Improving the Effectiveness of Nursing Work Area Design in Inpatient Care Units

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IMPROVING THE EFFECTIVENESS OF NURSING WORK AREA DESIGN IN INPATIENT CARE UNITS

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Architecture and Health

by
Laura Elizabeth Walker Hamm
May 2011

Accepted by:
Dr. Dina Battisto, Committee Chair
Dr. Stephen Verderber
Dr. Deborah Willoughby
ABSTRACT

Nurses are the primary caregivers for patients admitted to hospitals overnight and the design of the physical environment impacts the operational effectiveness of care delivery. Many nursing tasks are repeated across multiple patients (such as documentation, administering medications, assessing patients, etc) and there are strict protocols and procedures for how to administer these tasks to ensure the delivery of high-quality care. A nursing model is often chosen by a nurse administrator who oversees its implementation in an effort to provide effective care delivery to patients admitted on a nursing unit in a hospital. Throughout the unit, there are various nurse work areas strategically placed to help support the successful completion of nursing tasks. These work areas provide nurses with the necessary resources (such as access to patient medical information; access to medications, supplies, and equipment; and access to horizontal surfaces to work on or set up supplies) to care for ill patients. These work areas also serve as the primary locations to collaborate with other staff to coordinate care delivery for patients. The design of these work areas varies considerably across units, yet it is unknown if certain approaches or design attributes are more or less effective for supporting nursing tasks. Therefore, the aim of this study is to investigate relationships between the design of key nursing work areas and operational effectiveness in general medical/surgical patient care units. The primary nurse work areas investigated in this study include the central nurse station, fixed subwork areas, and the support work areas for medication dispensing and nursing administration. These nurse work areas will be investigated to determine the spatial considerations of different work areas for nurses (including size, types of activities performed, number and type of people using the work place), the technical requirements (such as lighting, electrical
utility, technological, etc) and the behavioral requirements (visibility, acoustical privacy, collaboration, acceptable travel distances, etc). In addition to studying the nursing work areas specifically, the context of the work areas will also be studied to ascertain necessary functional relationships to improve operational effectiveness within the areas and adjacencies.

Utilizing a case study research approach, multiple data collection methods will be employed to study operational effectiveness of nursing care delivery in relation to design attributes of nursing work areas. Through a qualitative investigation, existing nurse work areas (central nurse station, sub-nurse work stations, and support work areas including medication dispensing and administration areas and supply rooms) will be studied on three different nursing units with varying design. In addition to studying work areas in existing nursing units, nursing personnel will be asked questions about their nursing unit as well as to sort and rank their preferences for different approaches to these key work areas. The intent is to connect physical design options to perceived improvements in operational effectiveness of nursing tasks performed at these locations.
DEDICATION

This thesis is dedicated to my parents whose unwavering support and love have carried me through, even on the hardest days of this process. They are my constant personal cheerleaders who celebrate the good times and pick me up when I fall or feel I can’t go on. For them, I am forever grateful. And, to my sister, who reminds me one step and a time and is always willing to be a listening ear. I love you all.
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Dr. Dina Battisto has been a wonderful thesis committee chair. Her advice, insightful criticisms, and patient encouragement have brought this research study to a level I was not sure was possible. Additionally, she has helped mold and shape me into the researcher that I have become. I would also like to thank Dr. Stephen Verderber whose support and enthusiasm for this project was deeply appreciated. Finally, I would like to also thank Dr. Deborah Willoughby whose support and insight into the nurses’ perspective was invaluable and very much appreciated. I cannot say thank you enough or express my gratitude for all the support my thesis committee has provided. Thank you.

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CHAPTER 1: INTRODUCTION

Overview of Chapter 1

This chapter provides a general introduction to the research study and the questions and objectives of the study. It begins by defining the problem that led to the formation of this study. It next goes into an overview of the study including the general methods and design of the research. This section provides a brief introduction to the work areas the study will seek to understand, the research objectives, and the research questions. Finally, this chapter concludes by discussing the significance of this study.

Defining the Problem

The issues and problems related to nursing work areas in acute care patient care units have evolved over the last three centuries. Nursing work areas were first seen in the late nineteenth and early twentieth century in the traditional Nightingale wards. During this time, open wards with a nursing station at the center of the ward were the most common nursing unit typology. Each open ward had a nursing station...
at the center of the ward providing nurses visual access to all their patients but the nurses primary work area was at the patient’s bedside. By the mid-twentieth century, nursing units began to be organized into semi-private patient rooms on either side of a central corridor. These unit work areas were characterized by a large, fortress-like work area at the center of the unit with other various support spaces around the central nurse work station. The enclosed semi-private rooms reduced visual access to the patients and began pulling nurses away from the patient’s bedside. Most recently, the late twentieth and early twenty-first centuries saw a shift to decentralized nursing work areas. In these units, private patient rooms are located around the outside walls of the building with the work areas scattered throughout the inner core. While this model typically puts nurses closer to their patients than the single central stations of the mid-twentieth century, nurses still have to work tirelessly to provide a consistent level of care across the nursing unit. Today’s acute care, in-patient nurses are often stressed and consider the system and practices employed inefficient, leaving them feeling very dissatisfied. In addition to the evolving problem related to the physical design of nursing units, healthcare is at

Figure 2. Central Nurse Work Station
a crossroads in the United States and abroad regarding the patients hospitals serve, the staff who care for the patients, and even the practices healthcare employs. We have “more chronically-ill patients, more diverse and demanding patients, and new technologies [that challenge] the healthcare system” leaving us in a “sustained trend toward more complex and demanding patients that will require substantial changes to the healthcare system.” (When I’m 64...., 2007, 16)

**Overview of the Study**

The built environment of many medical/surgical patient care units does not support the tasks done by the nursing staff. The added stress of the environment results in discrepancies, variations, and deviations from the protocols and procedures while nurses struggle try to provide a consistent level of care across the unit. (McCarthy, 2004, 405) The problems faced by today’s in-patient acute care nurses led to this study that seeks to understand and improve nursing work areas. This research will be done through careful study of the specific places nurses work during a typical twelve hour shift:
1.) **Central nurse work station**: The central nurse work station is a centralized work area for nursing staff and other hospital staff. It is typically where the unit secretary works and is often centrally located on the unit.

