

E36 - Conquering Cancer Care: Optimizing Efficiency & Experience

HCD

October 6th, 2024
3:15 PM - 4:15 PM



LEARNING OBJECTIVES

Evaluate the impact of operations on patient journey

Explore the effectiveness of design principles

Identify the gaps in knowledge and future recommendation

Post-Occupancy evaluation techniques



MEET YOUR SPEAKERS



**Emmeline
Madsen***

Director of Business
Development
& Project Management
UNC Health Rex



Kenyon Worrell

COO |
Principal In Charge
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Wendy St. John

Operational Planner
BSA LifeStructures



Zahra Zamani

Director of Research
BSA LifeStructures

OVERVIEW

POST-OCCUPANCY EVALUATION

Trends in Cancer

The “Challenge”

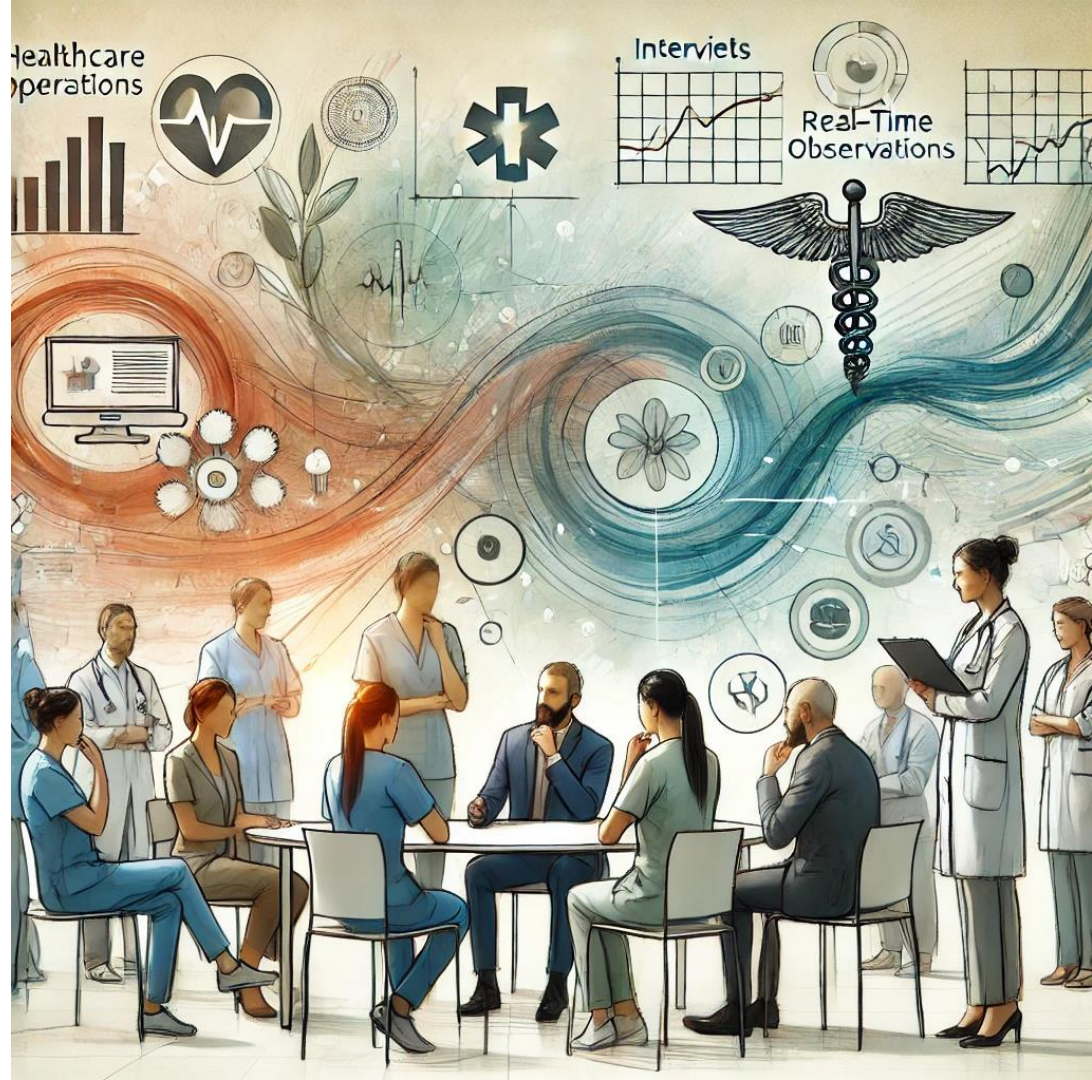
Design Process + Solutions

Overview of POE

POE Findings

Design Implications + Lessons Learned

Open Discussion | Questions?



TRENDS IN CANCER

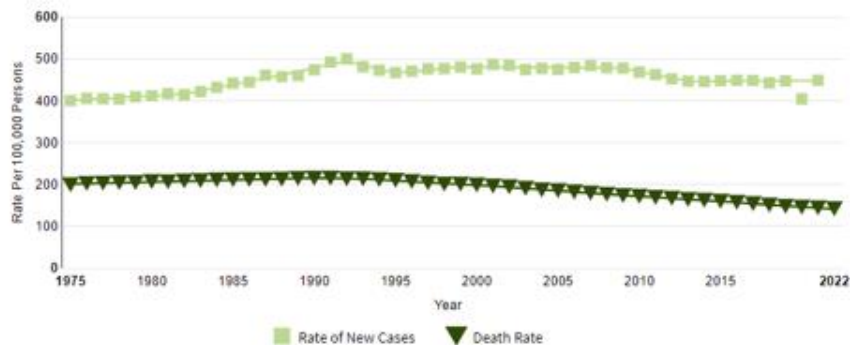
2022

Cancer is among the leading causes of death worldwide. In 2022, there were almost 20 million new cases and 9.7 million cancer-related deaths worldwide.

By 2040, the number of new cancer cases per year is expected to rise to 29.9 million and the number of cancer-related deaths to 15.3 million.

2040

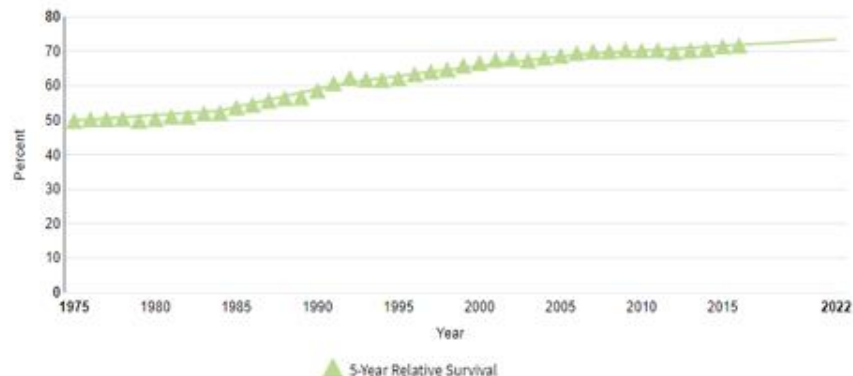
NEW CANCER CASES, DEATHS & 5-YEAR RELATIVE SURVIVAL RATE



New cases come from SEER 8. Deaths come from U.S. Mortality. All Races, Both Sexes. Rates are Age-Adjusted. Modeled trend lines were calculated from the underlying rates using the [Joinpoint Trend Analysis Software](#). The 2020 incidence rate is displayed but not used in the fit of the trend line(s). [Impact of COVID on SEER Cancer Incidence 2020 data](#)

At a Glance

Estimated New Cases in 2024	2,001,140
% of All New Cancer Cases	100.0%
Estimated Deaths in 2024	611,720
% of All Cancer Deaths	100.0%

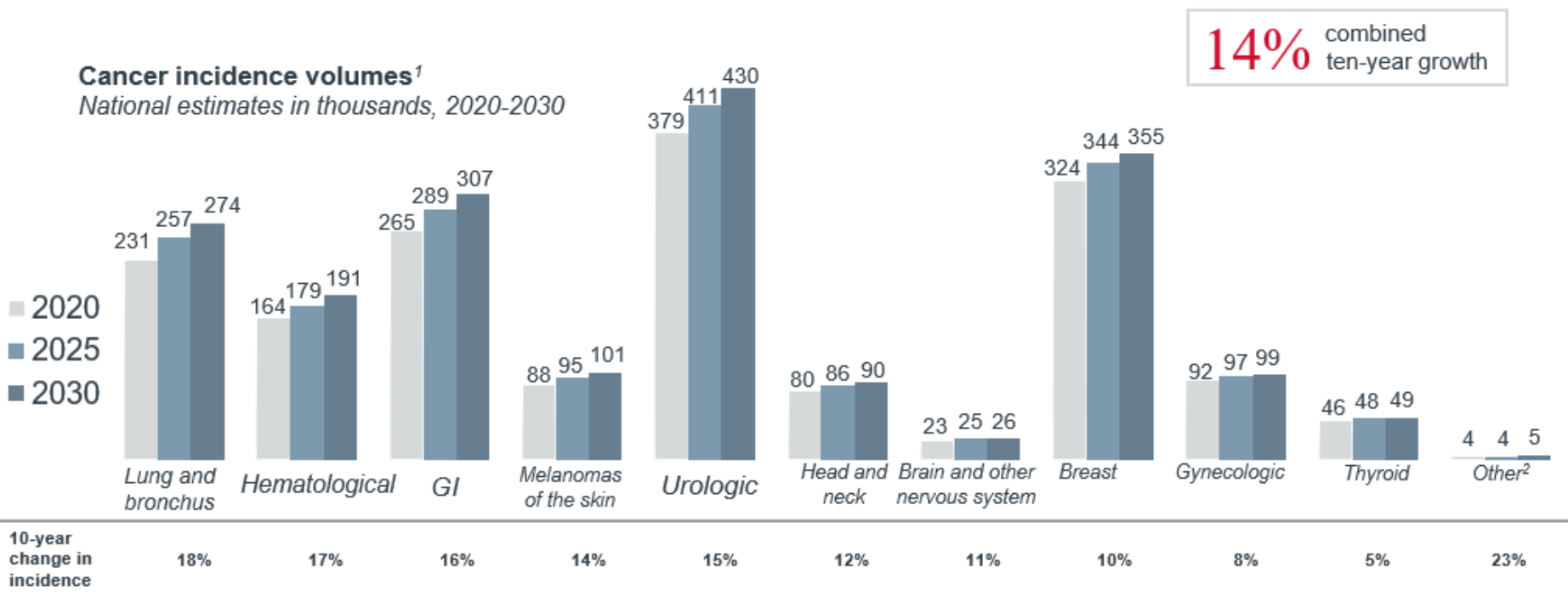


SEER 8 5-Year Relative Survival Percent from 1975–2016, All Races, Both Sexes. Modeled trend lines were calculated from the underlying rates using the [Joinpoint Survival Model Software](#).

