Hospital: A Creature of Duality

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A CREATURE OF DUALITY

SEEKING BALANCE BETWEEN

NATURE AND TECHNOLOGY

IN HEALTH ARCHITECTURE

GORDON MCCORMICK
1. CONSTRUCTION TYPE: Type 3A
2. USE: Group I-3
3. OCCUPANCY: 240 max. capacity of building
4. OCCUPANCY LOAD: 240 SF/person
5. OCCUPANCY LIMITATION: 290 max. capacity of building
6. AREA LIMITATION: 11,000 SF
7. HEIGHT LIMITATION: 1 Story
8. FIRE SUPPRESSION SYSTEM: Quick Response and Resident Sprinklers
9. STRUCTURAL FIRE RATING: 1 Hour
10. MEANS OF EGRESS:
   - NUMBER OF STAIRS: 4
   - NUMBER OF EXIT SIGNS: 4 per floor
   - NUMBER OF RAMPS: 2
11. MEANS OF ACCESSIBILITY:
   - 100% accessibility in all dwelling and sleeping areas
12. MEANS OF BATHROOMS: 8 full private bathrooms
13. MEANS OF ELEVATORS: 1
14. MEANS OF RAMPS: 2

Construction Drawings courtesy of Freeman Solt LLC
There was once a small fishing village situated in a lagoon on the edge of the sea. One day at low tide, some of the fishermen noticed rocks along the shore glistening in the sun. A white, powdery residue had been left by the evaporated sea water. It was salt. Unbeknown to the fishermen, the concentration of sea water the shallow lagoon had generated a high salinity content. This reminded them of the sunshine from the warm climate of the region, creating the perfect conditions for harvesting the mineral.

Salt had been around for centuries, used for everything from cleaning wounds to purifying water. However, it was expensive, imported from the East on the Silk Road—until now.

The newly discovered sea salt was also of a much higher quality than its eastern cousin, which was mined from the bowels of mountains. The purity of the sea salt made it more valuable, and the fishing village soon became a prosperous and wealthy trade center. The salt trade attracted merchants from civilizations throughout the known world.

The fortunes of the village led more than just the attention of the civilized world. However, this was in the wake of the collapse of the Great Empire, which had once spanned across three continents and protected its borders from the uncivilized savages that roamed beyond them. With the Empire gone, there was no army to protect the village from the nomadic raiders.

So the raiders came often, looting and laying waste to the coastal inhabitants. These chaotic episodes would last days at a time. The villagers’ only hope of escape was the sea, boarding their merchant ships and old fishing vessels with whatever supplies they could carry. There they would face starvation, exposure, and the wrath of storm surges.

At some point, a villager decided to make preparations in anticipation of future raids. He took his local salt into the lagoon and built a dock far from the coastline for his merchant ships to dock at. He then built a small shelter for his family, and once it was complete, he moved his family out there permanently. The structure took on a more architectural form, and soon, the entire town was located on the water.

That town is known today as Venice, Italy.

Without hardship, good design cannot flourish.
INTRODUCTION TO PROJECT

PROJECT STATEMENT

The site of this 1948 Johnson House is the last standing building to witness the transformation of a world-class medical facility into the new state-of-the-art health care campus.

The project was initially developed as a community-based project to replace the existing Johnson House, which was completed in 1948 and served as a residence for the nurses. The new building is designed to be a hospital that is warm, hospitable, and soothing. It is intended to change the perception of hospitals as cold, sterile, and uncomfortable to places that are welcoming and inviting, proactively in promoting healthy living.

PROJECT GOALS

1. Develop a design solution that can adapt to the existing health care clinic, without the need for significant renovations.
2. Change the role of the hospital from an institution that treats people to one that is proactive in promoting healthy living.
3. Change the perception of health care as a costly, sterile, and uncomfortable environment to a place that is warm, hospitable, and soothing.
4. Incorporate design elements that will challenge health care administrators to explore and encourage the use of alternative health care options.
5. Foster opportunities to develop unique architectural language.

THESIS STATEMENT

A hospital is a complex creature, feeding on a combination of life and death. As such, it is not a simple machine, but rather a living organism that reacts to the needs of the sick to one which is proactive in promoting healthy living. To keep the body alive, health care architecture must adapt or face extinction. The health care delivery system--as a physical environment--must be re-evaluated from top to bottom in order to meet the ever-changing needs of the health care administrator.

