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GREEN MOUNTAIN CARE BOARD

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DELIVERED ELECTRONICALLY

March 20, 2024

Eric Miller, Sr. VP and General Counsel
The University of Vermont Medical Center
462 Shelburne Road, Suite 301
Burlington, VT 05401

Re: Docket No. GMCB-004-23con, Development of Outpatient Surgery Center on Tilley Drive, Project Cost: $129,640,703

Dear Attorney Miller,

Green Mountain Care Board submits the following disclosure pursuant to the First Amended Scheduling Order of February 28, 2024:

1. **Boyd Gilman, Ph.D., Mathematica, P.O. Box 2393, Princeton, New Jersey 08543-2393. (617) 301-8974 extension 26974**

Boyd Gilman (Ph.D., Economics, Boston University) is a senior fellow at Mathematica. Dr. Gilman was one of the lead authors of a 2002 report on assessing the potential impact of the first for-profit ambulatory surgical center (ASC) in Vermont on the healthcare delivery system in Chittenden County and the state (Spitz and Gilman, 2002). More recently, Dr. Gilman developed a workforce model for Maryland's healthcare regulatory agency. He leveraged a wide range of state and national data sources to estimate the current demand and supply of physician services by region and medical specialty, as well as to assess future physician adequacy given changes in the state's demographic characteristics and physician workforce behavior. Dr. Gilman also created a health profession workforce model for the federal Department of Health and Human Services focused on medical specialties who treat patients with HIV. Dr. Gilman has also conducted several studies of the impact of federal and state payment policies on hospital costs and financial performance using claims data as well as hospital cost reports and financial statements.

Dr. Gilman's *curriculum vitae*, including a list of publications in the last ten years, is attached to Mathematica's report. Dr. Gilman has not testified as an expert in the last four years.

2. **Priya Shanmugam, Ph.D., Mathematica, P.O. Box 2393, Princeton, New Jersey 08543-2393. (510) 285-4668 extension 29668**

Priya Shanmugam (Ph.D., Economics, Harvard University) is a researcher at Mathematica. She conducted a physician workforce analysis for the state of Maryland, leveraging a wide range of survey and claims datasets at the national and state levels to estimate current and future demand and supply of physician services by region and medical specialty. Dr. Shanmugam has served as a researcher for the evaluations of Comprehensive Primary Care Plus and Primary Care First, two of the largest federal value-based payment models. She has led several real-world evidence studies for pharmaceutical and life sciences companies, using claims databases to estimate the burden of pneumococcal disease and rates of pneumococcal vaccination; the impact of alternative vaccination site policies on vaccine coverage rates; and the prevalence and long-term outcomes of long COVID.

Dr. Shanmugam's *curriculum vitae*, including a list of publications in the last ten years, is attached to Mathematica's report. Dr. Shanmugam has not testified as an expert in the last four years.

3. **Gregory M. Flicek, CPA/MBA, Ascendient Healthcare Advisors, 1335 Environ Way, Chapel Hill, North Carolina, 27517. (952) 994-3184**

Greg Flicek, CPA, MBA began his career in public accounting and transitioned to healthcare in 2010. He has held roles in healthcare finance, operations, and consulting. During his tenure with the firm, Greg has managed numerous types of engagements, has overseen the financial components of most firm engagements, and has frequently contributed to the firm's higher thinking content. Greg's passion is helping communities retain or grow healthcare services. Greg holds both a CPA license and an MBA and has taught more than 25 undergraduate or MBA courses in business strategy and accounting.

Regarding Certificate of Need, Greg has been heavily involved in applications, opposition comments, responses to opposition comments, administrative court appeals, and state health plan petitions. Greg's major focus areas have been on the financial and methodology sections of the firm's Certificate of Need applications and CON litigation. Greg has been involved in the preparation of nearly one hundred CON applications across multiple states and has testified as an expert witness in CON litigation in North Carolina and Kentucky.

Mr. Flicek's *curriculum vitae*, including a list of the cases in which he has testified, is attached to Ascendient's report.

4. **Dawn Carter, M.H.A. Ascendient Healthcare Advisors, 1335 Environ Way, Chapel Hill, North Carolina, 27517. (919) 403-3300**

As a leading thinker in transformational healthcare delivery, Dawn specializes in helping clients envision a future outside the traditional hospital "box," including new delivery channels, organizational models, and opportunities for collaboration. In addition to the latest data and modeling tools, her forward-thinking practice is solidly rooted in 30 years of healthcare consulting, marketing, planning, and market research.

Dawn has deep experience in strategic planning, mergers/acquisitions, business planning, and financial feasibility. She also assists healthcare organizations with strategizing and preparing Certificate of Need applications and serves as an expert witness in CON litigation. Throughout her career, she has been involved in the preparation of nearly a thousand CON applications in multiple states and for a wide spectrum of regulated services, including new and replacement hospitals, beds (acute, rehabilitation, psychiatry, and long-term care), skilled nursing, hospice, home health, operating and endoscopy rooms, ambulatory surgery centers, imaging centers, open heart surgery and a variety of major medical equipment. Dawn's experience includes exemption, non-applicability, no review, and material compliance requests across states, as well as permanent rule change proposals and methodology and special need petitions to the North Carolina State Health Coordinating Council. Dawn also serves as an adjunct assistant professor in the Department of Health Policy and Management at the Gillings School of Global Public Health at the University of North Carolina at Chapel Hill.

Ms. Carter's *curriculum vitae*, including a list of the cases in which she has testified, is attached to Ascendient's report.

5. **Mehdi Khosrovani, RA, AIA, President n | e |m |d architects inc., 1 Virginia Avenue, Suite 202, Providence, Rhode Island 02905. (401) 435-3532 extension 102**

Mehdi Khosrovani, RA, AIA has orchestrated all aspects of architectural design and construction in the healthcare industry, including master planning, project programming, design, construction documentation, and construction administration. Mr. Khosrovani has practiced architecture and has been involved in construction since 1980 with prior experience encompassing employment at some of the leading healthcare facilities in the region. He leads the firm in its unique specialization and has completed an extensive range of state-of-the-art projects. The scope of this includes new construction and extensive renovation in all aspects of the healthcare industry, such as operating rooms, imaging facilities, laboratories, nursing units, elderly care, mental health, medical office buildings, and research facilities.

Mr. Khosrovani's *curriculum vitae* is attached to the n | e |m |d architects report. Mr. Khosrovani has not testified as an expert.

6. Marc H. Schlessinger, RRT, MBA, FACHE, ECRI, 5200 Butler Pike, Plymouth Meeting, Pennsylvania 19462 (610) 825-6000

Marc Schlessinger is an experienced healthcare administrator, enhanced by a strong clinical skill set, having been responsible for ancillary service operations in hospitals for over 30 years. As a Senior Consultant, Marc provides consulting services and assistance to hospitals and other healthcare institutions concerning technology, strategic planning, operations, and reimbursement. He has been a practicing Registered Respiratory Therapist since 1978.

Mr. Schlessinger's *curriculum vitae* is attached to ECRI's report. Mr. Schlessinger has not testified as an expert.

Sincerely,

s/ Donna Jerry
Senior Health Policy Analyst
Green Mountain Care Board

cc: Interested Parties

Assessment of University of Vermont Medical Center's Certificate of Need Application for a New Outpatient Surgical Center in Burlington

Volume I: Surgical Demand and Capacity Projections

March 20, 2024

Priya Shanmugan and Boyd Gilman

Submitted to:

Green Mountain Care Board
144 State Street
Montpelier, VT 05602
Attention: Donna Jerry

Submitted by:

Mathematica
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Assessment of University of Vermont Medical Center's Certificate of Need Application for a New Outpatient Surgical Center in Burlington

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Boyd Gilman

Contents

Tables

Executive Summary

The University of Vermont Medical Center Inc. (UVMMC) submitted a Certificate of Need (CON) application to the Green Mountain Care Board (GMCB) on February 10, 2023. In its CON application, UVMMC proposed to develop a multi-specialty outpatient surgery center (OSC) in the Burlington area. UVMMC proposes to develop a total of eight ORs (ORs), including 12 prep rooms and 36 recovery spaces associated with the eight ORs. Five of these ORs would replace the existing five ORs at the Fanny Allen facility. The other three rooms would be new. UVMMC also proposes to build shell space to hold four additional ORs and related support space, including 14 pre- and post-operative spaces to be fit-up and utilized in the future, as needed. UVMMC stated in its application that the project would not only replace the outdated Fanny Allen facility, but also reduce unacceptable long wait times for surgical procedures and help meet the increasing demand for inpatient and outpatient surgeries from a growing and aging population.

To justify the need to construct these additional ORs and shell space, UVMMC provided projections of future **demand** including the number of inpatient and outpatient procedures it expects to perform through 2029. To create these estimates, UVMMC used data on the current number of procedures it performs, as well as assumptions about how that number will change as Vermont's population grows and ages. UVMMC compares its anticipated demand with its existing **capacity**, that is, the number of procedures it can realistically perform with its current 25 available rooms. UVMMC's capacity estimate is also based on a set of assumptions about the number of days per year and hours per day a room is used, the length of time it takes to perform a typical procedure, and the number of hours the hospital should leave open in case an unscheduled procedure needs to be performed or a delay occurs. The difference between future **demand** and existing **capacity** determines the number of additional rooms that UVMMC should build.

We divided our assessment of UVMMC's CON OSC application into two volumes. Volume I provides an assessment of the **demand** and **capacity** component of UVMMC's OSC CON application, including the anticipated demand for inpatient and outpatient surgeries in the hospital's service area, as well as the hospital's capacity to meet that demand. The second volume, prepared by Ascendient and submitted separately to GMCB, provides an assessment of the financial component of UVMMC's OSC CON application.

In its February 10, 2023 application package, UVMMC states that the demand for inpatient and outpatient surgeries at the hospital is expected to increase by between 14 and 22 percent from 2019 through 2030, depending on the inputs used. Assuming the five ORs at the Fanny Allen facility become permanently closed, this would result in a shortage of between 8 to 10 ORs by 2030, depending on the version of the model used. In subsequent responses to questions raised by GMCB during its review of the application, UVMMC revised several of its demand and capacity inputs and submitted updated projections. In its revised model, submitted to GMCB on March 12, 2024, UVMMC predicted a shortage of 11 ORs in 2029, again assuming UVMMC closes the five ORs at the Fanny Allen facility. **Sensitivity analyses indicate that these predictions remain fairly stable in the face of small variations in demand growth, length of outpatient and inpatient surgeries and operating room turnover time, and the targeted operating room utilization threshold.**

UVMMC's predicted rate of growth in demand for outpatient surgeries also aligns with forecasts independently produced by Mathematica. (Mathematica did not forecast demand for inpatient surgeries.) In its most recent version, UVMMC predicts demand for outpatient surgeries will increase at an average annual rate of 2.1 percent and cumulatively by 24 percent from 2019 to 2029. By comparison, Mathematica estimated that the number of outpatient surgeries demanded by residents in the Burlington hospital service area will increase by an average annual rate of 2.4 percent and a 27 percent cumulative increase from 2019 to 2029.

However, two factors make it difficult to fully assess the reasonableness of the demand and supply projections provided by UVMMC in its OSC CON application:

1. **Lack of supporting evidence on operating room shortages.** Lack of historic and verifiable information on wait times for inpatient and outpatient surgeries at UVMMC means that an assessment of its OSC CON application depends entirely on the results of its demand forecasting model.
2. **Use of Sg2's proprietary growth model.** UVMMC's use of a proprietary growth model makes it difficult to assess the validity of the assumptions and data used to project surgical demand.

In addition, three assumptions underlying UVMMC's demand and capacity projections as reflected in the application materials submitted to GMCB on February 10, 2023, cause concern:

1. **Public Opinion Strategies' population growth rates.** The population growth rates for two of UVMMC's demand models appear high relative to other sources. For example, UVMMC uses an over-65 population growth rate for 2020–2030 of 62 percent. By comparison, the U.S. Census forecasts over-65 population growth for the Burlington hospital service area is 36 percent and the state's own projections range from 31 to 39 percent.
2. **Turnover times.** UVMMC uses a benchmark of 37 minutes for the turnover time on its main campus and 25 minutes for the turnover time at Fanny Allen for surgical procedures in both inpatient and outpatient departments. Instead of relying on an assumption, UVMMC should base turnover times on actual times observed at its facilities, one for inpatient surgeries and one for outpatient surgeries. In addition, UVMMC should assess whether its turnover times are reasonable or represent an opportunity use existing ORs more efficiently.
3. **75 percent utilization threshold.** Thresholds for operating room utilization are set to maximize the usage of each room, while reserving operating room time to accommodate delays or unexpected procedures. Turnover time itself is a metric of operating room efficiency, and when combined with surgical time to calculate how full ORs are, the 75 percent utilization threshold seems low, particularly in the outpatient setting where unscheduled procedures are less common.

Despite these concerns and given the updates UVMMC submitted in March 2024 in response to questions from GMCB, we believe UVMMC provides a reasonable estimate of the future need for ORs at the hospital. An increase in the planned utilization threshold or increased efficiency in the utilization of ORs, including faster turnover times in the expanded space, would delay the need for additional capacity (particularly the need for shell space) by a couple of years, but it would not eliminate the predicted shortage in the next five years entirely.

I. Introduction

The University of Vermont Medical Center (UVMMC) submitted a Certificate of Need (CON) application for the development of a multi-specialty outpatient surgery center (OSC), located on a new parcel of land approximately 3 miles from its main campus. UVMMC operates a total 25 ORs (ORs): 20 of the room are located on the hospital's main campus and used for both inpatient and outpatient procedures and 5 ORs are located at its Fanny Allen facility used exclusively for outpatient procedures.[1] UVMMC proposes to develop a total of 8 new ORs—including 12 prep rooms and 36 recovery spaces associated with the 8 ORs. Five of the 8 ORs replace the outpatient rooms at the Fanny Allen facility plus 3 new ORs. UVMMC also proposes to create enough shell space to accommodate 4 additional ORs and related support space (including 14 pre- and post-operative spaces to be fit-up and utilized in the future as needed) (Page 2, OSC CON application, February 10, 2023).

UVMMC asserts in its application that it can and should invest in the project not only to replace the ORs at the outdated Fanny Allen facility, in which some ORs have had temporary closures due to technical issues, but also to reduce current unacceptably long wait times for surgical procedures as well as to meet the increasing demand for inpatient and outpatient surgeries from a growing and aging population in the future (Page 3, OSC CON application, February 10, 2023). UVMMC also asserts that a new OSC will enable the hospital to shift a portion of its surgical cases currently being performed on the main campus to the new facility, contributing to increased inpatient capacity at the main campus (Page 1, OSC CON application, February 10, 2023). UVMMC estimated the OSC would take 18 months to build, with an anticipated start date in fiscal year (FY) 2025 (Page 2, OSC CON application, February 10, 2023).

To justify the need for the additional ORs, UVMMC estimates the number of surgical procedures that will be demanded by patients in its service area through 2029 and then compares it with the number of surgical procedures that its current set of ORs can accommodate. If the estimated demand for procedures exceeds the number that UVMMC can currently provide, the applicant concludes that additional rooms should be constructed. However, like all forecasting models, UVMMC's projections rely on a set of assumptions, including (1) how demand will grow over time, as Vermont's population grows and ages; and (2) how many procedures each operating room can accommodate, which in turn depends on a range of assumptions, such as how long each procedure takes, how much turnover time is needed between procedures, and what proportion of rooms should be left open to accommodate unexpected demand.

The purpose of this volume of our report is to review and provide feedback to the Green Mountain Care Board (GMCB) on the **demand** and **capacity** projections in UVMMC's OSC CON application, including both the anticipated demand for inpatient and outpatient surgeries in the hospital's service area, as well as the hospital's estimated capacity to meet that demand. This report is based on a review of UVMMC's OSC CON application (dated February 10, 2023), as well as supporting materials submitted by UVMMC over the next 12 months in response to a series of questions (Q.001–Q.009) from GMCB. A second volume of the overall assessment report, covering UVMMC's financial projections, will be submitted separately.

[1] UVMMC explained in its application that several ORs were not being used from 2019 to 2023 due a range of issues, including air quality issues, deferred maintenance, and COVID-related closures.

We divided this volume into six sections. After this introduction (Section A), we summarize the key model inputs and assumptions UVMMC submitted to GMCB on February 10, 2023 (Section B). We then summarize the main results from UVMMC's model, focusing on the projected demand and capacity for ORs from 2019 through 2029 (Section C). Next, we provide our assessment of those results, highlighting several areas of concern (Section D). We then present the results of UVMMC's model based on a set of revised inputs requested by GMCB and submitted on March 12, 2024 (Section E). We also evaluate the sensitivity of the updated results to alternative utilization thresholds and compare UVMMC's demand projections to those independently produced by Mathematica (Section E). Finally, we summarize our conclusions. (Section F).

II. Key Inputs and Assumptions in UVMMC's Demand and Capacity Projections (Based on February 2023 Application Materials)

In this section, we describe the key inputs and assumptions underlying the surgical demand and capacity projections that UVMMC submitted in its OSC CON application and supporting materials to GMCB in February 2023. (We discuss subsequent changes that UVMMC made to its model inputs in response to questions from by GMCB in Chapter E.) We describe these inputs in Table 1 and discuss them in detail in this section. Other factors— such as health profession workforce shortage, hospital closures or mergers in New England providing the same type of surgeries, and unexpected health emergencies—may also affect demand or capacity but are not included in our analysis.

Table 1. Assumptions needed to estimate demand for and capacity of surgeries

Demand	Capacity
• Current number of surgeries demanded (by population age group) • Population growth rate • Changes in composition of population over time • Other growth factors such as epidemiological factors, policy changes, and technological shifts in health care provision	• Number of operational ORs • Number of minutes per year each OR is available • Average length of surgery • Average time needed to clean ORs after surgery and prepare for another one • Utilization threshold (the percentage of capacity that should be left unfilled to meet unexpected demand)

Notes: Demand is defined as the number of inpatient and outpatient procedures UVMMC expects to need to perform through 2029. Capacity is defined as the number of procedures UVMMC can realistically perform given its current availability of 25 rooms.

OR = operating room.

UVMMC's **demand projections** depend on three factors: (1) changes in the size and composition of the population in its service area; (2) the average number of surgeries per demographic subgroup (for example, women ages 65 and older); and (3) changes in number of surgeries demanded due to epidemiological, technology, or policy factors. For example, a newly developed surgical procedure or an increase in the proportion of the population with health insurance might increase the number of surgeries demanded. However, if a medical device or drug is developed that creates a simpler diagnostic or therapeutic alternative to a surgical procedure, the state may expect a decrease in demand within that service line.

UVMMC's **capacity projections** also depend on a range of empirical inputs: (1) the number of ORs available, (2) the days and hours of operation for those rooms, (3) the average length of surgeries, and (4) the average time to turn over ORs between surgeries. In addition, capacity projections depend on the utilization threshold imposed on the ORs, that is, the percentage of the operating room's overall capacity that hospitals deliberately leave unused to accommodate unexpected demand for surgeries.

A. Surgical demand projections

To develop a comprehensive OR demand model for both inpatient and outpatient surgical cases, UVMMC first established the current demand for surgical procedures in 2019, and then projected that demand over 10 years based on population growth and other demand-side factors.

Current demand. To establish baseline demand, UVMMC used data on the procedures performed on its main campus in 2019. UVMMC excluded from its projections (1) ORs on the University of Vermont's Fanny Allen facility, due to the closure of the facility; and (2) special-purpose ORs, such as hybrid, labor and delivery, and pacemaker installation (cardiology) ORs, as well as procedure rooms used for bronchoscopy, endoscopy, and dental procedures. UVMMC selected 2019 as the baseline year because it was the most recent year for which data were available at the time of preparing their application that was not impacted by the COVID-19 pandemic, the October 2020 cyber-attack, or the closure of the Fanny Allen ORs (Page 8, OSC CON application, February 10, 2023).

According to the application, in 2019 UVMMC conducted 6,078 *inpatient* surgical procedures (the most frequent being general and orthopedic surgeries) and 12,671 *outpatient* surgical procedures (the most frequent being orthopedic; ear, nose, and throat; urology; and general surgeries) (Page 20, response to Q.002, June 15, 2023). Table A.1 in the appendix shows the number of surgical procedures performed at the hospital for each inpatient and outpatient service line in 2019.

Population growth. Using 2019 demand for inpatient and outpatient procedures as its baseline, UVMMC applied a set of yearly growth rates to estimate future demand for surgical procedures in both settings. UVMMC grows this baseline demand over time based on the number and composition of the population in its service area. UVMMC implicitly assumes that the total demand the hospital serves (regardless of the location of the patient) will increase proportional to the growth of the population in the Chittenden County. UVMMC also assumes that it will not experience any shifts in market share or demand changes from outside its region. UVMMC presents three separate surgical demand projections through 2030—(1) the Sg2 model, (2) the Public Opinion Strategies (POS) model, and (3) the hybrid model (Pages 10-11, OSC CON application, February 10, 2023).

In all three models, surgical demand in each service line grows as a function of the population growth rate for the over-65 and under-65 populations, weighted by how many procedures are done for each of these population subgroups. In all three models, baseline demand is based solely on demand in 2019. The three models use different data and assumptions to estimate how demand will grow over time.

Table 2 shows the cumulative population growth rates from 2020 to 2030 in each of the three models UVMMC used to estimate demand. We provide details on the differences in the sources and assumptions between the three models below.

Table 2. Population growth rates and other non-population growth factors in UVMMC's demand projection models: 2020–2030

Factors	Sg2 model	POS model	Hybrid model
Population growth rate, 65 years of age and older	30%	62%	62%
Population growth rate, overall	4%	6%	6%
Other non-population growth factors[a]	Yes	No	Yes

Source: UVMMC OSC CON application, Pages 10-11, February 10, 2023.

Note: UVMMC did not provide a population growth rate for the population less than 65 years for the POS model.

[a] Non-population growth factors in the Sg2 model include economy and consumerism, health care policy, epidemiological changes, innovation and technology, and systems of care. In addition to population, the Sg2 model produces a separate percent adjustment for each of these five factors.

1. **Sg2 model.** This model projects baseline procedure volume for each service line through 2030 by using growth rates from a proprietary model developed by Sg2. Sg2 is a market analytics firm that develops forecasts of health care demand. Sg2's rates of demand growth reflect changes in population growth (based on population growth data for the over-65 and under-65 populations from Claritas, a consumer analytics company). The demand for procedures in each line is calculated by taking the weighted average of Sg2's growth rates for the under- and over-65 populations, weighted by the proportion of under- and over-65-year-olds who received procedures in the given service line at UVMMC in 2019. Effectively, this means that the demand for procedures typically performed on a specific subpopulation will grow at a rate similar to the growth rate for that subpopulation (Page 10, OSC CON application, February 10, 2023).
2. **Public Opinion Strategies (POS) model.** This model projects baseline procedure volume through 2030 based solely on population growth rates for the under- and over-65 populations, using population growth data from POS. POS is a public-opinion research firm that specializes in political opinion research. Like the Sg2 model, the POS model grows demand for procedures in each service line by taking the average of POS' under- and over-65 growth rates, weighted by how many individuals over and under 65 received procedures in the given service line at UVMMC in 2019. The population growth rates in the POS model, especially for the population aged 65 and above, are twice as high as the Claritas population growth rates used in the Sg2 model (Page 11, OSC CON application, February 10, 2023).
3. **Hybrid model.** This model combines Sg2's growth rates for the under-65 years of age population and POS's higher population growth rates for those at or over 65 years of age (Page 11, OSC CON application, February 10, 2023).