5-Year Relative Survival
69.2%
2014–2020

2020 - 2030

NUMBER OF NEW CASES EXPECTED TO RISE FOR ALL CANCERS



1. Estimates are based on historical incidence rates from the CDC's United States Cancer Statistics database.

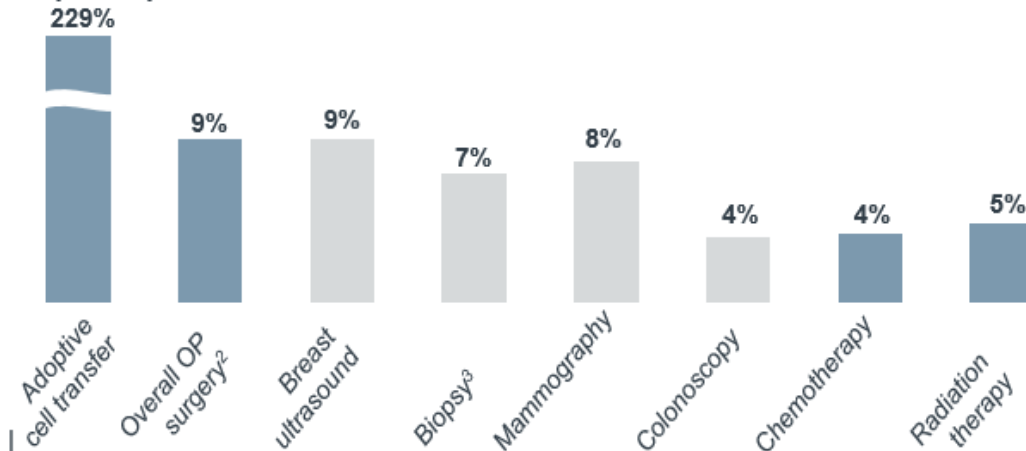
2. Includes Kaposi Sarcoma and mesothelioma.

Source: Advisory Board's Cancer Incidence Estimator.

5-YEAR ONCOLOGY PROCEDURE VOLUME GROWTH RATES, By Care Setting & Service Type

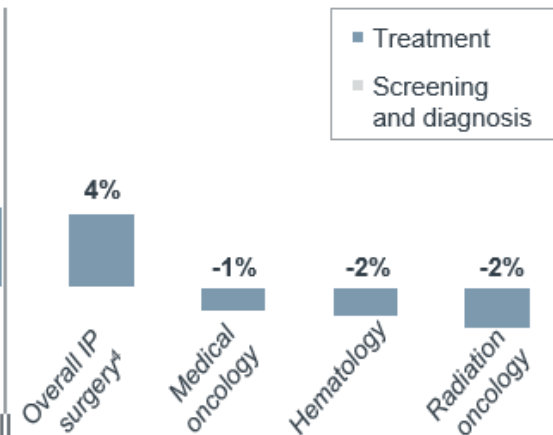
National estimates¹, 2022-2027

Outpatient procedures



7.3% Combined outpatient five-year growth

Inpatient procedures



1.5% Combined inpatient five-year growth

1. Service utilization estimates represent the number of distinct patient claims. A claim represents a unique discharge for inpatient services and a unique visit for most outpatient services, except chemotherapy and radiation therapy. Because chemotherapy and radiation therapy patients usually have a series of recurring treatment visits that can be billed on a single claim or multiple claims depending on the organization, it is not possible to tell the exact number of visits each chemotherapy or radiation claim represents.

2. Includes key surgeries for breast, colorectal, gynecologic, head and neck, hematological, hepatobiliary/pancreatic, musculoskeletal, skin, soft tissue, thoracic, and urology tumor sites.

3. Includes biopsies from breast, colorectal, gynecologic, head and neck, hematological, hepatobiliary/pancreatic, musculoskeletal, neurological, skin, soft tissue, thoracic, and urology tumor sites.

4. Includes key surgeries for breast, colorectal, gynecologic, head and neck, hematological, hepatobiliary/pancreatic, neurological, thoracic, and urology tumor sites.

Source: Advisory Board's Market Scenario Planner.



DESIGN TRENDS IN CANCER CARE

- Evidence-based & healing environment integration
- Patient & family-centered care
- Flexibility & adaptability
- Integrated palliative & support care
- Technology integration
- Focus on infection control & safety
- Incorporation of holistic & integrative oncology
- Sustainability & resilient strategic space planning
- Privacy & social interaction balance
- Positive distraction & sensory enrichment

THE "CHALLENGE"

Space Constraints

Space Constraints

Space Constraints

Patient Instructions

Aging Lower
Medical Infrastructures

Rotational Integration
Operational Issues

KEY CHALLENGES



REGISTRATION

Technology Integration
Operational Issues

Patient Flow
Operational Inefficiency

PATIENT

Inefficiency

Operational Inefficiency



- **Rex Hospital - oldest hospital in Raleigh, NC**
- **Opened 1894**
- **Moved to Current Location 1980**
- **Joined UNC Health system in 2000**
- **660 beds**



UNC Health Rex Cancer Center

- **Opened 1987**
- **COC Accredited**
Comprehensive Cancer Center
- **NAPBC Accredited**
- **3500+ Analytic Cancer Cases**



UNC Health Rex Cancer Center

- 2005
- CON for Expansion
- Designed
- Delayed
- **Supplemental Lease**
6 years
duplicate practice
across street
- **5 Suburban Sites**
- **Space Constraints**
- **Aging Infrastructure**
- **Numerous Renovations**



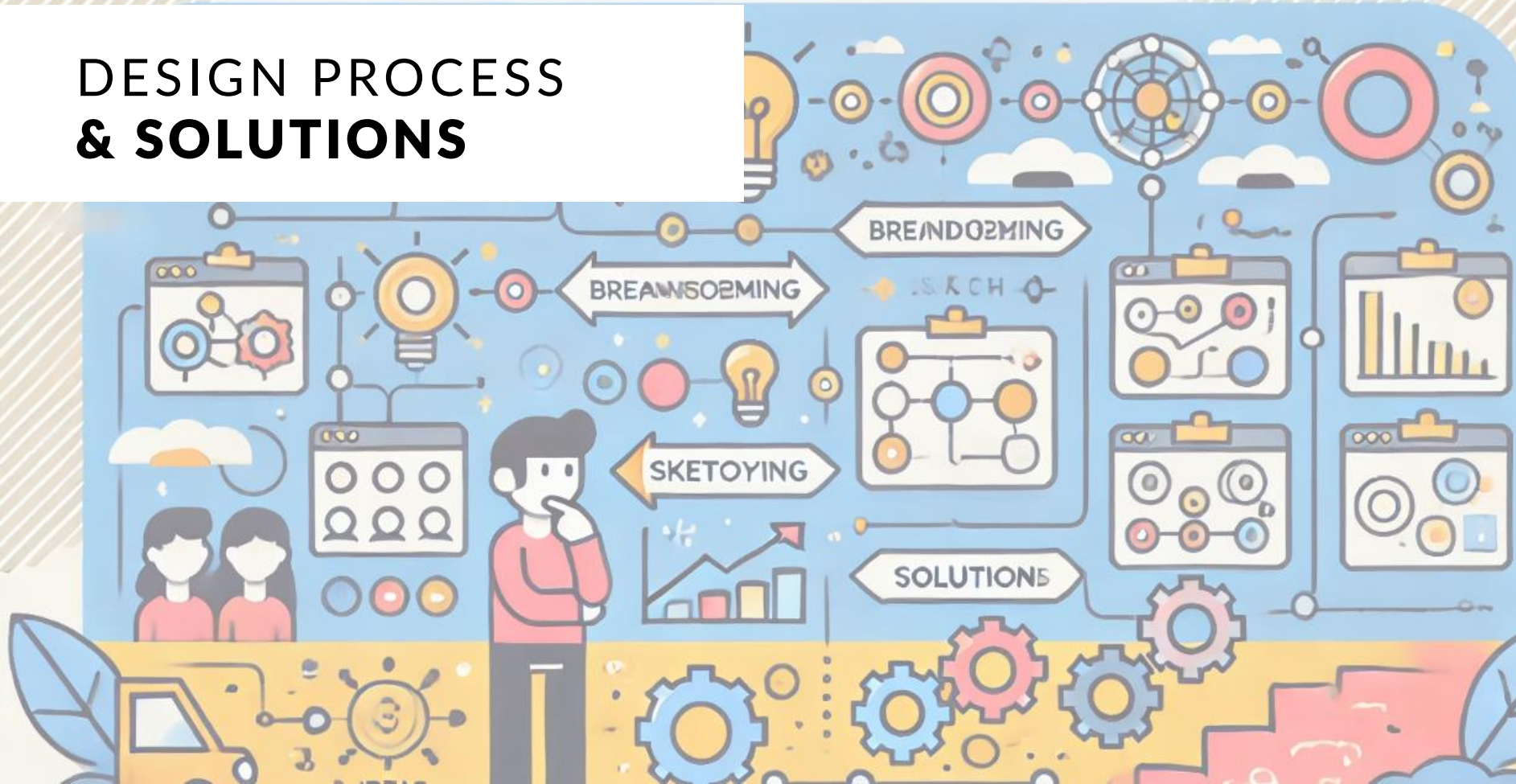
UNC Health Rex Cancer Center

- **\$65M Capital Project**
- **Medical Oncology**
- **Radiation Oncology**
- **Surgical Oncology Clinics**
- **On Site Lab & Pharmacy**
- **Support Services**
- **Combine Locations**
- **Expand Services**
- **Support Future Growth**