DUALITIES

Strong enough to protect, gentle enough to nurture.
A house for life's most joyful moments, but also its most tragic.
Provide total privacy while being completely transparent.
Constant communication, as well as reflection.
An apex of evolution that continues to adapt.
Harbor the sick, but attract the healthy.
A place that has all of the answers, but is always asking new questions.
A place of happiness that is never content.
A relaxing environment in a frenzy of activity.
A refuge for desperation that sustains hope.
Conventional wisdom with progressive ideas.
A temple of science that requires leaps of faith.
A zenith of technology, whose greatest ally is nature.

What is a hospital?
A simple question:

We begin then by defining these dualities with one simple question:

What is a hospital?
A retreat of technology, whose greatest days are nature.
A temple of science that requires leaps of faith.
Conventional wisdom with progressive ideas.
A refuge for desperation that sustains hope.
An apex of evolution that continues to adapt.
Constant communication, as well as reflection.
A place that has all of the answers, but is always asking new questions.
A place of happiness that is never content.
A relaxing environment in a frenzy of activity.
A temple of science that requires leaps of faith.
A zenith of technology, whose greatest ally is nature.

Despite this revelation, there is no doubt that the idea of innovation in technology would become synonymous with machines and the manipulation of nature's own innovations in technology, but the reality is that it is nature that demands change--a challenge of the status quo. The health care delivery system--as a physical environment--must be re-evaluated from top to bottom in order to meet the ever-changing needs of the health care administrator. For these reasons, the idea of a hospital as a “healing machine” must be re-evaluated. It is not the case that the latest trend in health care design is simply focused on the manipulation of nature's own innovations in technology, but that so far on an unprecedented scale, these artifacts are meant to transcend the mere physicality of healing through direct health care design through an artificial environment--a duality.

The question then is how this idea of duality can help redefine the notion of healthcare, and whether these ideas can influence the design of hospitals in a way that can benefit the healing process.
INTRODUCTION TO SITE

The building was originally the Robert E. Lee Elementary School. It was designed and built by local Richmond architect Charles Robinson in 1914. In 2003, the building was renovated into an apartment building, though great care was taken to maintain the historical integrity of the building.

EXTERIOR BUILDING ANALYSIS

The building has a strong architectural personality, expressing balance, symmetry and classical ideals such as Palladian windows, a colonnade, a frieze, domes, and expressive stone work.

Construction Drawings courtesy of Freeman Solt LLC.
The way that the tower loft space opens up to the copper dome is such a great feature. The spiral staircase leading up to an unfinished area in the space directly beneath the dome is a wonderful example of the overall architecture emphasized.

The character of the specific spaces of the existing building suggest a particular layout. The 2-story auditorium would be ideal for an open space from the program. The existing corridor will likely remain, and the alignment of the existing classroom space (currently apartments) would be a good fit for the hospital patient rooms.

Construction Drawings courtesy of Freeman Solt LLC.
The construction of the building took between 2-3 years, and according to Robinson, its completion was achieved despite a great degree of difficulty. Robinson was very demanding of his design, and his ambition helped create a building that was well before its time. The three key features that made the building so unique were the wheelchair ramps, central air conditioning, and the structure concerning the windows.

It was Robinson’s strong beliefs that compelled him to design such a unique building. The first of which was his belief in equal access to education. Decades before any form of ADA standards would exist, Robinson placed long and winding wheelchair ramps in the building. The fact that they were located in the two towers of the facade, which is the most prominent architectural feature of the building, emphasizes how strongly he felt about the matter.

Included in Robinson’s design was a central air conditioning system. What was remarkable about the inclusion of this feature was that air conditioning had been invented only 10 years before, and was mostly used in industrial refrigeration.

Robinson believed that comfort was essential to the learning process. He therefore took upon himself to engineer the air conditioning unit so that the school would be comfortable in the hot and humid months.
Despite its conventional style, the building reflects a forward-thinking mindset, utilizing large concrete lintels to serve as sills for a row of windows. Though the structure was designed and built well before the Modernist Movement, these large, engineered windows foreshadow the curtain-glass windows that would come to characterize architecture of the 20th century.
How has hospital design developed around the world and throughout history? What factors have influenced this development? How has the development followed a clear evolution or has it been more of a conversation of competing ideas? Have any of these ideas transcended time, still being used today?