Non-population growth factors. The Sg2 model also includes percentage adjustments for five other non-population demand-side factors related to economy and consumerism, health care policy, epidemiological changes, innovation and technology, and systems of care (Page 23, response to Q.002, June 15, 2023). UVMMC provided the percentage adjustments for each non-population growth factor in the Sg2's Model its February 27, 2024, submission (Page 3). However, despite the additional description of the model, it is a proprietary product, and we were unable to evaluate the methods, data, or assumptions in the model. UVMMC also applied these same non-population demand-side growth factors in the hybrid model. (The POS model does not account for changes in non-population demand-side growth factors.)

Based on these population and non-population demand-side inputs and assumptions, Table 3 summarizes the projected number of inpatient and outpatient surgical procedures demanded in 2029, as well as the effective overall growth in demand for surgical procedures, according to each of the three models. The Sg2 model provides the lowest estimate of a 14 percent cumulative growth in demand for surgical procedures, while the hybrid model projects the highest with a 22 percent cumulative increase in demand.

Table 3. Projected demand for procedures based on UVMMC's three projection models, 2029

Component of projected demand	Sg2 model	POS model	Hybrid model
Number of procedures demanded			
Inpatient	6,231	7,226	6,717
Outpatient	15,938	15,980	17,050
Total	22,169	23,206	23,767
Percentage increase in demand			
Inpatient	2%	18%	10%
Outpatient	20%	20%	28%
Total	14%	19%	22%

Source: Page 13, UVMMC OSC CON application, February 10, 2023.

B. UVMMC's capacity for supplying outpatient surgical procedures

UVMMC estimates its current and future surgical capacity by multiplying the number of available ORs by an assumed number of days, hours, and minutes these ORs are operating; the length of surgery (that varies by service line and is derived from UVMMC's own data); and turnover time (based on an assumption that does not vary by service line). Finally, they multiply the overall capacity by a utilization threshold (expressed as a percentage) based on a belief in how full the ORs should be to maximize both efficiency and safety. Table 4 summarizes the key inputs for projecting capacity.

Table 4. Key inputs for projecting inpatient and outpatient surgical capacity

Key inputs	Value used
UVMMC's model[a]	
Days per year (days) [1]	250
Hours per day (hours) [1]	10
Minutes per hour (minutes) [1]	60
Average length of surgery (hours) [2,b]	2.67 overall (3.17 for inpatient and 1.75 for outpatient)
Average turnover time (hours)[2,c]	0.62 (main campus) and 0.42 (Fanny Allen facility)
Utilization threshold (percent) [1,3]	75%
Surgical capacity in 2019 (per operating room) [4]	17,561

Sources:

[1] Page 13, UVMMC OSC CON application, February 10, 2023.

[2] Pages 18-19, response to Q.002, June 15, 2023.

[3] Page 22, response to Q.002, June 15, 2023

[4] Excel workbook, response to Q.006, November 16, 2023

Notes:

[a] These capacity inputs are used on all three of UVMMC's population growth models (Sg2, POS, and hybrid).

[b] Based on weighted average across service lines. A change in the distribution of cases across services line will affect the weighted average length of surgery and turnover time.

[c] Based on inputs recommended by Halsa Advisors.

Current ORs. Currently, UVMMC has 25 ORs. There are 20 ORs located at the UVMMC main campus, comprised of 18 ORs and 2 large procedure rooms. There are 5 ORs located at the Fanny Allen campus; UVMMC uses these rooms exclusively for outpatient procedures. The Fanny Allen ORs have been identified for replacement in the UVMMC Facilities Master Plan since 2017 (Page 1, OSC CON application, February 10, 2023).

Days per year, hours per day, and minutes per year OR is available. In its application, UVMMC assumes each operating room (both inpatient and outpatient) will be open for 250 days per year, 10 hours per day, and 60 minutes per hour (Page 13, OSC CON application, February 10, 2023).

Length of surgery. The average surgery length is calculated separately for all inpatient surgeries and all outpatient surgeries, using data from UVMMC's 2019 WiseOR and Epic I data. The average procedure time (not including the time it takes to turn over an operating room between procedures) is 190 minutes (3.17 hours) for inpatient surgeries and 105 minutes (1.75 hours) for outpatient services. The surgery times range widely, from 85 minutes for an outpatient pediatric surgery to 319 minutes for an inpatient transplant (Page 18, response to Q.002, June 15, 2023). Table A.2 in the appendix shows the procedure time for each inpatient and outpatient service line.

Turnover time. UVMMC assumes in its application that the turnover time between procedures is 37 minutes (0.62 hours) for procedures conducted on the main campus and 25 minutes (0.42 hours) for procedures conducted at Fanny Allen. These assumptions were recommended to UVMMC by Halsa Advisors and supported by the results of a hospital survey conducted by Vizient (Page 19, response to Q.002, June 15, 2023; Page 4, response to Q.006, November 16, 2023).

Utilization threshold. Based on the days, hours, and minutes available, each operating room can accommodate 250 x 10 x 60 = 150,000 minutes of procedures and turnovers per year. However, ORs should not be filled to 100 percent of their capacity, as some time must be reserved to accommodate unexpected procedures or delays. Based on a benchmark recommended by Halsa Advisors, UVMMC assumes its rooms should be utilized at 75 percent of capacity; the remaining 25 percent of unused capacity should be reserved to meet unexpected spikes in demand. The 75 percent utilization assumption includes both procedure time and turnover time and is applied to both inpatient procedures performed in the hospital and outpatient procedures performed in the OSC (Page 22, response to Q.002, June 15, 2023).

Based on these inputs and a 75 percent utilization threshold, UVMMC estimates in its February 2023 application materials it could have accommodated 17,561 surgical cases across its 25 ORs in 2019 (cited in workbook submitted on November 17, 2023).

III. Summary of Results of UVMMC's Demand and Capacity Model (Based on February 2023 Application Materials)

In this section, we summarize the results of UVMMC's surgical demand and capacity projections through 2029, based on the inputs and assumptions described above.

UVMMC uses the assumptions and inputs for surgical demand to estimate the number of procedures that it will need to perform in 2029. UVMMC uses the assumptions and inputs for surgical capacity to estimate the number of procedures that UVMMC can perform using the ORs it has available. The difference between demand and capacity represents the number of procedures that UVMMC can accommodate only if new ORs are constructed. Based on assumptions about the number of procedures one operating room can accommodate, UVMMC calculates the number of additional rooms needed to perform those procedures.

Table 5 shows the projected total number procedures demanded in 2029, and the number of ORs needed to meet the projected demand, under UVMMC's three surgical growth models.

Table 5. Number of inpatient and outpatient procedures demand through 2029, by model

Component of projected demand	Sg2 model	POS model	hybrid model
Estimated number of procedures demanded	22,169	23,206	23,767
Estimated number of ORs needed to meet demand	28.5	29.9	30.6
Number of ORs currently available	25	25	25
Estimated number of **additional** ORs needed to accommodate procedures that exceed current capacity	3.5	4.9	5.6

Source: Page 13, UVMMC's OSC CON application, February 10, 2023.

Notes: The number of ORs needed to meet demand is calculated by assuming a 75 percent operating room utilization threshold. We calculate the number of additional ORs that will need to be constructed assuming that the 25 rooms currently available at UVMMC will remain available.

OR = operating rooms.

All three models in UVMMC's application (Sg2, POS, and hybrid) predict that additional ORs over the 25 currently available rooms will need to be constructed to meet predicted surgical demand in 2029. The Sg2 and POS models predict that 28.5 and 29.9 ORs, respectively, UVMMC will need to meet demand in 2029. If the five Fanny Allen ORs do not resume operations, as UVMMC states in its application, this would require bringing online between 8.5 and 9.9 new ORs (in addition to the 20 currently available ORs on the main campus by end of the decade). The hybrid model, which combined the higher population growth rate for the 65 and older population from the POS model and the growth rate for the under 65 years of age from the Sg2 model, plus the non-population growth factors from the Sg2 model, predicts that 30.6 ORs will be needed by 2029, necessitating the construction of 10.6 additional rooms.

IV. Assessment of UVMMC's Demand and Capacity Model (Based on February 2023 Application Materials)

After reviewing the inputs and methods used in UVMMC's application and supporting documents, we identified six components of the application that cause some concern: (1) lack of supporting evidence on operating room shortages, (2) use of a proprietary growth model that does not allow for external evaluation, (3) use of POS' population growth rates as opposed to U.S. Census-based sources, (4) relatively high turnover time, (5) assumed growth in demand for inpatient surgeries, and (6) the use of the 75 percent benchmark for OR use. We discuss each of these components below.

Lack of supporting evidence on operating room shortages. UVMMC's CON application uses its projection model as the main source of evidence that the hospital is facing a shortage of ORs. However, all projection models require assumptions (and uncertainty) around the population's growth, changes in market share, and other shifts that might affect demand for surgeries over time. Concrete evidence that UVMMC has been facing a long-term and growing shortage of operating room shortages, either through longer wait times or more delayed care, would have strengthened its case. UVMMC noted that, as of November 2023, it had 375 patients waiting 60 to 90 days for their surgical procedure, and 341 patients waiting more than 90 days (Page 7, response to Q.006, November 16, 2023). However, without more detailed wait time data over a longer period, it is difficult to assess whether these counts are evidence of an operating room shortage. The CON application is primarily based on UVMMC's surgical demand projection model, and therefore we can only examine the inputs of the model.

Use of Sg2's proprietary growth model. UVMMC's use of a proprietary growth model makes it difficult for a third party to assess the validity of the assumptions and data used to project surgical demand. Sg2's Impact of Change model purports to predict changes in both inpatient and outpatient surgical demand due to factors related to the economy and consumerism, epidemiology, policy, innovation and technology, systems of care, and population growth (Page 23, response to Q.002, November 2023). In response to a request from GMCB, UVMMC provided a detailed description of the individual growth factors in the Sg2 model, including the numerical values for each growth factors and the data sources used to derive those estimates (Page 3, response to Q.009, February 2024). However, in the absence of more detailed information on how Sg2 uses the data to derive the estimates for these factors, we cannot assess whether the model provides a reasonable source for UVMMC's demand projections.

Use of POS' population growth rates. Our third concern is that the POS population growth estimates (used in UVMMC's hybrid model alongside Sg2's nonpopulation growth factors) for the over-65 years of age population appear high relative to most other sources. For example, based on Mathematica's review of the U.S. Census's forecasted population growth for the Burlington HSA for 2020-2030 is 36 percent. The state's own projections range from 31 to 39 percent for the over-65 population. UVMMC explained that POS developed its 62 percent projection for the over-65 population by comparing U.S. Census data from 2019 with a state projection to 2030, instead of deriving both 2019 and 2030 estimates from the same source (Page 17, response to Q.002, June 2023).

Turnover time. There are two concerns with the turnover time assumptions. First, UVMMC uses a fixed 37-minute turnover time for all main campus procedures and a fixed 25-minute turnover time for all Fanny Allen procedures, even though turnover times may be shorter for outpatient surgeries and longer for inpatient surgeries. The model's projections will be more accurate if turnover times are specific to inpatient and outpatient service lines, and ideally based on actual data on turnover times at UVMMC instead of an assumed benchmark.

Second, the 37-minute assumption may represent room for increased efficiency in the use of ORs. Some scoring tools for evaluating OR efficiency classify turnover times as efficient if less than 25 minutes, moderate if between 25 and 40 minutes, and slow if greater than 40 minutes.[2] While the results of the Vizient survey suggests that UVMMC's 37-minute turnover time is fast relative to similarly large, predominantly inpatient surgical departments and academic medical centers, UVMMC also suggests that once newer ORs are built, physician productivity will increase to accommodate demand. In response to a question from GMCB, UVMMC states "The OSC project will enable UVM Medical Center to increase outpatient OR cases to meet forecasted demand through 2029 without adding surgeon FTEs because the OSC's proposed design will optimize utilization of space, staff, and equipment to increase physicians' productivity" (Page 11, response to Q.002, June 2023). There is ample literature on how factors such as organizational management processes, scheduling strategies, and approaches to staffing affect physician productivity. However, there is less understanding of the impact of the design of ORs. UVMMC has not explained nor supported the specific aspects of the design of the OSC that may lead to increases in physician productivity.

Growth rate in inpatient surgeries. The predicted increase in demand for inpatient surgeries appears high across all three scenarios. According to the hybrid model, inpatient surgeries are expected to increase by more than one-third the rate of outpatient surgeries between 2019 and 2029 (10 percent for inpatient surgeries compared with 28 percent for outpatient surgeries) (Page 13, OSC CON application, February 10, 2023). UVMMC's POS model predicts an even higher rate of 18 percent growth in demand for inpatient surgical procedures (compared with 20 percent for outpatient surgeries). These predictions are driven by higher expected growth among the population that is 65 years and older in UVMMC's service area. At the same time, UVMMC states that it will not need to hire additional surgeons to accommodate the increase in inpatient surgeries. Because inpatient surgeries are reimbursed at a much higher rate than outpatient surgeries, the financial implications of the predicted rate of increase in inpatient surgeries should be carefully examined. We discuss the implications of the number of predicted inpatient surgeries for the financial impact of the OSC expansion in Volume II of this report.

Use of 75 percent utilization threshold. Our final concern surrounding UVMMC's methodology is the use of the 75 percent operating room utilization benchmark, and the inclusion of turnover time in utilization, for both inpatient and outpatient settings. Based on our review of the literature, there is no single, ideal measure of OR utilization. However, turnover time itself is a metric of OR efficiency, for

[2] Macario, Alex. "Are your hospital operating rooms "efficient"? A scoring system with eight performance indicators." *Anesthesiology*, Vol. 105, August 2006, pp. 237-240. Available at https://pubs.asahq.org/anesthesiology/article/105/2/237/6656/Are-Your-Hospital-Operating-Rooms-Efficient—A Scoring System with Eight Performance Indicators.

example as part of the Canadian Pediatric Wait Times Project.[3] Under the current definition of utilization, UVMMC's ORs could be at 75 percent utilization because procedures are being performed 50 percent of the time, and rooms are being turned over 25 percent of the time, or because procedures are being performed 25 percent of the time and rooms are being turned over 50 percent of the time.

The literature does identify metrics of OR efficiency with turnover time included in OR utilization. However, if utilization is measured this way, it would be reasonable to provide estimates for a higher target utilization benchmark. A simulation-based 2003 study by Tyler, Pasquariello, and Chen suggested that peak efficiency in the OR results when utilization (defined as surgery time plus turnover time) is between 85 and 95 percent.[4] In Section E of this report, we explore the sensitivity of UVMMC's model to the choice of utilization benchmark.

[3] Rothstein, D. and M.V. Raval. "Operating room efficiency." *Seminars in Pediatric Science*, Vol. 27, Issue 2, April 2018, pp. 79-85. Available at https://www.sciencedirect.com/science/article/abs/pii/S1055858618300040?via%3Dihub

[4] Tyler, D., C.A. Pasquariello, and C.H. Chen. "Determining Optimum Operating Room Utilization." *Anesth Analg*, Vol. 96, 2003, pp. 1114-21. Available at https://staff.washington.edu/mikeaa/SIP1/SIP1BestPractices/Determining_Optimal_Operating_Room_Utilization.pdf

V. Sensitivity and Validation of UVMMC's Demand and Capacity Model

A. Sensitivity analysis of UVMMC's model

Given the concerns summarized in Section D above, GMCB requested adjustments to UVMMC's models. GMCB also asked UVMMC to provide its updated results in an Excel workbook so that it could replicate the calculations. In response, UVMMC made several updates to its model by (1) using separate turnover times for inpatient and outpatient surgeries and creating a weighted average of the two based on their respective volumes; (2) adding one additional surgical room turnover to each operating room at the end of each day, (3) replacing the hybrid model with the Sg2 model (Scenario 1 instead of Scenario 3) and (4) using Claritas' latest population growth estimates from 2024.[5] We believe UVMMC's version of the model provided in response to GMCB-requested adjustments provides a more reasonable forecast of the need for surgical room capacity than the original version.

Table 6 compares the results of the model UVMMC submitted (in workbook format) in November 2023 with those produced by the version submitted in March 2024. Both models assume a 75 percent OR utilization rate and incorporate proprietary nonpopulation growth factors from Sg2. In the November 2023 model, UVMMC uses population growth rates from POS and turnover times for procedures performed at the main campus versus the Fanny Allen facility. In the March 2024 model, it uses the lower population growth rates from Claritas and a weighted average both locations to get the average inpatient and the average outpatient turnover times. In the March 2024 model, UVMMC also included an end-of-day turnover time adjustment, adding one additional cycle of surgical room turnover at the end of each day to each OR in its projections.

[5] In the version of the model submitted on March 12, 2024, UVMMC used a turnover time of 0.53 hours (32 minutes) for inpatient surgeries and 0.62 (37 minutes) for outpatient surgeries.

Table 6. Comparison of ORs needed to meet projected demand based on November 2023 and March 2024 versions of UVMMC's model

Year	UVMMC model (November 16, 2023 version) • 75 percent capacity utilization • POS population growth rates • With Sg2 nonpopulation growth factors • Turnover time by facility • Without EOD turnover time adjustment	UVMMC model (March 12, 2024 version) • 75 percent capacity utilization • 2024 Claritas population growth rates • With Sg2 nonpopulation growth factors • Turnover time by department, based on weighted facility time • With EOD turnover time adjustment
2019	27.0	26.4
2020	21.9	23.1
2021	23.2	27.9
2022	24.4	25.1
2023	27.0	27.2
2024	29.8	28.6
2025	30.5	29.2
2026	31.0	29.6
2027	31.6	30.0
2028	32.1	30.3
2029	32.7	30.7

Source: Results of workbook provided by UVMMC in its OSC CON application, November 16, 2023, and March 12, 2024.

Note: Values for 2019–2023 are based on actual number of surgeries performed. Values for 2024–2029 are based on projected number of surgeries demanded and current capacity. Red shading indicates that UVMMC will need the three new ORs, after it replaces the five Fanny Allen spaces. Blue shading indicates that UVMMC will require the use of the additional four shell spaces, after UVMMC replaces the five Fanny Allen spaces and constructs the three new ORs.

Both versions of the model indicate that the three proposed new rooms (in addition to the five rooms to replace the Fanny Allen closures) plus some of the additional shell spaces are needed to accommodate the current demand for surgeries (29.8 ORs in the November 2023 version and 28.6 ORs in the March 2024 version). By 2029, the November 2023 and March 2024 versions of the model project that UVMMC will need 32.7 and 31.0 total ORs, respectively, suggesting that the five Fanny Allen replacement rooms, the three additional ORs, and the four shell spaces will be needed under both sets of assumptions by the end of the decade.[6]

The one remaining input that causes concern is the assumption that UVMMC needs to reserve 25 percent of its OR capacity to accommodate delays or unexpected spikes in the demand for surgical procedures, particularly for outpatient surgeries. That is, UVMMC should plan its expansion based on the assumption that it will only use 75 percent of its capacity. To evaluate the sensitivity of the UVMMC forecasts to this assumption, we used the March 2024 version of the model and simulated how the demand for ORs relative to capacity would change if UVMMC instead used an 80, 85, or 90 percent utilization threshold.

[6] The revised inputs in the March 2024 version of the model also result in a relatively lower growth rate of demand for inpatient surgeries (8 percent), compared with 12 percent reported in the workbook submitted on November 16, 2023.

For all versions of the model, we highlight a shortage if the number of rooms needed exceeds the current 25 ORs (5 at Fanny Allen and 20 on the main campus). For each model, we also highlight the years in which the model suggests that the 3 new ORs and some or all of the four shell spaces will be needed.

The results (shown in Table 7) indicate that if UVMMC fills its rooms at 80, 85, or 90 percent of capacity, it will need fewer ORs in each year compared with UVMMC's 75 percent utilization threshold. Under the 80, 85 or 90 percent utilization thresholds, the model predicts that UVMMC will need three new ORs (in addition to the five Fanny Allen replacements) in 2023, 2024, and 2028, respectively. The 80 percent version of the model also predicts that UVMMC will need four shell spaces in 2027, while the 85 and 90 percent versions indicate that UVMMC will not need these four spaces until 2029. The OR utilization threshold is therefore a critical component of UVMMC's demonstration of need. An optimal threshold should reflect that utilization includes surgical time, turnover time, and additional end-of-day turnovers. Tables A.3 and A.4 in the appendix provide details on the number of surgeries and ORs demanded and the resulting shortage of ORs at current capacity at 80 and 85 percent utilization threshold, respectively.

Table 7. Number of ORs needed to meet projected demand using alternative utilization thresholds (based on model UVMMC submitted on March 12, 2024)

Year	75% utilization	80% utilization	85% utilization	90% utilization
2019	26.4	24.8	23.3	22.0
2020	23.1	21.6	20.4	19.2
2021	27.9	26.1	24.6	23.2
2022	25.1	23.5	22.1	20.9
2023	27.2	25.5	24.0	22.7
2024	28.6	26.8	25.2	23.8
2025	29.2	27.4	25.8	24.4
2026	29.6	27.8	26.1	24.7
2027	30.0	28.1	26.4	25.0
2028	30.3	28.4	26.8	25.3
2029	30.7	28.8	27.1	25.6

Source: Mathematica's analysis of workbook submitted by UVMMC on March 12, 2024.

Note: Demand estimates based on the Sg2 growth model using 2024 population data from Claritas. Capacity estimates based on inputs reported in UVMMC's OSC CON application and responses to questions. Demand for ORs shown for four utilization threshold assumptions. Values for 2019–2023 are based on actual number of surgeries performed. Values for 2024–2029 are based on projected number of surgeries demanded and current capacity. Red shading indicates that UVMMC will need the three new ORs, after it replaces the five Fanny Allen spaces. Blue shading indicates that UVMMC will require the use of the additional four shell spaces, after UVMMC replaces the five Fanny Allen spaces and constructs the three new ORs.

B. Comparison of UVMMC's model to Mathematica's outpatient surgical demand model

Independent of its review of the UVMMC OSC CON, GMCB asked Mathematica to build a statewide model to forecast the demand for surgeries performed on an outpatient basis in a hospital OR, procedure room, or freestanding ambulatory surgical center (ASC) by the hospital service area (HSA) in which the patient lives as well as the type of surgery. This model uses microsimulation techniques and both observed and imputed surgical cases based on information reported in the Vermont Health Care Uniform

Reporting and Evaluation System (VHCURES) and the Vermont Uniform Hospital Discharge Data System (VUHDDS) from 2016–2019.

As shown in Table 8, Mathematica estimated that the number of outpatient surgeries demanded in the Burlington HSA (as determined by the residency of the patient) would increase from an average annual number of 14,885 surgical cases in 2019 to 18,915 in 2029. This represents a 2.4 percent average annual increase (and a 27 percent cumulative increase from 2019 to 2029). This growth in demand is associated with changes to the size and demographic distribution of the population in Burlington only. When factoring in the nondemographic trends from the baseline period (such as the development of new technologies, a shift in surgeries from inpatient to outpatient settings, an increased health care coverage and accessibility, and personal preferences), the estimated average annual growth rate in outpatient surgeries increases to 3.5 percent. Both figures are higher than UVMMC's estimated annual growth rate for outpatient surgeries of 2.1 percent (and cumulative growth rate of 24 percent) over the same period (using UVMMC's March 12, 2024, version of the model).

Table 8. Comparison of demand for outpatient surgeries predicted using UVMMC versus Mathematica forecasting models

Year	UVMMC model (March 12, 2024)	Mathematica model
2019	13,052	14,885
2020	10,489	15,781
2021	11,586	16,131
2022	12,431	16,471
2023	14,109	16,822
2024	14,733	17,184
2025	15,153	17,524
2026	15,397	17,865
2027	15,641	18,225
2028	15,885	18,568
2029	16,129	18,915

Source: UVMMC results are based on workbook submitted by UVMMC on March 12, 2024. Mathematica's results are based on its independent outpatient surgical demand model.