**“the Quality of the Space should
reflect the Quality of the Care”**



DESIGN PROCESS & SOLUTIONS



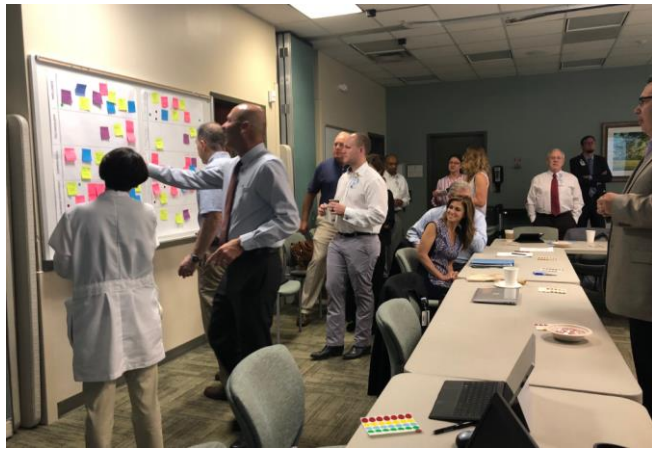
SITE PLAN

**Campus
Extension**

**Parking
Expansion**

**Road
Construction**





OUR COLLABORATIVE PROCESSES

- Visioning Exercises
- User Group Meetings
- PFAC Meetings
- Open House for Staff
- Simulation Models
- Design Visualization



VISION



AUDITORY
DIVIDE



REGISTRATION

MATERIALITY



LIGHTING

OPEN



DAYLIGHTING

VIEWS



ACCESS
OUTSIDE



BUDGET
CONSCIOUS

SEMI-DIVIDED



SCALE

SEATING FOR
FAMILIES

COLOR



NOT OMINOUS

WOOD



FIREPLACE



VISUAL CONNECTION
TO 2ND FLOOR



FUNCTIONALITY



WELCOMING



COMMUNITY



MIX OF MATERIALS



CONTINUUM OF HEART & VASCULAR



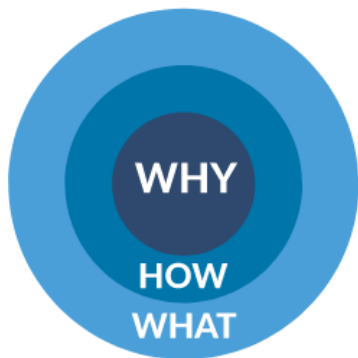
HOTEL



SOFT

UNC REX HEALTHCARE OUTPATIENT CANCER CENTER

THE Community's Cancer Center

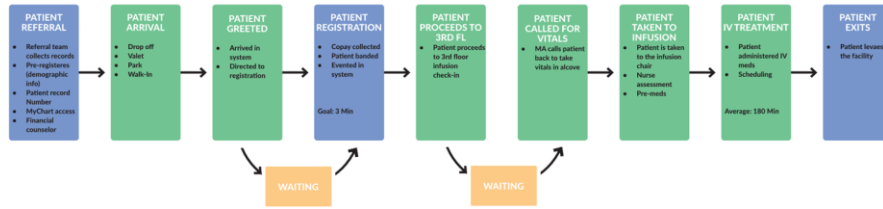


Supports the emotional journey of those affected by cancer
Revitalizes patients, staff, and caregivers by promoting healthy choices
Comforts through ease of use and control over the environment

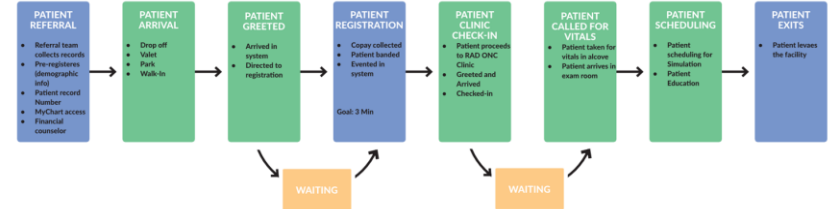
Streamlines processes through hyper-efficiencies
Evolves through flexible operational planning & potential for growth
Strengthens communication and collaboration

CONQUERING CANCER **TOGETHER**

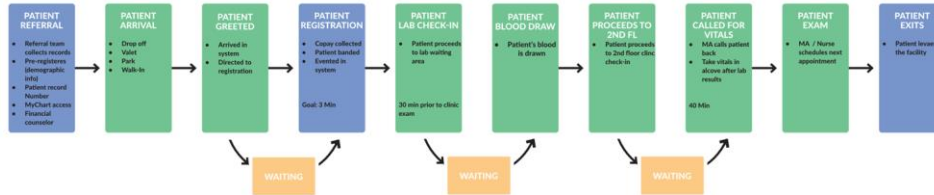
PATIENT FLOWS



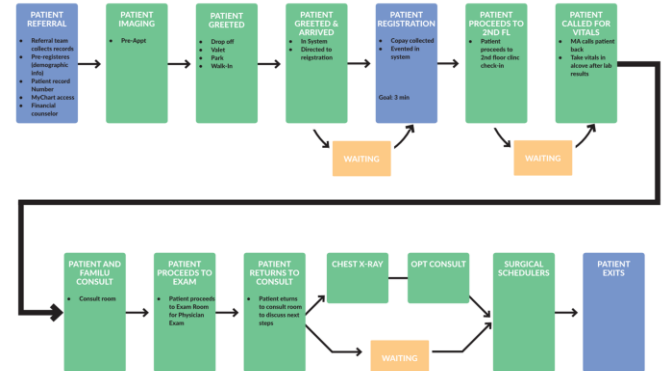
INFUSION PATIENT FLOW



RAD ONC PATIENT FLOW

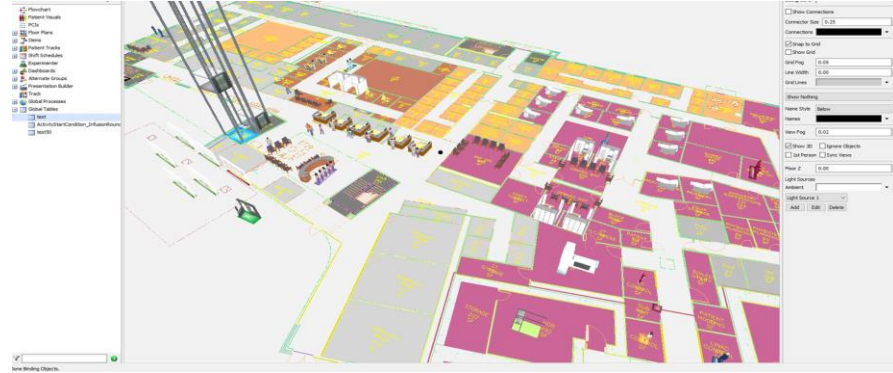


MED ONC PATIENT FLOW

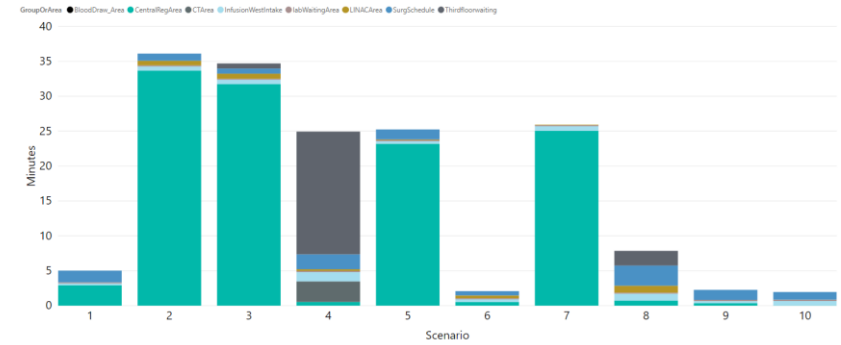


SURG ONC PATIENT FLOW

SIMULATION MODELING

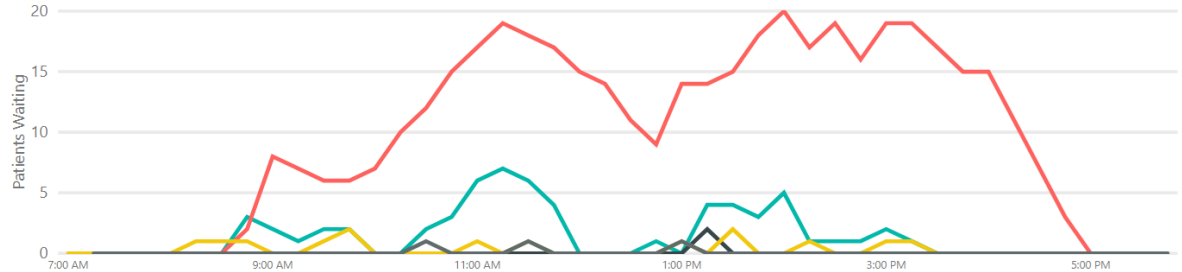


Total Patient Waiting Time, by Location



Main Lobby Census at 25% Growth

Scenario 1 10 5 6 9



STACKING DIAGRAM

3

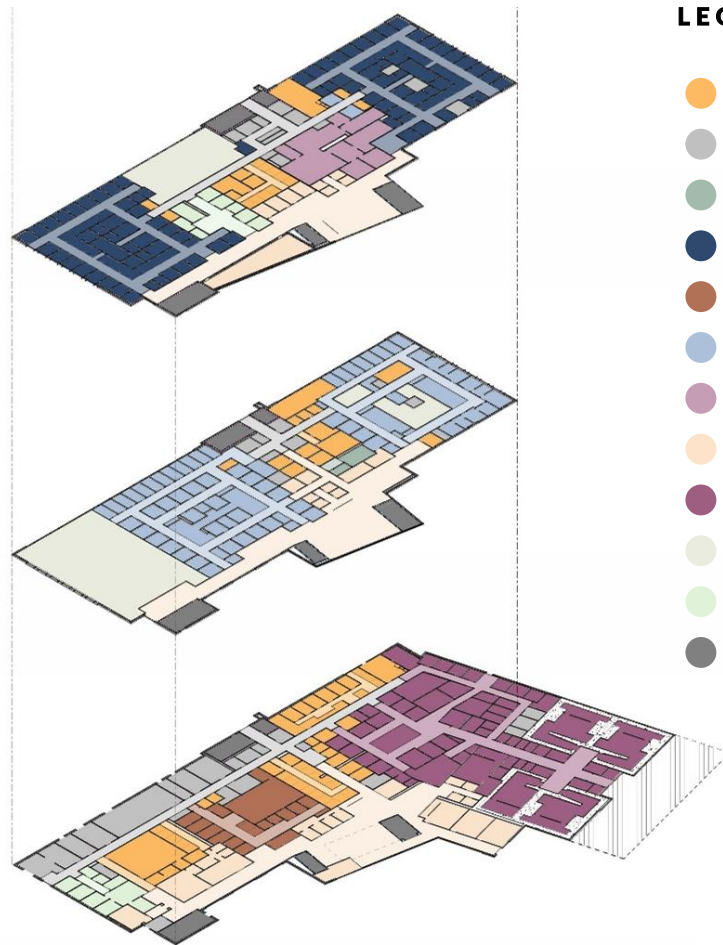
Infusion
Pharmacy
Research

2

Clinic
Offices

1

Registration
Radiation Oncology
Laboratory
Community/Support



DEPARTMENT LEGEND

- ADMIN
- BUILDING SUPPORT
- IMAGING
- INFUSION
- LAB
- ONCOLOGY
- PHARMACY
- PUBLIC
- RADIATION ONCOLOGY
- SHELL
- SUPPORT CLINIC
- VERTICAL CIRCULATION