In order to move forward, we must understand where we have been, and whether there are any lessons to be learned from those moments. The rise and fall of competing cultures has undoubtedly introduced different ideas concerning architecture, but whether this applies to hospital design needs to be assessed. It could be that great ideas have been lost to the pages of history.
EVOLUTION OF THE HOSPITAL

Greek Asklepieion (Healing Temple)

Asklepieon of Pergamon
Pergamon, Greece
450 BC
500 BC

Cluny Abbey (Monastery)

Infirmary Expansion
Cluny, France
1043 AD

Bimaristan
Early Persian Hospital (Persian Empire)
Junde-Shapur, Iran
800 AD

Roman Nazioclinicum (Military Hospital)

Vindonissa--Roman Legion Camp
Windish, Switzerland
15 AD

Roman Valetundinaria (Military Hospital)

Vindonissa--Roman Legion Camp
Windish, Switzerland
15 AD

Xenodochieon
Early Iberian Hospital
Porto, Portugal
400 AD

Palace-Style Hospital

France
17th Century

Hospitaliers (Knights of St. John)

Medieval Christian Crusade Hospital
Rhodes, Greece
1444-1483 AD

Cross Ward (Greek Cross) Opesdale Maggiore

Florence, Italy
1456

Pavillion-Style Hospital

Herbert Hospital
England
19th Century

Estate Hospital

Europe
18th Century

quadralectics.wordpress.com/3-contemplation/3-5-hospitals/
Considerable space and engineering were dedicated to the construction and design of the bathing facilities. Water had to be transported via aqueducts from local hot springs. If no hot spring were nearby, then other considerations had to be made in order to heat the water. Part of the bathing ritual was the long trek through a dark hallway, which ended at the baths. The path found at Pergamon is marked on the plan above.

**HISTORICAL CASE STUDIES**

**THE TEMPLE OF ASKLEPIOS AT PERGAMON**

The rod of Asklepios--recognized today as an international medical symbol--derived from the Greek Asklepeion. These temples were the original healthcare facilities of the western world. Though Greek medicine was quite advanced for its time--including sleep-induced surgeries and prescription medicine--the priests that administered care favored natural remedies over radical intervention. These remedies included a strict diet, exercise, exposure to sunlight, and rest and relaxation in the baths often found at these sites. To this day, thermal healing is viewed as a medicinal treatment rather than recreation--as it is viewed in the United States.

**DERIVED LESSON**

Activities such as dieting, exercise, bathing, and exposure to sunlight and nature are remedies that can decrease the dependency on invasive medical treatment.

**THE VALETUDINARIUM OF VINDONISSA**

The Valetudinarium, the hospital of ancient Rome, derived from many of the ideas developed by the Greeks. Asklepeion was primarily used by the military and thus the system for these facilities was primarily geared toward the military. Efficiency was the driving factor in the design decisions.

The most interesting of these design decisions was the vestibule (marked in red). Interior doors were not used in Roman design, so in order to keep out dust and noise, vestibules were included to act as a buffer between the patient rooms and corridors. These spaces were also utilized to store supplies and clean linen.

**DERIVED LESSON**

An additional space between patient room and public space can not only serve as a buffer, but can also serve functional needs of the program.
DERIVED LESSON
While architectural design can help establish a connection to nature, there is no substitute for the real thing.

HOSPITAL OF THE SECOND KNIGHTS OF RHODES
RHODES, GREECE (1481)

Built in the 15th century by the Knights of St. John, this facility provides a glimpse of what may have become a standard in hospital design—had it not been sacked by the Turks some 30 years after its completion. The Knights of St. John, also known as the Hospitaliers, were one of the many fighting forces that traveled east during the Crusades.

The Hospitaliers were akin to monks, having taken sacred vows to uphold their religion through physical force. They established a strong connection to nature, perhaps due to their spiritual beliefs, and so incorporated landscape design in their forts, palaces, and, in this case, hospital. A 2-story central atrium and rooftop garden make up the 2nd floor, while an expansive exterior garden provided walking paths in a more naturalistic setting.

