1%**	**0.2%**

Source: ESRI 2022

Socio-Economic Demographics

The Study Area is younger than state and national averages with a lower proportion of seniors dependent on the labor force. Economically, the Study Area is more challenged than the State overall with lower income levels, higher unemployment rates and poverty levels, and lower levels of healthcare insurance. It is also more racially diverse than state and national averages, requiring additional attention to cultural and language differences as well as disparity concerns.

Table 22: Study Area Demographic Profile

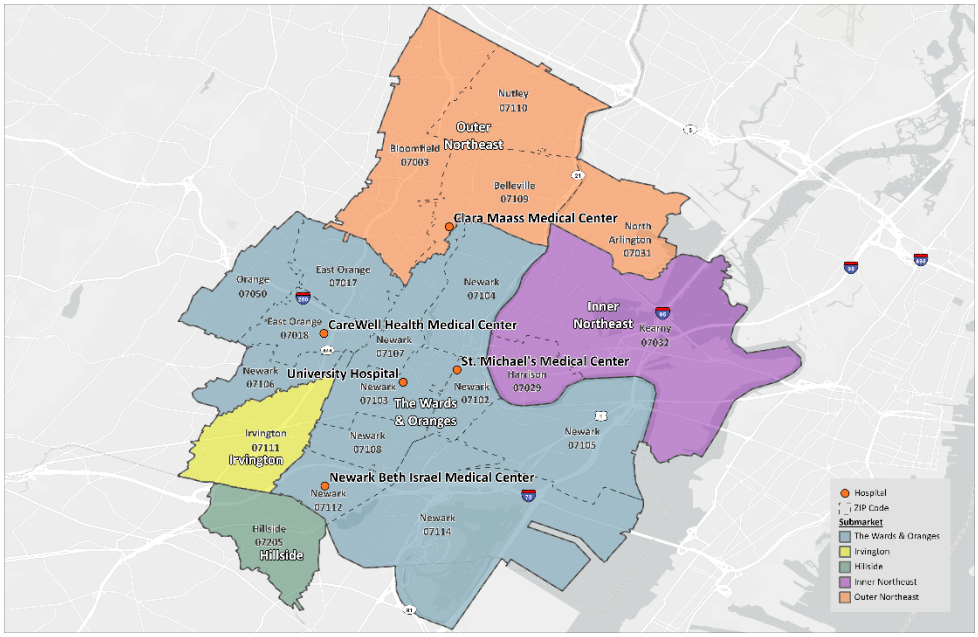
Indicator	Planning Area vs NJ*	Planning Area	New Jersey	US Total
Age and Education				
Percent of Population Age 65+	+	14%	18%	17%
Senior Dependency Ratio**	+	21.8	29.7	28.6
% Population 25+ with High School Diploma	+	31%	25%	23%
% Population 25+ with Bachelor's Degree	-	18%	26%	22%
Economic Indicators				
Median Household Income	-	$57,803	$93,664	$72,165
Unemployment Rate	-	7.8%	5.0%	4.1%
% Households Below the Poverty Level	-	19%	10%	12%
% Uninsured (Healthcare)	-	15%	8%	9%
% Insured on Medicaid	-	26%	14%	16%
Health Status				
% Households with a Disability	-	35%	29%	34%
Racial and Ethnic Diversity				
Diversity Index***		83.8	77.2	71.6
% Minority		81%	46%	39%
% Population Foreign Born		34%	43%	48%
% Language other Than English at Home		46%	32%	22%

* Key: (+ Favorable) (- Unfavorable)
** Defined as the estimated ratio of senior population (65+) to the working-age population (18-64) in the geographic area
*** Indicates the likelihood that two individuals, chosen at random from the same area, belong to the same race or ethnic group. The index ranges from 0 (no diversity) to 100 (highest diversity)
Source: ESRI 2022

The Innova Group divided the Study Area into five submarkets to better understand the submarket populations and their care-seeking behaviors:

- The Wards & Oranges (contains all hospitals)
- Irvington
- Hillside
- Inner Northeast
- Outer Northeast (CMMC on border)

Exhibit 10: Map of Service Area Hospitals and Submarkets



Source: NJEDA zip code list; Esri 2022

When looking at the differences between submarkets in the Study Area, The Wards and Oranges is more economically challenged than other submarkets. This submarket also has a greater percentage of disabled and minority populations. The Outer NE and Hillside submarkets are older, wealthier, and better insured than the Study Area in total while the Inner NE has a higher percentage of foreign-born residents and those who speak languages other than English at home.

Table 23: Submarket Demographic Profiles

Indicator	The Wards & Oranges	Irvington	Hillside	Inner NE	Outer NE	Total Planning Area
Age and Education						
Percent of Population Age 65+	13%	13%	17%	14%	17%	14%
Senior Dependency Ratio*	19.9	21.4	27.3	20.9	27.1	21.8
% Population 25+ with High School Diploma	33%	35%	30%	30%	27%	31%
% Population 25+ with Bachelor's Degree	14%	15%	21%	20%	27%	18%
Economic Indicators						
Median Household Income	$47,322	$52,430	$79,017	$79,419	$92,090	$57,803
Unemployment Rate	9.1%	9.4%	9.9%	6.0%	4.2%	7.8%
% Households Below the Poverty Level	24%	18%	9%	13%	8%	19%
% Uninsured (Healthcare)	17%	14%	16%	14%	9%	15%
% Insured on Medicaid	32%	29%	14%	19%	12%	26%
Health Status						
% Households with a Disability	43%	32%	20%	21%	23%	35%
Racial and Ethnic Diversity						
Diversity Index**	78.8	51.5	78.5	86.7	84	83.8
% Minority	90%	98%	81%	64%	53%	81%
% Population Foreign Born	34%	36%	34%	50%	28%	34%
% Language other Than English at Home	46%	36%	42%	70%	42%	46%

* Defined as the estimated ratio of senior population (65+) to the working-age population (18-64) in the geographic area
** Indicates the likelihood that two individuals, chosen at random from the same area, belong to the same race or ethnic group. The index ranges from 0 (no diversity) to 100 (highest diversity)
Source: ESRI 2022

COMMUNITY HEALTH STATUS AND NEEDS

Community Health Status Indicators

Residents of Essex County (which is a larger geographic area than the Study Area) in 2020 are shown to have less access to primary care, have greater obesity and less physical activity, greater rates of diabetes, higher rates of death from coronary artery disease, and higher infant mortality rates than the state on average. Preventative care rates are about the same as the state.

Table 24: Public Health Dashboard for Essex County – Healthy New Jersey 2020

Public Health Indicator	Essex County	Compared to NJ	New Jersey	United States
Health Status				
Percentage with at Least One Primary Provider, 2017-2020	75.2	x	80	--
Influenza Vaccination in the Past 12 Months, Aged 65+, 2017-2020	60	=	63.8	--
Percentage of Adults Who are Obese, 2017-2020 (age-adjusted)	31.4	x	27.9	--
Percentage of Adults Who Meet Aerobic Physical Activity Recommendation, 2013- 2017 (age-adjusted)	46.3	x	49.3	--
Preventive Care (Estimated Percent (Age-adjusted))				
Percentage of Adult Women Ages 21-65 Years who had a Pap Test Within the Past Three Years, 2017-2020	79%	=	81%	--
Percent of Adults Ages 50-75 who are Current with Colorectal Cancer Screening Recommendations, 2017-2020	73%	=	69%	--
Percentage of Females Aged 50 to 74 Who Reported Having a Mammogram in the Past Two Years, 2017-2020	80%	=	79%	--
Percentage of Adults Aged 18+ with Diagnosed Diabetes Who had a Dilated Eye Exam Within the Past Year, 2013-2015	69%	=	61%	--
Glycosylated Hemoglobin Screening Rate among Adults Aged 18+ with Diagnosed Diabetes, 2013-2015	61%	=	62%	--
Percentage of Adults Aged 18+ Who Reported Having Their Cholesterol Checked Within the Past Five Years, 2013-2017	82%	=	83%	--
Age Adjusted Death Rates per 100,000 Population				
Age-Adjusted Death Rate due to All Cancers, 2020	120.9	+	133.3	144.1
Age-Adjusted Death Rate due to Coronary Heart Disease, 2020	109.3	x	99.5	107.8
Age-Adjusted Death Rate due to Stroke, 2020	34.0	=	31.8	38.8
Age-Adjusted Death Rate due to Diabetes, 2018-2020	25.0	x	18.2	22.6
Age-Adjusted Death Rate due to Homicide, 2016-2020	12.0	x	4.1	6.4
Perinatal Indicators				
Infant Mortality Rate, 2016-2020 (Deaths per 1,000 Live Births)	5.6	x	4.2	5.7
Birth Weight: 2020 (Percentage of Live Births)	9.3%	x	7.7%	8.2%
First Trimester Prenatal Care, 2020 (Percentage of Live Births)	66.2%	x	75.5%	76.1%
Teen Birth Rates, 2016-2020 (Live Births per 1,000 Females 15-17)	6.7	x	4.1	7.4

Key to Symbols

\+ The community is performing BETTER than the state, and the difference is statistically significant

= The community value is the same or ABOUT THE SAME as the state. Differences are not statistically significant

x The community is performing WORSE than the state, and the difference is statistically significant

Source: New Jersey State Health Assessment Data (SHAD)

Summary of Community Health Needs Assessments

The Internal Revenue Service requires charitable hospital organizations to conduct a community health needs assessment (CHNA) every three years and to adopt an implementation strategy to meet the community health needs identified through the CHNA. The three non-profit hospitals in the Study Area have completed and publicly posted their CHNAs. The Innova group reviewed these CHNAs and identified key themes and concerns. The most pressing community health needs focused on the following:

- Lack of access to mental health services and resources
- Shortage of affordable housing
- Lack of transportation for medical services
- Community crime and safety
- Racism and discrimination

Table 25: Summary of Area Hospital Community Health Needs Assessments

Clara Maas Medical Center	Newark Beth Israel Medical Center	University Hospital
Community Assets		
• Abundance of safe outdoor recreation spaces • High levels of volunteerism	• Numerous places to socialize • Safe outdoor places to work and play	• Newark's central location is a hub for social service agencies and community organizations • Strong leadership reported
Community Concerns		
• Lack of affordable housing and transportation options • Food insecurity	• Lack of affordable housing and transportation options • Crime, violence and safety	• Need additional family support services and programming • Racism and discrimination
Community Healthcare Needs		
• Mental health issues, high stress lifestyles, substance use • Obesity / overweight, diabetes	• Mental health challenges and stigma • Obesity / overweight	• Insufficient mental health facilities and resources • Barriers to care access: disjointed services, poor continuity of care, lack of health insurance
Suggestions for improvement		
• Expand and strengthen mental health services • Increase access to transportation services for healthcare	• Invest in improvements in the physical and built environment • Improve safety	• Expand and strengthen mental health services • Offer Youth Development Programs and improve school curriculum

Source: UH, NBIMC and CMMC Community Health Need Assessments 2022

IMPLICATIONS FOR HOSPITAL-BASED HEALTH SERVICES

Hospitals that serve lower-income, less healthy populations such as the Study Area generally experience the following:

- **Higher use of emergency services:** Research has shown that emergency department utilization is positively correlated to poverty levels[2]. This applies to overall emergency visits as well as primary care sensitive (i.e., potentially-avoidable) emergency visits. There are many causes for this trend including economic and transportation access to primary care services as well as other social determinants of health. While improvements in the safety net for primary care services (e.g., FQHCs) can help alleviate this problem, it has proven to be difficult to dramatically change these behaviors on a community-wide basis
- **More complex acute care needs:** A less healthy population with high levels of chronic illness (e.g., heart disease, diabetes, pulmonary conditions, etc.) generates a greater mix of medically-complex cases that include multiple comorbidities and associated complications. These populations require hospitals that have the breadth of expertise and resources required at scale. Managing these complex cases may also skew quality outcomes and ratings, despite attempts to adjust for complexity. Medically complex cases also tend to have longer lengths of stay, higher readmission rates, and lower reimbursement than procedurally-based cases, resulting in an economic strain to the hospital
- **Concentrated demand for safety net hospital services:** Communities with higher poverty levels have fewer options for medical care and must rely heavily on the local safety net system

[2] Lines, Lisa & Rosen, Allison & Ash, Arlene. (2017). Enhancing Administrative Data to Predict Emergency Department Utilization: The Role of Neighborhood Sociodemographics. Journal of Health Care for the Poor and Underserved. 28. 1487-1508. 10.1353/hpu.2017.0129

SECTION 5: MARKET AND COMPETITIVE ASSESSMENT

Key observations and conclusions from this section are as follows:

- Study Area residents generated 61,507 adult hospital admissions (ADC of ~1,000) to NJ Hospitals in 2021
- The five Study Area hospitals have a 64% share of this market and UH alone has an 18% share
- Pediatric inpatient volume is relatively low and is primarily newborns. The five Study Area hospitals combined have an 84% share of this market and UH has a 27% share
- Approximately 36% of Study Area adult patients (ADC of 328) went to NJ hospitals outside of the Study Area
- A relatively small portion of Study Area residents out-migrate to New York (ADC of 23)
- The level of outmigration is not concerning. Most of the outmigration occurs from towns on the borders of the Study Area where other hospitals are geographically convenient and where residents may have employment, primary care, or other connections to the outlying communities
- The five Study Area hospitals drew 24% of their 2021 inpatient ADC from outside of the Study Area (ADC of 220), so that net outmigration from the Study Area is an ADC of only 110
- The most impactful activities to reduce outmigration are hospital-specific improvements in operations, marketing, and network development. To remain competitive, hospitals require modern facilities that provide sufficient space for physicians, staff, and patient volumes; offer up-to-date medical technology; and support a positive patient experience

MARKET SHARE AND PATIENT OUTMIGRATION ASSESSMENT

Market Size, Market Share, and Outmigration within New Jersey

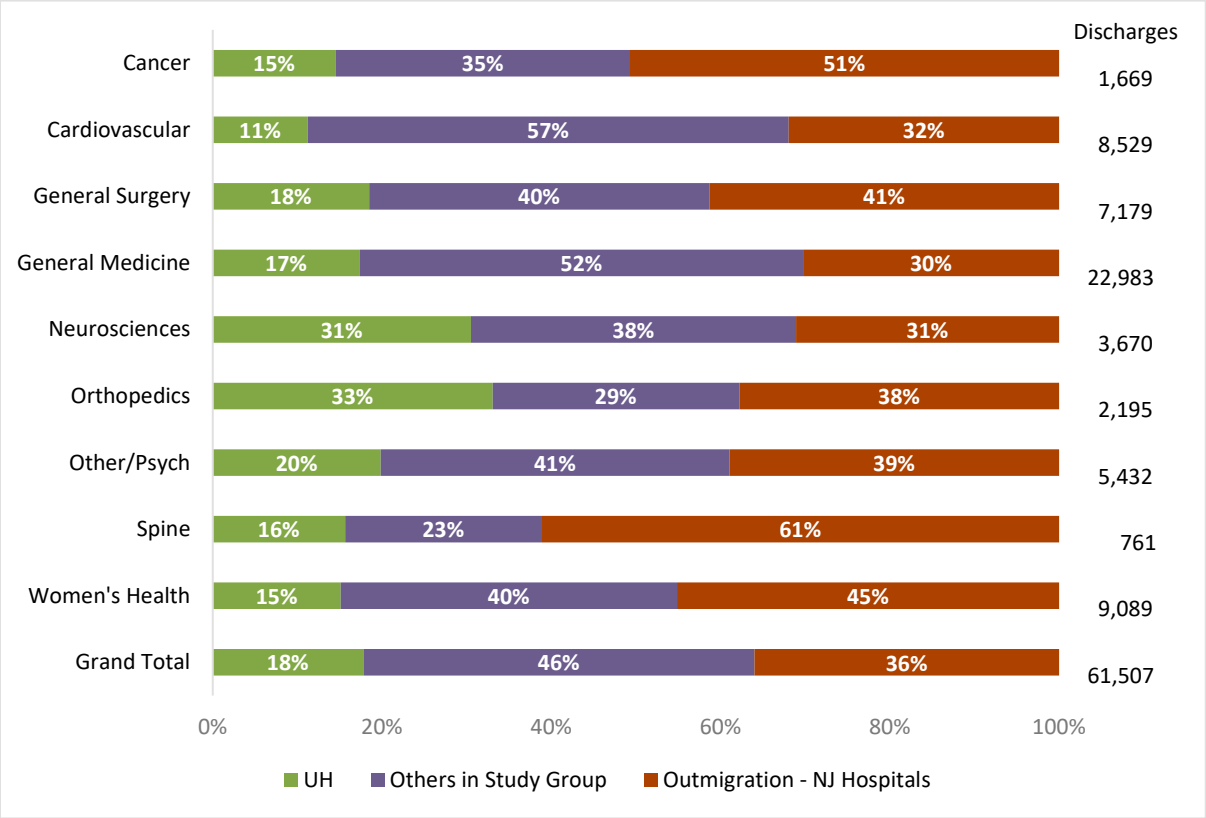
Residents of the Study Area generated approximately 61,500 adult inpatient hospital admissions to NJ Hospitals in 2021. This equates to an adult average daily census of approximately 1,000.