1 SUPPORTS

the emotional journey of
those affected by cancer

KEY DESIGN STRATEGIES:

- The **welcome mat** concept:
 - Curved shape of the building
 - Large covered canopy
 - One-story push on the ground floor
 - Connection to landscape
 - Valet services
- Immediate view of reception desks
- **Quality of Life Clinic**
(body, mind, spirit)
- Connection to art, light and nature
with views, focal points, art, etc.
- Design elements to create **texture
and warmth** - stone, wood, specialty
lighting, fireplaces, etc.



2 REVITALIZES

patients and staff by
promoting healthy choices

KEY DESIGN STRATEGIES:

- **Access to stairwells** to promote healthy choices for moving vertically through the building.
- Healthy food options on the ground floor
- Caregiver access to **open air terrace**
- Meditation space on ground floor
- Outdoor access for staff / patients / visitors
- Interior finish materials selection with **reduced harmful chemicals** from their composition.



3 COMFORTS

through ease of use and
control over the environment

KEY DESIGN STRATEGIES:

- **Patient Control** over type of Infusion bay (individual / private vs the “social” bays)
- Infusion Bay Control
 - Individual Temperature control
 - Lighting Control
 - Data / Power charging
 - Privacy Curtain
- Day-Lighting in Waiting Rooms
- **Clerestory day-lighting** at entry to Linear Accelerator Vaults



4 STREAMLINES

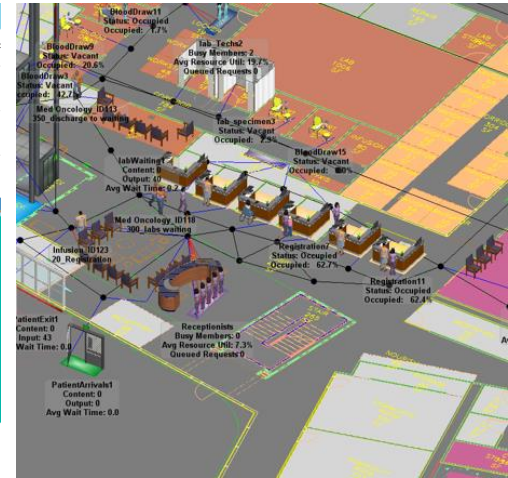
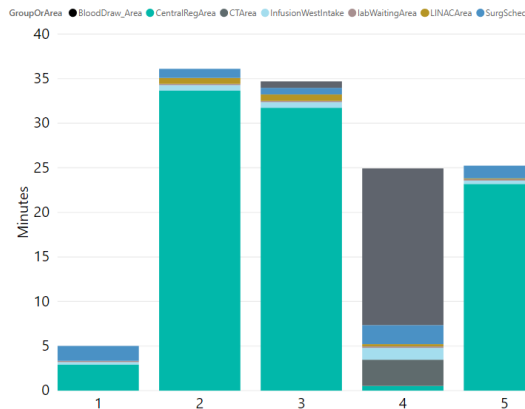
processes through
hyper- efficiencies.

KEY DESIGN STRATEGIES:

- **Centralized public core** to minimize walking distances
- Computer Simulation to test anticipated throughput
- Central service spine and support spaces close to caregivers
- Lab centrally located on ground floor
- **Clustered Clinics** / Offices located on 2nd floor



Total Patient Waiting Time, by Location

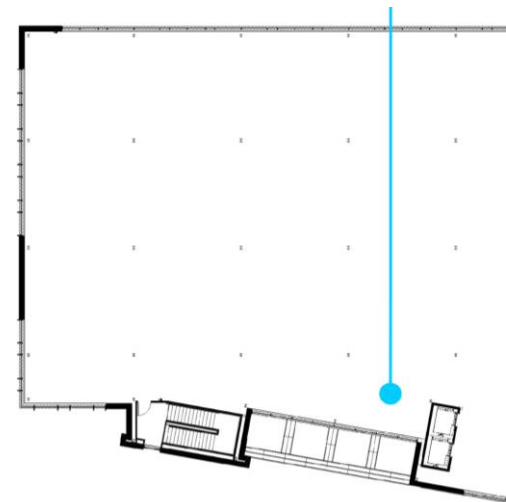


5 EVOLVES

through flexible operational planning and potential for future growth

KEY DESIGN STRATEGIES:

- **Right-sized spaces** planned for future technology
- Shelled space on 2nd and 3rd floors for future expansion of clinics
- 4th floor **shell space**
- Anticipated expansion Rad Onc to the south
- **"Soft Space"** in interior of building for future expansion of different departments
- Pharmacy sized for future to avoid future disruptions

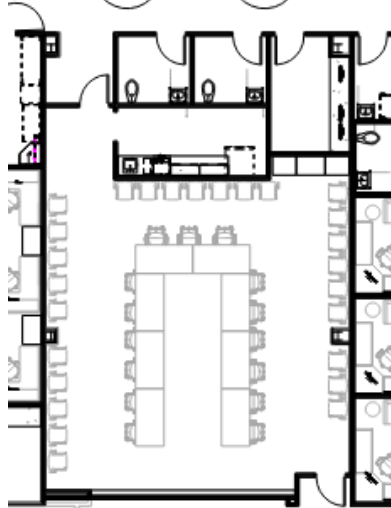


6 STRENGTHENS

communication and
collaboration

KEY DESIGN STRATEGIES:

- Care teams **designed for collaboration** (connections)
- Meeting spaces throughout including dedicated tumor conference
- Convenient central staff stair / elevator / corridor for **convenient staff circulation** / connections
- Community / Counseling spaces for patient / **community involvement**





UNC HEALTH
RANK

CANCER CARE

CANCER CARE

POST OCCUPANCY EVALUATION



POST-OCCUPANCY EVALUATION

DATA COLLECTION METHODS

2 Years Post Opening

METHODS

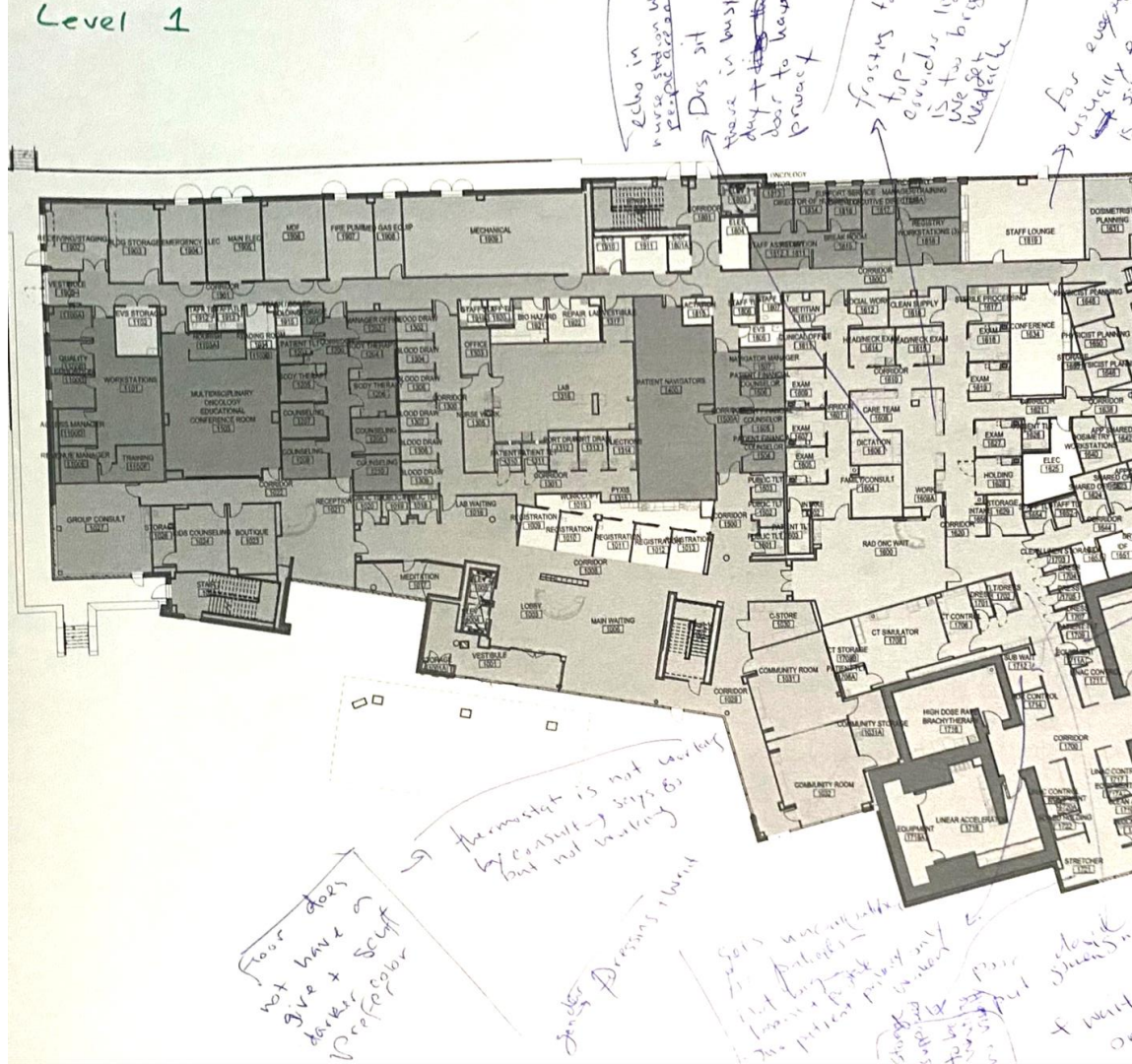
1. Direct Observations
2. Individual Interviews
3. Steering Committee Focus Group
4. Occupant Survey