2.) **Sub nurse work stations**: Sub nurse work stations are all work areas away from the central station. These can be various sizes serving 1-2 patients, 3-4 patients, or more. They can also be used by just one nurse or by several nurses. They can be located in various locations on the unit including in the hallway or even in the patient rooms.

3.) **Medication room**: The medication room is typically a controlled-access room on the unit where the medication dispensing machine is stored as well as other medication administration supplies (IV syringes, flushes, etc).

4.) **Supply room**: The supply room is where scanned clinical supplies are stored. The supplies can include patient hygiene, bandages, gauze, IV bags, etc. The supplies are typically organized into bins with barcodes that are scanned as the nurses retrieve the needed supplies.

![Figure 3. Medication Room](image)
The objectives of this research study are to:

1.) Provide evidence into what types of nursing work areas are most effective (including size, physical characteristics, and number)

2.) Provide the design field with a better understanding of the people and process they are designing for

3.) Serve as a basis for future research since current literature shows very little has been done in the area of nursing work areas.

Through the research objectives, this study aims to answer the following questions:

1.) What nursing tasks are performed (both generally and step-by-step) in key work areas (central nurse station, sub-nurse work stations, and support work areas)?

2.) What are the different design approaches to nurse work areas evidenced in practice?
3.) What are the different design requirements for nurse work areas as investigated through the three case studies?

4.) What contextual requirements (such as functional relationships to other areas, acceptable travel distances, and visibility thresholds) are necessary to make primary work areas operationally effective?

**Significance of Study**

This research study’s significance lies in its understanding of the inefficiencies, work load demands, demographics, and quality and safety in nursing work. The study attempts to understand the inefficiencies in the design of the nurse work areas in relation to the work nurses are doing, including the nursing processes. It seeks to improve nursing work areas by improving the built environment to support nursing tasks, thus improving efficiency and effectiveness. It is critical to understand how nurses work in their environments, improve the built environment to reduce stress and improve nursing efficiency, and reduce the demands on the nurses while considering the higher work load demands (from nursing shortage, staffing patterns,
sicker patients, etc). We are at a crossroads with an aging patient population that is
sicker, older, and larger, which places increasing demands on an aging nursing
population that work in areas that were not designed to meet the needs of today’s
nurses, procedures, and patient loads. This study strives to fully understand the
needs of the nurses and design work areas that meet those needs. Additionally,
nurses fear for their safety. It is the principal reason nurses leave the bedside in
acute care settings. Fear for safety, when paired with overall dissatisfaction, are
related to the work areas that nurses work in. Ultimately, this study aims feed
forward information that will improve the design of nursing work areas in both new
construction as well as in retrofits and renovations of existing facilities. Our nurses
need work areas that are “designed to make them more efficient, less conducive to
the commission of errors and more amenable to detecting and remedying errors
with they occur.” (Page, 2004, 227) Research shows it is possible to “redesign
workspaces to ... improve caregiver work environment and personal satisfaction.”
(Page, 2004, 268) We, as designers, need to understand who we are designing for
and ways to make nursing work less stressful and safer for nurses.
CHAPTER 2: LITERATURE REVIEW

Overview of Chapter 2

Chapter two serves to provide background information related to the study. It starts by providing insight into the historical context for today’s nursing unit designs. This chapter will then address the contemporary context of the problem related to the changing patient population, the changing nursing population, the increasingly complexity of nursing tasks, and the physical demands of nursing. The chapter will provide a brief overview of the various unit typologies and then will address the components of clinical care, specifically discussing the various program spaces of nursing units such as nurse work areas and support spaces. Finally, the chapter will briefly cover some of the forces that are influencing change such as technological advancements and changes in healthcare reimbursement.

Historical Context

Late 19th and early 20th centuries:

The late nineteenth and early twentieth century saw the first iterations of nursing work areas. These were seen in the Nightingale wards of European and early American hospitals. The Nightingale wards were design with beds along the outer
walls. A main spine down the center of the wards acted as the movement area for medical, administrative, and nursing personnel. (Verderber, 2000, 12-13) During this time, nurses’ primary work area was at the patient’s bedside. Wards often had a central observation area that nurses used to monitor patients. Nightingale herself said, “The most important practical lesson that can be given to nurses is to teach them what to observe” in her infamous essay Notes on Nursing. (Nightingale, 1898)

It was from the central observation points in Nightingale wards that nurses of the late nineteenth century and early twentieth century observed their patients.