Several unique features of Mathematica's forecasting model limit its value for assessing the reasonableness of the projections presented in UVMMC's OSC CON application:

- First, Mathematica's model is based on total demand among people who live in the Burlington HSA (without concern for where the surgery takes place), whereas the UVMMC model estimates demand for surgeries performed at UVMMC's main campus or the Fanny Allen facility only (without regard to where the patient lives). This means that Mathematica's model includes surgical procedures for Burlington residents that took place at other facilities in Vermont as well as in facilities in New Hampshire and New York but does not include procedures for non-Burlington residents that took place at UVMMC.

- Second, Mathematica's model includes many procedures that can be performed in a physician's office, freestanding ASC, or outpatient clinic, while the models in the UVMMC OSC CON application estimate demand for surgeries performed in a hospital OR only.
- Third, Mathematica relied on procedure codes submitted on billing claims to determine a surgical case, which might not produce the same count as UVMMC obtained when using internal data.
- Fourth, Mathematica's model used a four-year baseline (2016–2019) from administrative data for projecting demand for outpatient surgeries, whereas UVMMC used its own internal medical records and a one-year baseline period (2019) for projecting demand.
- Lastly, UVMMC's model uses the proprietary Sg2 model to incorporate nondemographic sources of change in demand, such as technological and epidemiological factors, whereas Mathematica's model focuses on demographic trends.

The differences in how UVMMC and Mathematica modeled the demand for outpatient surgeries make it difficult to draw a one-to-one comparison. However, the fact that UVMMC's demand projections (even with the impact of change growth factors) fall below those obtained by Mathematica offers assurance that the projections produced by the proprietary Sg2 model are reasonable.

VI. Conclusion

The proprietary nature of the Sg2 model and the lack of historic information on surgical wait times make it difficult to fully evaluate the outpatient surgical demand projections in the UVMMC OSC CON application. However, despite differences in the total *volume* of outpatient surgeries demanded, the demand growth rate for outpatient surgeries from UVMMC's updated Sg2 model (24 percent) are consistent with (and slightly lower than) the growth rate for outpatient surgical procedures estimated by Mathematica's forecasting model (27 percent). **Even with the GMCB-requested inputs in the March 2024 version of the model and a higher utilization threshold of 80 or 85 percent, UVMMC expects to exceed its current 25-room capacity in 2024.** With an 80 percent utilization threshold, UVMMC is predicted to also need the additional shell space within the next few years.

UVMMC faces both current and future shortages (particularly with the planned permanent closure of the Fanny Allen facility) and these shortages remain even when alternative assumptions surrounding the utilization benchmarks, OR turnover time, and overall demand growth are used. In its response to questions from GMCB, UVMMC noted that, as of November 2023, it had 375 patients waiting 60 to 90 days for their surgical procedure and 341 patients waiting more than 90 days (Page 3, response to Q.006, November 2023). However, without more detailed wait time data over a longer period, it is difficult to assess whether these counts are evidence of a substantial and persistent OR shortage and, if so, the best approach for meeting that need. As a result, the arguments for expanded outpatient surgical capacity presented in the UVMMC OSC CON application are primarily based on the Sg2 surgical demand growth model, which as noted is proprietary and unavailable for detailed review of its methodology, but in general are consistent with growth rates produced independently by Mathematica.

Appendix A. Supplemental Tables

Table A.1. Number of inpatient and outpatient procedures performed in 2019, by service line

Service line	Inpatient procedures		Outpatient procedures	
	Number	Percentage of all inpatient procedures	Number	Percentage of all outpatient procedures
Cardiology	3	<1%	5	<1%
Cardiothoracic	541	9%	6	<1%
Dermatology	1	<1%	37	<1%
ENT	187	3%	1,610	13%
General surgery	1,372	23%	1,014	8%
Neurosurgery	633	10%	314	2%
OB/GYN	178	3%	1,478	12%
Ophthalmology	22	<1%	1,247	10%
Oral/maxillofacial	25	<1%	59	<1%
Orthopedics	1,785	29%	3,406	27%
Other	4	<1%	11	<1%
Pediatrics	118	2%	267	2%
Plastics	177	3%	422	3%
Pulmonary	24	<1%	125	1%
Surgical oncology	37	1%	539	4%
Transplant	75	1%	5	<1%
Urology	388	6%	1,647	13%
Vascular	508	8%	479	4%
Total	**6,078**	**100%**	**12,671**	**100%**

Source: Page 20, response to Q.002, June 15, 2023.

Table A.2. Average inpatient and outpatient procedure time (in minutes), by service line

Service line	Inpatient procedures	Outpatient procedures
Cardiology	n.r.	n.r.
Cardiothoracic	275	n.r.
Dermatology	n.r.	123
ENT	195	127
General surgery	148	99
Neurosurgery	240	159
OB/GYN	207	139
Ophthalmology	209	115
Oral/maxillofacial	105	139
Orthopedics	179	124
Other	n.r.	173
Pediatrics	134	85
Plastics	218	181
Pulmonary	123	106
Surgical oncology	220	141
Transplant	319	n.r.
Urology	144	117
Vascular	198	112
Total	190	126

Source: Page 18, response to Q.002, June 15, 2023.

Notes: Length of surgeries based on self-reported WiseOR and Epic EHR data on all surgical cases conducted in 2019 at UVMMC.
n.r. = not reported.

Table A.3. Number of additional ORs needed to meet projected demand, assuming 80 percent utilization threshold

Year	Number of procedures demanded			Number of procedures UVMMC can perform at 80% utilization	Total number of ORs needed to meet demand	Number of ORs currently available	Additional ORs needed to meet demand
	Inpatient	Outpatient	Total				
2019	5,948	13,052	19,000	19,170	24.8	25	(0.2)
2020	4,879	10,489	15,368	17,759	21.6	25	(3.4)
2021	4,863	11,586	16,449	15,729	26.1	25	1.1
2022	5,012	12,431	17,443	18,533	23.5	25	(1.5)
2023	5,423	14,109	19,532	19,141	25.5	25	0.5
2024	6,220	14,733	20,952	19,537	26.8	25	1.8
2025	6,287	15,153	21,440	19,549	27.4	25	2.4
2026	6,318	15,397	21,715	19,559	27.8	25	2.8
2027	6,349	15,641	21,990	19,570	28.1	25	3.1
2028	6,380	15,885	22,265	19,580	28.4	25	3.4
2029	6,411	16,129	22,540	19,599	28.8	25	3.8

Source: Mathematica analysis of UVMMC workbook submitted on March 12, 2024.

Notes: Results based on Sg2 model with updated population growth rates and 80 percent utilization threshold. Values for 2019–2023 are based on actual number of surgeries performed. Values for 2024–2029 are based on projected number of surgeries demanded at current capacity. Negative values indicate current capacity exceeds demand and no new rooms are needed. Positive values indicate current capacity is not sufficient to meet demand. Red shading indicates that the three new ORs proposed by UVMMC will be needed, after the five Fanny Allen spaces are replaced. Blue shading indicates that the number of procedures demanded will additionally require the use of the four shell spaces, after the five Fanny Allen spaces are replaced and the three new ORs are constructed.

Table A.4. Number of additional ORs needed to meet projected demand, assuming 85 percent utilization threshold

Year	Number of procedures demanded			Number of procedures UVMMC can perform at 85% utilization	Total number of ORs needed to meet demand	Number of ORs currently available	Additional ORs needed to meet demand
	Inpatient	Outpatient	Total				
2019	5,948	13,052	19,000	20,369	23.3	25	(1.7)
2020	4,879	10,489	15,368	18,869	20.4	25	(4.6)
2021	4,863	11,586	16,449	16,712	24.6	25	(0.4)
2022	5,012	12,431	17,443	19,691	22.1	25	(2.9)
2023	5,423	14,109	19,532	20,338	24.0	25	(1.0)
2024	6,220	14,733	20,952	20,758	25.2	25	0.2
2025	6,287	15,153	21,440	20,771	25.8	25	0.8
2026	6,318	15,397	21,715	20,782	26.1	25	1.1
2027	6,349	15,641	21,990	20,793	26.4	25	1.4
2028	6,380	15,885	22,265	20,803	26.8	25	1.8
2029	6,411	16,129	22,540	16,659	27.1	25	2.1

Source: Mathematica analysis of UVMMC workbook submitted on March 12, 2024.

Notes: Results based on Sg2 model with updated population growth rates and 85 percent utilization threshold. Values for 2019–2023 are based on actual number of surgeries performed. Values for 2024–2029 are based on projected number of surgeries demanded. Negative values indicate current capacity exceeds demand and no new rooms are needed. Positive values indicate current capacity is not sufficient to meet demand. Red shading indicates that the three new ORs proposed by UVMMC will be needed, after the five Fanny Allen spaces are replaced. Blue shading indicates that the number of procedures demanded will additionally require the use of the four shell spaces, after the five Fanny Allen spaces are replaced and the three new ORs are constructed.

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Boyd Gilman

Senior Fellow

Experience

Mathematica

Technical Lead. Health Center Consolidated Research and Evaluation (2023-). Lead technical team in conducting and disseminating broad range of empirical studies each year on estimating impact of the Health Center Program on cost, quality, access, and equity of care; conducting additional short-term analyses on emerging priority identified by the Bureau of Primary Health Care (BPHC); calculating publicly reported annual health center performance scores on range of quality metrics; and facilitating technical advisory panel meetings to issues of concern to BPHC.

Director, Outpatient Surgical Centers, Green Mountain Care Board of Vermont (2022-). Develop claims-based model to predict the demand for hospital outpatient surgeries in Vermont by type of procedure and hospital service area, separately for urban and rural counties in the state. Conducted extensive review of demand and capacity projections in Certificate of Need application to develop new hospital-based outpatient surgical center in Vermont.

Senior Advisor, Rapid Uptake of Disseminated Interventions (2022-). Help study team develop analytic strategies to evaluate how, when, and where RWHAP recipients and providers access and use disseminated resources to improve care delivery for people with HIV. Help design and build interactive dashboard based on Google Analytics data from Compass Dashboard (and other sites) to identify patterns and trends in use of disseminated information. Participate in information-gathering meetings with HIV/AIDS Bureau leadership and staff to inform design and evaluation of dashboard.

Advisor, HIV Electronic Clinical Quality Measure Modernization (2021-). Serve as advisor to project on developing and testing three electronic clinical quality measures for the Health Resources and Services Administration's HIV/AIDS Bureau to improve care for people with HIV. Responsibilities include reviewing and providing feedback on developing the narrative and technical measure specifications, materials to recruit clinical sites to participate in testing, methods for testing the measures in accordance with the requirements of the Centers for Medicare & Medicaid Services (CMS) Measures Management System Blueprint, and plans for soliciting feedback on the measures using a technical expert panel and public comment.

Task Lead, Primary Care First (PCF) Model (2021-). Lead large researcher team across four contractors to collect and analyze primary data from practices in PCF model. Selected representative sample of practices, drafted interview protocols that align with research questions, interviewed key informants, coded and analyzed qualitative data, merged program data, and summarized and synthesized findings in annual reports to Centers for Medicare & Medicaid Services (CMS).

Education

1998 Ph.D., Economics, Boston University

1990 M.S., Economics, Boston University

1985 M. Phil., Development Studies, University of Sussex

1980 B.A., International Studies, University of North Carolina

Positions

2006- Mathematica

2002-2006 Senior Economist, RTI International

1998-2002 Senior Economist, Health Economics Research

1997-1998 Health Economist, Massachusetts Division of Health Care Finance and Policy

1995-1997 Health Economist, Management Science Group, Department of Veterans Affairs

1991-1995 Boston University

1991-1995 Teaching Fellow, Department of Economics

1994 Teaching Fellow, Department of International Health

1991-1995 Teaching Fellow, Harvard Institute for International Development

1986-1993 Consultant, The World Bank

Co-Principal Investigator and Implementation Lead, Evaluation of the Medicare Care Choices Model (MCCM) (2020-2023). Lead analysis of program data on implementation and operational performance of the MCCM, including hospice-reported information on referrals, enrollment, program-funded service, and transition to the traditional Medicare hospice benefit. Lead collection and analysis of qualitative information based on interviews with leaders from participating and nonparticipating hospices and referring physicians. Help synthesize analyses and annual reports. For this evaluation, the Center for Medicare & Medicaid Innovation (the Innovation Center) within CMS tests the effects of offering eligible beneficiaries the option to receive supportive services without forgoing treatment for their terminal conditions at the end of life.

Director, Analysis of Peer Groups and Allowable Resident Cost in Efficiency Analyses, Maryland Health Services Cost Review Commission (2020-2022). Used cluster analysis and regression modeling techniques to create hospital peer groups for identifying costs unrelated to hospital efficiency. Also built forecasting model to estimate supply and demand of physician visits by medical specialty and geographic region.

Task Lead, Process Evaluation of the Aging Network, and its Return on Investment (2020-). Review literature to identify and recommend approaches for measuring social return on investment of Aging Network grant programs funded by the U.S. Department of Health and Human Services (HHS) Administration on Aging.

Project Director, Health Resources and Services Administration (HRSA) Non-Outpatient Ambulatory Health Services (2018-2020). Direct study to estimate national clinical and process outcomes among Ryan White HIV/AIDS Program (RWHAP) clients who do not receive outpatient medical care directly funded under the RWHAP. Interview staff and clients and extract key data elements from clinical records among a representative sample of study providers to produce generalizable estimates of retention in care, initiation of HIV medications, and viral suppression rates.

Director, Public Health and Economic Impact of the Ryan White HIV/AIDS Program (2017-2020). Oversaw development and implementation of agent-based, stochastic, microsimulation social network model to estimate the cost effectiveness of the RWHAP. Provided technical assistance and trained HRSA staff to use the model to identify optimal allocation of resources across program services and populations.

Task Lead, Estimating the Indirect Costs of Medical Education (IME) Separately for Major and Non-Major Teaching Hospitals in Maryland (2017-2018). Used national data from HCRIS to identify hospital peer groups based on teaching intensity and estimated IME costs separately for each group. Tasks included defining national hospital peer groups based on teaching intensity; developing a hospital peer-group IME cost model; validating the results using state and national estimates and testing the sensitivity of the results to peer-group specification; using the results to calculate IME cost estimates for the 14 teaching hospitals in Maryland; and providing recommendations to the Maryland Health Services Cost Review Commission for monitoring hospital efficiency under the state's hospital all-payer inpatient rate-setting system.

Project Director, Evaluation of Health Care Innovation Award (HCIA) Round 2 (2015-2020). Managed large team of researchers across three organizations and coordinated evaluation activities across 38 awardee programs, several of which implemented primary care interventions. Integrated and synthesized findings using meta-analysis for final evaluation reports and other dissemination products.

Task Lead, Evaluation of Medicaid Section 1115 Demonstrations (2014-2016). Use Healthcare Cost Report Information System (HCRIS) to calculate change in uncompensated care costs after implementation of the 2010 Affordable Care Act (ACA) for states operating uncompensated care pools under Section 1115 authority. Conduct ad hoc analyses and provide data files to support CMS determination of appropriate funding for states' uncompensated care pools.

Director, Developing Outcome Measures and Associated Data Elements for Emergency Medical Services Using Telehealth Technology (2014-2015). Leveraged the HRSA's investments in the Evidence-Based Tele-Emergency Network Grant Program to identify and test a core set of performance measures that

would contribute to establishing an evidence base for evaluating the impact of telehealth technologies on rural hospitals' provision of emergency care services. Developed electronic tool that HRSA could use to import data and automatically calculate measure values in the future.

Deputy Project Director and Implementation Lead, Evaluation of Primary Care Redesign Health Care Innovation Awards (2013-2017). Manage and led evaluation of 14 primary care transformation programs funded under first round of HCIA initiative. Developed protocols, interviewed staff, coded and analyzed data, summarized and synthesized findings annual reports, and produced dissemination products.

Project Director, Implementation and Monitoring of the Community-Based Care Transitions Program (CCTP) (2011-2017). Directed study to develop and implement an electronic system for collecting, validating, reporting, and paying list bills for care transition services submitted by community-based organizations (CBOs). Monitored and reported CBOs' progress toward meeting their performance goals, as well as the impact of the program on federal expenditures. Study included administering participant experience survey; calculating outcome, process, adverse effect, and patient activation measures; and quarterly reporting of performance results for rapid-cycle feedback and improvement.

Project Director, Ryan White HIV/AIDS Program Modeling Project (2011-2014). Directed study to assess the impact of the ACA on access to care among people living with HIV and AIDS who historically have relied on the provision of free care funded under RWHAP for their medical and support service needs. Used primary and secondary data to develop projections of the need for RWHAP-funded medical services, wraparound support services, and prescription drugs; to determine the implications of the ACA for the allocation and distribution of RWHAP funds; to project the service gaps that will remain, even after the full implementation of the ACA; to identify eligible jurisdictions and populations with the greatest unmet needs under health reform; to develop alternative provider reimbursement models that cover the higher cost of care for HIV disease; and to provide recommendations for how to allocate RWHAP funding to jurisdictions and populations of greatest need and improve the monitoring of service needs under health reform.

Project Director, National HIV Clinician Workforce Study (2010-2013). Directed study to provide national and state-level estimates of the number of clinicians providing HIV-related medical care in the United States, and projections of the magnitude of expected HIV clinician shortages or surpluses in the future. The study included development of HIV clinician workforce supply and demand model; analysis of Medicare, Medicaid, and commercial claims to identify number of clinicians providing HIV-related medical care; and national survey of HIV clinicians to identify factors affecting HIV clinician supply. Study led to HIV workforce projections through 2015 under baseline assumptions and simulations under a range of alternative market and policy scenarios.

Senior Adviser, Potential Impact of the Affordable Care Act on the Ryan White HIV/AIDS Program (2011-2012). Provided design oversight and technical review on qualitative study to offer federal and state RWHAP planners and administrators with the information they need to plan for the educational and technical assistance needs of the RWHAP community as it transitions to full ACA implementation. The study was based on review of current documents assessing the potential impact of the ACA on the RWHAP program; interviews with technical experts and Medicaid administrators; and an assessment of how states developed and implemented programs and policies to provide medical, support, and drug assistance services to people living with HIV or AIDS under the ACA.

Project Director, Promoting Linkages to HIV Care for Newly Diagnosed HIV-Positive Persons in Racial and Ethnic Minority Communities Disproportionately Impacted by HIV/AIDS (2009-2011). Directed study to examine barriers to care among minority populations disproportionately affected by HIV/AIDS and identified and examined successful models used by hospital emergency departments, health department clinics, and other providers for testing, linking, and engaging newly diagnosed HIV-positive racial and ethnic minorities into primary care. The project used qualitative information collected through a review of the literature, guided discussions with expert panels and individuals, and site visits to successful HIV testing and treatment initiatives.

Senior Adviser, Responding to the HIV/AIDS Epidemic Among Latinos: Best Practices from Ryan White HIV/AIDS Program Grantees (2009-2010). Provided design oversight and review of deliverables on study to identify barriers and evaluate interventions that improve access to and retention in care among Hispanics and Latinos living with HIV and AIDS. Study collected qualitative information from key stakeholder panel discussion, grantee interviews, and site visits using two-stage purposive sampling strategy. Assessment also collected use data from providers and surveillance data from local, state, and federal sources.

Project Director, Factors Impacting the Retention of Clinical Providers and Other Key Personnel in Ryan White HIV/AIDS Program Care Settings (2008-2009). Directed study to assess the supply of clinicians and other key health care personnel in RWHAP care settings. The study used expert panels and key informant interviews to determine the extent and characteristics of HIV clinician shortage, the effect of clinician shortages on the ability of Ryan White grantees to provide care, the effect of clinician shortages on access to and quality of care among people with HIV/AIDS, and the feasibility and desirability of workforce strategies that Ryan White providers may have developed to mitigate the effects of clinician shortages.

Project Director, Evaluation of Medicare Rural Community Hospital Demonstration (2007-2011). Directed assessment of the impact of the Medicare Rural Community Hospital Demonstration on hospital financial viability, community benefit, and Medicare expenditures. Mathematica interviewed hospital administrators and analyzed data from hospital cost reports, hospital financial statements, and HCRIS to make recommendations to Congress regarding creating a second tier of low-volume hospitals serving sparsely populated communities and providing them additional financial compensation to ensure that elderly and disabled residents in rural areas have continued access to inpatient and emergency room services.

Task Leader, National Evaluation of the Demonstration to Maintain Independence and Employment (DMIE) (2007-2011). Led qualitative assessment of states' experience implementing DMIE programs designed to keep individuals with potentially disabling conditions from progressing to disability by providing health care coverage and employment support services early in their disease stage. Analyzed information collected through program site visits, key informant interviews with partners and providers, and a standardized quarterly reporting form to identify best practices and strategies for overcoming barriers to successful outcomes for states considering similar initiatives.

Project Director, Assessment of Impact of Key Health Care Financing Provisions of the Ryan White Comprehensive AIDS Resources Emergency (CARE) Act Grantees and Technical Assistance Implications (2007-2008). Directed data collection and analysis through expert interviews; advisory panel meeting; grantee site visits; and interviews with grantees, providers, and consumers. Mathematica assessed the impact of state Medicaid reforms on the demand for services under the RWHAP for people living with HIV/AIDS and provided HHS, HRSA, HIV/AIDS Bureau with recommendations for ensuring that people with HIV/AIDS and their families continue to have reliable access to necessary primary medical services.

Task Leader, Hospital Cost, Financial Performance, and Cost Shifting in West Virginia (2006-2007). Led assessment of hospital costs and West Virginia rate setting on hospital financial performance using Uniform Financial Reports. This project, sponsored by the West Virginia Health Care Authority, aimed to build a more systematic understanding of the financial performance of general acute care and critical access hospitals in West Virginia, to identify the extent to which hospitals shift costs among payers, and to assess the implications of cost shifting for private insurance costs and access to care.

Papers and Publications

JOURNAL ARTICLES

Goyal, R., J. Hotchkiss, B. Gilman, P.W. Klein, R.J. Mills, J. Starling, N.K. Martin, T. Patton, S.M. Cohen, and L. Cheever. "The Health Equity Implications of the Health Resources and Services Administration Ryan White HIV/AIDS Program." *AIDS*, forthcoming.

Au, M., E. Coombs, A. Jones, F. Carley, M. Talwar-Hebert, W. Addison, R.J. Mills, S.M. Cohen, P.W. Klein, L. Cheever, and B. Gilman. "Coordinating Care for People With HIV Who Have Lower Incomes and Alternative Sources of Health Care Coverage." *Journal of the Association of Nurses in AIDS Care*, vol. 34, no. 3, 2023. https://pubmed.ncbi.nlm.nih.gov/37098817.

Rowan, P., D. Whicher, M. Luhr, L. Miescier, K. Kranker, and B. Gilman. "Supportive Services at End of Life Can Help Reduce Acute Care Services: Observations from the Medicare Care Choices Model." *American Journal of Hospice & Palliative Medicine*, 2023. https://doi.org/10.1177/10499091231216887.

Goyal, Ravi, Cindy Hu, Pam Klein, John Hotchkiss, Eric Morris, Paul Mandsager, Stacy Cohen, Dara Luca, Jessica Gao, Andrew Jones, West Addison, Margaret O'Brien-Strain, Laura Cheever, and Boyd Gilman. "Development of a Mathematical Model to Estimate the Cost-Effectiveness of the Ryan White HIV/AIDS Program." *Journal of Acquired Immune Deficiency Syndrome,* vol. 86, no. 2, February 1, 2021, pp. 164-173.