DIRECT OBSERVATIONS & INTERVIEWS

Gemba Walks

- All Departments
- Number of Observers: 2
- Hours of Observation: 3
- Direct Interviews: 8
 - Nurses
 - Physicians
 - Registration
 - Operational Managers



FOCUS GROUP

11 UNC Rex participants

Participants

- Steering Committee Members
- Physician Leaders
- Operational Leaders

Focus Group Discussion

Guiding Principals

- Design Successes
- Design Challenges
- Lessons Learned



STAFF SURVEY



Survey Platform:

Qualtrics

Days open for response:

2 weeks

Survey Recipients: 248

Survey participants: 89

Participation rate: 36%

Regression Method:

Relative importance

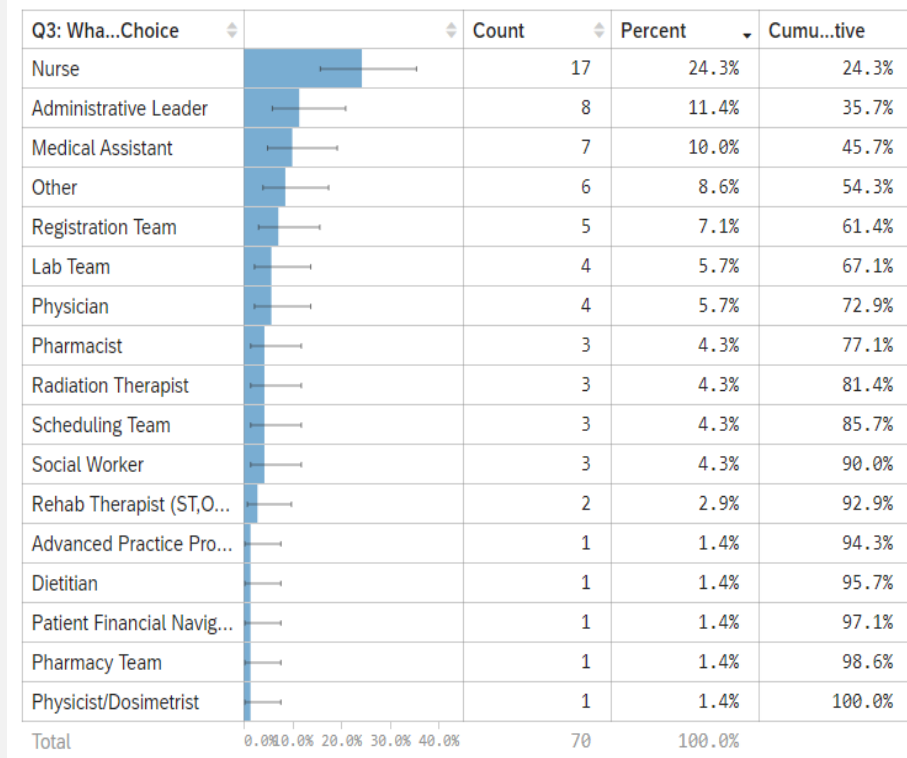
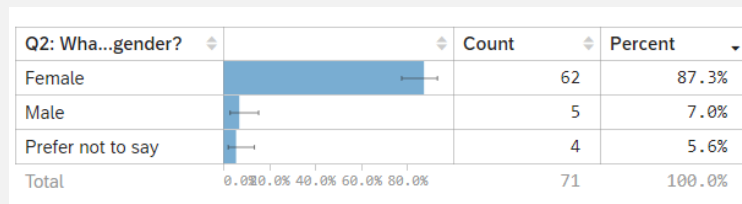
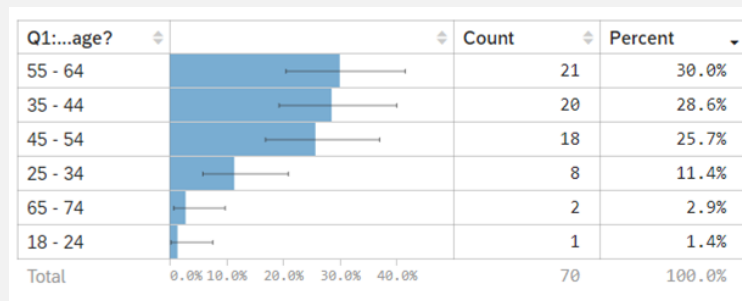
How satisfied are you with the following attributes for the delivery of care?

[illegible]

POE FINDINGS



SURVEY DEMOGRAPHICS



1 SUPPORTS

the emotional journey of those affected by cancer

DESIGN SUCCESSES:

- **Comfortable & Calming Spaces**

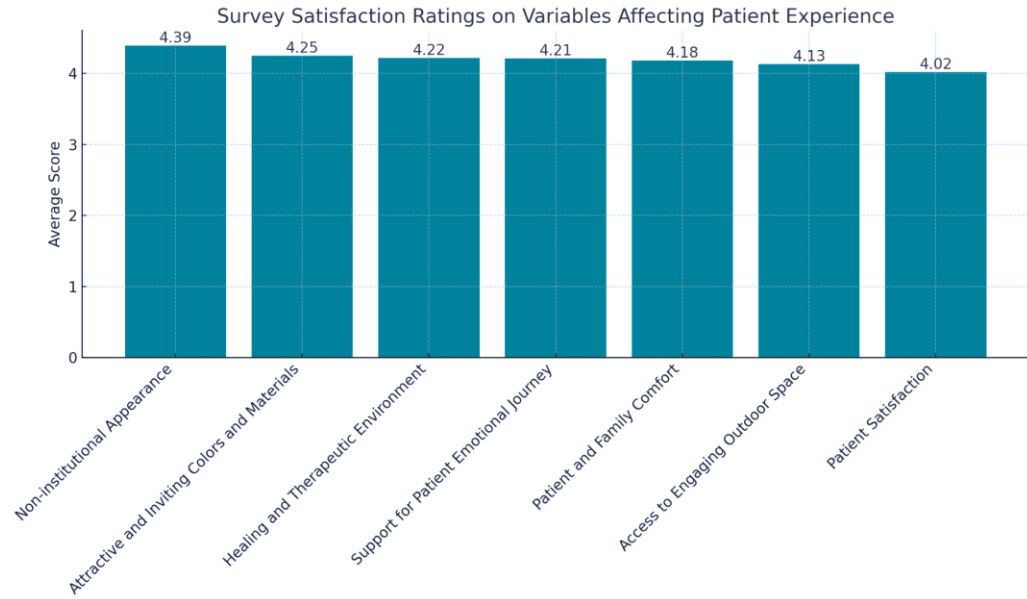
- Light, Airy, and Bright Spaces:
- Comfortable Seating and Nooks
- Fireplaces and Living Rooms

- **Functional Spaces**
Addressing Needs

- Quality of Life Clinic
- Consult Rooms
- Private Infusion Rooms

- **Outdoor & Relaxation Spaces**

- Terrace and Outdoor Spaces

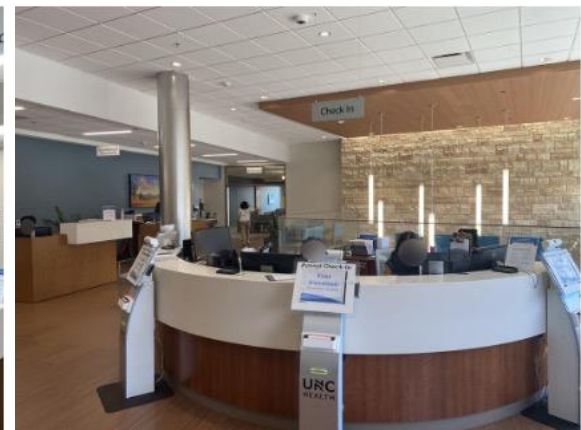
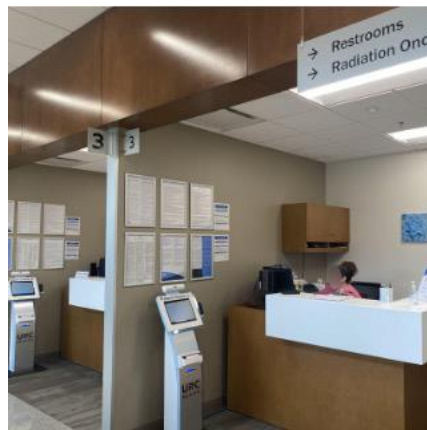
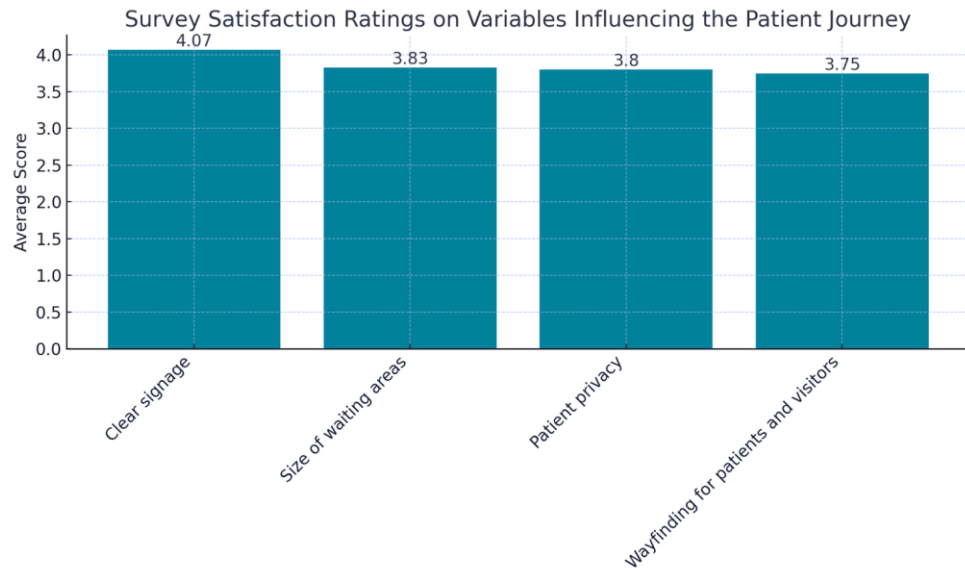