**Mid 20th Centuries:**

By the mid-twentieth century, the Nightingale wards were becoming obsolete for a variety of reasons including the rapidly rising land costs in urban areas. Additionally Nightingale wards were becoming outdated in the “face of medical and technological progress.”(Verderber, 2000, 31) Advancements such as “long-space structural systems” and the rise of HVAC lead to the fall of the Nightingale wards “in favor of “large block hospitals with vast window-less regions at the center of each floor.” (Thompson and Goldin, 1975, 203; Verderber, 2000, 13-14). Initially, these
new units were comprised of semi-private patient rooms that were organized around a double loaded corridor. At the center of these mid-century units were fortress-like nursing work stations with clinical support spaces adjacent to the nursing work area. By the 1960’s the racetrack unit typology began to grow in popularity. The racetrack design “allowed for the blocks of rooms to be pulled apart along the outside walls and creating a support space in the center area” (Verderber, 2000, 26). Additionally, the “new service core often contained elevators, nurses stations, closets for clean and soiled linens, shafts for mechanical requirements, general storage, staff offices, treatment rooms, and conference rooms.” (Verderber, 2000, 26) Unfortunately, while the block hospitals had exterior windowed walls, most rooms, especially staff/support spaces, were windowless. “As the generic block hospital quickly filled to capacity with people, services, and high technology, comparatively little thought was given to traditional qualities of buildings- natural daylight, scale, or meaningful connections to the natural environment.” (Verderber, 2000, 31) The building qualities that improve nurse (and patient) satisfaction and
health took a backseat to other aspects of hospital design and construction. Nurses lost all connection to the outdoors and often had no access to natural light.

*Late 20th and early 21st Centuries:* 

The late twentieth century and early twenty-first century was a period of varying unit typologies that produced inefficiencies associated with staffing and longer travel distances. Regardless of typology, most units included private patient rooms along the exterior walls of the building with work areas scattered throughout the inner core. Work areas began to be decentralized, putting the nurses closer to their patients. “The minimization of direct visual contact with patients from nurses’ station—nature as a healing force (an increasingly discardable amenity in the eyes of decision makers), and the indispensable machine merged into the struggle against the status quo of orthagonality” led to new curved typologies. These curved typologies included “radial, semi-circular, and cloverleaf floor plans for nursing units.” (Verderber, 2000, 34)
The historical context of the physical structure and design of hospital plays a critical part in creating the work environment of nursing work areas in today's patient care units. Many of these older units are still in use today. Despite renovations and up
fits, these older units have a hard time accommodating and meeting the needs of our nurses.

Contemporary Context

We are at a cross roads in healthcare in the United States and abroad. The aging changing nurse staff population and a rising nursing shortage all create an environment ripe for added dissatisfaction and ineffectiveness in our nursing population. This cross road has forced an environment of “inefficient care processes and workspace design” that “while not intrinsically dangerous to patients, decrease patient safety to the extent that they reduce the time nurses have for monitoring

Changing Patient population:

Our hospital’s patients are an ever changing patient population. Today’s patients are older, sicker, and physically larger than ever before. “By 2030, almost 20% of the U.S. population will be 65+” which will nearly double the over 65 age group. (When I’m 64..., 2007, 2) This aging Baby Boomer population will require more healthcare services than any other generation of Americans. (When I’m 64..., 2007, 4) Today’s patients are also sicker than previous patient populations (Shaver...
As the Boomer population ages, more than 37 million of them will be living with multiple chronic diseases such as diabetes, arthritis, high blood pressure, etc. (AHA, 2007) In addition to being sicker than ever before, the average length of stay is getting shorter due to quicker discharges related to reimbursement issues. Finally, there has also been a rise in the physical size of today’s patients. By 2030, “more than one in every three Boomers will be considered obese.” (When I’m 64..., 2007, 2) That equates to over twenty-one million Baby Boomers who will be overweight and does not even account for other generations, which area also larger than ever before.

Changing Nurse Population:

Just as the patient population is aging, today’s nurses are aging right along with them. The average age of nurses is 46.8 years old, up from 45.2 in 2000. (2004 National Sample Survey, 2007) The largest segment of the nursing population is nurses between fifty and sixty-nine years old. Additionally, there is a high turnover of first year nurses due to job dissatisfaction, which means fewer young nurses are
staying in the hospital setting for the length of their careers. This aging workforce has been dealt physical demands they are unable to meet. The average medical/surgical nurse walks 4.1 miles in a typical 12-hour shift, with day shift nurses walking slightly more and night shift nurses walking slightly less. (Nielsen et al., 2003) Nurse are more likely to get hurt on the job than coal miners (Healthcare Worker Safety, ANA, 2007) and are more likely to have musculoskeletal disorders than construction laborers. (Nielsen et al., 2003) Today’s acute care in-patient nurses are struggling to meet the physical demands of the job.