The five Study Area hospitals combined have a 64% share of the Study Area adult market (excluding out-migration to hospitals in other states). The other 36% of patients out-migrate to other hospitals in New Jersey. University Hospital has an 18% share of the adult market for all hospitals and about a 28% share among the five hospitals in the market. UH shows a relatively higher share in neurosciences, orthopedics, spine and psychiatry versus the other hospitals and a relatively lower share in cardiovascular services.

Pediatric inpatient volume is low overall and is primarily newborns. The five Study Area hospitals combined have an 84% share of the pediatric inpatient market (excluding out-migration to hospitals in other states). The remaining 16% out-migrate to other hospitals in New Jersey. University Hospital has a 27% share of the pediatric inpatient market and an approximately 32% share of the five hospitals in the market.

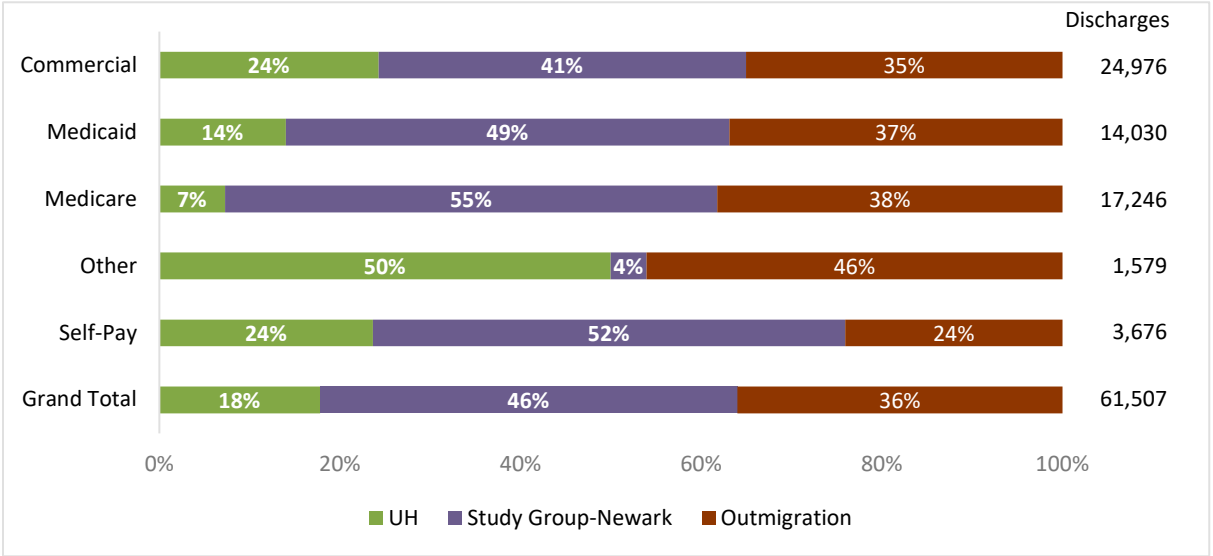
When considering market share and outmigration by payor class, UH has a relatively low market share for the Medicare population and relatively high shares for Self-Pay (uninsured) and Commercial populations. While more payor classes are out-migrating at similar levels, a lower percentage of self-pay (uninsured) patients are out-migrating to other New Jersey hospitals.

Exhibit 11: 2021 Market Share & Outmigration by Service Line: Study Area Adults Discharged From New Jersey Hospitals



Note: Excludes discharges from out-of-state hospitals
Source: New Jersey Hospital Discharge Data Set

Exhibit 12: 2021 Market Share & Outmigration by Payor: Study Area Adults Discharged From New Jersey Hospitals



Note: Excludes discharges from out-of-state hospitals
Source: New Jersey Hospital Discharge Data Set

As shown in the table below, an adult census of approximately 328 left the Study Area in 2021 for care in other New Jersey hospitals, representing a bed demand of approximately 410. Recapturing even a portion of that volume would lead to substantially greater bed demand for the Study Area hospitals.

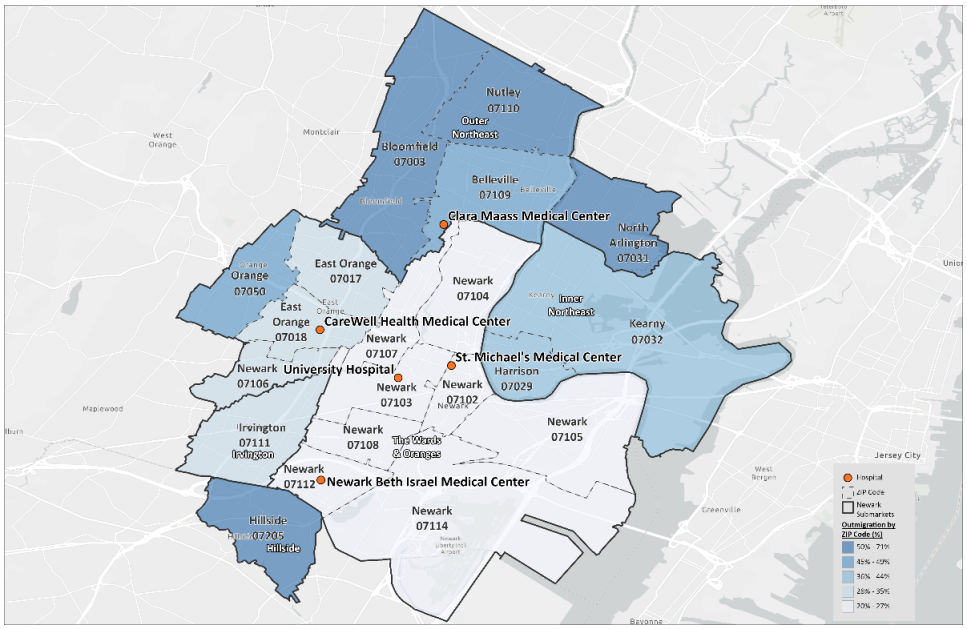
Table 26: 2021 NJ Outmigration Census and Bed Demand by Service Line: Study Area Adults Discharged From New Jersey Hospitals

Service Line	2021 Average Daily Census	Estimated Occupancy Target	Bed Demand
Cancer	18	80%	23
Cardiovascular	41	80%	51
General Surgery	59	80%	74
General Medicine	109	80%	136
Neurosciences	18	80%	23
Orthopedics	9	80%	11
Other	16	80%	20
Spine	5	80%	6
Women's Health	4	80%	5
Psych Acute	23	90%	26
Obstetrics	26	75%	35
Total	**328**		**410**

Note: Psych and Obstetrics are based on volumes from their respective unit types. All others use a blended occupancy rate of 85% for M/S and 70-75% for ICU/CCU
Source: New Jersey Hospital Discharge Data Set

When looking at outmigration from the Study Area, approximately 70% of the adult outmigration is from the "non-Ward" zip codes, representing a census of 227 adult patients. The greatest outmigration is from Nutley, Bloomfield, North Arlington, and Hillside, which are on the northern and southern boundaries of the Study Area. These towns represent about 25% of the outmigration with a census of 76 adults in hospitals outside of the five hospitals included in the study.

Exhibit 13: 2021 Outmigration by Ward/Town:
Study Area Adults Discharged From New Jersey Hospitals



Note: Excludes discharges from out-of-state hospitals
Source: New Jersey Hospital Discharge Data Set

Inpatient Outmigration to New York

Although the Study Area is located entirely within the state of New Jersey, the state of New York is directly across the Hudson River from Newark. FY 2019 and FY 2020 New York State disposition data was available to the team for analysis. FY 2019 data is included in the table below because it was higher, and more representative of typical outmigration of patients in the Study Area zip codes to New York hospitals than 2020 data (Covid).

An adult census of approximately 23 left the market to go to hospitals in the state of New York, representing a bed demand of approximately 28. The majority of these patients sought cardiovascular, general surgery and general medicine inpatient services.

Table 27: SFY 2019 NY Outmigration Volumes and Bed Demand by Service Line:
Study Area Adults Discharged From New York Hospitals

Service Line	Discharges	Average Daily Census	Occupancy Target	Bed Demand
Cancer	89	1.7	80%	2
Cardiovascular	230	4.1	80%	5
General Surgery	204	4.2	80%	5
General Medicine	300	4.1	80%	5
Neurosciences	68	1.1	80%	1
Obstetrics	233	2.0	75%	3
Orthopedics	129	1.4	80%	2
Psych Acute	156	3.3	90%	4
Spine	82	0.8	80%	1
Total	**1,491**	**22.6**		**28**

Note: Psych and Obstetrics are based on volumes from their respective unit types. All others use a blended occupancy rate of 85% for M/S and 70-75% for ICU/CCU
Source: FY 2019 NY State Hospital Discharge Data Set

The majority of Study Area residents seeking care in New York are from Newark, followed by Bloomfield and East Orange. This volume represents approximately 2.5% of the total average daily census for patients in the Study Area and is therefore excluded from the remainder of this analysis.

Table 28: SFY 2019 NY Outmigration Volumes by Town: Study Area Adults Discharged From New York Hospitals

Study Area Town	NY Outmigration Cases	NY Outmigration Average Daily Census
Belleville	97	1.3
Bloomfield	187	2.7
East Orange	174	2.6
Harrison	57	0.9
Hillside	45	0.5
Irvington	104	1.5
Kearny	105	1.6
Newark	519	8.5
North Arlington	45	0.8
Nutley	114	1.6
Orange	44	0.6
Total	**1,491**	**22.6**

Source: FY 2019 NY State Hospital Discharge Data Set

Emergency Department Outmigration

For emergency department patients, outmigration of treat & release patients has declined slightly over the past several years and in CY 2021 stood at 28%. Emergency department market shares among the five Study Area hospitals have remained relatively constant over this period, but SMMC did pick up some share in 2019. UH has 17% share.

Table 29: ED Treat and Release Market Share 2018 - 2021: Study Area Patients

Year	CMMC	CHMC	NBIMC	SMMC	UH	Other Hospitals	Total Market
CY 2018	18%	5%	21%	7%	17%	32%	100%
CY 2019	18%	4%	20%	11%	17%	30%	100%
CY 2020	19%	5%	20%	10%	18%	28%	100%
CY 2021	19%	7%	20%	9%	17%	28%	100%

Source: NJ Hospital Discharge Data Set, 2021 data; treat & release patients from the Study Area

As shown in the table below, 72% of adult ED visits in the Study Area zips remained within the study group facilities (including UH) with the rest leaving the market. Visits leaving the market primarily went to other hospitals in Essex County.

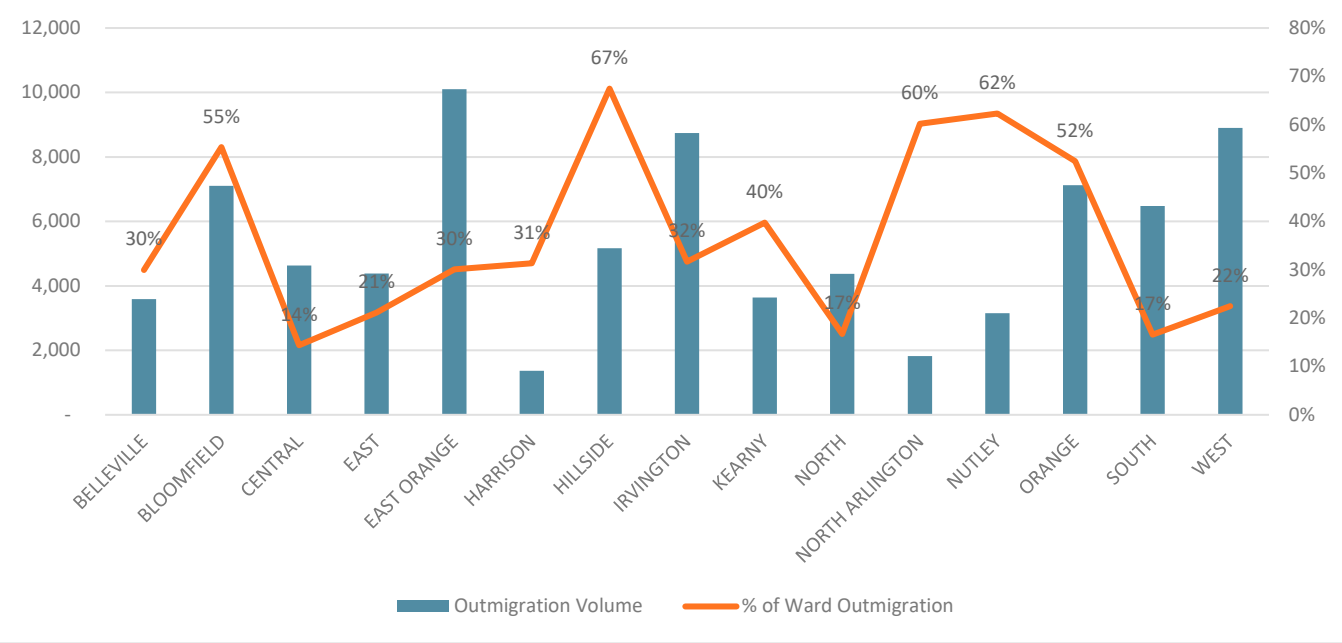
Table 30: Emergency Department Market Share and Outmigration by Hospital Location: 2021

Hospital Grouping	Market Volume	Market Share
UH	48,187	16.8%
Other Study Group Hospitals	157,736	55.1%
Total in Hospitals in Market		*72%*
Other Hospitals Located Outside the Study Area		
Essex	42,953	15.0%
Union	16,068	5.6%
Bergen	7,288	2.5%
Hudson	4,036	1.4%
Passaic	3,033	1.1%
Morris	2,144	0.7%
Other	5,041	1.8%
Total	**286,486**	**100%**

Source: NJ Hospital Discharge Data Set, CY 2021 data; treat & release patients; volume from the Study Area only (excludes inpatient admissions)

Among towns and wards, East Orange has the highest volume of patients leaving the market (~10,000 patients) while Hillside, North Arlington, Nutley, and Orange have the highest percentages of patients leaving the Study Area for emergency care (all over 50%). This high outmigration percent from the outer ring is a similar pattern as seen for Inpatient outmigration.