Goyal, Ravi, Dara Luca, Pam Klein, Eric Morris, Paul Mandsager, Stacy Cohen, Cindy Hu, John Hotchkiss, Jessica Gao, Andrew Jones, West Addison, Margaret O'Brien-Strain, Laura Cheever, and Boyd Gilman. "Cost-Effectiveness of the Health Resources and Services Administration's Ryan White HIV/AIDS Program." *Journal of Acquired Immune Deficiency Syndrome,* vol. 86, no. 2, February 1, 2021, pp. 174-181.

Bouchery, Ellen, Boyd Gilman, Sylvia Trent-Adams, and Laura Cheever. "Characteristics of the Ryan White HIV/AIDS Program Provider Network: Implications for Access to Care Under the Affordable Care Act." *HIV Specialist,* vol. 8, no. 3, August 2016, pp. 10-17.

Gilman, Boyd, Ellen Bouchery, Paul Hogan, Sebastian Negrusa, Sylvia Trent-Adams, and Laura Cheever. "The HIV Clinician Workforce in the United States: Supply and Demand Projections from 2010 to 2015." *HIV Specialist,* vol. 8, no. 3, August 2016, pp. 2-9.

Gilman, Boyd, Julia Hidalgo, Cicely Thomas, Melanie Au, and Margaret Hargreaves. "Linkages to Care for Newly Diagnosed Individuals Who Test HIV Positive in Nonprimary Care Settings." *AIDS Patient Care and STDs,* vol. 26, no. 3, March 2012, pp. 132-140.

Gilman, Boyd H., and Jeremy C. Green. "Understanding the Variation in Costs Among HIV Primary Care Providers." *AIDS Care,* vol. 20, no. 9, October 2008, pp. 1050-1056.

Priya Shanmugam

Researcher

Experience

Mary's Center Facilitated Telemedicine Evaluation

As **Project Director (2023-)**, conduct evaluation of the Facilitated Telemedicine program, in which physician's assistants visit patients in their homes, combining at-home care with telehealth services. Used claims and Electronic Health Record data to develop a statistical approach to estimate the effects of the program, accounting for changes in the eligibility criteria, the patient population, and the COVID-19 pandemic. Worked with Mary's Center, a FQHC, to identify aspects of FT program of highest-priority for evaluation.

Acceptability and Feasibility of HPV Vaccination in Global Pharmacy Settings

As **Project Director (November 2022 – March 2024),** led a team of qualitative researchers to develop an interview guide and recruit 32 pharmacists from the US and Canada. Conducted semi-structured interviews to understand how pharmacists implemented HPV vaccination in their settings, using the Consolidated Framework for Implementation Research.

Edwards Lifesciences Quality Improvement Project

As **Project Director (2023),** worked with academic anesthesiologist to conduct evaluation of blood pressure monitoring device pilot study. Supervised the cleaning and analysis data from various sources including blood pressure monitoring devices, surgical fluid dispensation, physician schedules, surgical intake forms, and hospital admission and discharge data. Assessed several statistical methods to address pilot study's small sample size. Created data cleaning and programming processes to enhance replicability of results. Presented findings to guide medical device company's decision-making on enhanced study designs.

Impacts of Alternative Sites and Providers, Merck

As **Task Lead (2023)**, spearheaded comprehensive review of the literature on the impacts of alternative and complementary vaccination sites and providers on vaccine coverage rates, across all countries and vaccine types. Identified key search terms, critical inclusion and exclusion criteria, and PICOTS search strategy. Synthesized results into presentation and a manuscript currently under submission at a peer-reviewed journal.

Social Determinants of Health and Pneumococcal Disease, Merck

As **Task Lead (2023 -),** led the analysis of the relationship between pneumococcal disease, pneumococcal vaccination, and area-level social determinants of health among Medicare beneficiaries. Developed statistical approach and supervised programming of claims data for ~70M Medicare beneficiaries to estimate pneumococcal disease incidence and vaccination at the U.S. County level. Conducted regression analyses to understand the impacts of area-level vulnerability on individual health and vaccination outcomes using the CDC's Minority Health Social Vulnerability Index. Synthesized results into peer-reviewed manuscripts and conference presentations.

Education

2020 Ph.D., Economics, Harvard University

2013 B.S., Economics and Mathematics, cum laude, Dartmouth College

Positions

2020- Mathematica

2017-2018 Predoctoral Fellow, Becker Friedman Institute

2017-2018 Predoctoral Fellow, National Bureau of Economic Research

2015-2017 Teaching Fellow, Harvard University

Advancing HPV Vaccine School Entry Requirements in Connecticut, Massachusetts and New York

As **Project Director (2022-),** conduct evaluation of the HPV vaccine school entry requirements policy landscape in CT, NY, and MA. Led development of interview protocol, recruitment strategy, literature review, and analysis of findings with key stakeholders to better understand factors affecting the implementation of HPV vaccination school entry requirements in Connecticut, New York, and Massachusetts. Work with commercial stakeholder to manage project budget and translate stakeholder interviews into actionable findings for policy engagement.

Comprehensive Primary Care Plus (CPC+)

As **Task Lead (2021-),** supervise a team of analysts in processing Care Delivery Reporting data to characterize participating practices' implementation of care delivery innovation strategies. Perform ad-hoc analyses of data to complement claims-, survey- and interview-based analyses. As **Researcher (2020-),** work with programming team to process Medicare claims, review analytic results, and complete written and graphical summaries of key findings for internal review and client deliverables. Completed ad-hoc analyses of COVID-19's impact on CPC+ using newly publicly available data ranging from cell phone GPS tracking data, UI and Medicare FFS claims, surveys, and policy trackers, and presented client with key findings and implications for modified analytic approaches.

Primary Care First

As **Researcher (2020),** reviewed the literature on causal mediation analyses, and worked with survey and claims teams to explore several potential strategies for estimating how the causal impacts of Primary Care First are mediated by various channels of care delivery reform. Wrote detailed summaries of methodological and data limitations and strengths for the client. As **Researcher (2021-),** conducted longitudinal site visit interviews with participating primary care practice team members to understand factors affecting the implementation of care delivery reforms. Reviewed qualitative data to extract high-level insights and presented these insights graphically and in written form for internal review and client deliverables.

19&Me

As **Researcher (2021-),** work with analysts and programmers to develop analytic strategies for predicting the short- and long-term clinical outcomes of COVID-19 patients using claims, EHR, and Rx data through the National Covid Cohort Collaborative. Review literature to identify approaches for identifying COVID-positive cohorts, create lookback and post-infection observation windows, and track the evolving literature on post-infection sequalae to create clinically meaningful definitions of long-COVID. Incorporate the recent literature on race-specificity of clinical predictive algorithms to explore the implications for COVID patients. Develop manuscripts for academic publication.

MACBIS

As **Researcher (2022),** develop programming specifications to link mother and infant Medicaid claims files using probabilistic and deterministic matching methods. Conduct review of the literature to contextualize linking process against existing matching methods, and perform diagnostic analysis to understand impacts of various linking processes on estimations of maternal and infant outcomes, and estimated health disparities in these outcomes, given varying rates of missing, incomplete or incorrect Medicaid claims data in each state.

Certificate of Needs Assessment, Vermont Green Mountain Care Board

As **Task Lead (2022-),** work with VT GMCB to review CON applications, providing evaluation of surgical OR demand and supply modeling data, methods and assumptions. Work with GMCB to suggest modifications to the CON process to better address the needs of rural Vermonters, reduce burden to applicants, and improve comprehensiveness of surgical OR demand and supply models, incorporating data on patient travel and wait times.

Maryland Healthcare Services Cost Review Commission

As **Task Lead (2020-2021),** worked with the Maryland Health Services Cost Review Commission to develop a model forecasting the supply and demand of physicians in Maryland from 2020 to 2040. Creatively harnessed many data sources – including state population projections, national NPI files, state medical licensure roster files, state all-payer claims databases, the American Community Survey and the Medical Expenditure Panel Survey – to estimate parameters of physician supply and demand. Proposed and implemented refinements to capture within-state and inter-state patient and physician travel, and claims-based measures of full-time equivalency of registered clinicians due to the presence of academic and federal medical research centers. Met biweekly with client to incorporate feedback on data, methods, and assumptions, and tailored projections and summaries to meet the client's policy needs.

ORI

As **Project Lead (2020-2021),** worked with the NIH Office of Research Integrity to review existing method for calculating return on investment (ROI). Reviewed the literature on ROI calculations for public programs, and the impacts of scientific misconduct on drug development, academic and private sector funding, and trust in science. Provided recommendations for updated ROI methodology, and developed an interactive workbook to streamline ORI's data collection and ROI calculation process. Solicited feedback regularly to incorporate ORI's goals and institutional considerations.

Papers and Publications

Shanmugam, Priya. "Essays on Clinical Decision-Making." Doctoral dissertation. Cambridge, MA: Harvard University, 2020.

Shanmugam, Priya. "Decision-Making Under Cognitive Constraints: Evidence from the Emergency Department." Job Market Paper. Cambridge, MA: Harvard University, 2020.

Shanmugam, Priya. "Gender Differences in Physician Learning." Unpublished manuscript. Cambridge, MA: Harvard University, 2020.

Shanmugam, Priya. "Habit Formation and Physician Technology Adoption." Unpublished manuscript. Cambridge, MA: Harvard University, 2020.

Honors and Awards

2018-2019	Earle A. Chiles Fellowship, Harvard University
2013-2014	Rita Ricardo-Campbell Fellowship, Harvard University
2013	Jacob J. Rintels Prize, Best Thesis in the Social Sciences, Dartmouth College
2013	Lewis H. Haney Prize, Best Thesis in Economics, Dartmouth College

Assessment of University of Vermont Medical Center's Certificate of Need Application for a New Outpatient Surgical Center in Burlington

Volume II: Financial Analysis REDACTED

March 20, 2024

Greg Flicek and Dawn Carter

Submitted to:

Green Mountain Care Board
144 State Street
Montpelier, VT 05602
Attention: Donna Jerry

Submitted by:

Ascendient Healthcare Advisors
1335 Environ Way
Chapel Hill, NC 27517
Phone: (919) 403-3300

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Greg Flicek

Contents

Tables

Figures

Executive Summary

The University of Vermont Medical Center Inc. (UVMMC) submitted a Certificate of Need application on February 10, 2023, to develop a multi-specialty outpatient surgery center (OSC), located on a new parcel of land approximately three miles from the main campus. UVMMC proposes to develop eight operating rooms, including 12 prep rooms and 36 recovery spaces associated with the eight ORs. Five of these ORs will replace the five existing ORs located at the Fanny Allen facility. The other three ORs would be new. UVMMC also proposes to build shell space for four additional ORs and related support space including 14 pre- and post-operative spaces to be fit-up and utilized in the future as needed. UVMMC estimates the project will take 18 months to develop, with an anticipated operational date during fiscal year (FY) 2025.

This report, Volume II, assesses the financial components of that application.[1] It summarizes UVMMC's financial projections, discusses UVMMC's key financials assumptions, identifies potential risks to the projected financial performance, and provides a ratio analysis. A second report, Volume I, covering UVMMC's service use and capacity assumptions and projections will be provided.

The application provided three different financial projections: (1) an incremental pro-forma for the proposed OSC; (2) UVMMC without the proposed project; and, (3) UVMMC with the addition of the proposed OSC. The analysis discussed in this report focuses on the first two sets of projections and concludes with the combined projections.

UVMMC projected the proposed OSC will result in substantial financial benefits. Namely, the project will generate significant operating income ($42.6 million) and cash flows ($41.9 million) over its first five years. The reasonableness of the incremental OSC pro-forma depends on three key assumptions:

1. **UVMMC assumed the shift of outpatient cases to the OSC will create needed capacity to perform additional inpatient procedures at the hospital that UVMMC could not otherwise accommodate.** Thus, UVMMC included *incremental* inpatient revenue in its pro-forma. The operating income attributable to these incremental inpatient cases produces all the operating income in the OSC pro-forma.
2. **UVMMC indicated in the OSC pro-forma it applied a reimbursement adjustment for patients shifting from hospital-based to ambulatory surgery center (ASC) billing.** If this reimbursement adjustment is understated, operating income is overstated.
3. **UVMMC assumed there will be no additional expenses to compensate surgeons for the additional volume of outpatient cases.** If additional surgical FTEs are needed or if surgeons receive additional compensation for performing additional procedures, expenses are understated.

Each of these assumptions, if unreasonable, will have a material impact on the actual financial results of the proposed OSC. In all three instances, the operating income presented in the application might be overstated if the questions around these assumptions are correct.

[1] Ascendient conducted this assessment for the Vermont Green Mountain Care Board under a subcontract with Mathematica.

UVMMC projected a financial turnaround beginning in FY 2023, before the addition of the proposed OSC. Based on its actual results, the FY 2023 projections appear reasonable. In addition to the actual turnaround in FY 2023, the projections assumed: (1) reimbursement rate increases would offset inflation; and (2) current cost-saving initiatives that contributed to the turnaround would continue in the future. If reimbursement increases are not realized or if cost-saving initiatives are not sustained, the operating income in the application is overstated.

The UVMMC projections without the proposed project included both positive and negative financial indicators. On the one hand, UVMMC projected that operating margins will return to historical levels and days cash on hand will increase. On the other hand, UVMMC assumed the average age of plant will continue to increase and debt-to-capitalization ratios will fall below peer benchmarks. According to its narrative, UVMMC expects the outpatient surgery center to positively affect all four of these ratios. The calculations reveal the OSC will have a positive impact on only three: operating margin, average age of plant, and debt-to-capitalization ratio; the proposed project will reduce days cash on hand by two days.

I. Introduction

The University of Vermont Medical Center Inc. (UVMMC) submitted a Certificate of Need (CON) application for the development of a multi-specialty outpatient surgery center (OSC), located on a new parcel of land approximately three miles from the main campus. UVMMC proposes to develop a total of eight operating rooms including 12 prep rooms and 36 recovery spaces associated with the eight ORs. Five of these ORs will replace the five existing ORs located at the Fanny Allen facility. The other three ORs would be new. UVMMC also proposes to build shell space for four additional ORs and related support space including 14 pre- and post-operative spaces to be fit-up and utilized in the future as needed. UVMMC estimates the project will take 18 months to develop, with an anticipated operational date during fiscal year (FY) 2025. UVMMC asserted it can and should invest in the project as part of its "financial stabilization."[2]

This report, Volume II, assesses the financial components of the application.[3] In four distinct sections, Volume II summarizes UVMMC's financial projections, discusses UVMMC's key assumptions, identifies potential risks to the projected financial performance, and provides a ratio analysis. The first section examines the incremental pro-forma for the proposed OSC, a critical component for gauging the independent financial consequences of the project. The second section explores the financial projections of UVMMC in the absence of the proposed project, establishing a baseline for UVMMC. The third section undertakes a comparison of UVMMC with and without the proposed project to gain a comprehensive understanding of the project's impact on financial ratios. The fourth section analyzes the financial impact of an alternative volume projection that was requested by the GMCB. This report is based on the UVMMC CON application as submitted; updated financial tables provided on June 19, 2023; UVMMC's response to questions; University of Vermont Health Network (UVMHN) budget submissions; and publicly available financial reports (audited financial statements and bond disclosure reports).

The financial discussion throughout the application focuses on two distinct presentations: the incremental pro-forma of the OSC and the overall financial projections of UVMMC. The report will discuss an analysis of these two presentations in turn.

[2] Certificate of Need Application for the Development of an Outpatient Surgery Center page 2.

[3] Ascendient conducted this assessment for the Vermont Green Mountain Care Board under a subcontract with Mathematica.

II. OSC Incremental Pro-Forma

This section of Volume II focuses on the financial projections for the OSC. The purpose of this section is to gauge the stand-alone performance of the proposed project.

A. Summary of results: OSC

UVMMC's OSC financial projections focused on the incremental impact of the proposed project. In this instance, the use of an incremental pro-forma is preferred to determine how this specific project will *incrementally* affect the health system's financial performance. It is important to note that future results of the OSC as a self-contained business unit are not represented by, and cannot be compared to, the incremental pro-forma because the former would include all revenue and expenses related to the OSC, while excluding revenue and expenses associated with incremental inpatient cases projected to result from the project that will be incorporated in the hospital's business unit statements. The self-contained business unit projections for the OSC are not required or included and the stand-alone profitability of the OSC cannot be determined.

UVMMC projected the OSC to deliver a positive incremental financial impact. Table 1 shows the revenues, expenses, operating income, and cash flow as projected by UVMMC through 2029.

Table 1. Incremental OSC financial projections

	2025*	2026	2027	2028	2029
Total operating revenue	$25,565,559	$51,721,627	$58,628,248	$64,018,118	$79,939,679
Total expenses	$24,064,001	$45,728,453	$49,716,994	$53,501,312	$64,229,500
Incremental operating margin	$1,501,558	$5,993,173	$8,911,254	$10,516,806	$15,710,179
Incremental cash flow	($18,368,393)	$12,842,885	$15,760,966	$17,366,518	$14,336,247

Source: Incremental pro-forma and incremental cash flow included in the updated financial tables provided on June 19, 2023.
* Represents six-months.

Based on Table 1 above, the project is expected to demonstrate a positive incremental operating margin every year, increasing from $1.5 million in partial FY 2025 (Year 1) to $15.7 million by FY 2029 (year 5). In addition, UVMMC projected an incremental positive cash flow resulting from the OSC project each year after the initial year. The cash outflow in Year 1 is the result of financing only $100 million of the total project capital cost of $129.6 million. The $29.6 million in capital costs funded by cash is partially offset by operating cash flow (incremental operating margin plus depreciation) and the capitalization of accrued interest resulting in a negative cash flow of $18.4 million in Year 1. In summary, the OSC is expected to contribute $42.6 million in additional operating margin cumulatively over its first five years, which translates to $41.9 million in additional cash flow during the same period.

UVMMC assumed the debt financing relating to the project will be interest only during the first 10 years. As a result, it included interest expense in the income statement, but it did not reduce projected cash flows for any principal repayments on the loan. In response to Question 3 of Q.008, UVMMC provided six different loan scenarios including a variety of principal repayment options. In four of the six scenarios, the projected interest expense calculation remains unaffected. Meanwhile, the remaining two scenarios result in a reduction of interest expense, slightly increasing operating profit due to a decrease in interest

expense as the principal is paid down. Regarding projected cash flows, three of the six scenarios have no impact on the calculation. Conversely, the other three alternatives lead to a reduction in incremental cash flow due to principal repayments. Overall, these scenarios will decrease cash flows by $4 to $10 million during the five-year projection period. Based on UVMMC's incremental cash flow projections included in the application, a $10 million adjustment would still result in more than $30 million in incremental cash flow from this project during the first five years.

B. Key assumptions: OSC

Three key assumptions within the OSC incremental pro-forma warrant discussion: (1) the inclusion of the inpatient operating margin; (2) the ASC reimbursement adjustment; and (3) the exclusion of incremental surgeon compensation expenses. The report will address these assumptions in order.

Assumption #1: Inpatient operating margin

UVMMC assumed the increase in outpatient surgical capacity created by the OSC would enable UVMMC to shift certain outpatient surgical cases from its main campus to the OSC, resulting in increased inpatient surgical capacity at the main campus.[4] In the selected volume assumptions underlying Scenario 3, UVMMC projected performing a total of 6,645 inpatient cases in 2029. This represents an increase of 696 cases compared to 2019. Table 2 displays inpatient cases by year from 2019 to 2029, along with the year-over-year percentage change and a comparison to base year volume (2019).

Table 2. IP volume projections by year

Year	Inpatient volume	Year-over-year change	Increase over 2019
2019 (actual)	5,948		
2020 (actual)	4,879	(18.0%)	(1,069)
2021 (actual)	4,863	(0.3%)	(1,085)
2022 (actual)	5,012	3.1%	(936)
2023 (annualized)	5,408	7.9%	(541)
2024 (projected)	6,280	16.1%	332
2025 (projected)	6,363	1.3%	415
2026 (projected)	6,433	1.1%	484
2027 (projected)	6,504	1.1%	554
2028 (projected)	6,574	1.1%	625
2029 (projected)	6,645	1.1%	696

Source: 2023-08-15 UVMMC Surgical Case Capacity and Volume Projections Model Final.

As shown in Table 2, UVMMC expected projected inpatient volumes to exceed base year 2019 volumes in all six forecast years. After projecting a 16.1 percent increase in 2024, the volume projections assume growth at just over 1 percent going forward. Table 3 shows the financial impact of these inpatient cases.

[4] UVMMC "Certificate of Need Application for the Development of an Outpatient Surgery Center," page 1.

Table 3. Projected inpatient operating margin (a component of the OSC incremental pro-forma)

	2025****	2026	2027	2028	2029
Cases: Inpatient	206	484	554	625	696
Net patient revenue: Inpatient*	$13,006,455	$30,194,700	$35,317,755	$40,594,503	$46,029,552
Direct costs: Inpatient**	$7,076,153	$16,427,407	$19,214,602	$22,289,163	$25,374,794
Health care provider tax***	$780,387	$1,811,682	$2,119,065	$2,435,670	$2,761,773
Operating margin: Inpatient	$5,149,915	$11,955,611	$13,984,088	$15,869,670	$17,892,985

* "Certificate of Need Application for the Development of an Outpatient Surgery Center," page 36. The revised projections did not provide a net patient revenue breakout between inpatient and outpatient, but overall net patient revenue was similar to the original forecast.

** Q004 updated financial tables provided on June 19, 2023.

***Six percent of net patient revenue based on Q004 updated financial tables provided on June 19, 2023.

**** Represents six months. Table 2 reflects 12 months of data.

As shown in Table 3, the inpatient cases drive significant net patient revenue and operating margin in the OSC incremental pro-forma. In fact, these cases provide nearly $64.8 million in operating margin cumulatively over the first five years of the project. Including the incremental inpatient volume in the OSC incremental pro-forma assumes UVMMC cannot accommodate these additional inpatient cases without the proposed OSC. If UVMMC can accommodate some (or all) of these cases without the proposed OSC, it should not attribute the financial impact to the OSC, as it could achieve the inpatient growth without the OSC project, and it should exclude these cases from the incremental pro-forma.

Table 4 shows the OSC operating margin without the impact of the inpatient cases.

Table 4. Operating margin without inpatient cases

	2025	2026	2027	2028	2029
Operating margin: OSC*	$1,501,557	$5,993,174	$8,911,254	$10,516,808	$15,710,179
Operating margin: Inpatient	$5,149,915	$11,955,611	$13,984,088	$15,869,670	$17,892,985
Operating margin: OSC without inpatient	$(3,648,358)	$(5,962,437)	$(5,072,834)	$(5,352,862)	$(2,182,806)

* Q004 updated financial tables provided on June 19, 2023.

As discussed, UVMMC's OSC financial projections focused on the incremental impact of the proposed project and do not reflect the OSC as a stand-alone business unit. An analysis of the OSC as a stand-alone business unit cannot be completed as that information was not provided in the application (it was not required).