**Stressed and Dissatisfied Nurses:**

Nursing work is never easy and nurses do not expect that. However, we cannot negate the fact that today’s nurses are stressed and dissatisfied with their jobs and the environments in which they work. We are in a position where a nursing shortage forces a “gap between patient need for inpatient care and the nursing available to meet patient needs” which leaves nurses expected to do more than ever before. (Welton, 2007) Nurses are often forced to work longer hours and more
shifts than they should ever have to do. The most recent national sample survey shows that registered nurses in acute care environments “worked on average 42.2 hours per week in contrast to their average scheduled hours of 39.3 hours per week.” (Page, 2004, 234) It is projected that by 2012 there will be over one million nursing vacancies in acute care settings in the United States. (Bureau of Labor and Statistics) At least 79% of RNs “believe that the nursing shortage presents a major problem affecting their work life.” (Buerhaus et al, 2005, 86) Lower staffing levels reflecting the nursing shortage and "attempts to reduce cost come at a serious cost to relatively high daily patient loads were also significantly associated to lower levels of job satisfaction." (Shaver and Lacey, 2003, 171) Additionally, “fatigue from increasing patient intensity and complexity of care endanger the patient as well as the RN.” (Nursing Staff, ANA, 2009, 1) Nurses fear not only for their own safety, but for the safety of their patients. (ANA, 2007) Consistently, research shows that nurses’ perception is that “short staffing affects their ability to meet their patients’ needs.” (Shaver and Lacey, 2003, 171) The nursing shortage (and short staffing) reduces the amount of time nurses spend at the patients’ bedside. (Hendrix, 2008)
Nurses are in a position where the “noise, the chaotic work environment and the lack of patient contact” negatively affect nurses job satisfaction, ultimately “contribut[ing] to the high nurse turnover rates that plague U.S. hospitals.” (McCarthy, 2004, 406) Nurses have more patients than before but also spend a large amount of time “documenting patient care and completing other paperwork to meet facility, insurance, private accreditation, state, and federal requirements as well as to furnish information needed by other providers.” (Page, 2004, 244) Documentation imposes “heavy demands on nurses’ time in hospitals.” (Page, 2004, 244) It is important for hospital administrators to remember that “just as customer satisfaction is the key to retaining customers, satisfaction with job and career choices are important for keeping staff nurses on the job.” (Shaver and Lacey, 2003, 166) Furthermore, “turnover, productivity, and job performance are extremely important issues in today’s economic climate” and “nurses’ satisfaction has been shown to be related to all three.” (Shaver and Lacey, 2003, 166) Acute care nurses are “leaving the hospital in search of less stressful environments with better schedules.” (Shaver and Lacey, 2003, 166) However, as one academic has said, “We
don’t have a shortage of nurses, we have a shortage of nurses willing to work in hospitals” because of the horrific work environments that many hospitals have become. (McCarthy, 2004, 406)

*Poorly Designed Work Areas and Complex Tasks:* 

Nursing work areas are often poorly designed and make complex tasks even more difficult to complete. Hospital leaders are in a state of denial about nurse dissatisfaction, especially at their own hospitals. (PricewaterhouseCoopers, 2007) The nurses and “their work environment [have] a reciprocal relationship, each influencing the other in an ongoing, dynamic interplay” and dialog that can have positive and negative effects. (Page, 2004, 65) There is a “direct relationship [that] exists between job satisfaction, retention, turnover, and elements of nurses’ work environments.” (Kotzer and Arellana, 2008, 1652) “The physical features of inpatient facilities can obstruct efficient nursing work and diminish patient safety” including “poor layout of patient care units and patient rooms and poor design and deployment of communication technologies.” (Page, 2004, 248) Often work areas
are retrofits and renovations that are not environmentally appropriate for the activities that occur there including ergonomics, spatiality, and provide little or no environmental quality. (Nielsen et al, 2003) These nursing work areas tend to have inadequate and/or inappropriate lighting. Nurses are often working in hallways in an effort to be closer to their patients but those areas often lead to physical demands from poorly designed ergonomic work areas that add to nurses’ stress and dissatisfaction. Another issue plaguing nursing work areas is that specific activities do not have specific work areas. This leads to interruptions, distractions, and, ultimately, errors. (Page, 2004) Many researchers agree that most nursing work areas are “crowded, noisy, [and] poorly thought out” that only “add to staff stress and increase the risk of medical errors, which cause an estimated 98,000 deaths in the USA alone.” (McCarthy, 2004, 405; Cappoza, n.d.,1) It is critical that designers understand that “the built environment is a powerful force in patient care” where properly designed work areas allow “care providers to do their work more effectively,” even offering the potential to improve patient safety. (Malkin, 2008, 1)
Physical demands of Nursing:

The nurses working in today’s hospitals are working physically harder than ever before. The further apart the behavioral settings are the greater the fatiguing effect on the nurses as they try to provide a consistent level of care for all patients, gather needed supplies, related paper work, and access to needed information, resulting in little time spent at the patient’s bedside. Many of today’s patient care units, especially older units, are “organized around a central nursing station where charts, orders, medications, and often supplies are concentrated in one place.” (McCarthy, 2004, 406) This forces nurses to “spend most of their time away [from the patients] walking up down halls ‘hunting and gathering’.” Nurses are forced to “travel miles a day in search of the next bit of stuff they need for care.” (McCarthy, 2004, 406) “Floor layouts can be designed to reduce staff fatigue and increase time for care” but conventional patient care units force nurses spend “much of their time walking up and down halls engaged in wasteful activity.” (Ulrich, 2006, 238) All the coming and going adds to the nurses’ struggle to maintain a consistent level of care across the unit.
Nursing Unit Typologies

The size of nursing units and their layouts vary from unit to unit and hospital to hospital. The size of a unit is often based on intended staffing patterns, the age of the unit, the needs of the hospital, and even the unit typology. Nursing units can also be “organized in a variety of ways, reflecting different decision-making, work allocation, and communication approaches.” (Page, 2004, 260) These varying layouts are called unit typologies. Some of the most common unit typologies are the double-
loaded corridor, racetrack, radial, triangle, L-shape, T-shape, and the semi-radial.