Exhibit 14: Emergency Department Outmigration by Town/Ward: 2021



Treat & release patients; volume from the Study Area only (excludes inpatient admissions)
Source: NJ Hospital Discharge Data Set, 2021 data; treat & release patients; volume from the Study Area only

Likely Causes for Outmigration

The level of outmigration in the Study Area is not concerning. The hospitals in the Study Area offer some of the most advanced care available in the state—including organ transplants, open heart surgery, and neonatal intensive care. The majority of inpatients and ED treat and release visits for residents of the Wards & Oranges remain within the five hospitals in the Study Area. The outmigration stems primarily from zips codes on the periphery of the Study Area, where other hospitals might be more geographically convenient, be deemed to have better quality or safety, be where the persons' primary care physicians practice, be a preferred provider by the persons' insurance, or some combination of these. Nationally, even sole community provider hospitals do not have 100% share of their market. And in many markets, such as the one in this study, some zip codes have options for their treatment and thus the market is split.

Recommendations to Reduce Outmigration

Although the level of outmigration is not excessive, there are always opportunities to gain a greater share of care. Typical tactics to reduce outmigration/gain in-migration or share include:

- Insurance strategies to be a preferred provider in more commercial insurance plans
- Physician alignment strategies to increase the number of physicians who refer to and provide services at specific hospitals
- Clinical services strategy to increase the range of specialties and capabilities at the hospital
- Emergency Management Services (EMS) strategies to encourage ambulances to direct clinically appropriate patients to specific hospitals versus others
- Marketing & promotion of the services and capabilities of the hospitals; reputation enhancement
- Improved patient experience, quality, and outcomes
- Improved facilities that can result in improved patient, family, and staff perception and experience and enable physician recruitment

Specific outmigration/share targets and tactics are out of scope for this report.

Inmigration

There is meaningful inmigration from outside the NJEDA defined Study Area to the five hospitals: nearly a quarter of the adult census in the five hospitals is from outside the Study Area in 2021. Much of this is from zip codes that UH considers part of its Primary Service Area (PSA) that were not included in the Study Area definition. But there is also meaningful volume from outside those zips as well. While there was a census of 329 that outmigrated, a census of 220 inmigrated in 2021.

Towns representing the majority of inmigration include Elizabeth, West Orange, Union, Passaic, Maplewood, Montclair, Linden, Lyndhurst, Jersey City, Paterson, Clifton, Bayonne, South Orange, and Roselle. The largest service lines for inmigration were General Medicine, General Surgery, Psychiatry and Cardiovascular.

Table 31: 2021 Adult Inmigration to Study Area Hospitals

Service Line	CMMC		CHMC		NBIMC		SMMC		UH		Total	
	ADC	%	ADC	%	ADC	%	ADC	%	ADC	%	ADC	%
Cancer	0.7	15%	0.1	25%	1.1	17%	0.2	14%	4.1	50%	6.2	30%
Cardiovascular	4.1	13%	0.6	9%	19.1	35%	2.5	20%	3.3	20%	29.6	24%
Gen Surg	5.6	15%	0.8	10%	14.8	30%	1.0	9%	26.4	41%	48.5	28%
Gen Med	11.5	13%	1.9	7%	18.4	20%	2.5	8%	22.8	27%	57.1	18%
Neurosciences	3.5	27%	0.2	5%	1.9	18%	0.1	6%	6.5	25%	12.1	22%
Orthopedics	0.8	15%	0.1	12%	0.6	16%	0.3	20%	5.9	35%	7.7	27%
Other/Psych	21.7	61%	6.7	26%	7.5	31%	3.0	37%	5.4	15%	44.3	34%
Spine	0.3	18%	0.0	0%	0.1	7%	0.0	0%	2.1	50%	2.5	33%
Women's Health	4.6	33%	0.0	10%	6.2	24%	0.0	12%	1.4	12%	12.2	24%
Total	**52.6**	**23%**	**10.4**	**14%**	**69.5**	**26%**	**9.7**	**14%**	**77.8**	**29%**	**220.1**	**24%**

Note: % represents percentage of that hospital's ADC for the selected service line that comes from outside the Study Area
Source: 2021 NJ Hospital Discharge Dataset

Table 32: 2021 ED Adult Inmigration to Study Area Hospitals

Indicator	CMMC	CHMC	NBIMC	SMMC	UH	Total Market
Visits Outside Study Area	7,281	2,032	7,863	3,242	7,781	28,199
Inmigration %	14%	10%	16%	12%	16%	14%

Source: NJ Hospital Discharge Data Set, 2021 data; treat & release patients

SECTION 6: DEMAND FORECASTS AND HOSPITAL GAPS/SURPLUSES

Key observations and conclusions from this section are as follows:

- Total Study Area inpatient admissions are forecasted by Sg2 to grow by 5% over the next five years for both adults (excluding obstetrics) and pediatrics (excluding newborns)
    - Almost all adult service lines are projected to grow except women's health (births)—which are forecasted to decline by about 10%. Neuroscience volumes are projected to grow the fastest
- When applying forecasted bed demand against currently maintained beds, the five Study Area hospitals have a forecasted net surplus of approximately 280 total beds by 2027 (note: this surplus may be 5%-10% lower based on observation patients using inpatient beds)
    - Most of the surplus is for CHMC, which has a forecasted net surplus of 117 beds
    - Combined ICU beds for all Study Area hospitals have a forecasted shortage of 18 beds
    - UH has a forecasted shortage of (49) med/surg beds, (12) ICU/CCU beds, and (5) psych beds
- Total Study Area ED visits are forecasted by Sg2 to grow by 8% over the next five years, with behavioral health visits increasing by 17%
- Based on current capacity, the five Study Area hospitals have a forecasted net shortage of approximately 36 ED bays by 2027. UH shows the greatest shortfall in the forecast (27 bays)
    - Both UH and NBIMC have planned ED expansions underway which will eliminate this net shortfall by adding a total of 35 ED bays. UH plans to expand its ED capacity by 15 bays by Q2 2024 and NBIMC plans to expand its ED capacity by 20 bays in 2023
- While there are no impending risks to the loss of unique or sensitive services in the Study Area, an ongoing lack of investment in medical equipment and facilities can result in difficulty for recruiting specialists and could affect the reputation and desirability of the Medical School for students and the teaching hospitals, ultimately impacting the ability to provide some advanced services
- The most prevalent high-cost service which may represent unnecessary duplication based on insufficient volumes is cardiac surgery, for which SMMC and UH do not meet typical minimums
- There are no crucial gaps in hospital-based services offered in the Study Area – it seems to be well served by all levels of inpatient and emergency care services. However, there is a need for more community-based services to address the mental health and substance use issues as well as the obesity and diabetes prevalence in the community

INPATIENT MARKET DEMAND SCENARIOS AND FORECASTS

Inpatient market volumes and bed demand were forecasted for five years based on the development of five different scenarios, applied to 2021 data from the local market. The first scenario was based upon a third-party forecasting company (Sg2). Sg2 is the third-party forecasting organization that UH uses to forecast future population and volumes.

An additional four scenarios were created, using the Healthcare Advisory Board (HCAB), another third-party forecasting organization that allows for development of scenarios based on five variables: readmissions management, disease prevalence, insurance, care management, and technology. These variables are explained in the introduction section of this report.

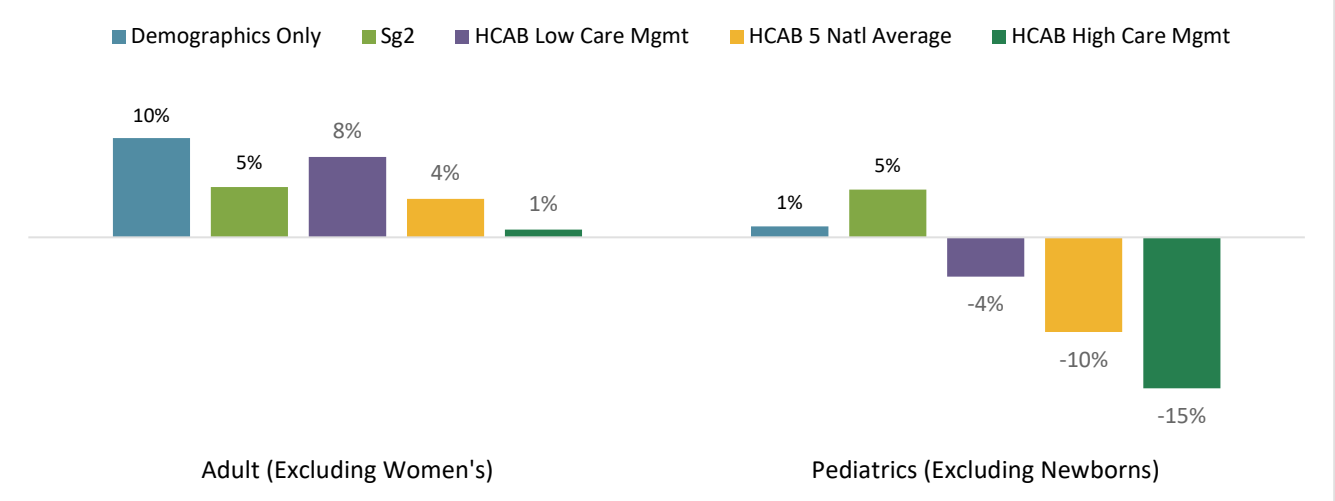
Table 33: Healthcare Advisory Board Scenarios

Scenario	Drivers				
	Readmissions Management	Disease Prevalence	Insurance	Care Management	Technology
"Demographics Only"	No Impact	No Impact	No Impact	No Impact	No Impact
"High Care Management"	More than National	Less than National	More than National	More than National	More than National
"National Average"	National Average	National Average	National Average	National Average	National Average
"Low Care Management"	Less than National	More than National	Less than National	Less than National	Less than National

Because Sg2 is the data provider that UH typically uses, this analysis defaults to the Sg2 scenario when forecasting future workload and space requirements; however, the HCAB data and scenarios were also analyzed and presented as comparison so that a range of reasonable, possible outcomes could be developed.

A summary of forecasted market growth rates from each of the scenarios is shown in the exhibit below. The Sg2 rates used in this report for the bed demand forecasts are in the middle of the range of scenarios for adult cases and on the high end of the range on pediatric cases.

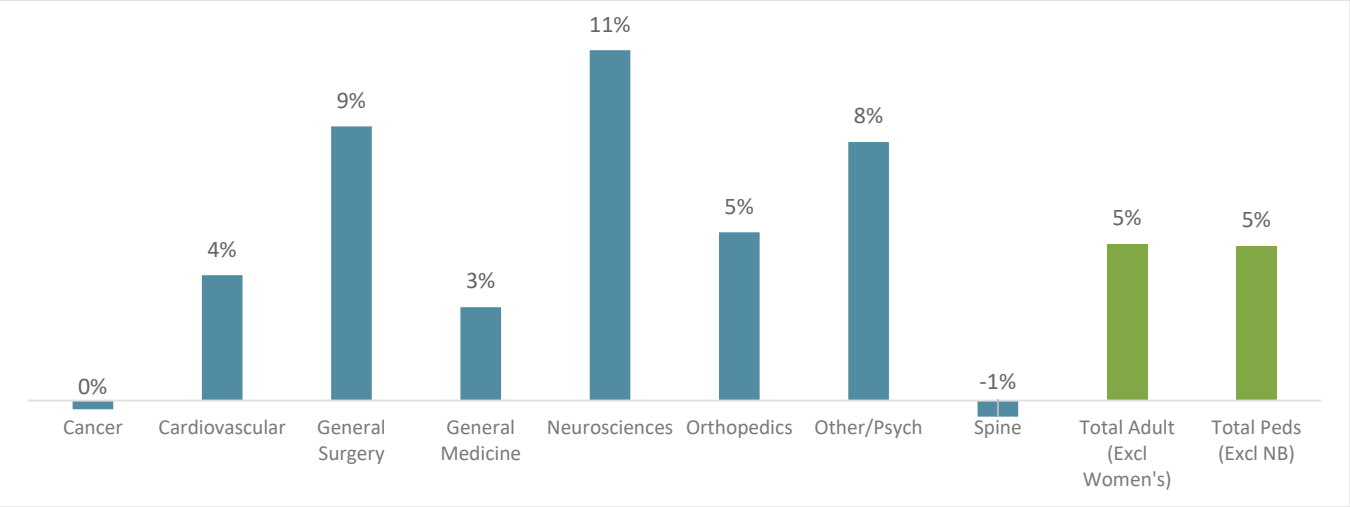
Exhibit 15: Five-Year Inpatient Forecast Growth Rates by Scenario



Sources: Sg2 and Healthcare Advisory Board growth rates applied to the 2021 Study Area case mix from NJ Hospital discharge dataset

Almost all adult services lines are projected to grow except women's health/births—which are forecasted to decline about 10%. Neuroscience volumes are projected to grow the fastest. Overall, non-newborn pediatric cases are projected to grow at the same rate as adult cases (excluding women's health).

Exhibit 16: Five-Year Forecasted Study Area Growth Rates by Service Line Using Sg2: Inpatient Admissions



Sources: Sg2 growth rates applied to the 2021 Study Area case mix from NJ Hospital discharge dataset

INPATIENT BED DEMAND FORECASTS

Forecasted Bed Demand Methodology

The five-year projected inpatient demand starts with 2022 patient days by level of care as reported on the B2 and divides the days by the occupancy target (see previous section) to calculate approximate bed demand. The 2022 bed demand is then multiplied by local Sg2 forecasts by diagnosis and rolled up to level of care. The forecasts assume no change in market share or percentage of patients from outside the Study Area. Per the Sg2 forecasts, inpatient demand is projected to change by the following percentage by unit type:

- Med / Surg: +4%
- ICU / CCU: +4%
- Psych: +7%
- OB: -10%
- Pediatrics (excluding newborn): +5%
- Total: +2%

Table 34: 2027 Forecasted Study Area Hospital Inpatient Bed Demand

Unit Type	CMMC	CHMC	NBIMC**	SMMC	UH*	Combined
Current Bed Inventory (Maintained)						
Med/Surg	200	151	256	97	187	891
ICU/CCU	24	13	64	30	43	174
Psych	42	37	42	20	34	175
OB	13	0	32	0	54	99
Peds	22	0	31	0	39	92
NICU	9	0	23	0	14	46
NICU Step-Down	0	0	46	0	14	60
Total	310	201	494	147	385	1,537
Beds Required (Based on Current Market Share): 2027						
Med/Surg	204	51	212	61	236	765
ICU/CCU	22	5	90	20	55	192
Psych	39	27	36	8	39	150
OB	16	-	27	-	14	57
Peds	-	-	20	-	11	31
NICU	3	0	4	0	9	16
NICU Step-Down	-	-	39	-	10	48
Total	284	84	428	90	374	1,260
Forecasted Bed Need Gaps/Surpluses: 2027						
Med/Surg	(4)	100	44	36	(49)	126
ICU/CCU	2	8	(26)	10	(12)	(18)
Psych	3	10	6	12	(5)	25
OB	(3)	-	5	-	40	42
Peds	22	-	11	-	28	61
NICU	6	-	19	-	5	30
NICU Step-Down	-	-	7	-	4	12
Total	**26**	**117**	**66**	**57**	**11**	**277**