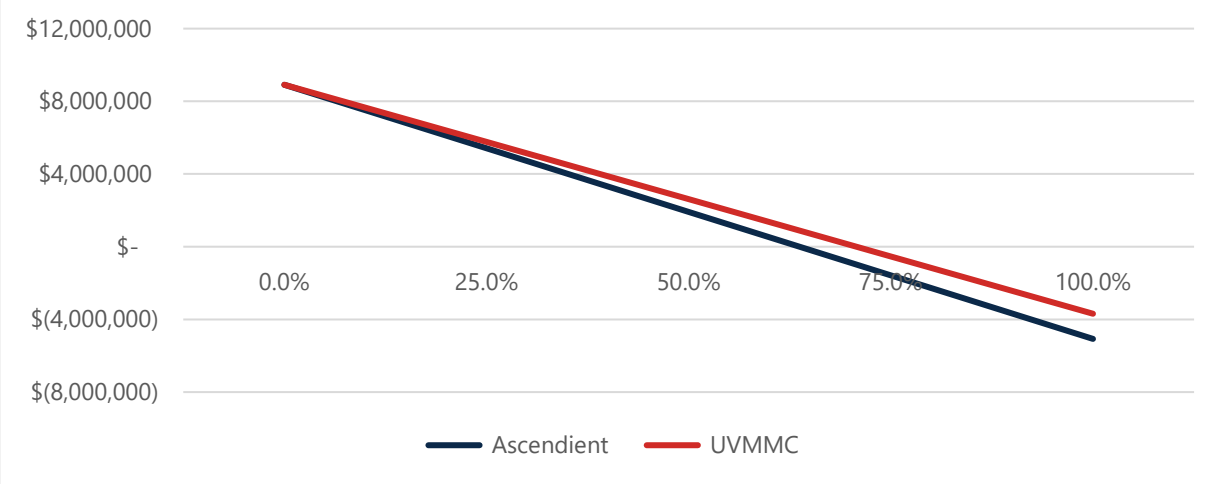
Table 4 demonstrates that inpatient cases will drive the operating margin of the OSC. Without including these inpatient cases, UVMMC projected the OSC will operate with an incremental loss each year. In addition, the incremental cash flow of the proposed OSC would be negative each year under those conditions.

As discussed in Section D on page 9 of Volume I, inpatient surgeries appear high across all three scenarios. In its response to Question 1 of the Green Mountain Care Board (GMCB) Requests for Additional Information Q.006, UVMMC stated, "The project would sustain a positive margin even if

incremental inpatient surgeries were substantially reduced…. If incremental inpatient surgeries were fifty percent (50%) lower than projected volumes shown in the project pro-forma, the projected margin in FY 26 would be reduced by an estimated $5.5M, and the projected margin in FY 27 would be reduced by an estimated $6.3M." Based on Table 4, the operating margin impact is calculated at $5.9 million and $7.0 million for a 50 percent reduction in inpatient volume for those two years. Regardless of the calculation used, the impact of a 50 percent reduction in inpatient volume will materially impact the profitability of the proposed OSC project.

The potential financial impact of this adjustment can be calculated by removing a percentage of the incremental inpatient cases from the operating margin. As shown in Figure 1, each model demonstrates that operating margins quickly decline as incremental inpatient cases are reduced.

Figure 1. FY 2027 Incremental operating margin based on the percentage reduction in incremental inpatient cases



Assumption #2: ASC reimbursement adjustment

UVMMC projected the outpatient cases performed at the OSC to come from two sources: patients shifting from an existing UVMMC facility and incremental new patients. Though the application does not explicitly provide the number of cases projected to shift from an existing UVMMC facility each year, the number can be calculated from information in the application as shown in Table 5.

Table 5. Number of outpatient cases

	2025	2026	2027	2028	2029
Total OSC outpatient cases*	7,310	7,785	8,040	8,040	9,209
Incremental new outpatient cases**	1,482	2,587	2,721	2,599	3,645
Shifted outpatient cases***	5,828	5,198	5,319	5,441	5,564

* "Certificate of Need Application for the Development of an Outpatient Surgery Center," page 17.

** Q004 updated financial tables provided on June 19, 2023.

*** Total OSC cases less incremental new outpatient cases.

UVMMC projected the shift in existing outpatient cases will come from either the main hospital campus or the Fanny Allen facility. Both existing facilities use hospital-based (HOPD) billing, whereas the OSC will be reimbursed as a freestanding ASC. Thus, an HOPD-to-ASC reimbursement adjustment is necessary as the fee schedules differ. The projected UVMMC adjustment per case can be calculated by dividing the projected outpatient net reimbursement adjustment by the shifted cases from Table 5.

Table 6. HOPD-to-ASC outpatient reimbursement adjustment

	2025	2026	2027	2028	2029
Shifted cases	5,828	5,198	5,319	5,441	5,564
OP: Net reimbursement adjustment*	$1,636,303	$3,338,044	$3,512,510	$3,692,210	$3,877,301
Adjustment per case	$281	$642	$660	$679	$697

* Q004 updated financial tables provided on June 19, 2023.

As shown in Table 6, the average adjustment per case in 2029 is projected to be $697 per case. [redacted] A review of the 2023 Centers for Medicare and Medicaid Services ASC reimbursement table confirmed the reasonableness of UVMMC's stated HOPD to ASC reimbursement adjustment for Medicare patients. [redacted] However, based on these figures, it appears the HOPD-to-ASC adjustment appears too low to account for Medicare patients, which would result in the average ASC reimbursement per outpatient case in the OSC to be too high.

In addition to a Medicare adjustment, if any other payors are adjusted for HOPD-to-ASC reimbursement, the adjustment percentage will need to be even higher. In its response to Q.009 Question 9, UVMMC stated it also applied the adjustment to commercial payers and that adjustment resulted in a 7 to 10 percent reduction in average OSC commercial category case reimbursement. The response goes on to state this adjustment does not affect Medicaid and other payors. If UVMMC reduced the reimbursement for 55 percent of its patients (commercial patients) by 7 percent (reduction amount) and further multiplied it by 77 percent (the facility portion), then the reduction would have been 3 percent (55% x 7% x 77% = 3.0%).

[5] Response to Q002 Question 11.

An understatement in the net reimbursement adjustment would result in overstated net revenue and overstated operating income. [redacted] In this instance, it appears the adjustment is low. Given the quantity of cases being shifted, an understatement in this adjustment would have a material impact on financial performance.

Assumption #3: Incremental surgeon compensation expense

According to UVMMC's responses to questions, the professional fees shown in the incremental pro-forma include fees for anesthesiologists and surgeons. Although it increases its professional fee expense for anesthesiologists, UVMMC assumed it will need no additional surgeons as the proposed design will optimize the use of space, staff, and equipment and will increase physicians' productivity.[6]

In its OSC incremental pro-forma, UVMMC projected to add 3,645 new outpatient cases by 2029, which represents a 28 percent increase in outpatient surgical cases compared to the base year (2019). It is uncertain that UVMMC can achieve an increase of this magnitude without adding additional surgeon FTEs or increasing the compensation of existing surgeons, especially if the compensation structure is based on productivity.

C. Overall assessment of financial projections: OSC

UVMMC expected the proposed OSC to provide strong financial support. As projected by UVMMC, the OSC would benefit UVMMC from both capacity and financial perspectives. The reasonableness of the incremental pro-forma depends on the validity of the three key assumptions previously discussed. In determining the reasonableness of the incremental OSC pro-forma, the Board needs to answer three questions:

1. Can UVMMC perform the incremental inpatient cases without the proposed OSC? If it can, though the inpatient cases will provide a financial benefit to UVMMC they should not be attributed to the OSC project.
2. Is the HOPD-to-ASC reimbursement adjustment large enough considering the projected Medicare adjustment and its applicability to commercial payors?
3. Is it reasonable to assume UVMMC will increase its surgical cases substantially without additional expense to compensate surgeons?

These three assumptions are vital to the validity of the OSC incremental pro-forma. First, without including the inpatient cases and the associated inpatient operating margin, UVMMC's projections have the OSC operating at a loss. Second, the ASC reimbursement adjustment for outpatient cases appears low given the expected Medicare and commercial adjustments. If this adjustment is understated, operating income on the incremental pro-forma is overstated. Lastly, if the OSC requires additional surgeons or if surgeons receive more compensation for additional productivity (cases), expenses are understated.

[6] Response to Q002 Question 14.

III. UVMMC Without the OSC

After focusing on the financial projections of the proposed OSC in the initial section, this section shifts focus to the financial projections for UVMMC without including the OSC. The purpose of this section is to confirm the reasonableness of UVMMC's projections and to create a baseline for comparison in the final section.

A. Summary of results: UVMMC without the OSC

UVMMC projects a financial rebound, without the proposed project, after a five-year period of financial challenges. As discussed in latter sections of this report, UVMMC assumes both positive and negative future impact on its financial ratios without the OSC.

- Positive: Operating margins return to historical levels.
- Positive: Days cash on hand will increase by 45 days.
- Negative: Average age of plant will increase from 12.0 to 14.9 years.
- Negative: Debt-to-capitalization ratios will fall below peer benchmarks.

Table 7 shows UVMMC's five-year projected operating income without the OSC.

Table 7. Projected operating income (in 000s) without the OSC

	2023	2024	2025	2026	2027
Total revenue	$1,991,416	$2,130,786	$2,200,397	$2,282,941	$2,378,856
Total expense	$1,935,687	$2,049,582	$2,114,870	$2,194,852	$2,282,248
Operating income (loss)	$55,729	$81,205	$85,527	$88,089	$96,608
Operating margin	2.8%	3.8%	3.9%	3.9%	4.1%

Source: UVMMC OSC Application Table 3A.

B. Key assumptions: UVMMC without the OSC

Similar to the discussion regarding the OSC incremental pro-forma, there are three key assumptions to consider when evaluating the financial projections of UVMMC without the proposed project: (1) the rebound in financial performance; (2) reimbursement rate increases; and (3) the sustainability of cost-saving initiatives. This report will address these assumptions in order.

Assumption #1: Rebound in financial performance

Table 8 shows UVMMC's historical financial performance.

Table 8. Historical operating income (in 000s)

	2016	2017	2018	2019	2020	2021	2022
Total revenue	$1,181,722	$1,246,930	$1,363,518	$1,436,348	$1,458,096	$1,608,747	$1,825,629
Total expense	$1,107,675	$1,178,350	$1,317,387	$1,404,942	$1,462,101	$1,572,224	$1,848,356
Operating income (loss)	$74,047	$68,580	$46,131	$31,406	($4,005)	$36,523	($22,727)
Operating margin	6.3%	5.5%	3.4%	2.2%	(0.3%)	2.3%	(1.2%)

Source: UVMMC portion of UVMHN audited financial statements.

As shown in Table 8, the operating margin of UVMMC declined from 6.3 percent in FY 2016 until it was negative in FYs 2020 and 2022. As discussed in its application and response to questions, UVMMC highlighted several causes that led to this decline in operating margin. First, UVMMC states that its commercial revenue rate increases, as approved by the Board, did not keep pace with cost inflation, leading to deterioration of the operating margin in FYs 2018 and 2019. Subsequent significant events in FY 2020 through FY 2022, including COVID-19, a cyberattack, the closing of the Fanny Allen operating rooms, and significant increases in staffing expenses all contributed to further deterioration in UVMMC's operating margin. The temporary rebound in FY 2021 was the result of federal and state relief funds.[7]

It is important to note that despite the decline from historical performance, UVMMC's operating margin has aligned for the past three years with S&P's median operating margin for U.S. not-for profit health care systems with an A rating. The medians were 1.1 percent in 2022, 1.9 percent in 2021, and 0.1 percent in 2020. UVMMC was slightly above the median in 2021 and slightly below the median in 2020 and 2022.

UVMMC assumes its financial performance will rebound beginning in FY 2023 as it projects an operating profit of $55.7 million for the year. Given the timing of this report, UVMMC's actual results for FY 2023 have been released and are publicly available. As shown in Table 9, UVMMC experienced a dramatic turnaround in FY 2023 compared to FY 2022 and the actual FY 2023 operating income exceeded the projected operating income by roughly $9 million.

Table 9. FY 2023 projected versus actual (in 000s)

	FY 2023 projected	FY 2023 actual
Total revenue	$1,991,416	$2,067,960
Total expense	$1,935,687	$2,003,412
Operating income (loss)	$55,729	$64,548
Operating margin	2.8%	3.1%

Source: UVMMC OSC Application Table 3A, UVMMC portion of FY 2023 UVMHN Hospital Results and Financial Statements.

UVMMC experienced a strong rebound in FY 2023 and its projection for FY 2023 was reasonable. After FY 2023, UVMMC expects its operating margin to return to pre-FY 2018 levels of about 4.0 percent. It bears noting that UVMMC realized the FY 2023 results despite a $17.1 million operating loss in the first quarter of the year. UVMMC's operating margin in the third and fourth quarters of FY 2023 averaged 6.0 percent. Although FY 2023 financial results are positive, future projections depend on assumptions relating to inflation and the sustainability of cost initiatives as discussed later.

[7] Response to Q002 question 3.

Assumption #2: Reimbursement rate increases

UVMMC assumes reimbursement rate increases will continue to keep pace with cost inflation as shown in Table 10.

Table 10. Reimbursement rate inflation

Year	Inflation
FY 24	5.0%
FY 25	4.0%
FY 26	4.0%
FY 27	3.5%

Source: Response to Q002 Question 5.

As discussed in the previous assumption, UVMMC stated it did not sustain its operating margin in FYs 2018 and 2019 because reimbursement rate increases did not keep pace with cost inflation. Conversely, part of its turnaround in FY 2023 was the result of the positive impact of commercial rates that more closely matched cost inflation.[8]

UVMMC assumes it will apply future rate increases to fund cost inflation to all payers evenly. It states that actual rate increases by payer to fund cost inflation are not determined until the annual budget submission and review process by the GMCB.[9] In its FY 2024 Hospital Budget Submission, UVMMC requested a reimbursement rate increase and noted that rate increases from Medicare and Medicaid do not cover the total cost inflation facing its Vermont hospitals. As a result, it has requested higher rate increases from commercial payers to cover the difference. UVMMC expects total cost inflation of 5.2 percent in FY 2024. With a Medicare payment increase of 2.9 percent and a Medicaid payment increase of 0.7 percent, UVMMC has requested a commercial payer rate increase of 13.45 percent in FY 2024.[10]

If future years continue the recent trend of Medicare and Medicaid rate increases not covering total cost inflation, commercial insurance rates will have to continue to increase at a rate greater than the projected overall cost inflation to realize the revenue growth assumed by UVMMC in its application.

Assumption #3: Sustainability of cost-saving initiatives

Given its recent operating margin challenges, UVMMC has implemented tighter expense controls and other margin improvement initiatives to reduce costs. A portion of the improvement in FY 2023 was the result of these cost-saving initiatives. UVMMC assumes these initiatives will continue and its dependence on contract labor will continue to decline.

If UVMMC does not realize or sustain the margin improvement initiatives, UVMMC's future expenses are understated, resulting in an overstated operating margin.

C. Overall assessment of financial projections: UVMMC without the OSC

As stated, UVMMC projected a financial turnaround in FY 2023, which it achieved. To continue the rebound and realize the projections as outlined in its application, UVMMC is dependent upon receiving reimbursement rate increases equal to expense increases, as well as upon completing and sustaining its cost-saving initiatives.

[8] Response to Q002 Question 3.

[9] Response to Q005 Question 8.

[10] UVMHN FY 2024 Hospital Budget Submission, page 17.

IV. UVMMC With and Without the OSC

The first two sections focused on the proposed OSC and on UVMMC without the proposed OSC. This section includes a comparative analysis of UVMMC with and without the proposed project to illustrate the impact of the project on UVMMC's financial ratios.

A. Ratio analysis: Impact of the OSC

As part of the project finances section of its application, UVMMC discussed the proposed OSC project's potential impact on UVMMC's financial framework. Specifically, UVMMC discussed operating margin, days cash on hand, average age of plant, and debt-to-capitalization ratio. According to the narrative, the proposed project was expected to improve all four measures relative to peers with a bond rating of A. The discussion that follows includes a detailed ratio analysis of UVMMC, both including and excluding the proposed OSC, along with a comparison to peer benchmarks.

Ratio #1: Operating margin

The first ratio is projected operating margin. As presented in Table 8, the operating margin for UVMMC declined from 6.3 percent in 2016 to 2.2 percent in 2019. UVMMC experienced a negative operating margin in 2020 and 2022 but returned to profitability in 2023. According to its application, UVMMC's operating margin decline was due largely to the fact that reimbursement from all sources did not keep pace with the inflationary pressures affecting the delivery of health care. As shown in Table 7, the projections provided by UVMMC expect the operating margin to increase annually until it reaches 4.1 percent in 2027 without including the OSC. The proposed project, with an estimated operating margin of $8.9 million in 2027, is expected to increase the overall operating margin to 4.3 percent in 2027.

Table 11. Total operating margin (in 000s), 2022 and 2027

	2022	2027 without project	2027 with project
Operating income (loss)	($22,727)	$96,608	$105,520
Total revenue	$1,825,629	$2,378,856	$2,437,484
Operating margin	(1.2%)	4.1%	4.3%

Source: UVMMC OSC Application Tables 3A and 3C.

Ratio #2: Days cash on hand

The second ratio is days cash on hand. A review of UVMMC's audited financial statements shows a decline from 185 days cash on hand in FY 2021 to 112 days in FY 2022. This decline was the result of its operating loss, its large increase in operating expenses, and significant investment losses ($234 million)[11]. The current days cash on hand is well below rating agencies' A-rated medians of 175 to 225 days. As shown in Table 12, UVMMC projects to have 157 days cash on hand in 2027 before the inclusion of the OSC. Because daily operating expenses increase proportionally more than total cash with the OSC, the days cash on hand will fall to 155 days with the inclusion of the OSC. These projections are well above where

[11] The University of Vermont Health Network Inc. and Subsidiaries Consolidated Financial Statements and Supplementary Information page 77.

UVMMC is today but are still below rating agencies' A-rated medians. This is a bit concerning as the financial projections show a clear indication that UVMMC is trying to increase its days cash on hand.

Table 12. Days cash on hand (in 000s), 2022 and 2027

	2022	2027 without project	2027 with project
Cash and cash equivalents	$127,854	$160,704	$160,704
Board designated assets	$420,337	$789,812	$795,156
Total cash*	$548,191	$950,516	$955,860
Operating expenses less depreciation	1,780,123	$2,209,461	$2,252,328
Daily operating expenses**	4,877	$6,053	$6,171
Days cash on hand***	112	157	155

Source: UVMMC OSC Application Tables 3A and 3C and balance sheet.

* Matches calculation as presented by UVMHN in its bond disclosure reports.

** Operating expenses less depreciation per 365 days.

*** Total cash and daily operating expenses.

Ratio #3: Average age of plant

The third financial metric is average age of plant. As discussed in its financial framework analysis, UVMMC stated that the average age of plant has slowly and consistently risen as a result of the lack of investment in its physical plant over the past three years in part due to UVMMC's efforts to preserve its cash. As shown in Table 13, UVMMC's average age of plant was 12.03 years in 2022. UVMMC's financial projections have the average age of plant increasing to 13.37 years in FY 2023, slightly higher than the agencies' A-rated median that ranges from 11 to 13 years. As presented in Table 13, UVMMC's projections assume it will continue to preserve cash and limit capital investment because it expects its average of age plant to increase to 14.90 years in 2027 without the project. With the capital expenditure in the OSC, the average age of plant is expected to decrease to 13.83 years, still above the A-rated median range of 11 to 13 years and above UVMMC's current year. Similar to the previous metric, this is a bit concerning as UVMMC's facilities are expected to age as it is not projected to make other substantial investments in its facilities or equipment.

Table 13. Average age of plant (in 000s), 2022 and 2027

	2022	2027 without project	2027 with project
Accumulated depreciation	$820,711	$1,084,582	$1,101,706
Depreciation expense	$68,233	$72,787	$79,636
Average age of plant in years	12.03	14.90	13.83

Source: UVMMC OSC Application Tables 3A and 3C and balance sheet.

Ratio #4: Average debt to capitalization

Finally, UVMMC discussed a fourth factor, the debt-to-capitalization ratio. It stated in its application that A-rated health systems should have an average debt-to-capitalization ratio of 30 to 40 percent. UVMMC is currently at 43 percent, just above this range, meaning it has more debt than its peers. As shown in Table 14, UVMMC expects to fall below the 30 percent threshold by 2027 without the OSC project as it

continues to pay off its long-term debts without significant issuing of new debt. With the $100 million loan related to the OSC, this ratio is expected to be within the A-rated range at 31 percent.

Table 14. Debt-to-capitalization ratio (in 000s), 2022 and 2027

	2022	2027 without project	2027 with project
Current portion of long-term debt	$21,997	$11,083	$11,083
Long-term debt	$393,967	$369,184	$469,184
Total debt	$415,964	$380,267	$480,267
Total net assets*	$963,031	$1,518,998	$1,536,859
Dept-to-capitalization ratio	43.19%	25.03%	31.25%

Source: UVMMC OSC application balance sheet table.

* UVMHN calculates its debt-to-capitalization ratio using unrestricted net assets in its bond disclosure reports. UVMMC did not provide a breakdown of unrestricted versus restricted net assets. Thus, total net assets are used.

B. Ratio analysis: Conclusion

The UVMMC projections without the proposed project include both positive and negative financial indicators. On the one hand, UVMMC projects operating margins will return to historical levels and days cash on hand will increase. On the other hand, it suggests days cash on hand will be below peer benchmarks, average age of plant will continue to increase, and debt-to-capitalization ratios will fall below peer benchmarks. All three of these items signal reduced investment in UVMMC's future.

According to its narrative, UVMMC expects the OSC to positively affect all four of these ratios. As shown, UVMMC expects the OSC project to have a positive impact on its operating margin, average age of plant, and debt-to-capitalization ratio. However, the OSC project will reduce days cash on hand by two days.

V. OSC Incremental Pro-Forma with Updated Sg2 Volumes

UVMMC provided an updated Sg2 volume projection on March 12, 2024, at the request of the GMCB. The projections were provided in response to questions and are not reflective of UVMMC's expectation. In the sensitivity analysis of UVMMC's model in Volume 1, it is believed that the UVMMC updated Sg2 model provides a more reasonable forecast of the need for surgical room capacity than the original version. This section updates the projected incremental operating margin for the OSC based on the updated Sg2 volume projection.

As shown in Table 15, the updated Sg2 volume projections result in a reduction of incremental inpatient and outpatient volume performed at the OSC.

Table 15. Updated Sg2 impact on OSC volume projections

Year	IP volume*	IP volume updated Sg2**	IP change	Incremental OP OSC volume***	OSC volume updated Sg2****	Incremental OP change
2025 (projected)	6,363	6,287	(36)	1,482	1,050	(432)
2026 (projected)	6,433	6,318	(114)	2,587	2,345	(242)
2027 (projected)	6,504	6,349	(153)	2,721	2,589	(132)
2028 (projected)	6,574	6,380	(193)	2,599	2,833	234
2029 (projected)	6,645	6,411	(233)	3,645	3,077	(568)

Source: *2023-08-15 UVMMC Surgical Case Capacity and Volume Projections Model Final.
**2024-03-12 UVMMC Q.009, Q.3 Workbook Version B.
*** Q004 updated financial tables provided on June 19, 2023.
****2024-03-12 UVMMC Q.009, Q.3 Workbook Version B Projected Year Less 2019 Baseline.
IP = inpatient; OP = outpatient

The reduction in incremental inpatient and outpatient volumes attributed to the OSC will have an impact on both the revenues and expenses included in the incremental pro-forma. Table 16 presents calculations for the impact on total operating revenue, operating expenses, and operating income. As shown in Table 16, total operating revenues are expected to decline by $56.3 million over the five-year projection period. Operating expenses are projected to decline by $35.3 million. The overall impact of the volume adjustment is a $21.0 million reduction in the OSC's incremental operating income over the five-year projection period.