The double-loaded corridor was one of the first typologies after the decline of the ward design. These units have patient rooms along the outside walls of the hospital (exterior facade walls) with a corridor that runs down the middle. In these double-loaded units, a central nurse work area is often located near the middle of the unit with support spaces adjacent to that work area. The L-Shape unit is often a by-product of the double-loaded typology. The L-shape, and its counterpart the T-shape, are often double-loaded halls that come together to form an “L” shape or a “T” shape. These two unit typologies are often served by a central station and support spaces where the hallways come together. Sometimes these units have decentralized sub work areas on the individual halls, but that varies from unit to unit. With construction technology advancements, the racetrack emerged as possibly the most commonly used unit typology. It was developed out of the block hospital design to push patient rooms to the outside walls with staff support spaces in the center. These staff support spaces are surrounded by a hallway, the “racetrack”, that goes around the entire unit. (Verderber, 2000) Racetrack units’
central station is located at true center of the unit or can be pushed further out towards the main entrance to the unit to increase visual access to the comings and goings of the unit. As technological advances in construction techniques continued advances in construction techniques continued through the 1960’s, the radial plan grew in popularity for the increase visual access it provided. These units are typically circular with the patient rooms on the outside wall and a central core support space. Typically radial plans have a central nurse work station at the very center of the unit. The rationale for the radial design is that it offers “greater efficiency in terms of staffing ratios, reduced travel distances for staff, better observation of patients and ease in expansion because future units could be stacked on top.” (Verderber, 2000, 35) One of the greatest flaws in this design is that as the number of beds on the unit grows, it creates excessive unneeded space in the core for support spaces. (Verderber, 2000) The triangle unit typology was also a 1960’s advancement. This unit typology was “justified largely on the basis of the Yale Index research which found it a highly efficient, effective configuration from the standpoint of The Nursing Index method of measuring operating efficiency, especially staff walking distances."
Triangle units are characterized by patient rooms on the outside walls of the triangle with support spaces in the inner part of the triangle, which is often surrounded by a hallway way separating the staff space from the patient rooms.

**Components for Clinical Care**

When studying nursing work areas, it is critical to have a basic understanding of each work area. While each patient care unit is different and has a mix of work areas, they are similar enough to compare across units.

**Central Nurse Work Area/Station:**

*Nursing stations* is a general term used to describe central nurse work stations as well as sub work stations, sometimes called decentralized stations. It is important to note that “a nursing station is not only a place where nurses chart, mix medications, discuss patient status and order tests” but is a “social world unto itself, the life center of the patient unit.” (Goldstein, 1979, 21) Because “nurses take and receive patient orders on paper or by phone; answer or initiate phone calls and pages;
receive faxed reports, view orders and reported results (e.g. laboratory, x-ray); pick up stat pharmacy deliveries; document the care process; and collaborate and socialize with other nurses, physicians, and allied health care workers,” nurse work stations “can be a chaotic work environments that introduce environmental factors, including high noise levels and simultaneous conversations, conducive to human errors” (Page, 2004, 248) Most work areas have “Sensory distractions and interference, such as noise, poor lighting, glare-producing surfaces, and clutter” that can also interfere with nurses’ work. (Page, 2004, 254) There has been some discussion on to the appropriate name for these work areas. Some researchers argue that nurses’ station denotes ownership of the work area by the nursing staff. (Jarrell & Shattell, 2010) Others argue that nursing station designates the area as only being used for nursing tasks, which is typically not the case. I would argue that either is acceptable by virtue of the fact that hospital staff know that nursing stations, especially central work areas, are for use by a variety of staff including PCAs, doctors, therapists, nutritionists, social workers, and the like.
The general classification of nursing stations (sometimes also called nurse stations or nurse work areas) is divided into two types of stations—central nurse work areas and sub work areas. The central nurse work area, also called the central station or central nurse(s) station, is a “nursing station [that] should be located near the entry; in this way entrance to the unit is controlled 24-hours a day” but can also be located centrally on the unit. (Goldstein, 1979, 22) These nursing work areas should “allow for reasonable access to facilities and equipment needed to satisfy basic personal needs.” (Goldstein, 1979, 22) The central station is often the “hub of the nursing unit for both simple and complex communications in a multitude of care delivery processes.” (Page, 2004, 248) The unit secretary often uses the central station as her/his main work area. The unit secretary’s tasks are “partly administrative, partly communicative, and partly social” but it is critical that their activities be “thoroughly considered in the design of the nursing station.” (Goldstein, 1979, 23) Additionally, the central station “has become the location for the unit secretary as well as all health professionals who spend any time on the patient care unit, including
physicians, pharmacists, respiratory therapists, physical therapists, dieticians, social workers, and pastoral care staff.” (Page, 2004, 248-249)

**Sub Nurse Work Area/Station:**

Sub nurse work areas, sometimes called decentralized work areas, are typically closer to patient rooms and away from the central nurse work station. They can be small where they are used by one nurse for one patient to larger sub work areas that a few nurses use to serve a variety of numbers of patients. Additionally, sub nurse work areas can be outside of the patient room or in the patient rooms. The benefit of sub nurse work areas, in room or out, is that nurses are working closer to their patients and often provide a quieter, less chaotic place to work when compared to the central nurse work station. (Lumsdon, 1996) Decentralized sub nurse work contend with noisy centralized nursing stations.” (Lumsdon, 1996, 56)

**Support Spaces:**

In addition to the nurse work areas, patient care units typically have a variety of support spaces. These spaces include medication room(s), supply room(s), soiled

![Figure 19. Example of sub nurse work area outside of patient room](image)
utility, clean utility, storage, nourishment, staff support spaces (break room, office(s), and meeting/conference room), and family support spaces (most commonly a waiting room). The medication room is typically equipped with a counter and sink of some sort. Most hospitals use electronic medication dispensing machines, often called an AcuDose or Pyxis, which bill patients for the medications as well as serve as a control point for medication dispensing, particularly for narcotics. In addition, each medication room has a “red box” on the counter where nurses are supposed to mix each patient’s medications. The red box should be clean and free from any other items or supplies than those the nurse is using to mix the medications. The supply room is just what you would expect - a place where supplies are stored. Supply rooms may be smaller with just clinical supplies or larger with clinical supplies, linens, and sometimes even equipment in them. Most hospitals use a barcode system for managing and monitoring supply levels and as a means to bill certain supplies directly to the patients. Clean utility is where sterilized and clean equipment is kept. Soiled utility is where dirty linens, used equipment, and other “soiled” but reusable supplies are stored before being taken to various parts of the...
hospital to be cleaned and/or re-sterilized. The nourishment station is typically near the central nurse work area and is where various foods and drinks are stored for patients. Most nourishment stations have an ice maker, refrigerator, sink, and counters and cabinets for storage. The size, location, and number of support spaces vary from unit to unit. Some units have multiple supply rooms or medication rooms. When this occurs, the unit is considered a decentralized unit because all or some of the support spaces are decentralized.