Christian monks maintained cloister gardens, where they grew vegetables to keep their bodies healthy and herbs for medicine. When monasteries became the de jure health care facilities of the Middle Ages, these gardens also served as sitting areas, and were sometimes supplemented with walking paths. These areas became opportunities for patients to get outside and establish a physical connection with nature.

The Hospitaliers were one of many fighting forces that traveled east during the Crusades. Their culture was very similar to monks, in that they took sacred vows to dedicate their lives to God. If the monks are thought of as the healing hands of God, then the knights were his fist. Like the monks, the knights seemed to have an affinity for outdoor spaces, as depicted in their hospital designs. But throughout their entire breadth, this design principle created an interesting duality between the violent solidarity of a fort and the lush beauty of a garden landscape.
The project was designed in 2009 by NXT, who partnered with Clemson University’s Healthcare & Architecture Graduate Program. The concept is based on the question, “What would a patient room look like if the architecture, products, technology, and medical processes were all designed in unison?” The idea was to “streamline the delivery of care, improve patient outcomes, and redefine the medical experience in the 21st Century.”

Though the project was designed in 2009, the feel of the space is too sterile. Despite the streamlined design and sleek aesthetics, the space feels cold and uncomfortable—like a high-tech science lab. I would find it hard as a patient to relax in such a space.

Though the project was designed in 2009, the feel of the space is too sterile. Despite the streamlined design and sleek aesthetics, the space feels cold and uncomfortable—like a high-tech science lab. I would find it hard as a patient to relax in such a space.

The modular design of the space allows for a range of customizations to be made, based on the patient’s needs. The design is focused around the patient’s comfort and safety, with surfaces and finishes that are non-porous and easy to clean.

CONTEMPORARY CASE STUDIES

Though a high-tech aesthetic can convey competence and a sense of security, too much of it can make a space feel cold and unwelcoming.
INTERSTITIAL SPACE DIAGRAM BY EBERHARD ZEIDLER

LONGITUDINAL SECTION SHOWING INTERSTITIAL SPACE

LATERAL SECTION SHOWING INTERSTITIAL SPACE

MCKENZIE TEACHING HOSPITAL
EDMONTON, ALBERTA (1986)

EBERHARD ZEIDLER

PATIENT ROOM

CIRCULATION

NURSE AREA

COMMUNAL SPACE

GUEST ROOM

ENLARGED 3RD FLOOR PLAN--TYPICAL SOUTH PLAN

DOES THIS AREA FUNCTION APPROPRIATELY, CARE & POST?

LARGE MEETING

CENTRAL NURSING STATION

SMALL MEETING

James 39

James 43

James 41

James 42

Miller/Swanson 36
This project was designed in 2009 by NXT, who partnered with Clemson University's Healthcare & Architecture Graduate Program. The concept is based on the question, "What would a patient room look like if the architecture, products, technology, and medical processes were all designed in unison?" The idea was to "streamline the delivery of care, improve patient outcomes and redefine the medical experience in the 21st Century."

**Deriving lesson:**
A high-tech aesthetic can convey competence and a sense of security, but much of it can make a space feel cold and unwelcoming.

[James 160]

[James 161]
Though a high-tech aesthetic can convey competence and a sense of security, too much of it can make a space feel cold and uninviting.
The facility will serve as a neurological oncology facility. It will offer diagnostic, surgical, and radiology services. The facility will contain 80 beds for inpatient care, but will also emphasize outpatient care to the community.
The hospital in this project will be part of an Independent Physicians Association (IPA), which is a large corporate healthcare network, focusing on providing high-quality healthcare services. An IPA is a group of independently owned and operated medical practices.

The hospital is designed to be part of an IPA, combining the use of a large corporate healthcare network, which focuses on providing high-quality care, with the benefits of an independent practice structure. The purpose of an IPA is to provide a high-quality, cost-effective, and efficient delivery system for patients. Patients can choose from a pool of doctors within the organization, and all patients choose to be referred to the hospital.