Table 16. Updated Sg2 impact on total operating revenue, expenses, and income

	2025*	2026	2027	2028	2029
Impact on operating revenue					
Total operating revenue*	$25,565,559	$51,721,627	$58,628,248	$64,018,118	$79,939,679
Total operating revenue**	$19,023,794	$42,129,505	$47,875,051	$55,722,819	$ 58,765,849
Change in total operating revenue	$(6,541,764)	$(9,592,121)	$(10,753,197)	$(8,295,300)	$(21,173,831)
Impact on operating expense					
Inpatient direct costs***	$(742,966)	$(4,491,844)	$(6,486,450)	$(9,045,908)	$(9,598,221)
Health care provider tax****	$(392,506)	$(575,527)	$(645,192)	$(497,718)	$(1,270,430)
Medical and surgical supplies*****	$(486,443)	$(275,332)	$(156,760)	$294,059	$(708,908)
Pharmacy*****	$(72,549)	$(41,253)	$(23,892)	$45,775	$(110,354)
Change in operating expenses	$(1,694,463)	$(5,383,956)	$(7,312,294)	$(9,203,792)	$(11,687,914)
Impact on operating income					
Change in operating income	$(4,847,301)	$(4,208,165)	$(3,440,903)	$908,492	$(9,485,917)

Source: *Incremental pro-forma included in the updated financial tables provided on June 19, 2023.

** 2024-03-12 UVMMC Amended Response to Q.009 total patient revenue.

***Adjusts inpatient direct costs to reflect 54.4% of inpatient net patient revenue.

****6.0% of reduced net patient revenue based on the incremental pro-forma included in the updated financial tables provided on June 19, 2023.

*****Outpatient surgery supply and pharmacy cost per reduced outpatient cases based on the incremental pro-forma included in the updated financial tables provided on June 19, 2023.

As shown in Table 17, despite the large decline in operating profit, the OSC is still projected to be profitable beginning in Year 2 (2026) and is expected to generate $21.6 million in operating income over the five-year projection period.

Table 17. Updated Sg2 adjusted operating income

	2025*	2026	2027	2028	2029
Operating income	$1,501,557	$5,993,174	$8,911,254	$10,516,808	$15,710,179
Change in operating income	$(4,847,301)	$(4,208,165)	$(3,440,903)	$908,492	$(9,485,917)
Updated operating income	$(3,345,744)	$1,785,009	$5,470,351	$11,425,300	$6,224,262

Source: *Incremental pro-forma included in the updated financial tables provided on June 19, 2023.

Given the nature of the revenue and expense adjustments, the incremental cash flow of the project will also be reduced by $21.0 million. The result is a positive cash flow of $20.9 million over the five-year projection period.

In summary, although the updated Sg2 projections will reduce the incremental operating income generated from the proposed project from $42.6 million to $21.6 million and the incremental cash flow from $41.9 million to $20.9 million, the project is still projected to generate operating income. However, the reasonableness of this incremental pro-forma is still dependent on the validity of the three key assumptions previously discussed in Section II.

VI. Conclusion: Impact of the OSC

The proposed OSC is projected to provide strong financial support for UVMMC as it is expected to contribute $42.6 million in additional operating margin cumulatively over its first five years. However, all of the contribution is attributable to increased capacity at the hospital to accommodate additional inpatient cases. The OSC is projected to positively affect UVMMC's operating margin, average age of plant, and debt-to-capitalization ratio.

The reasonableness of the OSC pro-forma depends on the validity of three key assumptions: (1) the inclusion of the inpatient operating margin; (2) the ASC reimbursement adjustment; and (3) excluding incremental surgeon compensation expenses. Each of these assumptions, if unreasonable, will have a material impact on the actual financial results of the proposed OSC. In all three instances, the operating income presented in the application is overstated if the questions around these assumptions are correct. Volume II has not assessed UVMMC's utilization and capacity assumptions and projections as it was covered in Volume I.

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Gregory M. Flicek, CPA/MBA

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EDUCATION/CERTIFICATIONS

Certified Public Accountant
North Carolina State Board of Certified Public Accountant Examiners, 2006 – present.

Meredith College, Raleigh, NC
Masters in Business Administration, December 2013.

University of Wisconsin Eau Claire, Eau Claire, WI
Bachelor of Business Administration, August 2005.

PROFESSIONAL EXPERIENCE

Ascendient Healthcare Advisors – *Chapel Hill, NC* **–** May 2021 – present.

Senior Manager
- Oversee the methodology and financial feasibility sections of certificate of need applications.
- Contribute to or lead CON comments and response to comments. Participate in appeals.
- Build volume projections and financial models for client business planning purposes including both facility and service specific projects.
- Lead the analysis for rural hospital sustainability projects and other strategy projects.

Meredith College – *Raleigh, NC* **–** January 2018 – July 2021.

Lecturer of Business (Business Strategy and Accounting)
- Taught a full course load including Integrated Strategic Management (MBA), Business Strategy, Financial Accounting, Intermediate Accounting, and Managerial Accounting (MBA).
- Drafted the Fifth Year Continuous Improvement Report for the School of Business which led to re-accreditation through AACSB in 2020.

Various Consulting Clients – *Austin, TX & Raleigh, NC* **–** October 2016 – May 2019.

- Built financial models and dashboards to help an Amazon seller maximize both sales and profitability. (February - May 2019)
- Taught the Financial and Managerial Accounting sections of the NC Bar Association's Mini-MBA continuing education event. (December 2018)
- Partnered with leadership at WakeMed Physician Practices to create business plans and pro-forma financial statements for new or expanded services. (October 2016-March 2018)
- Interim Director of Operations at a telemedicine startup. (November 2016-January 2017)

The Advisory Board Company – *Austin, TX* **–** June 2015 – September 2016.

Director, Medical Group Advisor
- Team worked directly with 45 medical groups across the United States using metrics and data to assist in performance improvement. Primary topics included provider productivity, patient access, financial performance, revenue cycle, physician compensation, coding, and staffing.
- Supervised, mentored, and coached 10 team members.
- Empowered medical group executives to facilitate meaningful conversations with physicians regarding sensitive topics such as financial performance, productivity and compensation.

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WakeMed Physician Practices (WakeMed Health & Hospitals) - *Raleigh, NC* **-** August 2010 – June 2015.

Practice Manager, Senior (2014 – 2015)

- Managed a group of eight pediatric practices including a general pediatric clinic, a pediatric endocrinology clinic, a pediatric gastroenterology clinic, a special infant care clinic, two groups of neonatologists, a group of pediatric intensivists, and a group of pediatric hospitalists.
- Improved the general pediatric practice by reducing staffing costs by 20 percent, increasing efficiency to expand volume, and implementing a customer service focus that increased patient satisfaction scores from the 1st to 70th percentile.
- Increased pediatric endocrinology patient visits by 24 percent by modifying schedule templates.
- Partnered with physician leaders to expand our Pediatric Intensivist group, Pediatric Hospitalist group, Neonatology group, and Pediatric Endocrinology group. Created pro-forma financial statements and business plans before working with physicians to execute plans.
- Created the business plan and opened a Pediatric Gastroenterology office meeting operational targets from day one.

Financial Specialist, Senior (2012 – 2014)
Financial Specialist (2010-2012)

- Performed physician incentive compensation modeling for 235+ physicians. These models ensured compliance with physician contracts and enhanced budget accuracy.
- Prepared budgets for over 65 physician practices included revenue and expense modeling.
- Analyzed and reviewed monthly financial statements with Service Line Directors.
- Redesigned the net revenue calculation to more accurately reflect cash receipts. New model improved forecast accuracy and increased net revenue approximately $1 million per year.
- Recommended a change in our Hospitalist staffing model that would limit negative budget variances and loss increases. Revised model saved an estimated $1 million annually.
- Saved $1.4 million in expenses through review of contracts and invoice recalculation.

Multiple Accounting Firms **-** *Raleigh, NC & Plantation, FL* - November 2005 - April 2010.

Both Hughes Pittman & Gupton and Williams Overman Pierce are public accounting firms. Trugman Valuation Associates is a nationally recognized business valuation and litigation support service firm.

- Performed business valuation, forensic accounting and litigation support services.
- Prepared partnership, S corporation and individual income tax returns.
- Specialized in complex tax entities including venture capital firms, real estate partnerships, and multi-state returns.

EXPERT LITIGATION EXPERIENCE

Deposition Testimony, March 4, 2024, *The Moses H. Cone Memorial Hospital Operating Corporation d/b/a Cone Health vs NC Department of Health and Human Services, Division of Health Service Regulation, Healthcare Planning and Certificate of Need Section and High Point Regional Health System d/b/a Atrium Health Wake Forest Baptist High Point Medical Center*, 23 DHR 03823.

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Hearing Testimony, December 22, 2023, *Chesapeake Diagnostic Imaging Centers, LLC vs NC Department of Health and Human Services, Division of Health Service Regulation, Healthcare Planning and Certificate of Need Section and Sentara Advanced Imaging Solutions, LLC*, 23 DHR 01469. Admitted as an expert in health planning, finance, and strategy by the Honorable Michael C. Byrne, ALJ.

Deposition Testimony, November 15, 2023, *Chesapeake Diagnostic Imaging Centers, LLC vs NC Department of Health and Human Services, Division of Health Service Regulation, Healthcare Planning and Certificate of Need Section and Sentara Advanced Imaging Solutions, LLC*, 23 DHR 01469.

Deposition Testimony, July 6, 2023, *Rex Hospital, Inc. vs NC Department of Health and Human Services, Division of Health Service Regulation, Healthcare Planning and Certificate of Need Section and WakeMed*, 23 DHR 00908.

Hearing Testimony, May 31, 2023, *Commonwealth of Kentucky, Cabinet for Health and Family Services, Division of Administrative Hearings, Health Services Administrative Hearing Branch Case* #HSAHB CON 23-004.

DAWN CARTER

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EDUCATION

M.H.A., Health Policy and Administration, University of North Carolina at Chapel Hill
B.S., Summa Cum Laude, Business Administration, Bob Jones University, Greenville, SC

PROFESSIONAL EXPERIENCE

ASCENDIENT HEALTHCARE ADVISORS, CHAPEL HILL, NC
f/n/a Health Planning Source, Inc.
President and Senior Partner, 1994 to present

PLANNING AND DESIGN ASSOCIATES, RALEIGH, NC
Consultant, 1990 to 1994

WALKE-HARDY AND ASSOCIATES, GREENSBORO, NC
Sales Assistant, 1989 to 1990

ARNEX, INC., GREENSBORO, NC
Manager, 1988 to 1989

GREENVILLE HOSPITAL SYSTEM, GREENVILLE, SC
Planning Assistant, 1987 to 1988

FACULTY POSITIONS

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL, GILLINGS SCHOOL OF GLOBAL PUBLIC HEALTH, DEPARTMENT OF HEALTH POLICY AND MANAGEMENT
Adjunct Assistant Professor

LITIGATION EXPERIENCE

Hearing Testimony, June 12, 2023, *Caris Healthcare LLC v Hosparus, Inc., Hospice and Palliative Care of Western Kentucky, Mercy Health Hospice, and Pennyroyal Hospice, Inc.,* Commonwealth of Kentucky, Cabinet for Health and Family Services, Division of Administrative Hearings, Health Services Administrative Hearings Branch, HSAHB CON 22-033

Hearing Testimony, November 15, 16, 17, 2022, *Henderson County Hospital Corporation d/b/a Pardee Hospital and Fletcher Hospital, Incorporated d/b/a AdventHealth Hendersonville v. NC Department of Health and Human Services, Division of Health Service Regulation, Healthcare Planning and Certificate of Need Section and MH Mission Hospital, LLP,* 22 DHR 02369

Deposition Testimony, October 5, 2022, *Henderson County Hospital Corporation d/b/a Pardee Hospital and Fletcher Hospital, Incorporated d/b/a AdventHealth Hendersonville v. NC Department of Health and Human Services, Division of Health Service Regulation, Healthcare Planning and Certificate of Need Section and MH Mission Hospital, LLP,* 22 DHR 02369

Hearing Testimony, October 14, 15, 19, and 20, 2020, *The Charlotte-Mecklenburg Hospital Authority d/b/a Atrium Health Lake Norman v. NC Department of Health and Human Services, Division of Health Service Regulation, Healthcare Planning and Certificate of Need Section and Presbyterian Medical Care Corporation and Novant Health, Inc.,* 20 DHR 01836 and 20 DHR 03986

Deposition Testimony, August 6 and 7, 2020, *The Charlotte-Mecklenburg Hospital Authority d/b/a Atrium Health Lake Norman v. NC Department of Health and Human Services, Division of Health Service Regulation, Healthcare Planning and Certificate of Need Section and Presbyterian Medical Care Corporation and Novant Health, Inc.,* 20 DHR 01836

Deposition Testimony, April 4, 2018, *The Charlotte-Mecklenburg Hospital Authority, d/b/a Carolinas HealthCare System, v. South Carolina Department of Health and Environmental Control and Piedmont Medical Center, d/b/a Fort Mill Freestanding Emergency Department,* 17-ALJ-07-0194-CC

Deposition Testimony, August 27, 2013, *County of Catawba, d/b/a Catawba Valley Medical Center v. Frye Regional Medical Center and Tate Surgery Center, LLC and Viewmont Surgery Center, LLC,* 11 CvS 2780

Hearing Testimony, April 30 and May 2, 2013, *AMISUB of South Carolina, Inc. d/b/a Piedmont Medical Center d/b/a Fort Mill Medical Center v. South Carolina Department of Health and*

Environmental Control and the Charlotte-Mecklenburg Hospital Authority d/b/a Carolinas Medical Center – Fort Mill, 11-ALJ-07-0575-CC

Deposition Testimony, February 14 and March 4, 2013, *AMISUB of South Carolina, Inc. d/b/a Piedmont Medical Center d/b/a Fort Mill Medical Center v. South Carolina Department of Health and Environmental Control and the Charlotte-Mecklenburg Hospital Authority d/b/a Carolinas Medical Center – Fort Mill*, 11-ALJ-07-0575-CC

Deposition Testimony, March 7 and 13, 2012, *Holly Springs Hospital II, LLC v. NC Department of Health and Human Services, Division of Health Service Regulation, Certificate of Need Section and Rex Hospital, Inc., Harnett Health System, Inc., and WakeMed,* 11 DHR 12727

Hearing Testimony, August 31, September 1, 2, 6, November 2 and 21, 2011, *Randolph Surgery Center, LLC and The Charlotte Mecklenburg Hospital Authority d/b/a Carolinas HealthCare System v. NC Department of Health and Human Services, Division of Health Service Regulation, Certificate of Need Section and University Surgery Center, LLC and Novant Health, Inc. and Cabarrus Orthopaedic Surgery Center Holdings, LLC,* 11 DHR 0889

Hearing Testimony, September 14 and 15 2011, *The Charlotte Mecklenburg Hospital Authority d/b/a Carolinas Rehabilitation-Mount Holly and d/b/a Carolinas HealthCare System v. NC Department of Health and Human Services, Division of Health Service Regulation, Certificate of Need Section and Caromont Health, Inc and Gaston Memorial Hospital, Inc.,* 11 DHR 3396

Deposition Testimony, July 27 and 28, 2011, *The Charlotte Mecklenburg Hospital Authority d/b/a Carolinas Rehabilitation-Mount Holly and d/b/a Carolinas HealthCare System v. NC Department of Health and Human Services, Division of Health Service Regulation, Certificate of Need Section and Caromont Health, Inc and Gaston Memorial Hospital, Inc.,* 11 DHR 3396

Deposition Testimony, July 14 and 15, 2011, *Randolph Surgery Center, LLC and The Charlotte Mecklenburg Hospital Authority d/b/a Carolinas HealthCare System v. NC Department of Health and Human Services, Division of Health Service Regulation, Certificate of Need Section and University Surgery Center, LLC and Novant Health, Inc. and Cabarrus Orthopaedic Surgery Center Holdings, LLC,* 11 DHR 0889

Hearing Testimony, March 1, 2 and 14, 2011, *Rex Hospital, Inc. d/b/a Rex Healthcare v. NC Department of Health and Human Services, Division of Health Service Regulation, Certificate of Need Section, and Holly Springs Surgery Center, LLC, and Novant Health, Inc. and WakeMed,* 10 DHR 5275

Deposition Testimony, February 7 and 8, 2011, *Rex Hospital, Inc. d/b/a Rex Healthcare v. NC Department of Health and Human Services, Division of Health Service Regulation, Certificate*

of Need Section, and Holly Springs Surgery Center, LLC, and Novant Health, Inc. and WakeMed, 10 DHR 5275

Deposition Testimony, June 1 and 8, 2010, *Alamance Regional Medical Center, Inc. v. NC Department of Health and Human Services Division of Health Service Regulation, Certificate of Need Section and University of North Carolina Hospitals at Chapel Hill,* 09 DHR 5771

Hearing Testimony, April 15, 16, 20, 21 and June 14 2010, *The Charlotte-Mecklenburg Hospital Authority d/b/a/ Carolinas-Rehabilitation-Mount Holly and d/b/a Carolinas HealthCare System v. NC Department of Health and Human Services Division of Health Service Regulation, Certificate of Need Section and Caromont Health, Inc. and Gaston Memorial Hospital, Inc.,* 09 DHR 6116

Deposition Testimony, February 8, March 23, April 9, 2010, *The Charlotte-Mecklenburg Hospital Authority d/b/a/ Carolinas-Rehabilitation-Mount Holly and d/b/a Carolinas HealthCare System v. NC Department of Health and Human Services Division of Health Service Regulation, Certificate of Need Section and Caromont Health, Inc. and Gaston Memorial Hospital, Inc.,* 09 DHR 6116

Deposition Testimony, October 29, 2009, *Davie County Emergency Health Corporation d/b/a Davie County Hospital and North Carolina Baptist Hospital v. NC Department of Health and Human Services Division of Health Service Regulation, Certificate of Need Section and Novant Health, Inc. and Forsyth Memorial Hospital, Inc. d/b/a Forsyth Medical Center,* 09 DHR 3116

Hearing Testimony, September 21 and 22, 2009, *Charlotte-Mecklenburg Hospital Authority, d/b/a Carolinas HealthCare System and Presbyterian Healthcare System d/b/a Presbyterian Hospital-York, LLC v. South Carolina Department of Health and Environmental Control and Amisub of South Carolina, Inc. d/b/a Piedmont Healthcare System, d/b/a Fort Mill Medical Center,* 06-ALJ-07-0713-CC

Deposition Testimony, February 4, February 9, and May 13 2009, *Charlotte-Mecklenburg Hospital Authority, d/b/a Carolinas HealthCare System and Presbyterian Healthcare System d/b/a Presbyterian Hospital-York, LLC v. South Carolina Department of Health and Environmental Control and Amisub of South Carolina, Inc. d/b/a Piedmont Healthcare System, d/b/a Fort Mill Medical Center,* 06-ALJ-07-0713-CC

Hearing Testimony, October 23, 24, 28, 2008, *Novant Health, Inc. and Medical Park Hospital, Inc. d/b/a Medical Park Hospital v. NC Department of Health and Human Services Division of Health Service Regulation, Certificate of Need Section and Davie County Emergency Health Corporation d/b/a Davie County Hospital, North Carolina Baptist Hospital, Town of Bermuda Run, Town of Mocksville, and Davie County,* 08 DHR 0688; *Davie County Emergency Health Corporation d/b/a Davie County Hospital and North Carolina Baptist Hospital and Town of Bermuda Run, Town of Mocksville, and Davie County v. NC Department of Health and Human*

Services Division of Health Service Regulation, Certificate of Need Section and Novant Health, Inc. and Medical Park Hospital, Inc. d/b/a Medical Park Hospital, 08 DHR 0689

Deposition Testimony, September 11, 2008, *Novant Health, Inc. and Medical Park Hospital, Inc. d/b/a Medical Park Hospital v. NC Department of Health and Human Services Division of Health Service Regulation, Certificate of Need Section and Davie County Emergency Health Corporation d/b/a Davie County Hospital, North Carolina Baptist Hospital, Town of Bermuda Run, Town of Mocksville, and Davie County,* 08 DHR 0688; *Davie County Emergency Health Corporation d/b/a Davie County Hospital and North Carolina Baptist Hospital and Town of Bermuda Run, Town of Mocksville, and Davie County v. NC Department of Health and Human Services Division of Health Service Regulation, Certificate of Need Section and Novant Health, Inc. and Medical Park Hospital, Inc. d/b/a Medical Park Hospital,* 08 DHR 0689

Deposition Testimony, February 20, 2007, *Rex Hospital, Inc. v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and WakeMed,* 06 DHR 1488

Deposition Testimony, October 12, 2006, *Novant Health, Inc., and The Presbyterian Hospital d/b/a Presbyterian Hospital Huntersville v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Mooresville Hospital Management Associates, Inc. d/b/a Lake Norman Regional Medical Center,* 06 DHR 0566

Deposition Testimony, June 15, 2006, *County of Union, Union Health Services, LLC and Union Memorial Regional Medical Center, Inc. v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Presbyterian SameDay Surgery Center at Monroe, LLC,* 06 DHR 0150

Hearing Testimony, March 24, 2006, *United Home Care, Inc. v. NC Department of Health and Human Services Division of Facility Services, Certificate of Need Section and Liberty Home Care II, LLC and Total Care Home Health of North Carolina, Inc.*, 05 DHR 1456 and *Total Care Home Health of North Carolina, Inc. v. NC Department of Health and Human Services Division of Facility Services, Certificate of Need Section and Liberty Home Care II, LLC and United Home Care, Inc.*, 05 DHR 1464

Deposition Testimony, March 2, 2006, *United Home Care, Inc. v. NC Department of Health and Human Services Division of Facility Services, Certificate of Need Section and Liberty Home Care II, LLC and Total Care Home Health of North Carolina, Inc.*, 05 DHR 1456 and *Total Care Home Health of North Carolina, Inc. v. NC Department of Health and Human Services Division of Facility Services, Certificate of Need Section and Liberty Home Care II, LLC and United Home Care, Inc.*, 05 DHR 1464

Deposition Testimony, June 3, 2005, *Community Hospice of the Carolinas, Inc., d/b/a Community Home Care and Hospice v. NC Department of Health and Human Services,*

Division of Facility Services, Certificate of Need Section and United Hospice, Inc., d/b/a United Hospice Eastern Carolina and Advantage Hospice & Home Care, Inc., 04 DHR 2214

Deposition Testimony, June 22, 2004, *Winter Village Medical Properties, LLC (Lessor) and Physicians East, P.A. (Lessee) v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Greenville MRI, LLC and Eastern Radiologists, Inc.*, 03 DHR 2411

Deposition Testimony, June 15, 2004, *Southeastern Orthopaedic Specialists, P.A. (Lessee) And Alliance Imaging, Inc. (Lessor) v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and High Point Regional Health System; Triad Imaging, Inc.; Community General Health Partners, Inc. D/B/A Thomasville Medical Center; And Randolph Hospital, Inc*., 03 DHR 2310

Hearing Testimony, May 18, 2004, *Good Hope Health System, LLC v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section, et al.,* 03 DHR 1838

Deposition Testimony, May 4, 2004, *Good Hope Health System, LLC v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section, et al.,* 03 DHR 1838

Deposition Testimony, October 28, 2003, *Native Angels Home Care Agency, Inc., v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Community Health, Inc., d/b/a Community Home Care and Hospice; Consolidated Health Services, Inc.; and Tender Loving Care Home Health Agency, Inc. d/b/a Healthkeeperz Hospice and Palliative Care Center,* 03 DHR 0903

Deposition Testimony, September 9, 2003, *The Presbyterian Hospital v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Mooresville Hospital Management Associates, Inc. d/b/a Lake Norman Regional Medical Center,* 03 DHR 0567

Deposition Testimony, February 28, 2002, *Mooresville Hospital Management Associates, Inc. d/b/a Lake Norman Regional Medical Center v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and The Presbyterian Hospital*, 01 DHR 1416

Hearing Testimony, October 9 – November 9, 2000, *Greensboro Heart Center, LLC v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and The Moses H. Cone Memorial Hospital and The Moses H. Cone Memorial Hospital Operating Corporation,* 00 DHR 0375

Deposition Testimony, March 23, 2000, *Fletcher Hospital, Inc. d/b/a Park Ridge Hospital v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Henderson County Hospital Corporation d/b/a Margaret R. Pardee Memorial Hospital,* 99 DHR 1197

Hearing Testimony, November 10 – 16, 1999, *Cabarrus Diagnostic Imaging, Inc. v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Cabarrus Memorial Hospital d/b/a NorthEast Medical Center*, 99 DHR 0396; *Cabarrus Memorial Hospital d/b/a NorthEast Medical Center v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Cabarrus Diagnostic Imaging, Inc.*, 99 DHR 0392

Deposition Testimony, July 8, 1999, *Cabarrus Diagnostic Imaging, Inc. v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Cabarrus Memorial Hospital d/b/a NorthEast Medical Center*, 99 DHR 0396; *Cabarrus Memorial Hospital d/b/a NorthEast Medical Center v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Cabarrus Diagnostic Imaging, Inc.*, 99 DHR 0392

Deposition Testimony, October 28, 1998, *Frye Regional Medical Center v. NC Department of Health and Human Services, Division of Facility Services, Certificate of Need Section and Catawba Memorial Hospital,* 98 DHR 0743

Deposition Testimony, December 3, 1997, *Lynnhaven VI, LLC d/b/a Glen Alpine Health and Rehabilitation Center v. NC Department of Human Resources, Division of Facility Services, Certificate of Need Section and Carolina Health Care Center of Burke, LLC, Grace Properties, Inc. and Grace Nursing Center, Inc., Burke Health Investors, LLC d/b/a Burke Health Care Center,* 97 DHR 0925; *Grace Properties, Inc., and Grace Nursing Center, Inc., v. NC Department of Human Resources, Division of Facility Services, Certificate of Need Section and Carolina Health Care Center of Burke, LLC, Lynnhaven VI, LLC d/b/a Glen Alpine Health and Rehabilitation Center, Burke Health Investors, LLC d/b/a Burke Health Care Center*

Deposition Testimony, May 28, 1997, *Carolina Imaging Center, Inc. v. NC Department of Human Resources, Division of Facility Services, Certificate of Need Section and Cumberland County Hospital System Inc., d/b/a Cape Fear Valley Medical Center,* 96 DHR 1570

Deposition Testimony, April 10 – 12, 1996, *Roanoke-Chowan Hospital v. NC Department of Human Resources, Division of Facility Services, Certificate of Need Section and Bertie Home Care, Inc.*

PRESENTATIONS

"Outnumbered – The Future of CON." Women in Healthcare North Carolina Chapter, Winston-Salem, NC, January 24, 2024

"Rural Hospital at Home: Lessons Learned at the One-Year Mark." New England Rural Health Association Annual Conference, Killington, VT, November 9, 2023.