1 SUPPORTS

the emotional journey of those affected by cancer

DESIGN CHALLENGES:

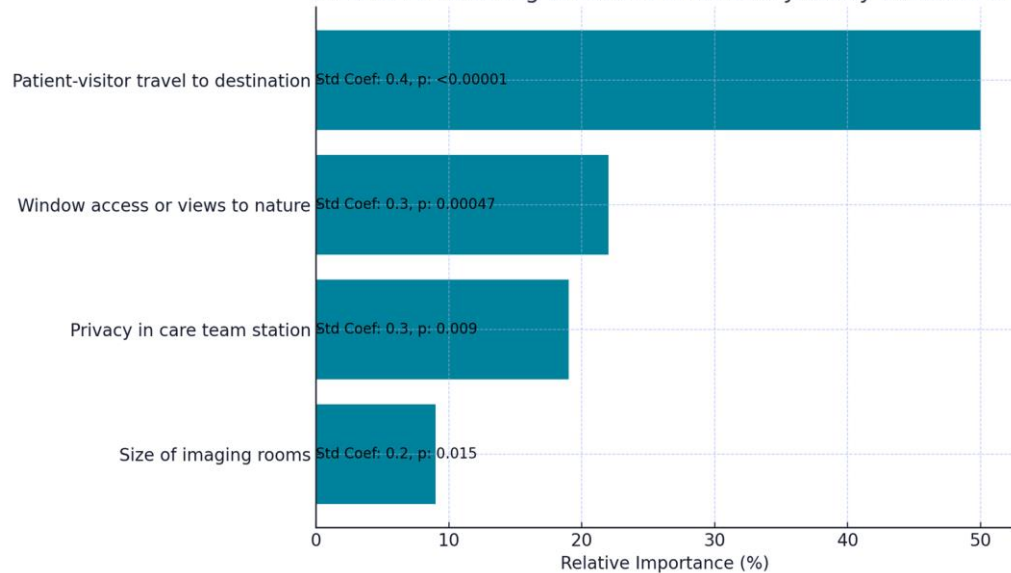
- **Underutilized & Overcrowded Spaces**
 - Underutilized Sacred Space
 - Overcrowded **Lab Waiting** Area
 - Space Constraints in the Quality-of-Life Clinic
- **Wayfinding & Flow**
 - Inadequate Signage and Wayfinding
 - Registration and Checkout Congestion
- **Privacy Issues**
 - Second-Floor Check-in and Checkout
 - Gown and waiting space in Radiology



1 SUPPORTS

the emotional journey of
those affected by cancer

Predictive Modeling of Patient Emotional Journey Satisfaction



1 SUPPORTS

the emotional journey of those affected by cancer

“Our Quality of Life staff is vibrant, bright and beautiful.

We have the **happiest wall** in the building!”

“The first floor has **direct outdoor access** which is nice.”

“Infusion room has great windows.”

“doing assessments chair side can be not private when infusion area is full wish there was **art** work on the walls in the infusion area **soft music** in the background would be nice”



2 REVITALIZES

patients and staff by
promoting healthy choices

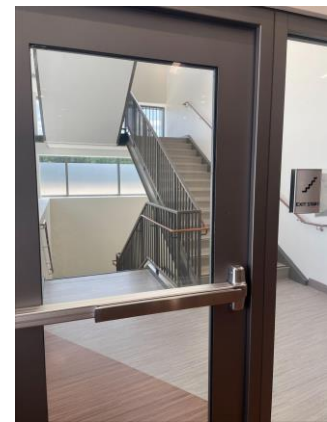
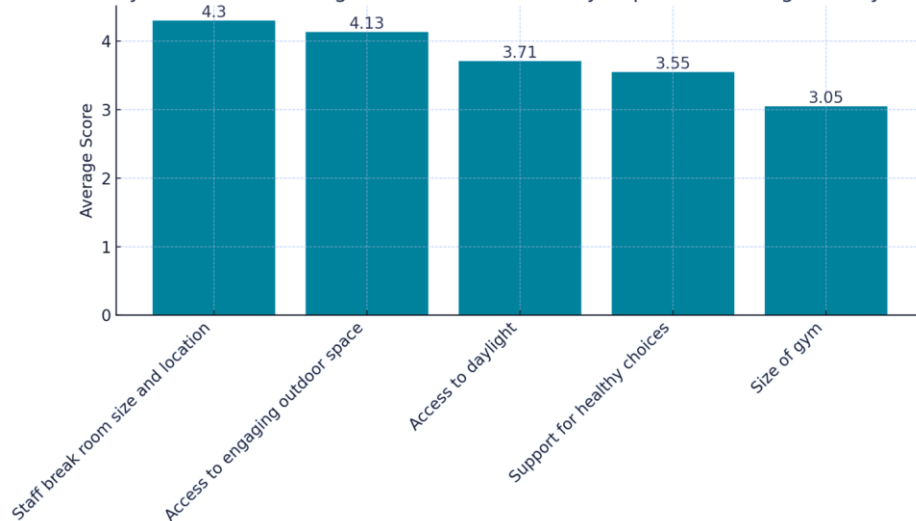
DESIGN SUCCESSES:

- **Outdoor Spaces and Walking Areas**
- **Front Stairwell Usage**
- **Break Rooms**
- **Access to terrace and outdoor space**

DESIGN CHALLENGES:

- **Lack of Food Options or Cafeteria**
- **Inadequate size of Rehab Gym (repurposed Space)**

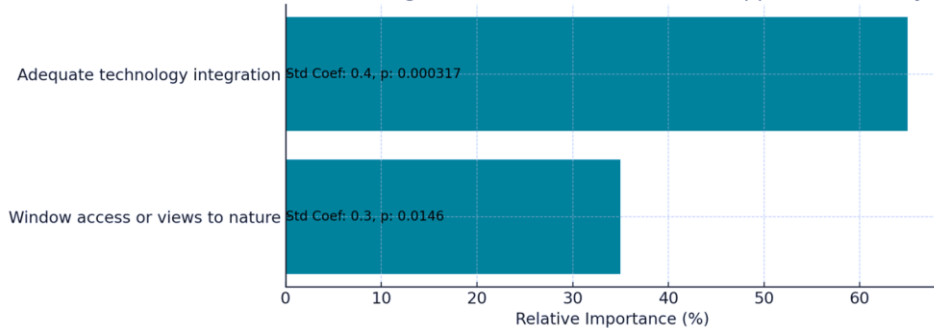
Survey Satisfaction Ratings on Variables That May Impact Promoting Healthy Choices



2 REVITALIZES

patients and staff by
promoting healthy choices

Predictive Modeling of Patient Satisfaction with Support for Healthy Choices



2 REVITALIZES

patients and staff by
promoting healthy choices

"I sit outside most days for lunch now."

"Families and/or pts could meet, support one another and have access to food and drink while being treated at the center. Some come from quite a distance away, get dropped off, etc. **All that would be needed is a barista, glass pastry case, small oven for warming premade items/sandwiches, fridge for items and a customer glass front fridge with drinks.**



3 COMFORTS

through ease of use and control over the environment

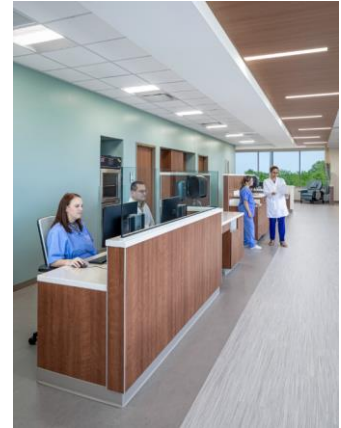
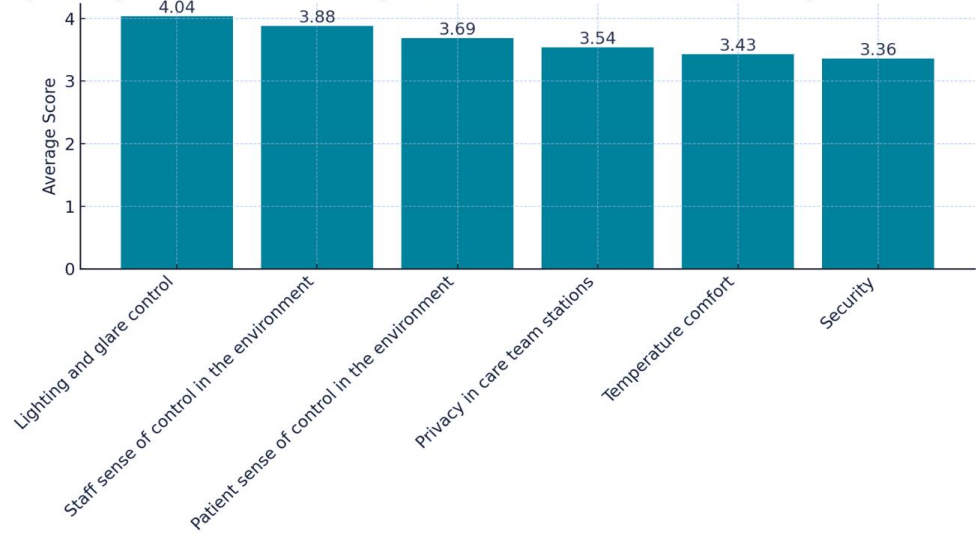
DESIGN SUCCESSES:

- **Control Over Lighting**

DESIGN CHALLENGES:

- **Temperature Control**
- **Corridor Lighting Glare**
- **Care Team Privacy**

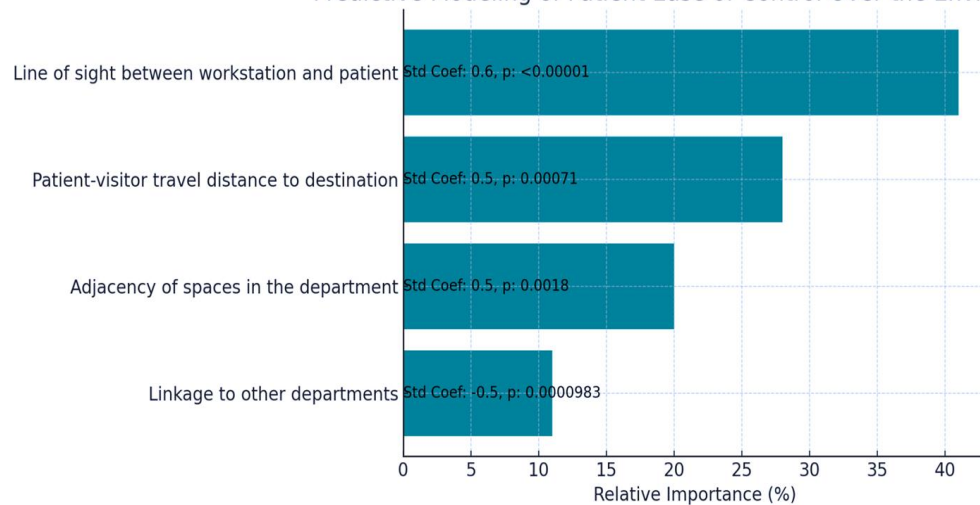
Survey Findings on Satisfaction Rating of Environmental Variables Impacting Ease of Use and Control



3 COMFORTS

through ease of use and
control over the environment

Predictive Modeling of Patient Ease of Control Over the Environment



3 COMFORTS

through ease of use and
control over the environment

“Patients like control of lighting in treatment area and choice of music.”

“Exam rooms are **large enough to maneuver** in now compared to prior offices.”

“I have been told by multiple patients that we need a small cafe/coffee shop”

“Another small waiting room/ one for both genders” (Radiation Oncology)

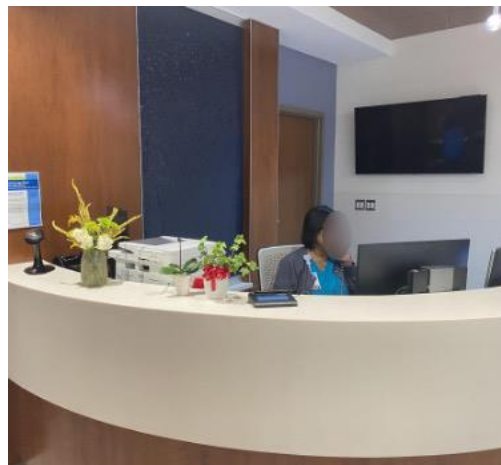
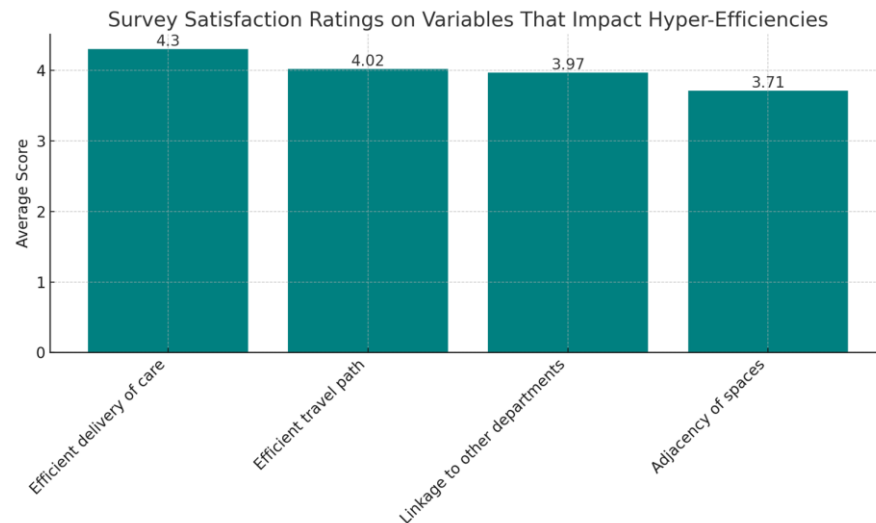


4 STREAMLINES

processes through
hyper- efficiencies.

DESIGN SUCCESSES:

- Centralized Pharmacy & Lab Location
- Centralized Staff Areas
- Effective Use of Technology (Barcode Scanners, Kiosks)



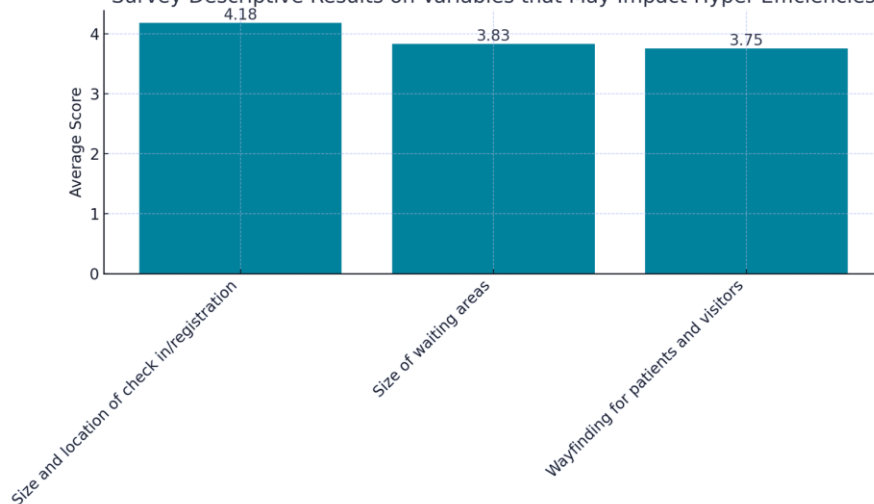
4 STREAMLINES

processes through
hyper- efficiencies.

DESIGN CHALLENGES:

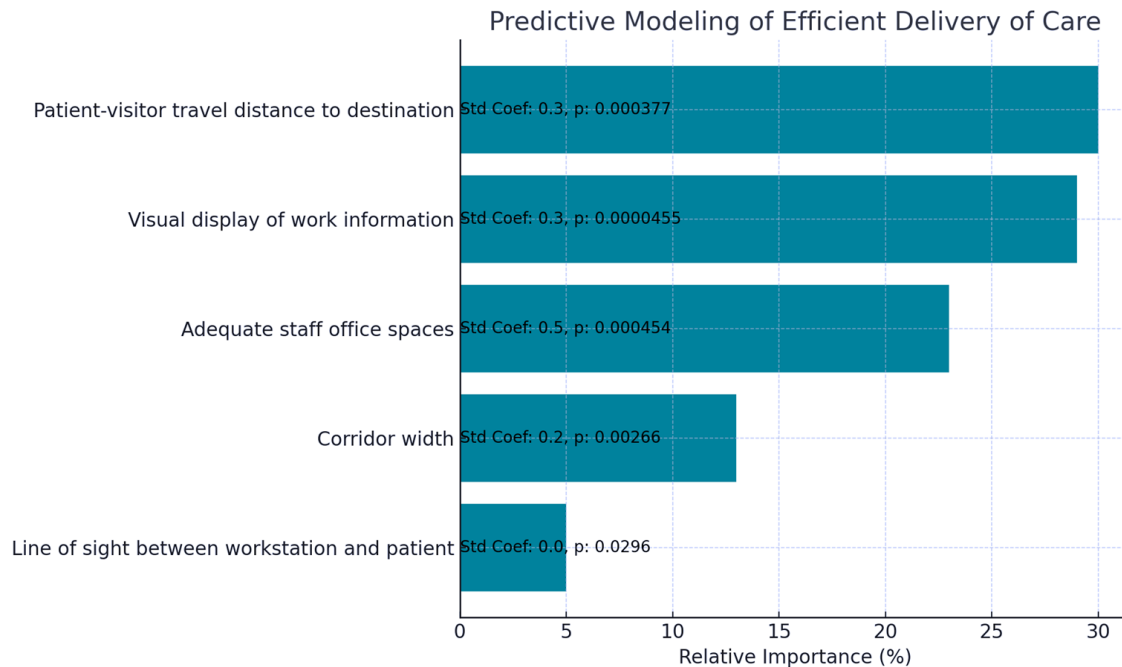
- **Space and Capacity Challenges**
 - Lab Capacity Issues and waiting space limitation
 - Second-Floor Check-in and Checkout Congestion
 - Underutilized Infusion Bays (5 years capacity and staffing)
- **Visibility & Wayfinding Concerns**
 - Visibility Issues: Registration Areas and ambulance bay drop off
- **Connectivity to Main Campus**
 - Lack of Connectivity to Main Campus

Survey Descriptive Results on Variables that May Impact Hyper-Efficiencies



4 STREAMLINES

processes through
hyper- efficiencies.



4 STREAMLINES

processes through
hyper- efficiencies.

“Streamlining operations and having dedicated core resources (loading dock, materials management, has been a major improvement.”

“Being split by 3 floors is also a difficulty for some patients. With not enough infusion nurses currently, difficult to get patients into chemo in a timely manner leading to patient/staff dissatisfaction.”