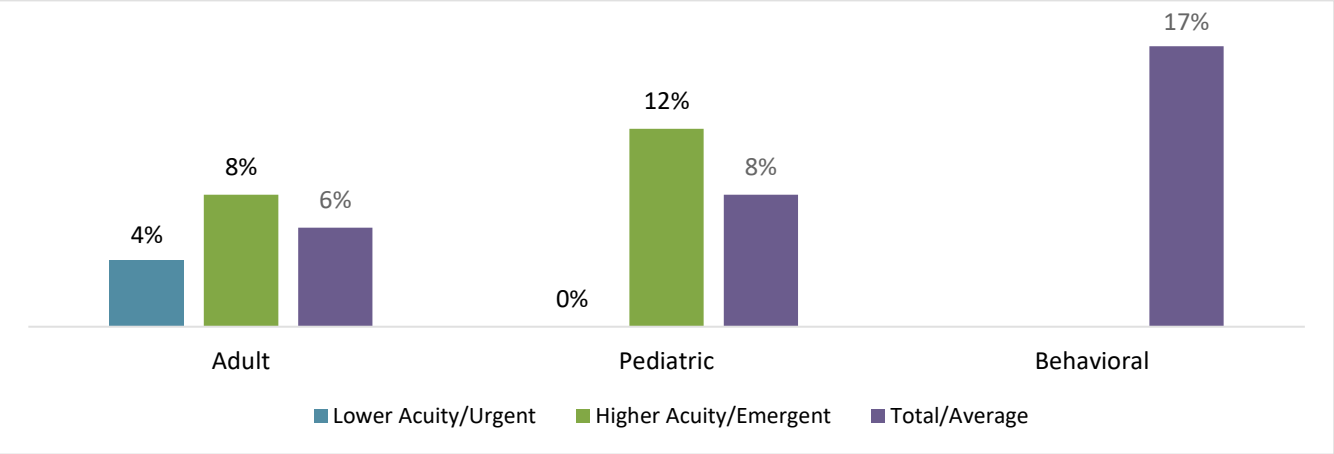
Notes: Adult non-maternity/non-psych service lines = M/S & ICU growth. Women's Health service line applied to OB; Psych service line applied to psych. Peds exclude newborns. The same ICU growth rate applied to adult ICU/CCU was applied to NICU and NICU Step-Down
Demand assumes observation days are included in the B2; definitions are unclear. If observation is excluded, excess beds are likely ~5-10% lower
*Internal bed counts reported by UH are different than reported in B2. See Appendix for detail. UH bed days and bed inventory include both adult and pediatric ICU data
**NBIMC has very high reported ICU days in multiple data sets. For example, the 2022 B2 reports approximately 23,000 ICU days and the 2021 Hospital Discharge Data set has over 30,000 ICU days. This results in a census that is greater than the bed count
Sources: Maintained bed count & patient days from B2 Quarterly Inpatient Utilization Report although internal data provided by UH shows slightly different bed counts at UH. See Appendix for detail. 2021 NJ Hospital Discharge Data Set for case mix. Uses 2021 market data x Sg2 five-year forecasts; assumes 2022 is similar to 2021

A bed surplus is forecasted to exist within the market in all unit types except ICU / CCU, which is projected to have an 18-bed market shortfall by 2027. Note this surplus might be slightly overstated (~5-10%) because the extent to which observation care is included in the market data is unclear. Per correspondence with the New Jersey Department of Health Office of Health Care Financing, "same day medical," "same day surgical" admissions are included, but "observation" is excluded. A large portion of "observation" is typically same day services—so it is unclear how much observation care is actually included or excluded from the patient days data. See other section for description of types of patient care.

FORECASTED EMERGENCY DEPARTMENT DEMAND

Behavioral health ED visits are projected to grow the fastest over the next five years and pediatric visits are projected to grow faster than adult non-behavioral visits. Overall, total ED visits in the Study Area are projected to grow by 8% over the next five years.

Exhibit 17: Five-Year Forecasted Emergency Department Market Growth Rates: Outpatient Treat & Release Visits



Source: Sg2

To forecast ED demand by hospital, Sg2 approximate growth rates were applied to each hospital's 2022 ED volumes. The market area B2 data that was available did not have the severity and age mix of the patients at each ED, therefore approximate Sg2 growth rates were used. The Emergency Department Benchmarking Alliance (EDBA) medians for similar volume ED cohorts were used for number of visits per room per year.

Table 35: 2027 Forecasted Emergency Department Bay Demand

Indicator	CMMC	CHMC*	NBIMC	SMMC	UH	Total
ED Bays (Excl. Hallway)	58	23	83	41	63	268
ED Bays w/ Hallway	92		98		100	
2022 ED Visits	72,914	28,524	87,565	37,572	90,123	316,698
Visits per Room (Bay) per Year (Excl. Hall)	1,257	1,240	1,055	916	1,431	1,182
EDBA 2021 Median V/R/Y**	1,195	1,175	1,080	1,175	1,080	
ED Bays Demanded at Median	61	24	81	32	83	281
Current Excess/(Deficit)	-3	-1	2	14	-20	-13
Total 5 Year Market Growth (Sg2)***	8%	8%	8%	8%	8%	8%
5 Year ED Bay Demand	66	26	87	35	90	304
5 Year ED Excess/(Deficit)-Excluding Hall	**-8**	**-3**	**-4**	**6**	**-27**	**-36**

*CHMC ED bay counts are from the 2015 Navigant NJHCFFA report. Unable to verify/update. **EDBA = Emergency Department Benchmarking Alliance. Medians against similar volume ED cohorts; 2021 data. V/R/Y = visits per room per year. ***Source Sg2; approximate since the B2 data do not have the severity and age mix of the patients at each ED

Sources: 2022 B2 Files, RWJ Barnabas, University Hospital internal data; SMMC website

The market area ED capacity deficits will worsen over five years with a growth in demand. Only SMMC remains having sufficient capacity. The market is projected to have a shortfall of 36 ED bays, with 27 of these being at UH.

HOSPITAL EXPANSION PLANS AND IMPACT ON ABILITY TO MEET DEMAND

The Innova Group contacted all five hospitals in the Study Area to gather information regarding recent and planned changes in service offerings and facility expansions/renovations. NBIMC and CMMC responded and provided the requested information. SMMC and CHMC did not provide the requested information. We also conducted an internet search for hospital projects and collected information regarding certificate of need, licensing applications, and functional review projects from the NJ Department of Health. A summary of our findings follows.

University Hospital

University Hospital is in the process of expanding their emergency department to empty space across the hallway. The project adds 15 bays, allowing some of the hallway beds to be replaced by true ED treatment stations. The project is anticipated to be completed by Q2 2024.

Newark Beth Israel Medical Center

NBIMC is making considerable investments in service and facilities upgrades and expansions. In 2021, it announced a $150 million expansion project including the following components:

- A new 17,000 square foot, glass enclosed, main lobby to improve patient and family experience
- A 4,000 square foot emergency department expansion which will add 20 new bays to current inventory in 2023
- Renovated and expanded critical care unit with 13 new beds (in current inventory)
- Expanded cardiac care including a new hybrid operating room, one new cardiac cath lab, and upgraded equipment
- A newly renovated 24-bed geriatric unit offering all private rooms (in current inventory)
- Newly renovated 34-bed Mother-baby unit (in current inventory)

Result: the additional 20 ED bays will address the anticipated deficit at NBIMC.

Clara Maass Medical Center

CMMC invested in upgrades and expansions when, in 2017, it added an 87,000 square foot, four-story expansion which included a new main entrance, lobby, patient registration area, pharmacy, physician office space, and a 32-bed ICU. Then in 2019, it updated the emergency department. Recent developments include the following:

- The transitional care unit (subacute beds) was closed in the first quarter of 2023
- CMCC will create a new behavioral health outpatient program/intensive outpatient program (IOP) by the third quart of 2023

IMPLICATIONS: EXISTING HOSPITAL CAPABILITIES VS MARKET DEMAND

Overall, there are some excess beds in the market, but not at University Hospital. There is a deficit of ED bays—especially at UH, and the UH facilities master plan will help address that deficit.

Unique or Sensitive Services: Potential Risks of Losing Capabilities

Based on available public data, the five hospitals in the Study Area appear to provide a good mix of primary, secondary, tertiary, and quaternary services. Tertiary and quaternary services typically have the greatest demand for state-of-the-art facilities and technology: these specialized and complex services use critical care rooms and often specialized procedure rooms that need to accommodate new clinical technology. Medical trainees and experienced specialists alike demand up to date technology and facilities to learn and to treat

patients for the most advanced services. Although hard to measure, at some point, lack of investment can result in difficulty in recruiting specialists and could affect the reputation and desirability of the Medical School for students and the teaching hospitals (UH and NBIMC) to trainees (residents & fellows).

Potential Unnecessary Duplication of Low Volume/High-Cost Services

Services are generally well distributed with two major teaching hospitals that have tertiary/quaternary services (NBIMC & UH) and three community hospitals.

Cardiac Surgery:

Three hospitals in the market show volume in cardiac surgery: SMMC, NBIMC, and UH all have open heart surgery and structural heart programs. In the 2021 Hospital Discharge Dataset, NBIMC showed 434 Cardiac Surgery discharges, SMMC showed 93 Cardiac Surgery discharges and University Hospital showed 48. These are similar to 2019 discharge counts for each hospital.

The 2022 Leapfrog Group algorithm[3] looks for a minimum of 20 carotid endarterectomy cases, 40 mitral valve repair & replacement cases, and 10 open aortic procedures per hospital as a minimum for quality. The Hospital Discharge Dataset does not list the actual procedures (but only DRG- or Diagnostic Related Group)-- but given that UH has 48 total cases of any type, it appears that it would be below the Leapfrog threshold, and St. Michael's is likely close or below the thresholds. Neither UH nor SMMC meet the State of 100 cases per cardiac surgeon as outlined in N.J. Admin. Code § 8:33E-2.4 "Cardiac Surgery Center Personnel."

Cardiac surgery is an area of rapid advancement, with catheter-based services (especially for valves) becoming more common. As technology changes, more hospitals are adopting interventional cardiology services, so it is possible that three hospitals can continue to serve this population. But if one were to discontinue these services, it would likely not have a negative effect on market access—if there is sufficient OR and cath lab/IR room capacity (which is out of scope for this report).

Neonatal Intensive Care:

Three hospitals in the market offer neonatal intensive care: Clara Maass (level II), UH (level III), and NBIMC (level IV). A higher level means the institution has the capability to care for increasingly complex and fragile neonates. In the 2021 Hospital Discharge Dataset, CMMC showed a census of 5 neonates, UH 15, and NBIMC 35. While the units are not fully occupied, they offer different levels of service and are well distributed across the city.

New Services Needed in the Study Area (if any)

The Study Area seems well served by all levels of inpatient and emergency care services. As noted in the 2022 Community Health Needs Assessments of the three non-profit hospitals, there is a need for more services to address mental health and substance use issues as well as the obesity and diabetes prevalence in the community. However, these are most effectively addressed in the outpatient and community setting versus the hospital setting.

[3] https://www.leapfroggroup.org/sites/default/files/Files/2022HospitalSurveyScoringAlgorithm_20220411_v8.3.pdf

SECTION 7: UH MASTER FACILITY PLAN ASSESSMENT

Key observations and conclusions from this section are as follows:

- The plan replaces most of the clinical services in either new construction or in major renovations in the existing buildings
    - Ambulatory/outpatient services have capacity for growth in a large "placeholder" ambulatory care center (ACC) for which the details of the occupants and sizing of each are still to be determined through work with the Medical School
    - A new acute care patient tower with adult beds
    - A substantially renovated existing facility to modernize the infrastructure and functionality of the remaining and relocated services in the hospital
- The plan has very little growth in room counts for beds, emergency department, and interventional rooms
    - This was likely intentional, since the plan used only five-year demand forecasts and assumed no change in market share
    - It could be prudent to plan for growth beyond the planning horizon: for example, allowing for some "shell" space in the most critical areas
- For the planned number of "key rooms" (beds, ORs, etc.), the proposed block sizes appear to be within the correct order of magnitude and use sizing factors that are within industry standards
- The Innova Group forecast aligns well with the Guidehouse forecast for inpatient beds and ED bays. The proposed and accommodated number of inpatient beds and ED bays in the facilities plan aligns with the Guidehouse forecast
    - Using the same assumptions of only a five-year forecast, no change in market share, no change in operations
- While some changes in operating assumptions could result in a lower emergency department bay count demand, it could be risky to "undersize" the ED with those assumptions

PLAN OVERVIEW

The Hospital Master Facilities Plan, developed in 2022 by the architecture firm Gensler along with planning support from the consulting firm Guidehouse, and with involvement of University Hospital leadership and staff and extensive community engagement results in a $1.8 billion investment to modernize the facilities and patient care at University Hospital.

A Master Facilities Plan is a long-range framework for growth & development on a campus. It is not detailed departmental design. Rather it provides the "scope & scale" and the "blocking and stacking" of spaces: showing approximate size, adjacencies, connectivity, phasing and feasibility. In addition, the plan intends to establish a direction for the likely cost of the project and use an iterative process to estimate capital needs versus capital availability. Detailed operational visioning and design occur at later phases—and the block sizes are intended to be sufficient to accommodate a variety of operational models that are established in later phases of plan development.

Key drivers and attributes of the plan include:

- **Site & circulation improvements**
  - Creating a welcoming campus that physically engages the surrounding community and provides parks and green space
  - Developing better connections and flow across the hospital, medical school, and medical office buildings
- **Facility infrastructure replacement/repair**
  - Replacing or repairing old mechanical, electrical and plumbing infrastructure that has insufficient capacity, does not meet current codes, and is in poor condition
- **Modernization/functional improvements**
  - Converting from semi-private and quad inpatient rooms to all private inpatient rooms
  - Converting hallway beds in the Emergency Department to true treatment rooms
  - Increasing the size and capabilities of the operating rooms
  - Improving adjacencies and flow within and among many departments, including the outpatient medical office building
  - Developing appropriate staff support spaces to meet the needs of an increasingly burdened and burned-out staff

The major facility components of the plan are:

- **A placeholder large new medical office building – ambulatory care center (ACC)** to hold the faculty practices and outpatient diagnostics & treatment services: final occupants and capacity is still to be determined, but the plan is to greatly expand the capacity for outpatient services
- **A new acute care tower** with medical/surgical beds, critical care beds, and interventional services (OR, cardiac cath, etc.) that creates contemporary clinical services and adds capacity to allow for decompression of the existing hospital and conversion to all private inpatient rooms
- **A major renovation to the existing hospital,** to upgrade the infrastructure and re-build remaining inpatient units and ED at modern standards but in the existing building envelope

The Gensler team developed fourteen potential options and had three for more detailed exploration. The options were scored against the criteria of:

- Community Input
- Program Accommodation
- Proximity to Medical School
- Implementation Timeframe
- Overall Cost
- Value for the Community, Newark, and New Jersey

All three of the plans deemed “viable” were estimated at $1.8B or more. The proposed plan occurs in 4 phases over nine years:

Phase 1: “Make-Ready”
- Vacate some buildings
- Prep site
- Documentation

Phase 2: “New ACC”

- Build and occupy an ambulatory care center (ACC) for outpatient clinics
- Demolish existing medical office buildings
- Upgrade existing hospital infrastructure
- Phase 1 ED construction

Phase 3: “New Hospital”

- Build & occupy new hospital expansion in the location of the previous medical office buildings
- Additional existing hospital infrastructure upgrades

Phase 4: “Renovations”

- Backfill renovations of remaining spaces in the hospital
- Final phases of ED expansion

The project results in state-of-the-art ambulatory facilities, acute care services, and upgraded facilities infrastructure. It also addresses goals of connectivity between the hospital, ambulatory facilities, and medical school as well as creating a more open and integrated site with the community.

The proposed bed count and ED bay count in the Master Facilities Plan aligns well with the five-year forecasted demand in all levels and types.

CURRENT FACILITIES CONDITION

Per the Master Facilities Plan documents, University Hospital is 44 years old (constructed in 1979), and the average age of the infrastructure is over 30 years. According to the Master Plan documents, the current campus was built over a period of 60+ years starting with the ADMC buildings in the 1960s, shortly followed by University Hospital, the Medical School Building, and the Dental School. Some deficits noted in the Master Facilities Plan include:

- Compromised mechanical & plumbing that is aged, non-compliant, insufficient capacity, and prone to failure
- Buildings are not fully sprinklered
- Life safety code violations
- Aging exterior envelope

The envelope, fire protection, code compliance on the hospital all rated a B, and the parking/site access, mechanical/HVAC, and plumbing all rated C (on a scale of A to C), according to the Facilities Master Plan

In addition to facility condition challenges, the hospital is *functionally obsolete*. Many of the clinical departments are undersized for the volumes, have rooms that are smaller than current codes or practice, and lack support and storage space. Inpatients are in 2- and 4-bedded rooms, computers and materials clog the corridors, ORs cannot accommodate the latest technology, and patients are “parked” in hallway bays in the ED. UH has two ICUs that are 6-bed open wards—with no walls at all. Just to “right size” the facility for the current key rooms would require the facility to be about 30% larger than it is today, according to commonly used metrics shown in the Facilities Master Plan. Many important rooms—such as operating rooms—are undersized, making it difficult (or impossible) to accommodate current technology and do modern and leading edge care typically provided in an academic medical center. For example, some operating rooms are 365 net square feet (NSF) large, compared to 600+ NSF in new construction. The most technologically advanced operating rooms are 800+ NSF in new construction. The Labor & Delivery Rooms are 165 NSF compared to 365 clear floor area required by the Facilities Guidelines Institute (FGI, which serves as code minimums in most states).