"Using a Rural Population Health Chartbook for Strategic Action." NOSORH Regional Partnership Meeting, Chicago, IL, July 26, 2023.

"Rural Hospital at Home: Lessons Learned at the One-Year Mark." NOSORH Regional Partnership Meeting, Charleston, WV, June 22, 2023.

"Rural Emergency Hospitals." Invited Speaker. North Carolina Healthcare Association. Cary, North Carolina, February 16, 2023.

"Creating Guidance on Rural Emergency Hospitals." South Carolina Hospital Association's CFO Forum. Charleston, South Carolina, August 19, 2022.

"Saving Rural Healthcare." South Carolina Hospital Association's CFO Forum. Charleston, South Carolina, August 19, 2021.

"Learning from the Maryland Model." South Carolina Hospital Association's CFO Forum. Charleston, South Carolina, August 19, 2021.

"Healthcare M&A Predictions Take Two: Under Biden & Post-COVID-19." Jarrard, Phillips, Cate & Hancock. Virtual Panel. March 3, 2021.

"Clinical Reconfiguration in the Transformation Era: A Successful Case Study." SHSMD Connections 2019. Nashville, Tennessee, September 11, 2019.

"Observations on Women in Healthcare Leadership." Invited Speaker. 2018 HPM Women in Healthcare Leadership Symposium, The University of North Carolina at Chapel Hill, Gillings School of Global Public Health, Chapel Hill, North Carolina, January 26, 2018.

"CON Research and Impact Analysis." Invited Speaker. North Carolina Hospital Association Winter Meeting, Raleigh, North Carolina, February 15, 2017.

"Healthytown USA: Transforming Payment and Care Delivery." North Carolina Hospital Association Summer Meeting, Pinehurst, North Carolina, July 14, 2016.

"Welcome to Healthytown USA." Webinar. North Carolina Hospital Association, December 3, 2015.

"A Statistical Analysis of Arguments For/Against Certificate of Need." Carolinas Society for Healthcare Strategy and Market Development Fall Conference, Asheville, North Carolina, December 8, 2011.

"Forging the Future: What Makes Strong Small and Rural Hospitals?" Invited Speaker. The Duke Endowment Small & Rural Hospital Conference, Charlotte, North Carolina, November 9, 2010.

OTHER ACTIVITIES

American College of Healthcare Executives
Society for Healthcare Strategy and Market Development, AHA
The Community Church of Chapel Hill Unitarian Universalist, Vice President of the Board

n|e|m|d architects, inc.

architects | planners | interior designers

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1 Lincoln Street, 30th Floor, Suite 117, Boston, MA 02111
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March 19, 2024

NEMD Architects

Architectural Design and Construction Cost Estimate Report of:

University of Vermont Medical Center, Development of an Outpatient Surgery Center in South Burlington, GMCB-004-23con

The Green Mountain Care Board engaged New England Medical Design (NEMD) Architects to review the Certificate of Need application and architectural and site plans submitted by the University of Vermont Medical Center (UVMMC) to develop a new outpatient surgery center.

UVMMC proposes to purchase a 13.5-acre parcel of land located at 119 Tilley Drive in South Burlington and build a new 93,577 gross square foot outpatient surgery center (OSC) which includes 83,602 gross square feet to house eight operating rooms (OR) and related space and 9,975 gross square feet of shell space to accommodate four future ORs and related space. UVMMC currently has 20 operating rooms (ORs) located on its main campus in Burlington and has five ORs located on its Fanny Allen campus in Colchester. In its application, UVMMC represents that the new facility is needed to meet the surgical needs of a growing and aging patient population. UVMMC also represents that the five ORs located on the Fanny Allen campus have, since 2017, been identified for replacement as these ORs are undersized and outdated and due to their configuration and footprint, cannot be expanded or renovated to accommodate the array of surgeries performed in an outpatient setting. The new OSC is designed to accommodate the projected increase in surgical volume over the next ten years.

The proposed new outpatient surgery center to be built in South Burlington includes eight ORs, five of which will replace the ORs currently located on the Fanny Allen campus. Once operational, UVMMC proposes to close the five ORs located on the Fanny Allen campus. The new OSC is 93,577 gross square feet which includes 83,602 gross square feet for eight ORs and 9,975 gross square feet of shell space to accommodate four future additional ORs. The newly constructed 83,602 gross square feet will house eight identical 630 square foot operating rooms, a net increase of three ORs once the five aging Fanny Allen ORs are closed. The building also contains 12 prep rooms, and 36 recovery spaces associated with the eight ORs (including eight 23-hour extended stay recovery rooms), plus shelled space for four additional ORs and 14 pre-and post-operative spaces that will be fit-up and utilized in the future to increase capacity as needed.

The new facility is located 3.3 miles from UVMMC's main Burlington campus. The site has ample parking for employees and patients, is served by public transportation, and is in close proximity to existing UVMMC services offering potentially integrated patient experience. UVMMC states that the OSC's design is intended to maximize flexibility and productivity, as well as to enhance patient and staff experience. On its first patient day, UVMMC expects to utilize eight ORs which will accommodate approximately 8,000 surgeries annually.

A- Review Method and procedure.

Upon receiving the CON materials for review, the following steps were taken:

1- NEMD reviewed the preliminary construction package for compliance with FGI requirements as well as Healthcare design industry standards and adjacencies. This review entailed a detailed study of each clinical component contained in the plans, including required areas for each room, required handwashing sinks, and other amenities needed in each space used for patient care and clinical staff. Deficiencies NEMD identified during our review were sent to the applicant through the Green Mountain Care Board. Once responses were received from UVMMC, they were reviewed by NEMD to ensure compliance with all requirements and that the information provided by the applicant was sufficient.

2- A preliminary cost estimate (CSI estimate) prepared by a professional cost estimator of a qualified Construction Management company was not included in the preliminary package and was requested by NEMD and included in the set of questions sent to the Applicant on February 23, 2023.
On April 17, 2023, UVMMC provided the cost estimate prepared by a professional cost estimator. NEMD carefully reviewed the cost estimate and compared it with similar projects recently completed in New England. NEMD has completed similar projects in-house throughout New England, which allows us to compare the cost estimate with those projects. In some cases, we compared the cost estimate using other resources such as Construction Management companies that have completed similar projects recently.

Review of Documents and Responses to Questions Relating to Information Missing in The Application

Review #1 2/22/2023

We reviewed the preliminary design information dated 2/10/2023 forwarded to NEMD for the UVMMC OSC and had the following comments and observations.

1- Financial Table 1: Project Cost.

A- Construction cost estimate of approximately $990/Square foot seems reasonable and meets the current industry standards in Northeast. Based on the information provided, this number includes both construction cost and all required soft costs such as FF&E, A/E fees and any other associated cost required by the project financing.

B- Project cost estimate of approximately $1,400.00 / Square foot seems reasonable and meets the current industry standards in Northeast.

C- Architectural and engineering fees equal approximately 6% of the construction cost and are reasonable and meet the current industry standards.

D- 20% Construction Contingency at this preliminary stage is reasonable.

2- Project Scope Narrative and preliminary drawings.

A- Project scope is reasonable and all required OSC spaces are accounted for.

B- Preliminary drawings represent a well thought out plan and all adjacencies are practical and reasonable.

C- The operating rooms' sizes are adequate for any type of surgery and meet the current industry standard.

D- There are a sufficient number of Prep, Phase 1 and Phase 2 recovery areas for the number of Operating Rooms provided.

3- CSI estimate format, prepared by a CM or a professional Estimating company.

A- As noted above the CSI Estimate was missing from the application and was requested in the questions sent to the applicant dated February 23, 2023. The CSI Estimate was provided by UVMMC in their response to questions received on April 17, 2023, NEMD reviewed the CSI estimate and found it to be reasonable and in line with industry standards.

4- FGI Check list.

In addition, the following requirements were not addressed in the FGI Checklist which were included in questions sent to UVMMC on February 23, 2023, to which they responded on April 17, 2023.

Item 2.7-2 Accommodations for care of patients of size. Please explain how UVMMC is planning to accommodate patients of size who will be treated in this facility.
Item 2.1- 3.8.8.2. Please check the box if 4 minimum air changes will be provided in the med prep room.
Item 2.7-6.4. Please explain what alternative accommodation is being provided for general support area staff storage.

UVMMC's response to each of these requirements was reviewed and NEMD found their responses to be complete and responsive to each item.

General comments.

1. There were no Mechanical/ Electrical/ Plumbing and Fire Protection design narrative included in UVMMC's submission. Hence, we did not provide any review of these materials.

2. NEMD's review was based on the preliminary design, schematic drawings and project scope provided by UVMMC.

3. UVMMC's architectural plans for the OSC project are responsible for designing the project to conform with all applicable codes and state requirements. NEMD Architects did not review the preliminary package for the conformance of said codes and regulations.

Review #2 7/12/2023

NEMD reviewed all documents included in UVMMC's submission dated 4/17/ 2023 and had the following comments.

1- NEMD reviewed only the architectural section of the package based on the GMCB's direction. The documents support our belief that the architectural drawings meet the requirements of the project and the 2018 FGI standards.

2- NEMD's cursory review of the Civil and Site Plan package found the scope to be very extensive due to the existence of ledge on site, installation of 2 Gravel Wet land areas, sewer system, large area of site prep, etc. Therefore, we believe the Site and Civil cost appear to be reasonable and meet the industry standard.

3- NEMD did not fully review all the applicable codes by state of Vermont and local municipality. It is the responsibility of UVMMC's architect to adhere to all the codes applicable to this project as well as 2018 FGI.

4- NEMD did not review the M/E/P/FP package based on GMCB direction. While we advised the GMCB that M/E/P/FP is the costliest portion of construction and recommended that M/E/P/FP engineers review this aspect of the project, the Board did not select this option.

5- NEMD believes that if costs had appeared to be unreasonable, a peer review by a construction estimating firm would have provided a detailed breakdown of all construction costs to ensure that the cost of this project is reasonable. However, based on our review of the project and comparison with other similar projects in New England, NEMD found the construction cost to fall within the industry standard in New England as previously stated and did not recommend a more detailed review.

Review #3 11/20/2023

We reviewed UVMMC's responses to questions 7 (regarding site conditions) and 9 (square footage and cost per square feet associated with the shell space) in their submission dated November 16, 2023, and found the answers to be thorough and complete.

Prepared by:

Mehdi Khosrovani, RA, AIA | Vermont License #2991
President, NEMD Architects

MEHDI KHOSROVANI, RA, AIA

PRESIDENT
PRINCPAL-IN-CHARGE

Education

Master of Architecture Studies
Boston Architectural Center
Boston, Massachusetts
2001

Bachelor of Science, Architectural Engineering
Roger Williams University
Bristol, Rhode Island
1980

Affiliations

American Institute of Architects (AIA)

Construction Specifications Institute (CSI)

Associated Architects of Rhode Island

Bradley Hospital Board of Trustees

Providence Foundation

RWU Real Estate Advisory Board

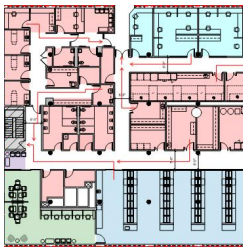
Mehdi Khosrovani is the President and founder of n|e|m|d architects, inc, which was established in 1993. For three decades, he has orchestrated all aspects of architectural design and construction in the healthcare industry, including master planning, project programming, design, construction documentation, and construction administration. Mr. Khosrovani has practiced architecture and been involved in construction since 1980 with prior experience encompassing employment at some of the leading healthcare facilities in the region. He leads the firm in its unique specialization and has successfully completed an extensive range of state-of-the-art projects. The scope of which includes new construction and extensive renovation in all aspects of the healthcare industry, such as operating rooms, imaging facilities, laboratories, nursing units, elderly care, mental health, medical office buildings and research facilities.

Relevant Experience

CORO Research Lab Master Plan | Principal-in-Charge

n|e|m|d developed a series of options to explore the long term vision for a comprehensive research facility. While focused on creating a collaborative environment centered on a universal design open lab module, we explored several iterations for a complete transformation of the third floor. These studies responded to both the technical complexities of lab design as well as the need to foster a creative research environment. Circulation incorporating gathering nodes sought to promote spontaneous meetings. In this way, the physical design of the space seeks to spark the exchange of ideas that can lead to new paths of discovery.

CORO Research Lab NIH Grant | Principal-in-Charge

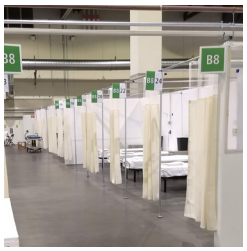


Following our masterplan project for identifying research capacity at Coro, n|e|m|d participated in preparing further documentation for an NIH research grant. Our efforts entailed formulating design narratives and supporting drawings to illustrate how the built environment of the facility would accommodate the proposed research activities, focusing on sepsis, antimicrobial resistance, and opiate addiction. Using our previous masterplan documents as an impetus, we worked extremely closely with Lifespan stakeholders, including Chief Science Officer Dr. Bharat Ramratnam and Director of Research Operations Daniel Bryant, to tailor and align the design intent with this specific research program.

Semma Therapeutics Research and GMP Lab | Providence, RI | Principal-in-Charge

n|e|m|d architects worked closely with Semma Therapeutics, Inc. (Vertex) to design and construct their Providence location. The office included multiple laboratory and support spaces. A chemistry lab, histology lab, tissue culture lab, engineering and surgical preparation lab and a quality control lab are all housed alongside workstations, storage areas, and a clean room and gowning area.

RI COVID Field Hospital | Providence, RI | Principal-in-Charge



These projects were design/build and occured concurrently at the Rhode Island Convention Center in Providence, the former Citizens Corporate Headquarters in Cranston, and a vacant box store in Quonset. Working directly with owners, operators, consultants, and contractors daily we were able to design and build three facilities in less than a month. All facilities were designed with individual patient bays, nurse stations, pharmacy space, lab space, exam rooms, triage/resuscitation rooms, transport bays, clinical support spaces and some patient bathing areas.

MEHDI KHOSROVANI, RA, AIA

PRESIDENT
PRINCPAL-IN-CHARGE

University Orthopedics | East Providence, RI | Principal-in-Charge

n|e|m|d was commissioned by University Orthopedics to consolidate their various New England offices into a new signature building on the waterfront in East Providence. The design for the new building is an innovative, four-story, 88,000 SF steel-framed building that is clad with a metal/composite panel rain screen. Large areas of glass visually reinforce the vertical circulation elements of the building and allow ample transmission of natural light into its core giving a contemporary and cutting edge appearance. Each floor of the building has a unique composition of patient and/or administrative areas. The overall program includes exam space, MRI, x-ray, physical therapy, administrative space and a full service ambulatory surgery floor.

Regan Building Inpatient Hospital Renovation | Cranston, RI | Principal-in-Charge

In 2017, the State of Rhode Island asked n|e|m|d to complete a risk assessment of various behavioral health hospitals on the John O. Pastore campus in Cranston. One of these hospitals was the Regan Building, a six-story, 130,000 SF building that was in need of a near full renovation. Working along side the State of RI, our design team tackled obstacles like roof replacement, insulated over-skinning of the existing façade, and fitting a large program into a space with severe space restraints. Restricted floor plates caused the space constraint, but planning each floor of the hospital to have unlimited flexibility relieved that burden. Spaces were designed to accommodate a variety of activities.

Lahey Hospital and Medical Center|Burlington, MA|Principal-in-Charge

Lahey, considered to be one of the best medical centers in the United States, enlists n|e|m|d for frequent assignments. Since 2007, n|e|m|d architects, inc. have completed over 100 projects, including but not limited to:

- Master Planning
- Space Management
- Facility Programming
- Human Resources Department
- Cardiology Suite Renovations
- MICU Renovations
- Interventional Radiology
- Clinical Laboratory Upgrades
- Operating Room Upgrades
- Dialysis Renovation
- Radiation Therapy Treatment

South County Hospital | Wakefield, RI | Principal-in-Charge

n|e|m|d architects, inc. has designed and implemented over 30 projects for South County Hospital since 2017. These projects include full hospital master planning, inpatient facilities, outpatient and ambulatory clinics and physician offices at off-campus facilities including but not limited to:

- Radiation Therapy
- Facade upgrade and re-design
- Emergency Department
- Medical Office Building
- OR Suite Expansion/Renovation
- Orthopedic Department Relocation
- Main Campus Interior Renovations
- Imaging Department Renovation

The Preserves at Briarcliffe | Johnston, RI | Principal-in-Charge

The Preserves at Briarcliffe is a two-story assisted living facility. n|e|m|d worked with the owner to design a modern building with mixed material languages to complement their other existing campus buildings. Residential units located at the front of the building, or within the courtyard, have full patios/ balconies for enoying the outdoors directly from their living space while units facing the rear of the building have oversized picture windows. In addition to 66 assisted living units, the new facility has a bistro, large dining area, library, public living/lounging rooms, an exercise room, hair salon, resident laundry, a medical suite and staff support spaces. The main lobby has a welcoming fireplace and sitting area with a soothing water wall while a state of the art kitchen provides meal services for the new building, as well as support for the other buildings on campus.

MEHDI KHOSROVANI, RA, AIA

PRESIDENT
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Brigham and Women's Hospital | Boston, MA | Principal-in-Charge

n|e|m|d architects, inc. has designed and implemented over 300 projects for Brigham and Women's Hospital since 1993. These projects vary from inpatient facilities to outpatient and ambulatory clinics as well as physician offices at off-campus facilities. Projects include the following partial list:

- Facility Programming
- Women's Healt
- Pre-Admission Testing Center
- Ambulatory Treatment Suites
- Animal Research Operating Room
- Comprehensive Breast Center
- MRI Suites
- Primary Care Suite
- Executive Offices
- PET/CT Suite
- Simulation Laboratories
- Orthopedic/Arthritis
- In Vitro Fertilization
- General Medicine
- Primary Care Suite
- Pharmacy Renovations
- Preoperative Evaluation
- Dermatology Department Relocation

Dwares Jewish Community Center | Providence, RI | Principal-in-Charge

In 2013, n|e|m|d architects, inc. was commissioned by the Jewish Alliance of Greater Rhode Island to provide master planning and to create a guide for building standards, thus ensuring a unified design aesthetic as the projects are constructed. When these studies were finished, n|e|m|d was hired to design the renovation of the building's David C. Isenberg Family Early Childhood Center, revising the layout of the center's nearly 10,000 SF of classrooms/offices as well as selecting of all its colors and finishes. In addition, n|e|m|d has now designed renovations to many other areas of the building, including the Health Clubs/Steam Rooms/Family Changing Rooms, the Victor & Gussie Baxt Social Hall, the Sandra Bornstein Holocaust Education Center, and both of the building's main entries and lobbies.

Victory Place - Lifespan| Providence, RI | Principal-in-Charge

Lifespan's proposed vision for creating a diverse, transformative campus at Victory Place, seeks to complement and enhance the collective health science emphasis already blossoming within the Knowledge District. The campus development envisions a series of mid-rise buildings surrounding a lively public plaza that intertwines a mix of healthcare, office, retail, hospitality, and residential functions. It is intended that this campus serve as a destination, not only for those participating in the health science fields, but also for the city at large.

Boys and Girls Club - Wanskuk | Providence, RI | Principal-in-Charge

n|e|m|d has been working with BGCP for the past several years to evaluate their aging 50,000 SF building and develop a master plan focusing on more efficient use of their existing infrastructure and providing them the ability to offer new programs. Using the approved master plan, n|e|m|d completed a comprehensive design to modernize the building façade, create two new entrances, renovate the existing infrastructure, and add a 3,000 SF addition. The renovation will allow BGCP to provide many new programs for all ages including several workforce developments programs, workshops, a childcare facility, learning centers, dance and recording studios, diverse teen gathering areas, etc. The new addition will house two state-of-the-art commercial kitchens. Anticipated project completion is the end of 2023.

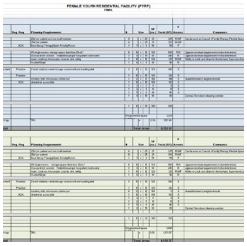
Benton Behavioral Health Renovation | Cranston, RI | Principal-in-Charge

After completing a risk assessment for various behavioral health hospitals on the John O. Pastore campus, the State of Rhode Island asked our team to begin developing renovation plans for the Eleanor Slater Hospital – Roosevelt Benton Building. The Benton Building consisted of transforming 28,050 SF of what was a juvenile detention center into five wards of a new psychiatric hospital. The wards included Intake/High Risk, Intensive Treatment, Men's Forensic, Women's Forensic and Step-Down Clinical. Due to the severity of each patient's case, n|e|m|d set a goal to achieve a feeling of warmth and calm to aid in the everyday life of each man and woman that called Benton their home.