The proposed hospital for this thesis project will be one of these small IPA facilities. Not only does the 80,000 SF space represent the typical size of a small hospital, but the idea of the IPA facility also represents the progressive mentality of this project. The fact of the matter is that the megablock hospital is cumbersome and inefficient, and as communication technology improves, the need for spatial adjacencies between hospital departments diminishes. Regardless of whether this IPA model for small hospitals catches on, corporate providers will look to break up their megalithic facilities in favor of smaller, more efficient delivery models that separate functions from one another.
PATIENT ROOM (PRIVATE)

- Min. 200 SF
- Patient bed
- Headboard
- Overbed table
- Bedside storage for patient
- Bedside storage for nurse
- Natural light/views
- Cleanliness
- Shower/bath
- Toilet/bedpan
- Sink/mirror
- Isolation, when required
- Company, when appropriate
- Seating area
- Sleeping area
- Easy access to nurse call, phone, lighting, bed, and TV controls
- Entertainment/distraction
- TV
- Interaction with nurses
- Interaction with patients
- Interaction with visitors
- Computer with internet

NURSING UNIT

- Min. 150 SF for nursing station
- 1 station per 8 patient rooms
- Easy access to patients
- Ability to see patients
- Minimized walking distances
- Control desk/call systems
- Charting desk
- Medication alcove
- Lockers/toilets
- Supervisors office
- Storage closet
- Supplies and equipment
- Treatment room
- Utility room—for clean/soiled operations
- Staff collaboration space
- Serving kitchen
- Ability to move beds, equipment, supplies, laundry in and out of rooms
- Minimum 6 ft width for corridors

COMMUNAL SPACE

- Education
  - Reading
  - Access to archived sources
  - Seminars
  - Scheduled for patients/families
  - Teaching art or horticulture
  - Counseling
  - Mentoring by doctor or nurse
- Therapy
  - Physical activity
  - Walking paths
  - Exercise/yoga classes
  - Thermal bathing
  - Mental
  - Reflection space
  - Horticulture
  - Group therapy
  - Counseling
- Socialize
  - Group gathering space
  - Staff, patients, or visitors
  - Small group meeting
  - One-on-one meeting
  - Dining space

INDEPENDENT

- Reading
- Walking
- Reflecting
- Art
- Bathing

INTERPERSONAL

- Mentoring
- Counseling
- Conference/Discussion
- Dining
- Bathing

GROUP

- Seminar
- Exercise/Yoga Class
- Group Therapy
- Group Visits
- Patient Gatherings
- Dining
- Bathing
INTRODUCING THE CONCEPT

THE FOUR CRITICAL ELEMENTS OF HEALING

STRENGTH
REJUVENATION
REFLECTION
OPTIMISM

OVERALL PARTI DIAGRAM

HEALING GARDEN PARTI

STRATEGIES FOR INTERACTION BETWEEN ELEMENTS
CONCEPT DEVELOPMENT

ONE BOLD GESTURE

SUBSEQUENT GESTURES IN RESPONSE

- MASS & FORMS
- THICK WALLS, THIN BOWLS
- CUT INTO MASS
- SPACES OF ABSENCE
- TRANSFORM VIEWS
- PUSH, PULL, SWING
- LIGHT & DARK
- REMAINING LAYERS

Concept model #1

Concept model #2

WARPED PATH
- SQUEEZE THE CORNERS
- BEND & DISTORT
- FLOW IN TRANSITION
- LIGHT & DARK
CONCEPT MODEL #3
TWO TOWERS FLANKING FOUR RIBS
ASSIGNING THE ELEMENTS

Each of the four healing elements correlates directly with an element of nature

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**REFLECTION**

- Reality
- Sensual
- Empowerment
- Connection

**OPTIMISM**

- Confidence
- Brightness
- Happiness
- Joy

**GROUNDED**

- Extraverted
- Empathic
- Reason
- Rest

---

**REJUVENATION**

- New Strength
- Stamina
- Support
- Meditation

---

**STRENGTH**

- Resilience
CONCEPT MANIFESTATION

A SEATING CONDITION FOR EACH HEALING ELEMENT

A ROCK SOLID FOUNDATION--A CRADLE OF SUPPORT--A STUDY OF ERGONOMICS

A JOURNEY OF RECOVERY--A PATH OF ENLIGHTENMENT--A STUDY OF MATERIALITY
CONCEPT MANIFESTATION
A SEATING CONDITION FOR EACH HEALING ELEMENT