**Forces Influencing Change**

Finally, technological advances are changing today’s in-patient units. The rise of computers has led to the development of electronic medical records and the computer on wheels (COW). Computers have also allowed for remote telemetry—patients being monitored (heart rates, oxygenation, etc) from a distance. Computers have forever changed how nurses work, however the enormity of moving totally to a paperless system is far more than most hospitals have been able to do. Many hospitals are in a limbo between traditional paper charting and a totally
electronic records system. Furthermore, the rise of the computer and the World Wide Web has created a generation of patients that are more educated than ever before and demand more care because of that knowledge. (When I’m 64..., 2007)

In addition to the technological changes, issues related to reimbursement as well as the issues related to staffing are also forcing change. Not only do we face a nursing shortage, many hospitals are opting to increase patient to nurse ratios in an attempt to save money on staffing. This is forcing changes in nurses work areas and how much time they spend with patients. Finally, reimbursement issues related to insurance and Medicare/Medicaid have forced changes in the way nurses work. For example, nurses only have one hour to deliver all of their patients’ medications and still have the hospital be reimbursed for those costs. That forces nurses to do “work arounds”, increases the chances of medication errors, and adds to the stress and dissatisfaction of nursing staff.
Theoretical Frame Work: Environmental Press Theory

Many theorists agree that behavior is a function of both the person and the environment. (Lawton, 1980) It is impossible to totally separate the built environment of the hospital from the nursing staff working in it. There is an “infinite variety of behaviors that are a function not of the person alone, nor of the environment alone, but of the unique interactions between what is inside and what is outside the person...” (Lawton, 1980, 9) Psychologist M. Powell Lawton has suggested that “people and the environment they are in are related via the peoples ‘competence’ and the environment’s ‘Press’” where competence is the person’s cognitive, mental, emotional aptitude and press is the “demands the environment has on the user.” (Lawton, 1980, 9) He goes on to argue that there are “positive and negative effects based on the combination of the two in specific ‘person/environment transactions.’” (Lawton, 1980, v-vi). Examples of positive effects in nursing are increased job satisfaction, increased efficiency, reduced stress, etc. where negative effects would be increased travel distances, increased noise, low visibility, etc. Lawton points out that people have the ability to adapt to a certain

Figure 22. Lawton’s diagram of environmental press
degree but “no matter how high the person’s level of competence, there is always a point of high press where behavior and affect deteriorate— every person has a breaking point.” (Lawton, 1980, 13) Unfortunately in the healthcare sector, specifically nurses and their work areas, we are at the breaking point. This theoretical frame work of environmental press serves as the filter through which all of the collected data in this research study is examined and processed.
CHAPTER 3: METHODOLOGY AND RESEARCH SETTINGS

Overview of Chapter 3

This chapter discusses the research methodologies and introduces the case studies. The chapter starts by addressing the research design as a qualitative study for descriptive understanding. From there, the chapter discusses the IRB process and the four phases of the study. After discussing the design of the study, the report will address data analysis. Finally, the chapter discusses, in detail, the three case study units.

Research Design

This research was a qualitative study for descriptive understanding using a mixed method approach. The research was “conducted through an intense ... contact with [the] field [and] life situation” that was “reflective of everyday life of individuals, groups... and organizations.” (Miles and Huberman, 1994, 6) The design enabled the researcher to “gain a ‘holistic’ (systemic, encompassing, integrated) overview of the context under study” including its “logic, its arrangements, [and] its explicit and
implicit rules.” (Miles and Huberman, 1994, 6) Additionally, it allowed the researcher to “attempt to capture data on the perceptions of local actors ‘find understanding and of suspending or ‘bracketing’ preconceptions” related to nursing work areas in acute care patient care units. (Miles and Huberman, 1994, 6) It “focused on the ordinary events that happen in the work environments” while emphasizing “peoples ‘lived experience’.” (Miles and Huberman, 1994, 10)The mixed methods approach included archival research, observation research, and interviews and focus groups.

*Institutional Review Board Process and Approval:*

This research study was done with complete institutional review board (IRB) approval. The IRB application was submitted by the research team via the eIRB system of Health Sciences South Carolina and to ensure the protection of human rights during the study. The application was written per the organization’s IRB application template. It included an abstract of the research being done, research questions that would be answered, and then detailed written explanations of each phase of the research. The detailed explanations elucidated each phase of the
research to detail why each phase was being done, how exactly the phase would be carried out, and what the expected outcomes from each phase were. Once the application was written, it was submitted for approval. The review committee came back with several minor changes and requests for verification. Those changes were made and it was re-submitted for final approval. After the review committee reviewed the changes, the application was approved and the study could commence. The final IRB application can be found in the appendix of this manuscript.