The Average Age of Plant (accumulated depreciation/annual depreciation) at UH is nearly twice the NJ median, reflecting an historical underinvestment in capital.

UH INPATIENT BED DEMAND VERSUS SUPPLY IN MASTER FACILITIES PLAN

The table below displays UH's current staffed bed count, rooms, and census. In most cases the current bed count far outnumbers the room count, as many rooms are double, triple or even quadruple occupancy, which does not meet the current single occupancy standard of care. The planning occupancy rate is applied to the 2022 census to determine the current bed demand. The Sg2 forecast data was applied to UH CY2022 data to develop the Innova 5-year forecasted demand, as shown in the last column.

Table 36: UH Current Beds and Bed Demand vs Innova 5-Year Forecasted Demand

Bed Type	Current Staffed Beds	Current Rooms	2022 Census	Planning Occupancy Rate	2022 Bed Demand	Innova 5-Year Forecasted Demand (CY2022 basis)
Adult Med/Surg (Excluding Observation)	202	166	149	85%	176	186
Adult Intermediate	66	45	50	80%	62	67
Adult ICU	53	53	39	75%	52	58
Pediatric Med/Surg	10	9	2	75%	3	3
PICU	4	4	3	75%	3	3
OB/Post-Partum	30	24	10	75%	13	12
FIN/Intermediate Nursery	18	18	12	75%	16	16
FICN/NICU	24	24	10	75%	13	13
Psych	34	13	31	90%	35	35
Observation	30	24	21	85%	24	26
Total	**471**	**380**	**327**		**397**	**419**
Total Adult/ Non-OB	**385**	**301**	**290**		**349**	**372**

The Innova Group updated the bed demand forecasts versus the forecasts in the Master Facilities Plan (MFP). The Innova Group used more recent internal data from UH (CY 2022, versus FY 21 in the MFP), used a different 3rd party forecaster (Sg2 at the DRG level, versus Truven at the Service Line level in the MFP), and used slightly higher occupancy targets to convert patient days to bed demand. Despite these differences in baseline data and approach, the bed demand forecasts align closely with the forecasts in the MFP. The proposed bed counts in the MFP generally also align with both forecasts, with explicable deviations as seen in the table below.

The table below shows the detail comparisons of the Guidehouse forecasted demand versus The Innova Group forecasted demand versus what is shown in the Facilities Master Plan. The demand in this table will differ slightly from UH demand shown in the Market Demand section tables because it uses actual internal data at the individual discharge level versus broader aggregate reported data in the B2 dataset used for Market Demand section analysis.

Table 37: UH Bed Demand vs Supply in the Master Facilities Plan

Bed Type	Current Staffed Beds	Guidehouse 5-Year Forecasted Demand (FY21 basis)	Innova 5-Year Forecasted Demand (CY2022 basis)	Proposed in Master Facilities Plan	Comments
Adult M/S	202	191	186	191	Different base year, different 3rd party forecast company, and Guidehouse used slightly lower occupancy target than Innova
Adult Intermediate	66	68	67	68	
Adult ICU	53	66	58	66	Different base year, different 3rd party forecast company, and Guidehouse used slightly lower occupancy target than Innova
Pediatric M/S	10	6	3	0	Guidehouse combined Peds/PICU; Gensler plan does too
PICU	4		3	6	Guidehouse combined Peds/PICU; Gensler plan does too
OB/Post-Partum	30	11	12	0	The bed complement in the forecast is being reconciled with the Gensler program and will be completed this week confirming 30 existing is post partum only
FIN/Intermediate Nursery	18	11	16	11	Re-evaluate FIN/FICU size at design stage: possibly should be larger
FICN/NICU	24	10	13	10	Re-evaluate FIN/FICU size at design stage: possibly should be larger
Psych	34	42	35	42	Guidehouse used lower occupancy target than Innova. Accommodating psych patients dwelling in ED.
Observation	30	21	26	21	Different base year, different 3rd party forecast company, and Guidehouse used slightly lower occupancy target than Innova
Total	**471**	**426**	**419**	**415**	
Total Adult/ Non OB	**385**	**388**	**372**	**388**	

Notes: No change in share; in addition, there are 8 Labor & Delivery Rooms (LDR) at present with a forecast demand of 5; there are 5 in the MFP. Guidehouse did not forecast LDRs; LDRs are typically not licensed beds
Sources: UH CY 2022 actual case mix with Sg2 total market forecast growth

Because inpatient units come in cohorts of floors sized for operational efficiency and geometric constraints, the actual number of beds will likely vary from the forecasted demand. Inpatient units that aren't being renovated or relocated are likely to maintain the same capacity.

While the quantity of beds at UH is approximately sufficient, the quality of the beds is challenged. The majority of the inpatient units are functionally obsolete. Many semi-private and even quad rooms still exist and are utilized for patient care. Additionally, many rooms are far smaller than current planning guidelines with insufficient storage and support space on the units. Some beds are also in buildings that are reported per the Master Facilities Plan to have substantial infrastructure deficiencies.

UH EMERGENCY DEPARTMENT BED DEMAND VERSUS SUPPLY IN THE MFP

The Innova Group updated the ED demand forecasts versus the forecasts in the Master Facilities Plan. The Innova Group used more recent internal data from UH (CY 2022, versus FY 21 in the MFP), used a different 3rd party forecaster (Sg2, versus Truven in the MFP), and used an encounter-level "triple peak" approach to estimating bed demand (versus an occupancy target method used in the MFP). Despite these differences in baseline data and approach, the demand forecasts align closely with the forecasts in the MFP. The proposed counts in the MFP generally also align with both forecasts as displayed in the following table. Both forecasts result in a demand of 106 bays versus 111 proposed in the MFP. The additional bays are reported to be for trauma.

Table 38: Projected ED Bay Demand vs Supply in the Master Facilities Plan

Completed Care	Existing Bays (excl hall & chair)	Existing w/hall & Chair	Current Demand (CY 2022 Basis)	5 Year Demand with Sg2 Forecasts	Future Demand w/ 50% of Incomplete Care	Guidehouse Proposed (FY 2019 Basis)	Proposed in Master Facilities Plan
Vertical/Low Acuity	12	15	20	21	21	18	18
Main	34	61	49	52	52	73	62
Psych	6	8	14	16	16	incl. in others	16
Peds	11	16	7	8	8	15	15
Walk Outs/LWBS	0	0	see below	see below	9	incl. in others	
Total	**63**	**100**	**90**	**97**	**106**	**106**	**111**

Incomplete Care w/Case Lengths Equivalent to Vertical	Current Demand (CY 2022 Basis)	5 Year Demand with Sg2 Forecasts
Walk Out after Medical Screening Exam	8	8
Left Without Being Seen	10	10
Total	**18**	**18**

University Hospital has 63 actual emergency department bays, with an additional 37 in the hallway or as chairs for a total of 100 "treatment stations." Approximately 22% of the 2022 visit volume was incomplete care: either patients "Left After Medical Screening Exam" (and spent some time in the treatment areas) or "Left Without Being Seen" (were never triaged, left after triage but were never roomed). Presuming that sufficient capacity would encourage half of those patients to stay would result in a forecasted demand of 106 bays with no change in length of stay or acuity.

The Innova Group ran two scenarios to test the potential to reduce the ED bay demand. Median visits per treatment station per year is 1,080 for similar hospitals in the 2021 Emergency Department Benchmarking Alliance (EDBA) database. With estimated future volumes (including 50% of incomplete care remaining for care), throughput at UH would be 1,363 when dividing by the 63 actual treatment stations available. It would be 812 with 106 stations and 774 with 111 stations: below median throughput.

Scenario 1: Lower length of stay/higher throughput

- The UH throughput falls below median due to higher length of stay at UH versus median LOS in the database
  - At 1,080 visits per room per year, UH would need 80 treatment stations for the forecasted volume
  - However: annualized 2023 volume exceeds 2022 volume - median might not be achievable with the patient mix
  - Guidehouse reports that they discussed potential improvements in throughput, but the departmental leadership felt it would be risky to assume those improvements could be achieved

Scenario 2: Lower volume - divert low acuity to different setting

- Roughly 29% of completed visits were low acuity, which is consistent with national averages. If the incomplete visits are assumed to be low acuity (presuming higher acuity patients would not be well enough to walk out), then the forecast model that converts 50% of incomplete visits would yield 37% of completed visits as lower acuity
  - If instead 15% of incomplete visits converted (and the remainder were seen elsewhere or the visit was avoided), the low acuity percent would drop back to 31% of completed visits, reducing the total ED treatment station demand to 100 (versus 106)

ADDITIONAL ASSESSMENT OF MASTER FACILITIES PLAN

Facility Sizing per Key Room Projections

The Master Facilities Plan documents a "DGSF per Unit" method for sizing the project—resulting in a "block size" for each department. This is a standard industry practice and the DGSF per Unit sizes shown in the master plan are generally within range of those seen in the planning of academic medical centers.

DGSF means Departmental Gross Square Feet, which is typically the size of a department including the internal circulation, internal infrastructure requirements, and wall thicknesses. It excludes the building circulation (horizontal and vertical) required to access the department, major building infrastructure (such as a mechanical penthouse) and external wall thicknesses. The "units" are the primary drivers of space in a department—such as inpatient beds in an inpatient unit and ED bays in an emergency department. For example, the DGSF per Unit used for the ED is 650 DGSF per Unit for the main Adult Emergency area—thus 52 beds convert to 33,800 Departmental Gross Square Feet for that section of the Emergency Department.

Review of Methods and Assumptions for Other Key Rooms

The methods used in the MFP to forecast Operating Rooms and Imaging units for the hospital are acceptable and align with industry practices.

RECOMMENDATIONS FOR UH CAPACITY

Summary

The quantity of inpatient beds and emergency department bays provided in the Master Facilities Plan appears to be justified based on industry standard methods of forecasting demand. While there are other variables that could be included in the analysis (such as changing length of stay, reducing low acuity visits to the emergency department, changing market share, etc.), they would likely have minimal impact on the overall direction, scope & scale of the Master Facilities Plan. Those changes "on the margin" could be revisited during the design phase of the project.

SECTION 8: CONCLUSIONS AND RECOMENDATIONS

KEY FINDINGS AND RECOMMENDATIONS

- While there is outmigration of care, it derives primarily from the towns in the northeast zone of the Study Area, which have equally or more convenient access to other hospitals outside the Study Area. And, a majority of the outmigration is offset by inmigration from towns outside of the Study Area
- While a new, improved facility could draw patients selectively to UH, there will be only limited ability to accept greater volumes. Because the MFP adds very little additional capacity, it should have limited impact on the volumes of the other hospitals in Newark
    - Other hospitals in the market have completed recent improvements as well
    - The increase from 63 to 111 ED bays might seem dramatic, but the ED uses 100 beds today: with 37 of the stations being makeshift "hallway stations," and the increase in actual ED bays will help solve a city-wide ED bay shortage
- The Average Age of Plant (accumulated depreciation/annual depreciation) at UH is 21 compared to a median of 12 for hospitals in NJ. This reflects an historical underinvestment in capital at UH relative to other hospitals
- There does not appear to be an excessive amount acute care service duplication in the market, with the possible exception of cardiac surgery
- The methods used to forecast inpatient beds and emergency department bays align with industry practices, and the analyses in this report aligns with the results shown in the Master Facilities Plan
    - The MFP used 5-year forecasts with no change in market share. It could be prudent to do a 10-year forecast with some potential change in market share: such as maintaining some outmigration or modeling the impact of another hospital closure on the demand for inpatient beds and ED bays
    - The third-party forecasts used in the MFP (Truven Health Analytics) used the company's assumptions about trends in healthcare, impact of aging and disease burden, etc.
    - Essex County shows higher age-adjusted inpatient days per 1000 and emergency department visits per 1000 population than the state. Were utilization lower, acute care hospital demand would decrease. However, a hospital is only one step in the healthcare continuum. Many healthcare and social service providers in the continuum would need to cooperate and intervene to meaningfully reduce hospital utilization since poverty is correlated with higher acute healthcare utilization
- The high-level square footage "block sizes" used to convert the key room types are within the ranges typically used in the industry. The actual size, layout, and operational model for each department will be developed during the design phase of the project
- Should the State wish to complete similar future studies, the State should track additional room counts besides beds. Recommend the State track licensed and maintained emergency department bays, operating rooms, cath labs, and other major diagnostic and treatment rooms
- The Master Facilities Plan states the team explored 14 scenarios, 3 of which were deemed viable based on the priorities of UH. Each of the 3 scenarios were $1.8B or more. It could be useful for the State to understand if any of the 11 initially discarded scenarios were substantially less costly, and if so, what compromises must be made to achieve a lower cost

FINANCIAL IMPACT OF UH MFP

From a financial perspective, major hospital capital projects fall into two main categories: 1) Strategic capital projects (which generate a high return on investment through volumes/profitability growth) and 2) Replacement capital projects (which replace assets at the end of their useful lives and support necessary quality, safety, and public mission goals but do not generate significant growth). Many large capital projects are a mixture of the two with some strategic investment along with a major component of replacement (such as building new towers to convert semi-private rooms to private).

Strategic capital projects create enough financial capability to pay for themselves over time (and create additional capital capacity for replacement projects). Replacement capital projects are more difficult to fund because they do not typically generate sufficient incremental cash flows to cover the cost of capital. Because the replacement projects do not typically generate a return, they are often delayed—resulting in a large "deferred maintenance" and "deferred obsolescence" challenge for the institution. Replacement projects are typically funded through capital capacity that a hospital has accumulated over decades by building cash/investment reserves and debt capacity in anticipation of the need for an eventual replacement.

UH's MFP is primarily a major replacement capital project. It seeks to address years of deferred maintenance on its base infrastructure, which is 44 years old. A common financial ratio used to gauge a hospital's need for capital replacement is Average Age of Plant (AAP), defined as accumulated depreciation divided by annual depreciation expense. According to its FY 2022 audited financial statements, UH's AAP is 20.6 years, which is much older than the statewide median of 12.7 years and even older than the 25th percentile of 16.6 years. (NJ HCCFA Apollo reports 6/30/22). This reflects the years of underinvestment in capital at UH relative to other hospitals.

When looking at the financial implications of such a project, the key questions are:

1. What are the sources and uses of funds: is sufficient funding accessible?
2. What is the carrying cost of the project: how much debt service and depreciation costs are added?
3. Can the organization cover the additional carrying cost of the project through ongoing operations?

Sources and Uses of Funds

Uses of Funds: The MFP's estimated capital requirements extend over an eight-year horizon – likely funded in six years over 4 phases.

Table 39: UH MFP Capital Cost Estimates ($millions)

Phase (Duration) Funding Year	Phase 1 (9 months) SFY 2024	Phase 2 (30 months) SFY 2025	Phase 3 (30 months) SFY 2027	Phase 4 (36 months) SFY 2030	Total
Construction Costs	$23.5	$429.2	$610.0	$258.0	**$1,321**
Other Costs	$8.0	$150.2	$213.5	$90.3	**$462**
Total Project Costs	**$31.5**	**$579.4**	**$823.5**	**$348.3**	**$1,783**

Note: Total project costs above are a sum of costs by phase as reported in the MFP. MFP shows $1.789B total project cost
Source: UHNJ Preliminary Master Plan May 17, 2023, Gensler

Sources of Funds: Sources of funds for hospital projects consist of: available cash & investment balances; ongoing cash flows from operations; philanthropy; available debt capacity; and public funding (for public hospitals).