“have better visibility of the staff, in whole infusion area. Medication rooms in between infusion rooms block the view”



5

EVOLVES

through flexible operational planning and potential for future growth

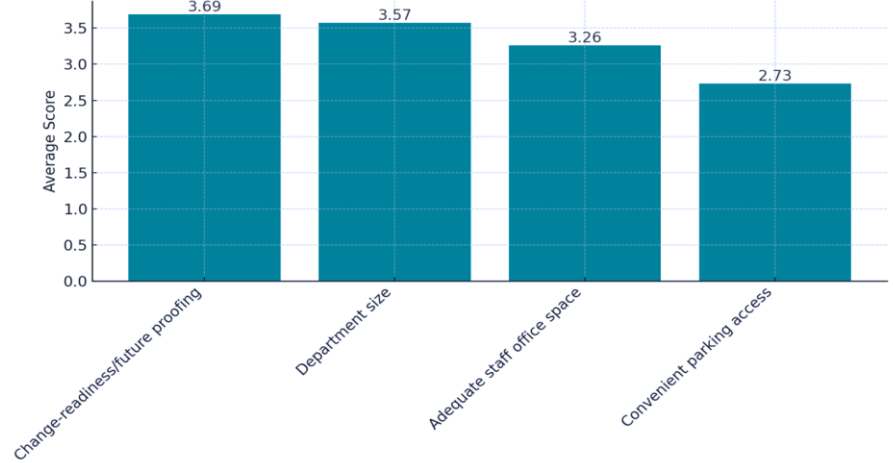
DESIGN SUCCESSES:

- **Adaptability of Spaces over Time**
- **Shell Space**
- **Soft Space**

DESIGN CHALLENGES:

- **Parking Limitations**
- **Insufficient**
- **Pneumatic tubing system**

Survey Descriptive Results on Various Aspects That May Impact Future Proofing Outcomes



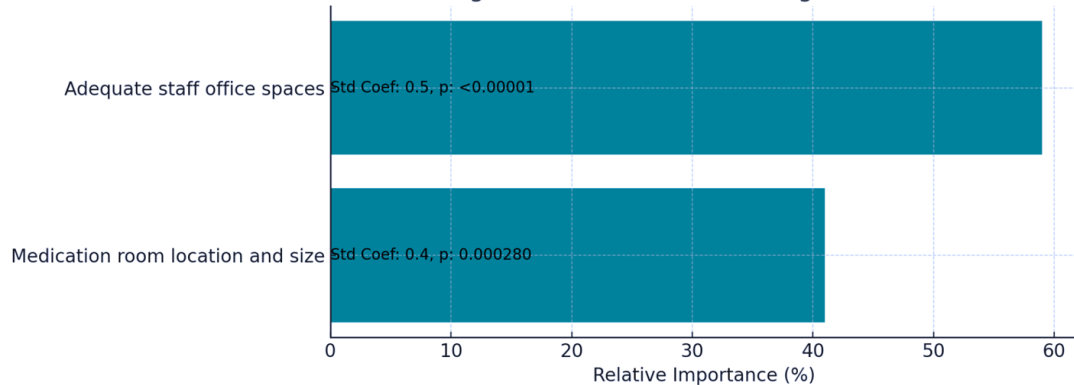
5

EVOLVES

through flexible operational
planning and potential for
future growth



Predictive Modeling of Satisfaction with Change-Readiness: Future Proofing



5 EVOLVES

through flexible operational planning and potential for future growth

“Knowing the building has capacity allows for excitement for the future...”

“Since 3 offices now work under one roof, there is a lack of appropriate offices for staff. We are working with fewer staff members for the continued growth and comorbidities of the patients we are seeing. “

“I would have added more lab/port draw stations to accommodate growing size of clinic.”



6 STRENGTHENS

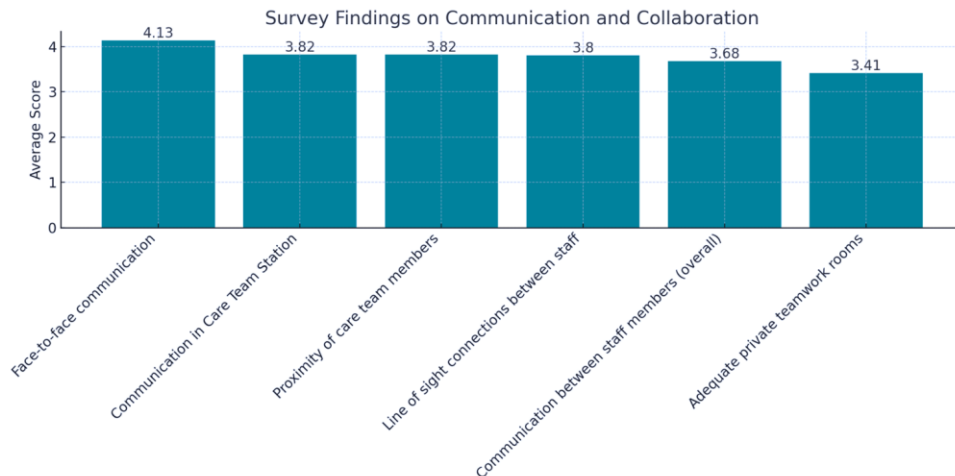
communication and collaboration

DESIGN SUCCESSES:

- Centralized Care Team Areas
- Frosting Glazing
- Shared Break Rooms

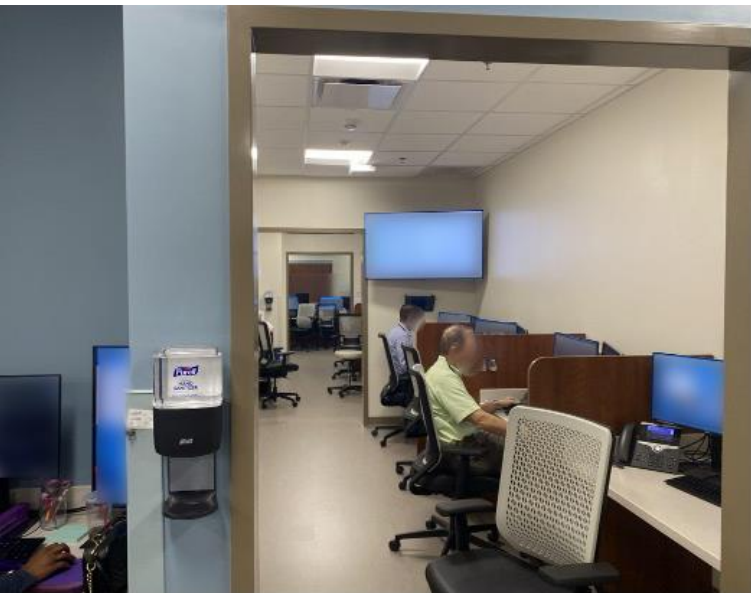
DESIGN CHALLENGES:

- Physician-Nurse Offices Not Adjacent
- Building Scale – Less Frequent Interactions



6 STRENGTHENS

communication and
collaboration



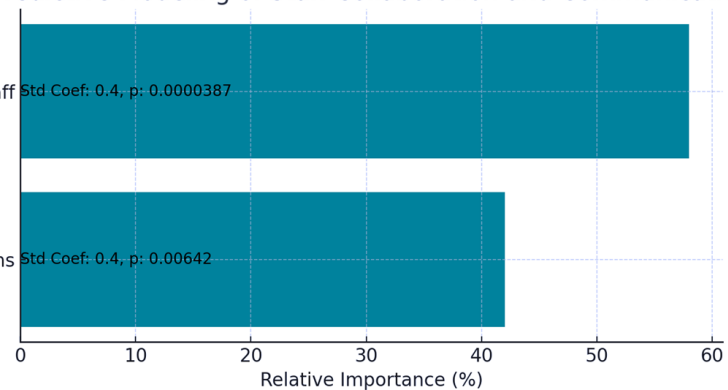
Predictive Modeling of Staff Collaboration and Communication

Line of sight connections between staff

Std Coef: 0.4, p: 0.0000387

Adequate private teamwork rooms

Std Coef: 0.4, p: 0.00642



6 STRENGTHENS

communication and
collaboration

“Collaboration between team members, communication with patient/family throughout work day - easy access to them is an improvement.”

“Nurses and providers being on separate floors has diminished any relationship between the two.”

“Would like to make it so that the staff on the first floor can see each other and know when each one has a pt.”



DESIGN IMPLICATIONS & LESSONS LEARNED

The diagram features a central lightbulb with a network of lines and icons inside its filament. Various healthcare-related icons and text labels are connected to the lightbulb, representing different design implications and lessons learned. The labels include:

- Better Utilization
- Infrastructure Patient Flow
- Inpatient Outflows
- Patient Technology Flow
- Structure Upgrades
- Streamlined Patient Flow
- Operational Integration
- Integration

WAITING & RECEPTION AREAS

- **Welcoming Waiting Areas**
 - Color, Texture, Lighting
 - Art & Sound
- **Clear Signage and Wayfinding**
- **Privacy in Registration Areas**
- **Visibility between Patients & Staff**
- **Design for Safety & Security**



PATIENT CARE AREAS

- **Light and Airy Spaces**
- **Adequately Sized**
- **Variety of Private and Communal Spaces**
- **Patient Support Areas**
- **Accessible & Plentiful Patient Toilets**
- **Reliable Temperature & Lighting Control**
- **Security & Safety Solutions**



STAFF AREAS

- **Care Team Areas**

- Centralized
- Visibility
- Noise Control

- **Office Areas**

- Integrated Physician Spaces
- Flexible Office Spaces
- Training Spaces

- **Staff Support**

- Accessible Break Rooms
- Outdoor Access
- Food Access

- **Safety & Security Solutions**



DESIGN PROCESS

- **Establish and Utilize Guiding Principles**
- **Engagement**
 - Physicians
 - Staff
 - Patient & Family
- **Workflow Focused Design**
 - Design
- **Adequate Time for Iterative Process**
- **Test “Breaking the Building”**
- **Challenge Value Engineering**



DESIGN PRINCIPLES

- **Plan for Future Growth**
 - Shell Space or Soft Space
 - Scalable Design
- **Consistency in Design Standards**
- **Incorporate and Plan for Technology Solutions**



OPERATION IMPACT ON DESIGN

- **Determine your Collaboration Process**
 - Physicians
 - Staff
 - Patient & Family Engagement
- **Care Team Ratios**
- **Plan for Critical Staffing**
- **Ensure Access to Core Services**
- **Change Management**



IMPLEMENTATION AND ON...

- **Prepare for Awe and Adjustment**
- **Remain Flexible**
- **Post Occupancy Evaluation**
- **Iterative Optimization**
- **Capacity & Capital Planning**
- **Share Lessons Learned**
- **Celebrate the Building**



QUESTIONS



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