*Phase I - Archival Research:*

The research study was divided into four phases that were completed at each of the three case study units. Phase I consisted of archival data collection, verification, and guided walk-throughs. The first step of phase I was the remote collection of archival and existing data about the facility and operations of the nursing unit. The data provide a descriptive account of the physical and clinical characteristics of the nursing units studied including the unit's context (the greater whole of the hospital)
as well as specific information related to the unit. The archival data included information about number of beds (in the hospital and on the unit), gross square feet, net square feet, travel distances, typology of the unit, types of nursing work areas, and other information that built a foundation for the researcher to move forward. The on-site verification was the second step of phase I. This step verified that the collected archival data were accurate and as well as noted any changes or corrections. The final step of the first phase was the guided walk-through of the units being studied. The unit manager for each unit guided the researcher on a tour of the unit. This provided further understanding of the basic function and layout of the unit and often gave a glimpse into the day-to-day operation of the unit.

**Phase II- Observations:**

Phase II was the on-site observations. This methodology was chosen because it allows the researcher to observe and understand the function without actually participating. (Creswell, 186) Observation provides the research team with firsthand note of unusual aspects and can be useful in exploring topics that some participants...
may not be comfortable discussing. This phase consisted of two types of observations: general observations and focused observations. The first observation on each unit was a general observation of the public areas focusing on areas nurses work in/at most often. This observation included looking at the central nurse work stations, sub nurse work stations, medications rooms, supply rooms, and general observation of activity in the hallways of each case study unit. Each general

<table>
<thead>
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<th>Observation Type</th>
<th>General Characteristics</th>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
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<tr>
<td>General</td>
<td>2 hrs, M-F day</td>
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<td>Fri Oct 1, 2010- 1:30pm- 3:30pm</td>
<td>Mon Oct 11, 2010- 10am- 12noon</td>
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<tr>
<td>Focused</td>
<td>4 diff shifts</td>
<td>#1- Day</td>
<td>#2- Night</td>
<td>#3- Weekend</td>
</tr>
<tr>
<td></td>
<td>6 locations</td>
<td>Friday</td>
<td>Thursday</td>
<td>Sunday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10am - 12noon</td>
<td>9pm - 11pm</td>
<td>12noon - 2pm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 24. Chart of observation times and dates
observation lasted two hours but no specific amount of time was spent at any one area. Phase II was the focused observations. The focused observations consisted of four observations on each unit at various times and shifts and spending a specific window of time observing each work area. The four observations were done during a typical week day shift between 10am and 12noon, typical week night shift between 9pm and 11pm, a weekend shift between 12noon and 2pm, and at shift change which varied for each of the three case studies. Within each of the four two-hour observations, twenty minute windows were spent observing each of the specific work areas- the central station, sub nurse work stations, medication room, and supply room. These observations captured data for specific time periods at specific intervals and looked for information related to the users. This data included who was using the various work areas, how many people were in the area, and how the staff worked in the area. Other data such as tasks (the types of tasks and the needs related to the tasks) and physical characteristics of each nursing work area (work surfaces, seating, lighting, etc.) were also captured during some of the
observations and were noted in the data collection tools. All of the observation data collection tools can be found in the appendix.

**Phase III- Interviews and Focus Groups:**

Phase III of the research was interviews and focus groups with nursing staff on each unit. The unit manager for each unit was interviewed to gain insight from the nursing administrator’s perspective. The focus groups were conducted with clinical care staff (RNs and PCAs) who work at least 50% of their shifts on the unit. The focus groups gave insight from the staff that most commonly use the work areas being studied. Both the interviews and focus groups provided information about the strengths and limitations of the case study units. Additionally, a sorting task to rank various unit typologies was completed during the interviews and focus groups. This provided the study with user preference for various unit designs and types of nurse work areas.

**Phase IV- Post-Research Follow-up, Overall Analysis, and Dissemination:**

Finally, the last phase of the research, Phase IV, was for post-research follow-up, overall analysis, and dissemination. This phase included analyzing thirty hours of

<table>
<thead>
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<th>FG and Interviews</th>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
</tr>
</thead>
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<td>N=1</td>
<td>N=1</td>
</tr>
<tr>
<td>FG</td>
<td>N=6</td>
<td>N=7</td>
<td>N=7</td>
</tr>
</tbody>
</table>

*Figure 25. Sample information for Phase III*
observation data consisting of over 1300 pages of focused observation data
collection sheets and general observation sheets as well as studying 10 hours of
interview and focus group recordings. This all resulted in incredible insight into the
three case study units as well as generalizable information that can be used in the
design of new facilities and renovations of existing ones. The data analysis provides
information to each unit for improvements to increase efficiency and effectiveness
of the nursing work areas and suggests design guidelines for future projects.

Data Analysis

The collected data were analyzed in a variety of ways. The archival data were
examined to determine travel distances and obtain a holistic understanding of the
units being studied. The data collected in Phase II, the observation phase, were
analyzed through diagrammatic study of numbers and types of staff working at the
various work areas during the focused observations. The data were analyzed for
typical average use as well as numbers of users during peak times and observation
data were also analyzed for the kinds of tasks that staff were doing during the
observation windows. Upon completion of Phase I and Phase II, the information was
used to develop additional questions that were discussed during the interviews and focus groups. The interview and focus group data were analyzed by looking at reoccurring comments and topics that were addressed at each unit. Additionally, all of the data were analyzed for common occurrences that were seen across the units. The variety of unit typologies, research strategies and attention to sampling design contributes to the generalizability of the study as a standard for future design and construction.