A specific financing plan for the entire MFP has not yet been developed. To fund the MFP, UH will rely heavily on funding from the State because it has limited financial capability from other sources. Specifically, its limitations on internal funding capabilities include:

- Available cash & investment balances: UH does not currently have excess cash/investment balances to use for project funding. According to UH's 2022 audited financial statements, it only has enough cash/investments to cover 87 days of operational expenses (87 days cash on hand). A hospital of this size and complexity would be expected to maintain at least 180 days cash on hand. Major Teaching hospitals in NJ averaged 208 days cash on hand for the period ending 6/30/22 according to NJ HCFFA Apollo reports
- Debt capacity: UH's bond rating has dropped to BB-, a non-investment grade rating, which severely limits its ability to obtain additional debt. UH maintains a negative net position on its balance sheet (due largely to its State pension fund liability) and poor performance on key balance sheet ratios such as cash/debt and debt/capitalization. The Fitch rating agency has informed UH that its greatest barrier to a credit rating upgrade is the State Pension Liability which weighs down UH's balance sheet with $665M in liabilities
- Philanthropy: UH has historically not developed a strong philanthropic base of funding. While current efforts are underway to develop a philanthropic fund to help support the MFP, it is only expected to cover a small percentage of the capital cost
- Ongoing income and cash flows from operations: UH has improved its profitability substantially over the past several years, with net income of $59 million in FY 2022 vs a loss of ($62M) in FY 2020 according to its audited financial statements. It generated earnings before interest, taxes, depreciation, and amortization (EBITDA) of $100 million in FY 2022. While recent earnings are strong, UH needs to replenish its balance sheet (as discussed above) in addition to funding ongoing urgent capital projects

Carrying Cost for the Project

The carrying cost for the project would include the additional cost of debt service (cash outflows) and depreciation expense (non-cash expense). Since the financing plan has not been developed, debt service costs are unknown at this time. However, given UH's limited debt capacity, it is likely that only a relatively small portion of the $1.8B project cost would be covered by UH debt.

As a non-cash expense, depreciation from the project would impact operating income and net income for UH, but not cash flow/cash position. While the estimated project costs are preliminary and lack detail around asset type, depreciation expense for the project could be roughly estimated by dividing the depreciable project cost by an estimated average depreciable life for the assets. Assuming an average depreciable life of the new assets ranging from 30 to 35 years and capitalization of 50% to 80% of soft costs, the project would generate approximately $45M to $55M in additional annual depreciation expense to UH.

Ability to Cover Additional Carrying Costs

UH's ability to cover the additional carrying costs of the MFP project depends on its current level of income and cash flow, profitability improvements of current operations, and the incremental profitability from project-related expansions/improvements.

Incremental operating income from the project was estimated by applying the volume projections developed by Guidehouse for the MFP to UH's average contribution margin per case. Contribution margin per case is the amount of operating income each new case generates based on revenues minus direct patient care expenses. As shown in the table below, the volume growth related to the project would be expected to generate approximately $13.5 million annually.

Table 40: Forecasted Incremental Operating Income from MFP-related Volume Growth

Service	Five-year Growth %	Contribution Margin ($M)
Inpatient Subtotal	1.3%	$3.0
Outpatient		
Observation	1.3%	$0.2
Emergency	12.1%	$3.4
OP Surgery	8.7%	$1.3
Other Outpatient	8.0%	$3.1
Outpatient Subtotal		**$8.1**
Total (2021 $)		**$11.1**
Inflated (10 yrs @2%)		**$13.5**

Inpatient calculated at the service line level. Other outpatient growth rate assumed by The Innova Group
Sources: Guidehouse volume projections prepared for MFP, UH internal cost accounting data

In summary, while the scope of this report did not include an in-depth financial analysis, a high-level review of the MFP's financial impact shows that the $1.8 billion project would generate estimated incremental depreciation expense of $45-$55 million (compared to UH's FY 2022 net income level of $59 million). The project is projected to generate incremental income of approximately $13 million from growth in clinical services, which would improve UH's financial capacity over the long term. The amount of funding that UH could contribute towards the project would depend heavily on UH's future financial position, credit ratings, and available financing terms at time of issuance. Such assumptions and forecasts are outside the scope of this report.

From a financial perspective, the MFP establishes the first step in developing a practical plan to balance capital needs vs. capital availability by providing an estimated cost for a comprehensive solution to UH's facility needs. Going forward, an iterative process of matching available funding with refined capital needs will be required. To fund the MFP, UH will rely heavily on funding from the State because it has limited financial capability from other sources such as cash and investment balances, debt capacity, and philanthropy.

Appendix: Additional Detail

APPENDIX: ADDITIONAL DETAIL

BED COUNT RECONCILIATION

The New Jersey Department of Health gathers utilization statistics of inpatient services and outpatient data. The B-2 Quarterly Inpatient Utilization Report, or commonly known as the B-2 Report is filed on a quarterly basis by the licensed New Jersey health care facilities. The table below displays the number of maintained beds (set up and staffed) as well as licensed beds (allowed by the State but may not have a physical space) reported in the 2022 B-2 file as well as the number reported by UH as a part of this study and the number of beds shown on the UH actual license. This internal data provided by UH sometimes differs from the B-2 data and the B2 data sometimes differs from the actual license. In particular, the number of observation beds, telemetry and PCU beds are not reported in the B-2 data. Additionally, the number of maintained pediatrics beds is 39 in the B-2 data but only 14 beds are available to pediatric patients according to internal UH documentation. The number of total maintained ICU beds also differs by 10 beds.

It is possible that these discrepancies occur in other hospitals in the market, thus any analysis using B2 bed data for other hospitals could possibly misalign with actual conditions.

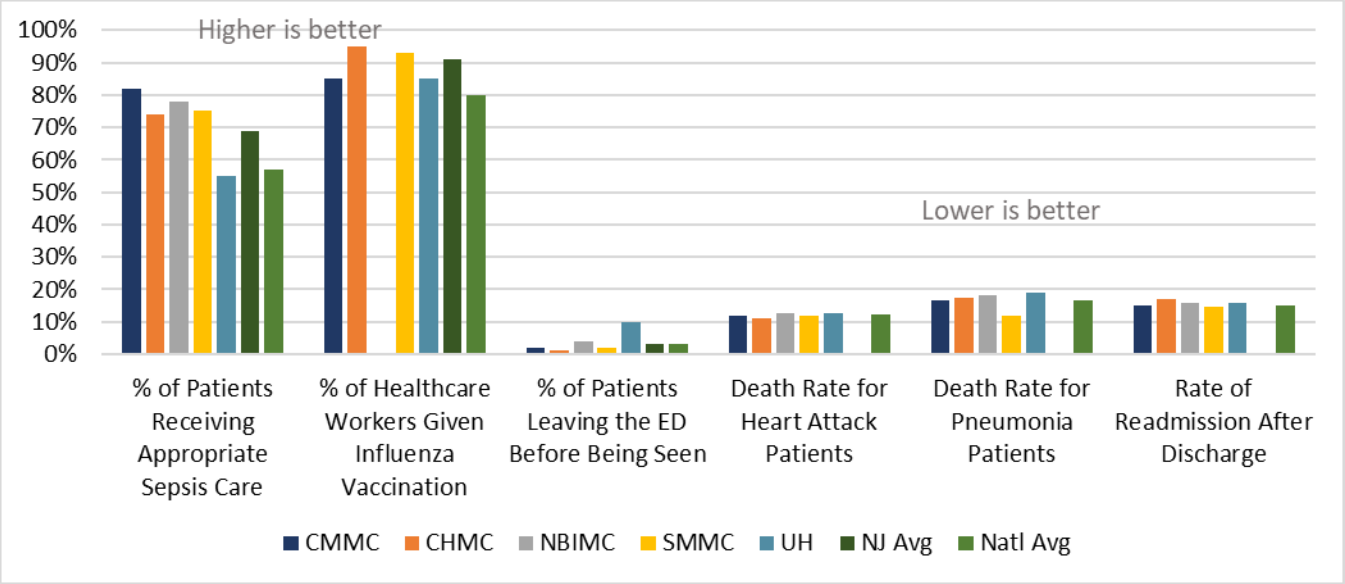
Table 41: Bed Count Reconciliation between NJ DOH B-2 Quarterly Inpatient Utilization Report and UH Internal Documentation

Bed Type	B-2 Maintained Beds	B-2 Licensed Beds	Actual License Document	UH Internal Bed File
Total ICU/CCU	**43**	**62***	**62**	**53**
ICU Bed (SICU)	-	-	-	*14*
ICU Bed (CTICU)	-	-	-	*6*
ICU Bed (Neuro)	-	-	-	*6*
ICU Bed (MICU)	-	-	-	*17*
ICU Bed (CCU)	-	-	-	*10*
Total Med/Surg	**187**	**270**	**270**	**264**
Adult Med/Surg	*187*	*270*	-	*198*
Telemetry	-	-	-	*26*
PCU	-	-	-	*40*
Observation Beds	-	-	-	**30**
Adult Psych	**34**	**34**	**34**	**34**
OB Beds	**30**	**54**	**30**	**30**
Total Peds	**39**	**71**	**71**	**14**
Peds	-	*60*	*60*	*10*
PICU	-	*11*	*11*	*4*
Total NICU	**28**	**28**	**52**	**42**
Intermediate Nursery (FIN)	*14*	*14*	*24*	*18*
NICU Nursery (FICN)	*14*	*14*	*28*	*24*
Total Beds	**361**	**519**	**519**	**467**

Note: B-2 Licensed bed number was 73, which included PICU; however, PICU was separated to be shown with pediatric beds for this chart

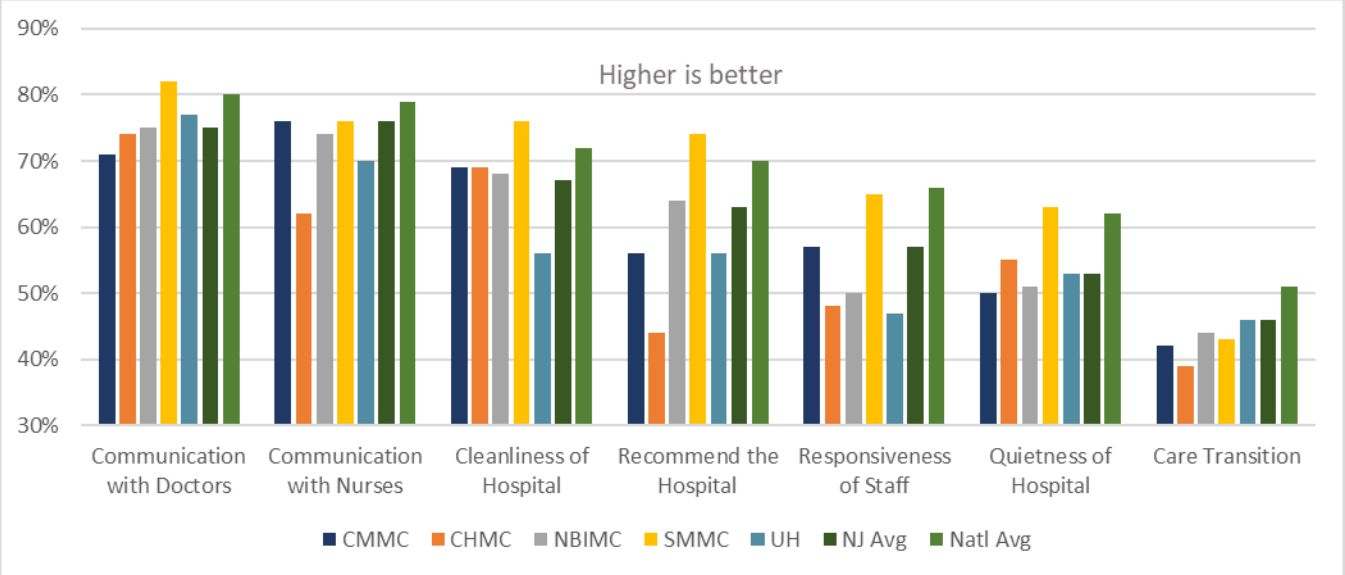
QUALITY SCORES

Exhibit 18: CMS Quality Reporting Program Overall Star Rating - Selected Measures



Sources: Medicare.gov Hospital Compare website (based on HCAHPS January 2023 Report) and Leapfrog Hospital Safety Grade website (hospitalsafetygrade.org)

Exhibit 19: CMS Quality Reporting Program Patient Survey Rating - Selected Measures

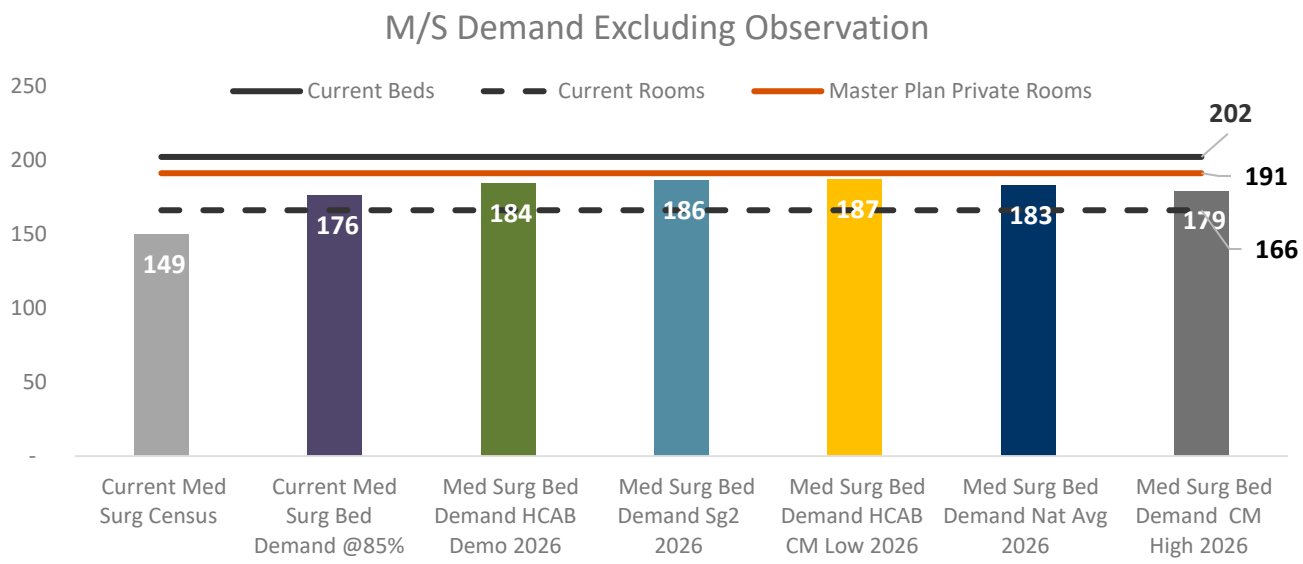


Sources: Medicare.gov Hospital Compare website (based on HCAHPS January 2023 Report) and Leapfrog Hospital Safety Grade website (hospitalsafetygrade.org)