A MOMENT OF THOUGHT--A MOMENT OF INSPIRATION--A STUDY OF EXPERIENTIAL CONDITIONS

CIRCULAR DESIGN PROMOTES INTRUSION--NO EYE CONTACT

A BRIGHT MOMENT OF JOY--THE INSPIRATION TO LIVE--A STUDY OF FORM

INFO.MARBLEANDGRANITE.COM/BLOG/?TAG=SOAPSTONE+WHOLESALE+NEW+ENGLAND
CREATING THE SPACE

PROJECT SCOPE

EXISTING BUILDING
NORTH FACADE

REMOVE EXISTING ROOF
REPLACE WITH GLASS ROOF

EXISTING STRUCTURE
OUTSIDE OF SCOPE

EXISTING BUILDING
SOUTH FACADE

ADD TWO 12’ X 12’ MEZANINE DECKS TO FOURTH FLOOR
OVERLOOKING AUDITORIUM

EXISTING STRUCTURE

DEMOLISH REAR FACADE AND INTERIOR AUDITORIUM WALL

NEW STRUCTURE

ADD STRUCTURE THAT FOLLOWS EXISTING STRUCTURAL GRID
SEEKING BALANCE BETWEEN A CREATURE OF DUALITY

Strong enough to protect, gentle enough to nurture.
A house for life's most joyful and most tragic moments.
Constant communication, as well as reflection.
A zenith of evolution that continues to adapt.
Harbor the sick, but attract the healthy.
A place of happiness that is never content.
A relaxing environment in a frenzy of activity.
A refuge for desperation that sustains hope.
Conventional wisdom with progressive ideas.
A temple of science that requires leaps of faith.
A hospital must be a marvel of technology whose greatest ally is nature.

A hospital is inherently a creature of duality. It must being many things, simultaneously; many of which are contrasting characteristics.

THE TEMPLE OF ASKLEPIOS AT PERGAMON

PRECEDENT STUDIES CONCEPT DEVELOPMENT

These spaces were also utilized to house supplies and clean linens. Interior doors were not used in Roman design, so in order to keep out dust and noise, driving factor in the design decisions. were primarily used by the military for soldiers. Therefore, efficient performance was the elements in favor of functional efficiency. The reason for this was that these facilities the ideas developed by the Greeks Asklepeions, the Romans removed the spiritual the Valetudinarium was the hospital of ancient Roman society. Based on many of the Hospitaliers were akin to monks, having taken sacred vows to uphold their religion the Turks some 30 years after its completion. The Knights of St. John--also known as what may have become a standard in hospital design--had it not been sacked by Built in the 15th century by the Knights of St. John, this facility provides a glimpse of

If no hot spring were nearby, then other considerations had to be made in order to heat the bathing facilities. Water had to be transported via aqueducts from local hot springs. Considerable space and engineering were dedicated to the construction and design of radical intervention. These remedies included a strict diet, exercise, exposure to sunlight prescription medicine--the priests that administered care favored natural remedies over These temples were the original healthcare facilities of the western world. Though

DERIVED LESSON

Activities such as dieting, exercise, bathing, and exposure to

DERIVED LESSON

While architectural design can help establish a connection to

DERIVED LESSON

nature, there is no substitute for the real thing.

STEEL SKELETON MEETS FLOOR AT A SINGLE POINT

(NO HARSH ANGLES)

LIGHT, PLYABLE, COMPOSED OF CONTOURS

GROWING NATURAL BUILDING MATERIALS

BAMBOO IS ONE OF THE FASTEST

MADE OF WOVEN STRIPS OF BAMBOO

A SEAT FOR REJUVENATION

ROOM FOR 2--PROMOTES EXTROSPECTION,

AND SECURITY

CRADLES OCCUPANT TO PROVIDE A SENSE OF STRENGTH

BUILT UP FROM THE GROUND--IDEA OF BEING GROUNDED,

A SEAT THAT IS YOUR ROCK TO LEAN ON

COMMUNICATION

PROMOTING INTROSPECTION

CIRCULAR SEATING STYLE INHIBITS FACE-TO-FACE CONTACT,

A SEAT FOR REFLECTION

INNER MONOLOGUE

SELF AWARENESS

INSPIRATION

COMMUNICATION

PROMOTING INTROSPECTION

INSPIRATION

EXTROSPECTION

INSTITUTIONAL ELEMENTS

MEDICATION

STAFF MACHINERY

NURSING STATION

ACTIVITIES

THERAPY

HOSPITAL CARE
THANK YOU

To my friends, family, and professors who supported me through this rigorous process.