MEHDI KHOSROVANI, RA, AIA

PRESIDENT
PRINCPAL-IN-CHARGE

DCYF New Female Youth Residential Facility | RI | Principal QC/QA



In March of 2022, n|e|m|d architects, inc. were commissioned by Downes Corp (Owner Project Managers) to assist with providing programming, block diagrams, adjacency studies and site selection for this facility. The Downes/n|e|m|d team had several charrette meetings with all stake holders, including DCAMM, DCYF, Child advocacy group and family court representatives to gather information and formulate a unified program. The design team was able to bring together user groups with disparate project visions and to reach consensus on a project direction. The Downes/n|e|m|d team prepared a guideline and project preliminary cost for DCAMM in 4 weeks' time. This informational package has been used by DCAMM to prepare Request for Proposals for A/E , OPM and CM services.

South County Wellness & Medical Center|Westerly, RI| Principal-in-Charge

n|e|m|d architects, inc. was commissioned by John Greim, Managing Partner of WSCHB, LLC, to design the core and shell of their new Westerly Medical and Wellness Center. Construction on the 30,000 SF professional medical office building began in May 2015. The design included a two-story glass lobby and atrium space to create bright, cheerful spaces through the use of a large amount of glazing that increases natural interior light and promotes the wellness of patients, visitors, and staff alike.

CharterCARE | Our Lady of Fatima Hospital Emergency Department | Providence, RI | Principal-in-Charge

n|e|m|d is designing a renovation plan for the busy 13,000 SF Emergency Department that will provide privacy as well as efficiency and supervision. n|e|m|d's current design focuses on the best level of transparency across the central nurse station to balance supervision and privacy. The Hospital is moving forward with an approach that will advocate a more adaptable modular approach to the treatment rooms.

Coastal Medical Office Building|East Providence, RI | Principal-in-Charge

This 50,000 SF medical office building provides single-visit convenience for patients in a "signature building" for Coastal Medical Group by housing a variety of Coastal-affiliated healthcare providers. The building includes primary care, pediatrics, women's health services, ENT, neurology, medical imaging, and cardiology. In 2008, Real Estate and Construction Review awarded n|e|m|d with "Building of America Plaque of Honor" for designing one of New England's most important, innovative, and unique new construction projects.

Alternative Care Facilities - COVID | RI | Principal-in-Charge

As part of the response to the rapid spread of coronavirus, the State of Rhode Island constructed three Alternative Care Facilities to provide overflow / surge bed capacity for the State's healthcare system. n|e|m|d was integral in the construction of all three sites. The projects were design/build and occured concurrently in Providence, Cranston, and North Kingstown. The facilities were designed with individual patient bays, nurse stations, pharmacy and lab space, exam rooms, triage, support spaces and patient bathing areas. Patient bays included electrical and medical gas (O2) outlets. n|e|m|d was onsite daily working directly with the owners, operators, consultants and contractor to make design decisions in the field so that all three facilities could be simultaneously constructed in less than a month.

Virks Building Renovation | Cranston, RI | Principal-in-Charge

n|e|m|d architects, inc. was selected to provide design and construction administration services for conversion of the historic 50,000 SF Virks Building for patient care facility to an office building housing various state agencies. Design work on this project started late January of 2014 and construction will be completed in the summer/fall of 2017.

Ms. Donna Jerry
Health Policy Analyst
Green Mountain Care Board
89 Main St., City Center
Montpelier, VT 05620

March 18, 2024

Via email: donna.jerry@state.vt.us

Re: Certificate of Need Application – University of Vermont Medical Center – New Outpatient Surgery Center

Dear Ms. Jerry:

ECRI has reviewed the information you submitted to us as part of the proposal from the University of Vermont Medical Center (UVMMC) to develop a new Outpatient Surgery Center (OSC) in South Burlington, Vermont. It is our understanding from reviewing the provided documents that this surgery center will replace the surgical capacity formerly available at the Fanny Allen Campus and will be capable of increased capacity as well as more sophisticated surgical procedures. This space is being designed to accommodate the increased surgical volume expected over the next 10 years.

ECRI also reviewed the response from UVMMC dated November 16, 2023, which addressed questions regarding equipment purchases.

The proposed center, to be located at 119 Tilley Drive in South Burlington, is estimated to be approximately 93,577 GSF and will include eight (8) operating rooms with 12 prep rooms and 36 recovery spaces. The building will also include shell space to accommodate four operating rooms and 14 pre- and post-operative spaces to be fit-up and utilized in the future as needed. The partial basement level will have a sterile reprocessing area to support the onsite sterilization needs of the operating rooms as well as providing sterile storage for surgical supplies.

Currently, UVMMC has 25 operating rooms divided between the main campus, which houses 20 inpatient and outpatient ORs, and the Fanny Allen facility in Colchester, which houses 5 ORs used exclusively for outpatient procedures. UVMMC represents that the 5 ORs are undersized. The Fanny Allen ORs have been identified for replacement in the UVMMC Facilities Master Plan since 2017. UVMMC states the rooms are undersized, outdated and, due to their configuration and footprint, they cannot be expanded or renovated to accommodate the array of outpatient surgeries required for patients today. With a lease set to expire in 2026, UVMMC states it has become evident that the Fanny Allen surgical facility is nearing the end of its useful life as a surgical environment.[1]

UVMMC states the anticipated closure of the Fanny Allen ORs coincides with a rapidly growing and aging population within UVMMC's service area, and therefore a significantly increased need for both inpatient and outpatient surgical procedures.

UVMMC has stated in documents that the main campus cannot accommodate the outpatient surgeries now performed at the Fanny Allen ORs once they close, nor will it have capacity to meet the increasing demand for inpatient and outpatient surgeries driven by a growing and aging population. To ensure continued access to care for its patients and to meet current and future surgical demand, UVMMC proposes to construct a multi-specialty OSC that aligns with contemporary surgical practice and the expectations of UVMMC's patients and providers. UVMMC states that the increase in outpatient surgical capacity created by the OSC will also allow UVMMC to shift a portion of surgical cases from its main campus to the new facility, resulting in increased inpatient surgical capacity at the main campus as well as increased patient satisfaction.

The proposed eight (8) operating rooms are identical in size and functionality. These eight (8) operating rooms will result in a net increase of three (3) operating rooms when considering the closing of the existing five (5) operating rooms at Fanny Allen.

This proposed new site will have the capacity to accommodate 8,000 surgeries annually.

ECRI was asked to review the lists of proposed equipment for the new operating rooms to determine if they will meet the needs for the surgical procedures to be performed as well as their cost appropriateness.

[1] While this application was under review, UVMMC informed the Green Mountain Care Board of its intent to purchase, the entire Fanny Allen campus in Colchester, including the building housing the existing ORs. Although the property would no longer be leased, UVMMC maintains it is not feasible to enlarge or retrofit the five existing ORs on the Fanny Allen campus. Response to Questions, (Jan. 16, 2024), 7-9.

Our analysis is based on data provided in the CON application and includes:

- Type of surgical cases anticipated to be performed at the new OSC.
- Listing of equipment needed, with description, department, quantity, and price.

TYPE OF SURGICAL CASES ANTICPATED BY SERVICE LINE

The following types of surgical cases are anticipated to be performed in the new OSC:

- ENT
- General
- OB/Gyn
- Ophthalmology
- Orthopedics
- Plastics
- Surgical Oncology
- Vascular

REVIEW OF EQUIPMENT LIST

ECRI reviewed in detail an Excel spreadsheet titled "OSC Equipment List Rev. 4.15.23". We subsequently reviewed an updated Excel spreadsheet titled "2023-10-23 OSC Equipment List". This updated spreadsheet contains 1,058 lines of information. Each line had detailed information with headings of clinical area, vendor, description, category, condition, quantity, unit price and extended price. Total equipment cost proposed is $16,290,516 with a contingency cost of $1,629,052 for a total cost of $17,919,568.

For the purposes of this analysis, we filtered by category on instrumentation, medical equipment, pathology, radiology, and robotics. We did not review items in the artwork, distribution, environmental services, facilities, furnishings, IT, miscellaneous/other, nutrition, and security categories.

Upon filtering by category as noted above, our analysis consisted of 445 distinct equipment types with a total equipment count of 973 devices, for a total projected cost of $13,160,010.

Breakdown of equipment category is as follows:

Category	Total Device Count	Total Cost
Instrumentation	1 (not broken down)	$1,922,945
Medical Equipment	962	$9,863,365
Pathology	7	$133,700
Radiology	2	$290,000
Robotics	1	$950,000

DETAILED ANALYSIS BY CATEGORY

Instrumentation

This category was provided as a lot with a total cost of $1,922,945. This is common practice for this category type. Instruments in this category usually include forceps, needle holders, hemostats, trocars, scissors, scalpel, dilators, retractors, curettes, speculums, etc.

Medical Equipment

This category consisted of 434 distinct items with a total count of 962 devices for a total cost of $9,863,365.

All devices with a single price of $5,000 or more (usual capital threshold) were compared to the ECRI Capital Guide pricing guide. Additionally, all devices with a unit price of $100,000 or more had a more detailed analysis performed. Items with a cost of $100,000 or more included the following:

- Velys navigation system - $110,000
- Culpul microscope - $125,000
- Microscope – Cataract - $135,000
- Fixed arm CO2 laser - $140,000
- Fixed arm CO2 laser w micromanipulator - $140,000
- Pin Point Tower - $145,000
- Microscope - Laryngoscopies - $150,000
- OR booms set up - $154,007
- Endo Tower - $165,000
- Camera Box Towers - $165,000

- Hand Microscope - $175,000
- Faxitron OR Specimen Rad System - $250,000
- C-Arm, large - $250,000
- Spyellite – $276,000
- BrainLAB Navigation System Curve system - $305,000
- 4K S&N video/tower/equipment drills/saws/positioning/table - $1,700,000

All pricing in this category was within ±2% of recently quoted prices ECRI has seen.

My original question regarding what ECRI believed to be an excessive number of large C-arms and mini C-arms was fully addressed by UVMMC in its response dated November 16, 2023. The response from UVMMC stated there was an error in the original submission and that only one (1) large C-arm and one (1) mini C-arm would be purchased new, with two (2) large C-arms and three (3) mini C-arms being moved to OSC from the Fanny Allen Campus.

Pathology Equipment

This category consisted of 7 distinct items with a total cost of $133,700.

All devices were compared to the ECRI Capital Guide pricing guide.

All pricing in this category was within ±2% of recently quoted prices ECRI has seen.

Radiology Equipment

This category consisted of the following:

- (1) Portable Radiographic unit - $150,00
- (1) Large C-Arms – total cost $250,000
- (1) Mini-C-Arms – 1total cost $140,000

Additionally, all devices in this category had a detailed analysis performed.

All pricing in this category was within ±2% of recently quoted prices ECRI has seen.

Robotics Equipment

The only device in this category is a Stryker Mako, used for total knee surgery. The cost of this device is listed at $950,000 and is well within ±2% of recently quoted prices ECRI has seen.

Conclusion

ECRI considers all equipment on the list provided to be appropriate for the anticipated services that will be performed, and all pricing is as expected.

Please call me at (215) 989-3962, or E-mail at mschlessinger@ecri.org if you have any questions.

Sincerely,

Marc Schlessinger, RRT, MBA, FACHE
Senior Consultant and Investigator

MARC H. SCHLESSINGER, RRT, MBA, FACHE

SENIOR CONSULTANT & INVESTIGATOR
HEALTHCARE INCIDENT INVESTIGATION & TECHNOLOGY CONSULTING (HII-TECH)

Fields of Competence

Clinical operations management, utilization, strategies, workflow assessment and optimization; Strategic planning for ancillary clinical services including respiratory, radiology, cardiology, physical medicine and rehabilitation, point of care testing, neurodiagnostics; Ambulatory Care Center design; IT clinical systems project management, program implementation, operations analysis and restructuring. Additional competencies in the design and implementation of alarm management and middleware systems as well as policy development and practice design for telemetry and central monitoring rooms.

Background

Marc Schlessinger joined ECRI as a Senior Associate of the Applied Solutions Group in 2014. Mr. Schlessinger is an experienced healthcare administrator, enhanced by a strong clinical skill set, having been responsible for ancillary service operations in hospitals for over 30 years. As a Senior Associate within the Applied Solutions Group at ECRI, Marc provides consulting services and assistance to hospitals and other healthcare institutions in matters concerning technology, strategic planning, operations, and reimbursement.

He has been a practicing Registered Respiratory Therapist since 1978 with experience in critical care, transport, and diagnostic testing. Additionally he has achieved specialty credentials in the areas of Pediatric and Neonatal Respiratory Care as well as an advanced certification in Pulmonary Diagnostics. Marc has been a clinical instructor and visiting lecturer for several colleges offering programs in Respiratory Care, as well as serving on their advisory boards. He has served on multiple College of American Pathologists (CAP) inspection teams and is very knowledgeable in regulatory and accreditation requirements including the Joint Commission, CMS, CAP, American Academy of Sleep Medicine and Commission on Accreditation of Rehabilitation Facilities.

Marc has managed multiple ancillary and diagnostic areas. For 17 years he directed the Cardiopulmonary Department at Rolling Hill Hospital, now Einstein Hospital at Elkins Park. His areas of responsibility included Respiratory Care, Pulmonary Diagnostics, non-invasive Cardiology, and Cardiopulmonary Rehabilitation. Marc's major accomplishments at Rolling Hill Hospital included the design, required capital purchases and start-up of a Level II NICU; implementation of a Cardiovascular Information System;

managing the design and planning of a modern five story patient tower; and initial program design and implementation of a Medicare designated Cardiopulmonary Rehabilitation program.

From 1998 through 2014, Marc held multiple leadership positions with Aria Health, previously known as Frankford Hospitals in Philadelphia, Pa. Aria Health is the largest healthcare provider in Northeast Philadelphia and Lower Bucks County and consists of three acute care, teaching community hospitals and also includes multiple outpatient diagnostic and treatment centers. During his career at Aria Health, Marc provided strategic and operational leadership over multiple ancillary and procedural areas including diagnostic and interventional Radiology, non-invasive and Invasive Cardiology (4 catheterization and 2 EPS rooms), Respiratory Care, Physical Medicine & Rehabilitation (Physical, Occupational and Speech Therapy), Cardiopulmonary Rehabilitation, EEG, Sleep & Wake Centers, Stat Laboratories, and Pharmacy Services.

Some of Marc's major accomplishments while at Aria include the following: successfully completed multiple occupancy surveys for free standing, new construction projects including a PET/CT, Sleep & Wake Center, and two Physical Medicine centers with all projects completed on-time and on-budget; restructured the Rehab Services department leading to a nationally benchmarked productivity standard while reducing expenses 12%; opened a second Sleep Lab center and increased overall referrals by 70% in 1st year; increased Outpatient Therapy Volume for PT and specialty services by 15% in one year; and improved appointment turnaround time for Outpatient Radiology Studies from 21 days to 10 days.

Employment History

2014 - Present	Senior Associate, ECRI, Plymouth Meeting, PA
1998 – 2014	Senior Director, Aria Health, Philadelphia, PA
1981-1998	Director, Rolling Hill Hospital, Elkins Park, PA
1978 -1981	Respiratory Therapist, PCOM, Philadelphia, PA

Education and Training

MBA, Healthcare Administration, 2014. Eastern University, St. Davids, PA

BS, Healthcare Administration, 1984. Philadelphia University, Philadelphia, PA

AS, Respiratory Care, 1978. Community College of Philadelphia, Philadelphia, PA

Professional Memberships

American College of Healthcare Executives, member since 2011; achieved Fellow status in 2013

Healthcare Finance Management Association, member since 2012

Healthcare Leadership Network of the Delaware Valley, member since 2011

American Association of Respiratory Care, member since 1976

Pennsylvania State Society for Respiratory Care, member since 1976

Publications

Marc has contributed to multiple key ECRI publications and articles, however because all ECRI publications are considered collaborative, bylines are never included. His contributions include: Top 10 C-Suite Watch, Top 10 Hazard Lists, and technology reports and statements.

Speaking Engagements

Focus Respiratory Seminars – Las Vegas, NV – October 2015

Marc spoke on alarm middleware, alarm fatigue and alarm management.

OR Managers Meeting – Nashville, TN – October 2015

Marc spoke to a large audience on the Top 10 Technologies to Watch for 2015.

Pennsylvania Society for Respiratory Care – May 2016 – May 2017

Marc has spoken at several regional events on alarm management and fatigue.

Louisiana Hospital Association – Baton Rouge, LA - May 2016

Marc spoke at a full-day seminar on NPSG .06.01.01, alarm management, and middleware solutions

Focus Respiratory Seminars – Orlando, FL – May 2017

Marc spoke on alarm management, medical device cybersecurity and FTE management

Louisiana Hospital Association – Baton Rouge, LA - October 2017

Marc spoke at a full-day seminar on NPSG .06.01.01, alarm management, and middleware solutions

American Association for Respiratory Care – Indianapolis, IN - October 2017

Marc spoke on both alarm fatigue and medical device cybersecurity

American Association for Respiratory Care – Las Vegas, NV – December 2018

Marc spoke on both alarm fatigue and medical device cybersecurity

American College of Healthcare Executives – Chicago, IL – March 2019

Marc spoke on clinical engineering – in-house vs. outsourcing

Key Projects

Rolling Hill Hospital, Elkins Park, PA – NICU Project

Project Team Member **–** Services included the design and startup of a 4 Bed Level II NICU. Responsibilities included determining space requirement, equipment selection and procurement, and policy/ procedure development. Equipment included in this project included isolettes, physiologic monitoring equipment, ventilators, IV pumps, and radiant warmers. *Project Budget = $800,000*

Rolling Hill Hospital, Elkins Park, PA – New Patient Tower Build Out

Project Team Member – Services included the design, build out, equipment selection, procurement, and installation **of** three floors in a new five floor patient tower. These floors included medical/surgical rooms (120 beds), ICU, CCU, and step down rooms (34 beds). Equipment for this project included beds, nurse

call systems, ventilators, physiologic monitoring and central station monitoring, IV pumps, headwalls, and other miscellaneous equipment. *Project Budget = $5.5m*

Frankford Hospitals, Philadelphia, PA – MUSE Project

Project Manager – Services included a major CVIS upgrade including relocation of all connectivity equipment and servers. Also attached to this project was the purchase of 48 ECG carts along with enhanced workflow solutions. This project was completed in 1998. *Project Budget = $800,000*

Frankford Hospitals, Philadelphia, PA – CVIS/PACS Project

Project Manager – Services included the RFP, selection process, procurement, installation, testing and training for a multi-location, CVIA-CPACS system. Equipment included four servers and fourteen workstations. An extensive workflow re-design accompanied this project requiring all Physicians to move from dictating reports to a structured reporting system. . *Project Budget = $1.1m*

Frankford Hospitals, Philadelphia, PA – Ventilator Replacement Project

Project Manager – Services included the evaluation of multiple ventilators to arrive at a single ventilator solution, the RFP, site visits, bid process, and procurement for 48 new critical care ventilators. *Project Budget = $1.2m*

Frankford Hospitals, Philadelphia, PA – Sleep Diagnostics Expansion Project

Project Manager – Services included site selection, lease agreement for the space, RFP's for the general contractor and diagnostic equipment, and selection of furniture and finishes for the relocation and expansion of the Sleep Diagnostics Laboratory from a hospital based service to a free standing center. Responsibilities included site selection, lease agreement for the space, RFP's for the general contractor and diagnostic equipment, and selection of furniture and finishes. This project came in 3% under budget and on time. Mr. Schlessinger also oversaw the successful Pennsylvania Department of Health occupancy inspection and subsequent American Academy of Sleep Medicine survey. Project Budget = $1.2m

Frankford Hospitals, Philadelphia, PA – Heart Center Project

Project Team Member – Services included the planning, equipment selection and procurement and conversion of an existing hospital unit to a self-contained Heart Center. Equipment included all items required for three cath labs, 2 EPS labs, 2 CT OR's, a 7 bed Heart Care Unit, along with nursing stations, pre and post op care areas, and support/ management space, including critical care beds, cardiac perfusion pumps, anesthesia machine, ventilators, physiologic monitoring including central stations, cardiac cath lab, automatic doors, procedure beds, power injectors, operative lights, etc. Project Budget = $12m

Frankford Hospitals, Philadelphia, PA – Bernoulli Ventilator Alarm Management Project

Project Manager – Services included the RFP, bid process and installation for a three-hospital ventilator monitoring and alarm system that included 16 central stations, 60 wireless clients, EHR integration, and paging modules. *Project* Budget *= $400,000*

Aria Health, Philadelphia, PA – MUSE Wireless Project

Project Manager – Services included the planning, equipment selection and procurement for an upgrade for a CIS to a fully wireless system with EHR integration and secure web access. *Project Budget = $900,000*

Aria Health, Philadelphia, PA – Ambulatory Care Center Relocation Project

Project Manager – Services included the site selection, lease agreement for the space, RFP's for the general contractor and capital purchases and selection of furniture and finishes for a relocation of a hospital based Physical Medicine (PT/OT/SLP/EEG) center to a free standing center.. This project was completed on budget and on schedule. Mr. Schlessinger also oversaw the successful Pennsylvania Department of Health occupancy inspection for this location. *Project Budget = $450,000*

Aria Health, Philadelphia, PA – Ambulatory Care Center Relocation Project

Project Manager – Services included the site selection, lease agreement for the space, RFP's for the general contractor and capital purchases and selection of furniture and finishes for the relocation of two major hospital based services (Sleep Diagnostics and Physical Medicine) to a large free standing center. The project scope included the expansion of the sleep center from two to four beds and the development of a pelvic floor and lymphedema program. Also included in this project was the development of a community Wellness program. The acquired space totaled 12,000 sq. feet and included required the total demolition and build out of the new space. *Project Budget = $900,000*

Aria Health, Philadelphia, PA – RIS Upgrade

Project Manager – Services included overseeing the final phase of a major RIS upgrade, moving from a PC based application to a web based solution. This project included full integration with a PACS system along with an EMR. Responsibilities included template development, report writing, staff training, and go-live issues. *Project Budget = $900,000*

ECRI – Premier Project – Respiratory Products Technical Review

Project Lead – Services included the analysis and comparison of several types of humidifiers and nebulizers, including product features, safety concerns, efficiencies, and best technologies.

ECRI – Premier Project – Surgical Instrument Containers Products Technical Review

Project Lead – Services included the analysis and comparison of multiple types and manufacturers of rigid surgical instrument containers, including product features, safety concerns, efficiencies, and best technologies.

ECRI – Multiple Clients – Predictive Replacement Planning

Marc has served as both the Project Manager and as a team member on multiple Predictive Replacement Plans at hospitals ranging from single site to a large multi-hospital system. The suggested 5-year spend for these projects ranged from $25m to $75m.

ECRI – Client Confidential – Strategic Technology Planning

Team Member - Marc served as the content expert in the areas of Surgery and Cardiology for a 3-hospital system located in Western Pennsylvania. Providing extensive research and forecasting, Marc developed a technology spending plan totaling $6.5m over 5 years for these service lines.

ECRI – Client Confidential – Alarm Management

Team Member – Marc has provided his clinical and operational expertise for several multi-system hospitals in the area of alarm fatigue and management. By adding his extensive clinical knowledge to the project, patient alarm management at these client has improved dramatically, while decreasing alarm fatigue and thereby improving patient safety.

ECRI – Client Confidential – ED Patient Flow

Marc has served as both the Project Manager and as a team member on for an academic medical center who was experiencing patient flow issues in their large emergency department/trauma center. Multiple solutions were offered to the client, including technology, architectural, and practice alternatives.

ECRI – Client Confidential – Medical Device Cybersecurity

Marc assisted in a project for a large hospital group where we evaluated 500 pieces of legacy medical equipment to determine the risk associated with their continual use.

ECRI – The World Bank – Sourcing and Procurement for COVID-19

Marc was project manager for a large international sourcing and procurement effort to supply member countries with both capital equipment and PPE to combat the COVID-19 pandemic. Authorized spend for this project was up to $15B.