DETAIL UH BED DEMAND FORECASTS UNDER DIFFERENT SCENARIOS

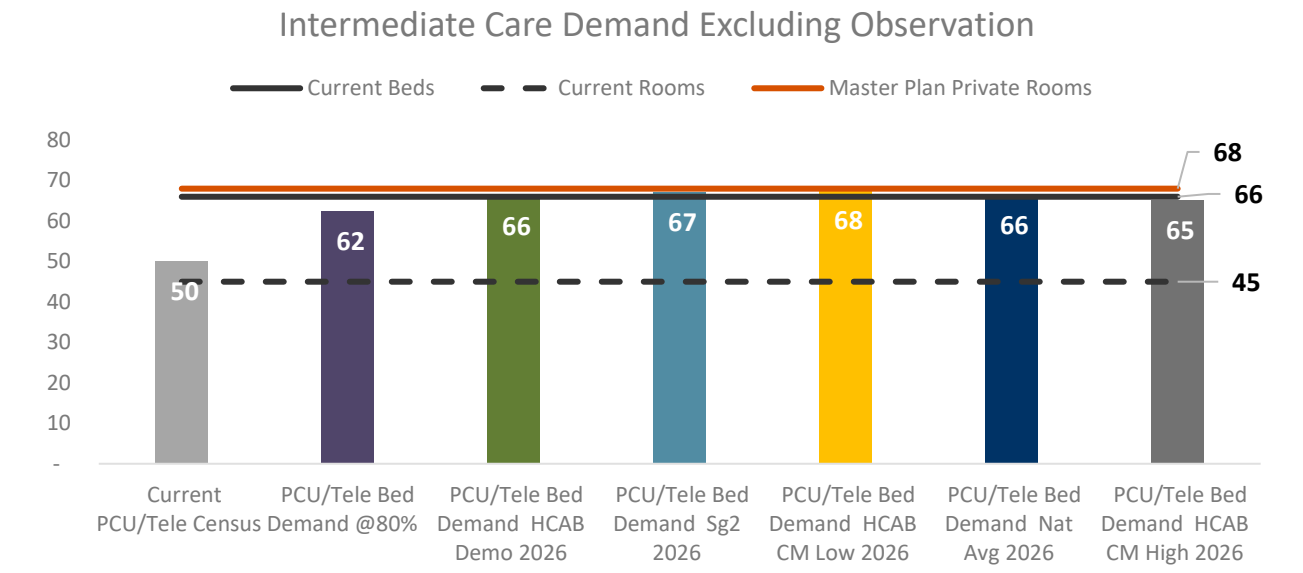
The following tables display with more granularity, the projected five-year bed forecasts for medical surgical, intermediate care, critical care, obstetric, psychiatric, pediatric, pediatric ICU, neonatal ICU and observation units. The current number of beds is indicated by a solid black horizontal line and the current number of rooms are displayed by a dashed black line. The number of beds (and rooms – since all planned beds are within private rooms) called for by the Master Facilities Plan are displayed with an orange horizontal line. The medium blue bar in the center of the graphs represents the Sg2 bed projection, which can be compared to the current census, current bed demand and HCAB scenarios shown by the other colored bars.

Exhibit 20: Projected Med/Surg Bed Demand Scenarios: UH



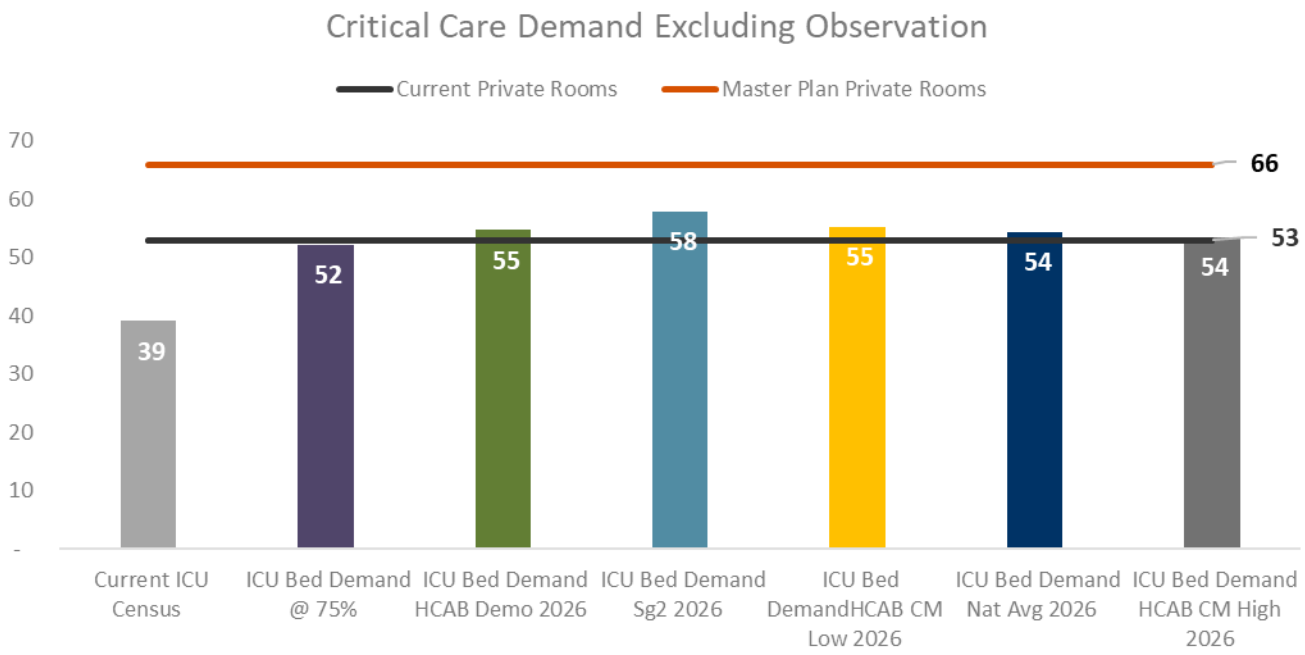
Sources: FY22 Internal (NO PL) file from UH, Sg2, HCAB

Exhibit 21: Projected Intermediate Care Bed Demand Scenarios: UH



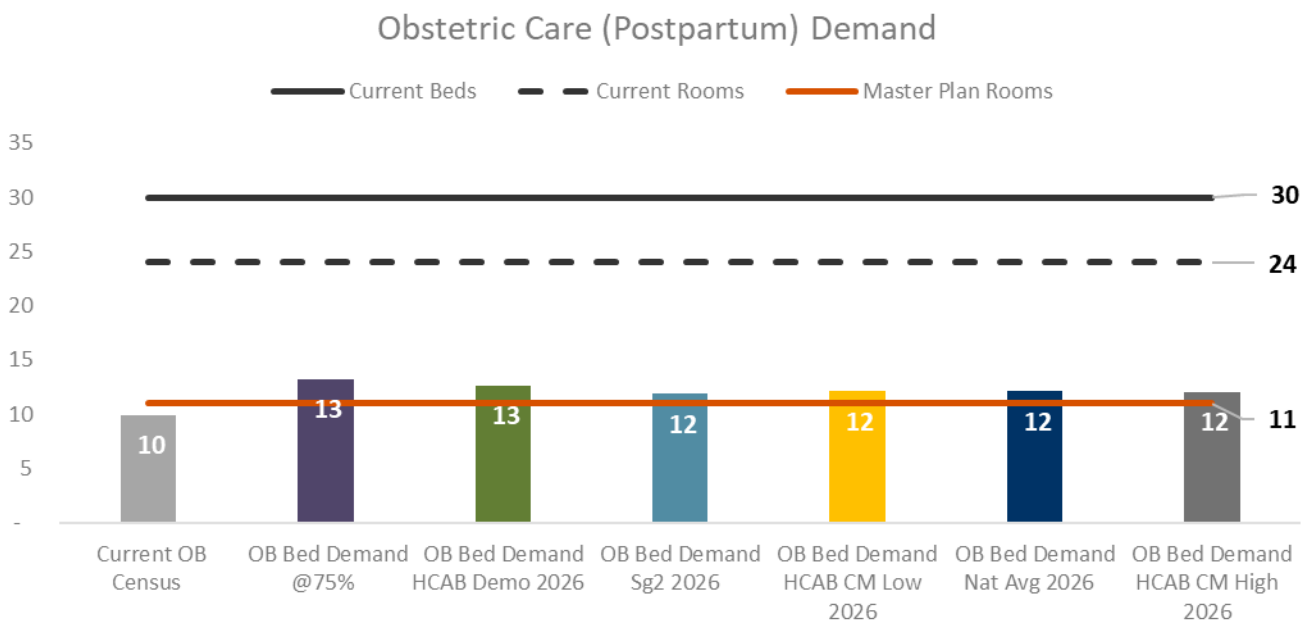
Sources: FY22 Internal (NO PL) file from UH, Sg2, HCAB

Exhibit 22: Projected Critical Care Bed Demand Scenarios: UH



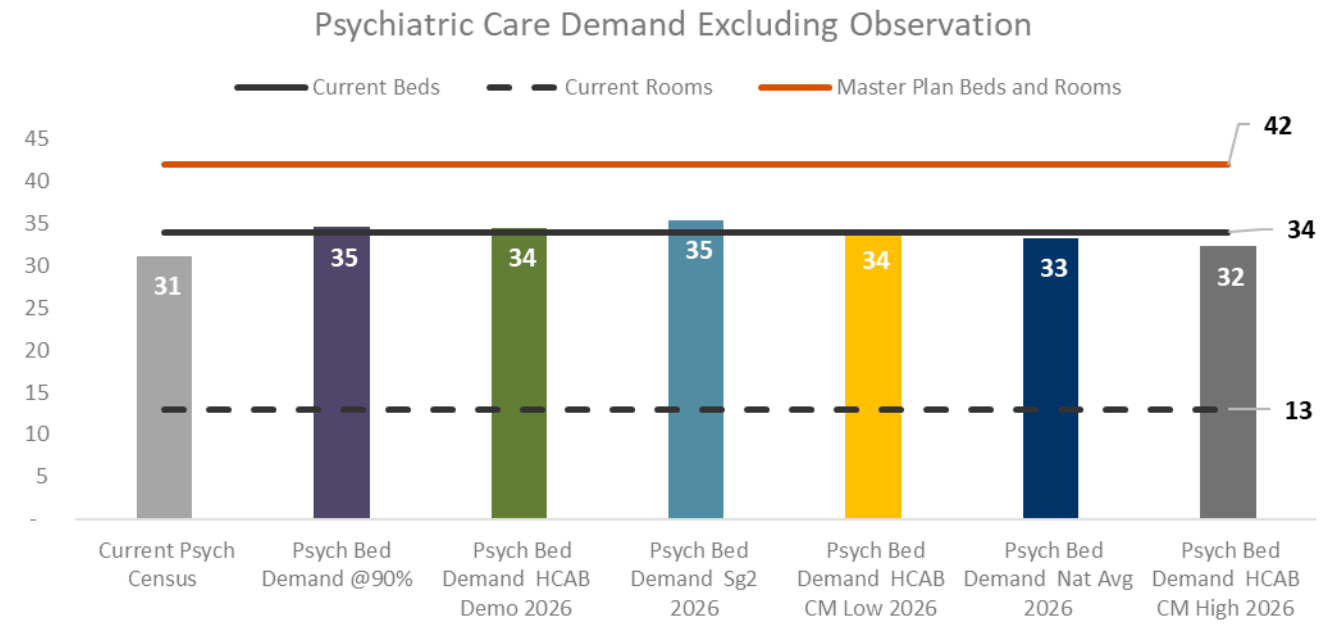
Sources: FY22 Internal (NO PL) file from UH, Sg2, HCAB

Exhibit 23: Projected Obstetric Bed Demand Scenarios: UH



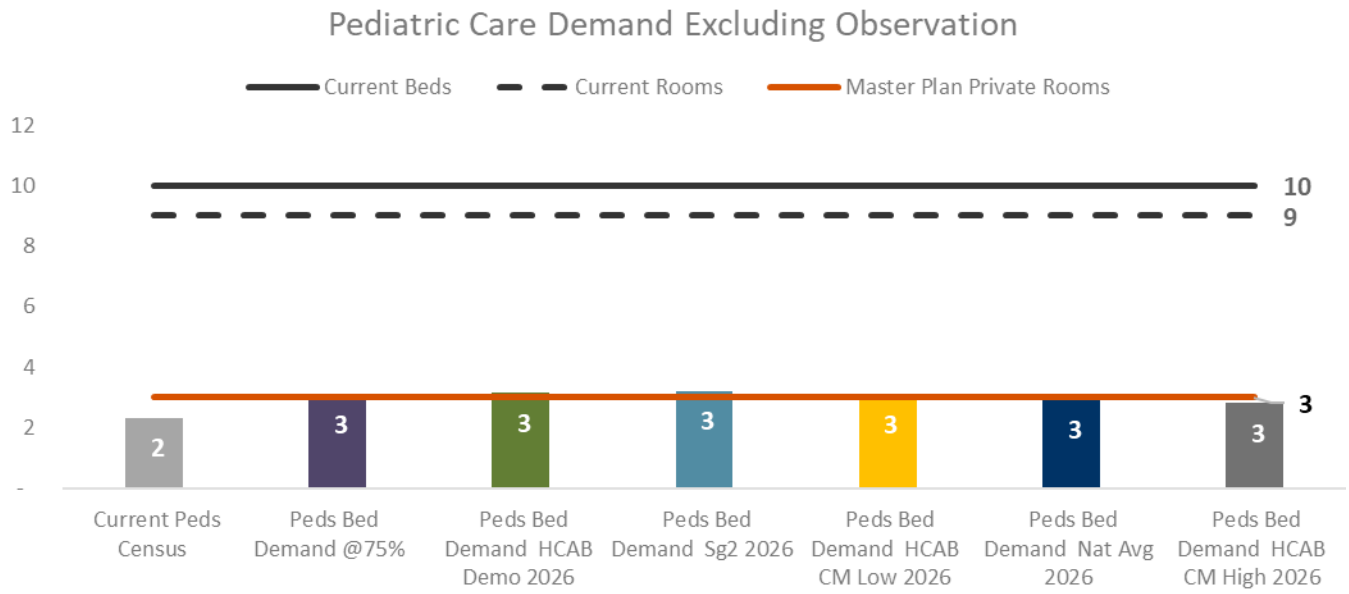
Sources: FY22 Internal (NO PL) file from UH, Sg2, HCAB

Exhibit 24: Projected Psychiatric Bed Demand Scenarios: UH



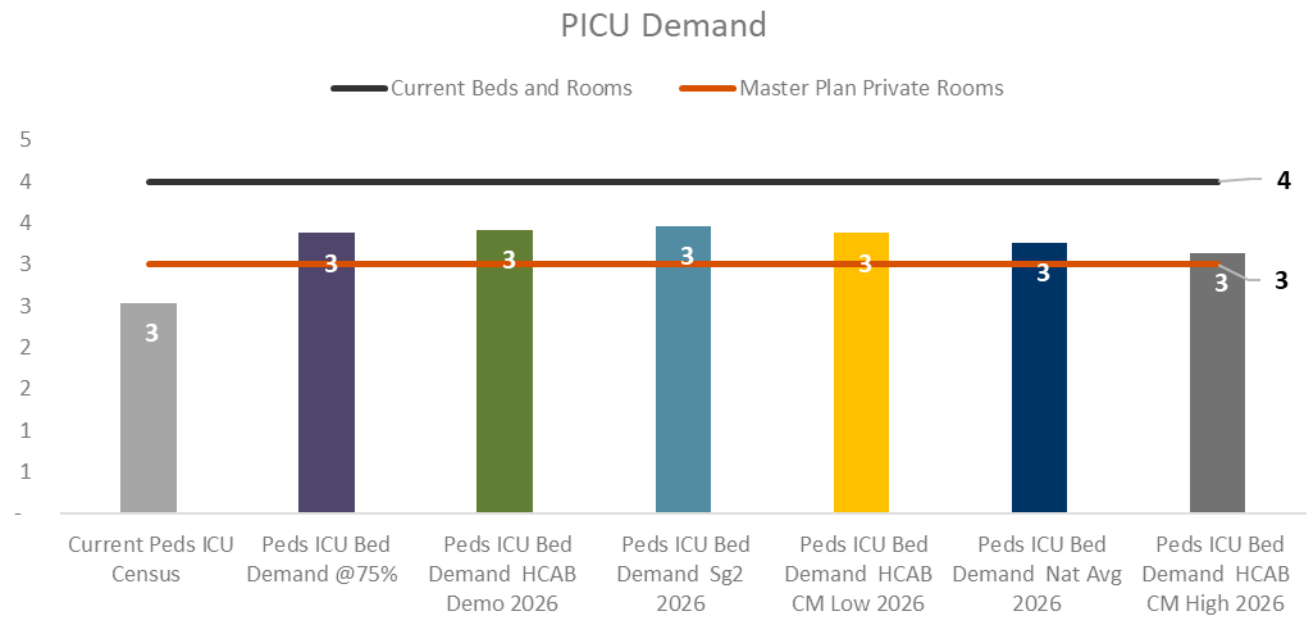
Sources: FY22 Internal (NO PL) file from UH, Sg2, HCAB

Exhibit 25: Projected Pediatric Bed Demand Scenarios: UH



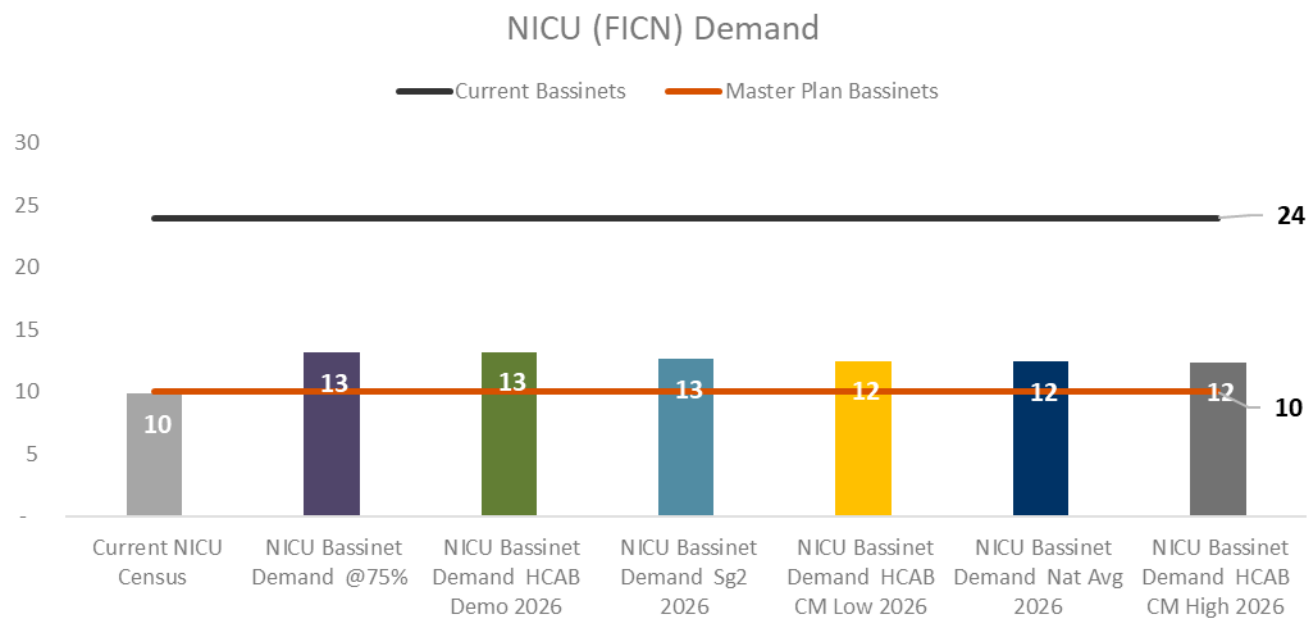
Sources: FY22 Internal (NO PL) file from UH, Sg2, HCAB

Exhibit 26: Projected Pediatric ICU Bed Demand Scenarios: UH



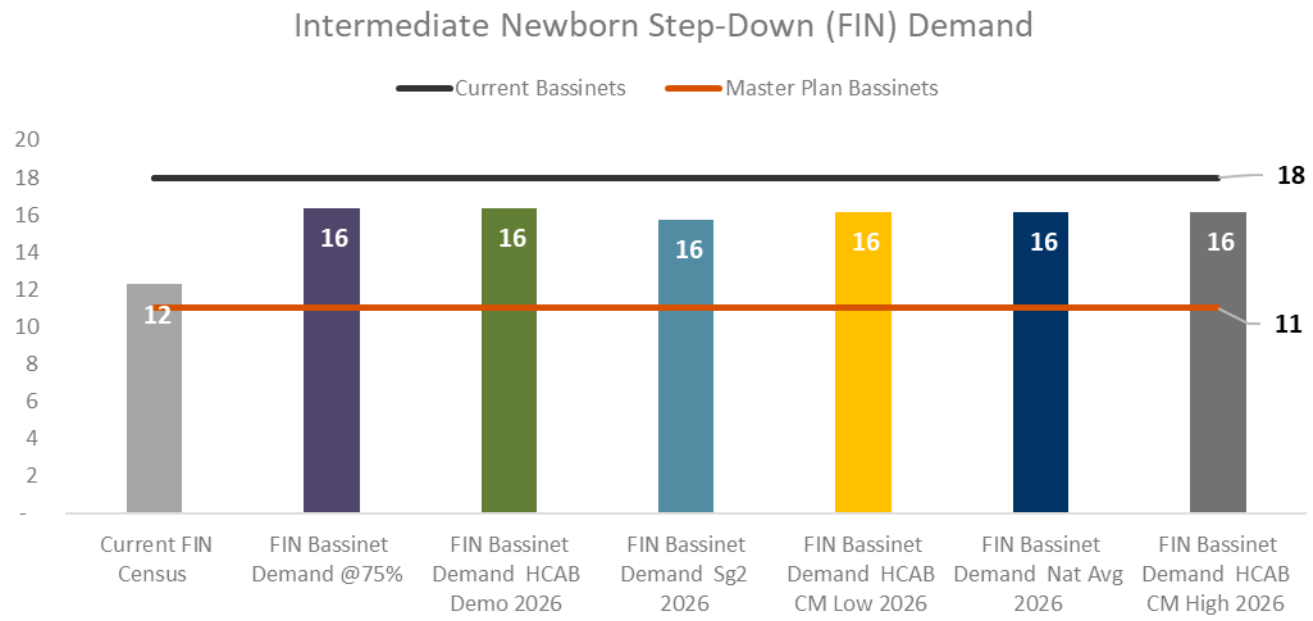
Sources: FY22 Internal (NO PL) file from UH, Sg2, HCAB

Exhibit 27: Projected Neonatal ICU Bed Demand Scenarios: UH



Sources: FY22 Internal (NO PL) file from UH, Sg2, HCAB

Exhibit 28: Projected Neonatal Intermediate Care Bed Demand Scenarios: UH



Sources: FY22 Internal (NO PL) file from UH, Sg2, HCAB

EMERGENCY DEPARTMENT BAY DEMAND METHODOLOGY

Similar to inpatient bed demand methodology, Sg2 was used to project the emergency department (ED) bed demand; however, HCAB does not publish ED workload forecasts. The Sg2 outpatient total market forecasts were applied to discharges classified as urgent, emergent, behavioral. These forecasts were applied separately for adults and pediatric patients. The Sg2 case mix-adjusted medical inpatient discharge forecasted growth was applied to emergency department admits.

Some definitions applied to the data are as follows:

- Completed Care
  - Vertical: Level 4 & %; 35% of discharged level 3
  - Acute / Main: Level 1&2, all admit level 3, 65% of discharged level 3
  - Behavioral Health: Identified with ICD Codes, includes all levels and ages
  - Pediatrics: Includes all levels
- Incomplete Care
  - Left after medical screening exam (MSE): Includes patients that left after or during MSE
  - Left without being seen (LWBS): Includes patients that walked out before triage and walked out before MSE

The demand with “triple peak” method was applied, which looks at the demand in the peak month, during the peak shift, at 95% confidence (Poisson) for each type/level of care.

Addendum:
Frequently Asked Questions

ADDENDUM: FREQUENTLY ASKED QUESTIONS

OVERVIEW

1. What is University Hospital (UH)?

University Hospital (UH) located in Newark, New Jersey is a public institution of healthcare and an instrumentality of the State of New Jersey (the State). It is the principal teaching hospital for Rutgers New Jersey Medical School and Dental School. UH is New Jersey's only public hospital and one of only three Level 1 Trauma Centers in the state.

2. What is UH's Master Facility Plan (MFP)?

The UH MFP, developed in 2022 by the architecture firm Gensler along with planning support Guidehouse, and with involvement of University Hospital leadership and staff and extensive community engagement, results in a $1.8 billion investment to modernize the facilities and patient care at University Hospital. The MFP is designed to replace, modernize, and right-size the existing capacity – *without adding significant bed capacity*. The MFP would take 8+ years to complete over 4 phases.

PROJECT SIZING AND APPROPRIATENESS

3. Is a major facility replacement/expansion project needed at UH?

Yes. UH's main facility was built in 1979 (44 years old). According to the MFP, the average age of the infrastructure is over 30 years and, according to reports from the NJ Healthcare Facility Financing Authority, UH's "average age of plant" is in the bottom quartile of hospitals in NJ. Noted deficits include compromised mechanical & plumbing, non-compliant/insufficient patient care and staff capacity, and buildings with aging exterior envelopes that are not fully sprinklered and violate current life safety codes.

Additionally, the hospital is functionally obsolete. Most of the clinical departments are undersized for the volumes, have rooms that are smaller than current codes or practice, and lack support and storage space. Inpatients are in 2- and 4-bedded rooms, computers and materials clog the corridors, ORs cannot accommodate the latest technology, and patients are "parked" in hallway bays in the ED.

4. Are the key room counts, which drive the facility plan, appropriate?

Yes. The methods used to forecast inpatient beds and emergency department bays align with industry practices, and the analyses from The Innova Group align with the results shown in the MFP. However, it should be noted that the original study used 5-year forecasts and assumed no change in market share for UH. It could be prudent to study the impact of share change and longer range forecasts for the acute care demand: it would likely be higher than what is planned in the project.

5. Is the overall size and scale of the project appropriate?

The high-level square footage "block sizes" used to convert the key room types are within the ranges typically used in the industry. The actual size, layout, and operational model for each department will be developed during the design phase of the project.

6. Is there a solution to meet the key facility needs more quickly?

This question is beyond the scope of the current study.

FINANCIAL CONSIDERATIONS

7. Is the total cost of the project reasonable? Is there a lower cost option to meet the facility needs?

This question is beyond the scope of the current study. The MFP team explored 14 scenarios, 3 of which were deemed viable based on the priorities of UH. Each of the 3 scenarios were $1.8B or more. It could be useful for the State to understand if any of the 11 initially discarded scenarios were substantially less costly, and if so, what compromises must be made to achieve a lower cost.

8. What would be the timing of funding requirements?

Estimated timing for phased funding is listed below. These are full project costs – not necessarily the amounts requested from The State.

UH MFP Capital Cost Estimates ($millions)

Phase (Duration)	Phase 1 (9 months)	Phase 2 (30 months)	Phase 3 (30 months)	Phase 4 (36 months)	Total
Funding Year	SFY 2024	SFY 2025	SFY 2027	SFY 2030	
Construction Costs	$23.5	$429.2	$610.0	$258.0	**$1,321**
Other Costs	$8.0	$150.2	$213.5	$90.3	**$462**
Total Project Costs	**$31.5**	**$579.4**	**$823.5**	**$348.3**	**$1,783**

9. How much of the project cost could UH fund with sources other than State appropriations?

A specific financing plan for the entire MFP has not yet been developed. To fund the MFP, UH will rely heavily on funding from the State because it has limited financial capability from other sources. Its cash and investment balances are well below reserves recommended to fund operations and its credit rating at BB- is non-investment grade, severely limiting its debt capacity. Philanthropic development is underway, but UH has not historically had a large philanthropic base.

10. What would the financial implications of the project be for UH's ongoing operations?

The carrying cost for the project would include depreciation expense (non-cash expense) and the additional cost of debt service (cash outflows). Based on the current project cost, UH would need to cover additional (non-cash) depreciation expenses of approximately $45M to $55M, compared to its FY 2022 net income level of $59 million. The volume growth related to the project would be expected to generate approximately $13 million in operating income annually.

COMMUNITY NEEDS/IMPACT

11. Does the MFP address community needs?

UH's MFP is focused on meeting community needs relevant to its role as the tertiary/quaternary academic medical center for the region and the public safety net hospital for the Newark area. In this role, UH's two primary areas of focus are 1) complex specialty medical care and associated medical education, and 2) high-volume emergency care and follow up treatment for the entire population regardless of ability to pay.

The community it serves is economically challenged and racially/ethnically diverse with relatively poor health status. The implications for hospitals that serve communities with these characteristics are higher use of emergency services, more complex acute care needs, and concentrated demand for safety net hospital services for the uninsured, which the MFP addresses.

There are a range of other complex community health needs that are addressed by other providers and social service agencies in the community with whom UH coordinates. Most notably primary care providers, including Federally Qualified Health Clinics (FQHCs), which focus on preventive care, low acuity outpatient services, and management of chronic illnesses. Additional/improved services are needed in this area, but FQHCs are outside of UH's operating authority.

12. How will the MFP impact other hospitals in the Region?

While a new, improved facility could draw patients selectively to UH, there will be only limited ability to accept greater volumes. Because the MFP adds very little additional capacity, it should have limited impact on the volumes of the other hospitals in Newark. UH's underlying planning assumption for bed needs was that it *would not gain inpatient market share*. Other hospitals in the study area have completed significant facility expansions/enhancements in recent years.

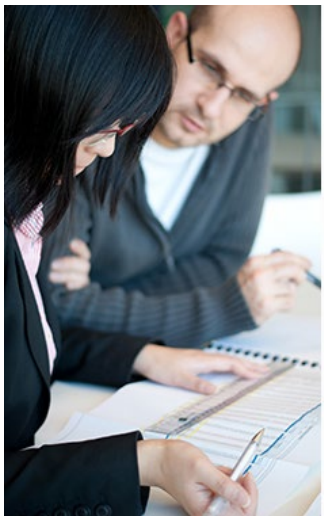
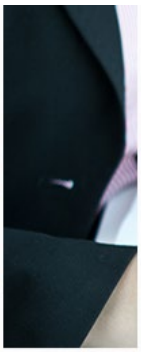
13. Are there major service gaps or unnecessary duplication in services in the Newark area?

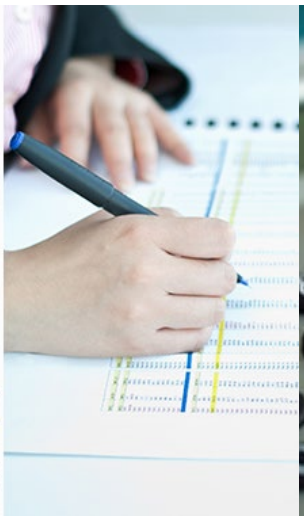
There are no crucial gaps in hospital-based services offered in the Study Area – it seems to be well served by all levels of inpatient and emergency care services. However, there is a need for more community-based services to address mental health and substance use issues as well as the obesity and diabetes prevalence in the community.

The most prevalent high-cost service which may represent unnecessary duplication based on insufficient volumes is cardiac surgery, for which SMMC and UH do not meet typical minimums.

14. How much outmigration of healthcare is there? Are there opportunities to reduce outmigration?

The outmigration is largely offset by inmigration. The level of net outmigration (outmigration minus inmigration) for hospital care is not concerning (adult ADC of ~110). Most of the outmigration occurs from towns on the borders of the Study Area where other hospitals are geographically convenient and where residents may have employment, primary care, or other connections to the outlying communities. A relatively small portion of Study Area residents outmigrate to New York (~2%).

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