**Research Settings: Case Study Units**

The research for this study was done at three different units in one hospital system. The criterion for selection was that the units had to be medical/surgical patient care units. They could not be intensive care units (ICU), critical care units (CCU), pediatric, psychiatric or labor/delivery/recover/post-partum (LDRP). The units had to be of various unit typologies and had to be in community hospital settings. Ultimately, three medical/surgical units at two hospitals in one hospital system were chosen as case studies for the research. Units A and B were in one 540 bed hospital in 1,388,780 square feet while unit C was in a 48 bed hospital in
265,780 square feet. Both hospitals were located in upstate South Carolina.

Unit A

*Built Environment of Unit A:*

Unit A was an 11,211 square foot, L-shaped unit with 25 private patient rooms. The unit was in an original part of the hospital with one long hall and one shorter hall and traditionally small patient rooms and bathrooms. This unit’s primary nurses work areas were a central station and a series of small sub work areas in the halls near the patient rooms. The central station was located where the two halls come together. The short hall had ten patient rooms with two sub work areas located on opposite sides of the hall. This hall was a commonly used thoroughfare through the hospital and was often used by transporters and other staff moving through the facility. The long hall had fifteen patient rooms, ten of which were original to the unit and 5 that were added more recently. The added rooms are referred to as the “hole” by nursing staff because of the long distance from the patient rooms back to the support areas and the central nurse work station. The long hall had four sub work stations on both the long and short halls. Additionally, the sub work areas
Figure 27. Unit A Floor Plan- Blue areas are work areas and support spaces; light gray denotes patient rooms
were equipped with a telephone and electrical outlets for charging CarePoint carts and other equipment. Adjacent to the central station was most of the unit’s staff support spaces including the medication area, a work room, supply room, break room, and nourishment station. This unit did not have a dedicated medication room. Instead it had a medication area that was part of large sub nurse work area that was immediately adjacent to the central nurse work area and accessible from the short hallway. Across the hall from the central station was a large supply room. All supplies were kept in that one room as well as clean linens and some equipment etc were stored in a medium sized equipment closet just off of the unit. Soiled utility was a few feet down the long hall from the central station. The nourishment station was located behind the central station and was not accessible to patients or their families. The nourishment station was equipped with a refrigerator, ice machine, and microwave as well as sink and large counter space for preparing food for patients.
**Patient Population of Unit A:**

Unit A's patient population was predominately pulmonary patients and had an average census of twenty-four. The unit’s average length of stay was 6.89 days. The patients’ illnesses varied slightly seasonally but were typically chronic obstructive airways disease (COPD) patients, emphysema patients, and some asthma patients, particularly in the summer months. The top three diagnostic related groupings (DRGs) were COPD, sepsis, and pleural effusion.

**Operational Information of Unit A:**

Operationally, Unit A was typically staffed at a one-to-five nurse-to-patient ratio but it fluctuates a bit depending on shift. Typically, the day shift is staffed with five nurses, two patient care assistants (PCAs), 2 unit secretaries (who worked varying shifts – 7am to 7pm and 11am to 11pm), a nurse educator and a nurse manager. Night shift was commonly staffed at a slightly lower level with four to five nurses, two PCAs and one unit secretary that were on shift until 11pm. Other staff on the unit included housekeeping, food service, physicians, therapists (including respiratory, physical, and occupational therapists) and nursing students. This unit

![Figure 30. Staffing on Unit A](image-url)
used both electronic medical records (EMRs) as well as traditionally paper charts.

Nurses commonly documented in the patients electronic medical records from the
sub nurse work areas on their CarePoint computers, essentially computers on
wheels with lockable drawers for medications, while the full paper charts were kept
on a rand at the central nurse work station. The medication administration record
(MAR) was stored at the sub work areas near the patient rooms.

**Medication Delivery and Administration on Unit A:**

Medication delivery and administration for this unit began when pharmacy
delivered each patient’s daily medications to the medication room prior to day-shift
nurses’ arrival. The medications were delivered in a blue CarePoint cart drawer to a
cabinet located in the medication/sub work area. Day shift nurses moved their
patients’ medications from the cabinet to their CarePoint carts. Any additional
medication that was needed during the day was ordered via a three-in-one (fax,
printer, copier) machine at the central station. Ordered medications were delivered
via Tug, the hospital’s robot, about once an hour. Medications that were needed
quickly were delivered via the pneumatic tube which was located in the
medication/sub work area adjacent to the central station. Controlled substances, which were common medications of pulmonary patients, were kept in the AcuDose machine in the medication room.

**Unit B**

*Built Environment of Unit B:*

Unit B was a racetrack unit that was originally built in the early 1990’s. It was a twenty-eight bed unit with one overflow bed in the hall in about 16,000 square feet. The unit was a medical/surgical unit but served predominately surgical patients. The top three diagnostic related groupings (DRGs) for this unit were women’s surgeries (ex. Hysterectomies), male pelvic procedures, and kidney and urinary tract infections. The average census for this unit was twenty-three patients and it had an average length of stay of 4.28 days. This unit was served by a central nurse work station. Patient rooms were located around the perimeter of the unit with the staff support areas in the center. The unit had four isolation rooms in two of the corners, each served by an ante room. This unit’s central station was the predominate nurse work 11pm when there is no unit secretary on duty. There were small cubby-like
nurse work areas outside each patient room. Most cubbies provided a small space.
for nurses to do documentation and were equipped with electrical outlets where nurses could plug their computer-on-wheels (COW). The individual work areas had lockable drawers where the patient’s medications were stored. The medication administration records were kept at the cubbies in a small file on the wall or on the counter itself. Additionally, a closet had been converted into a small nurse work area on one of the back halls. Unfortunately, the closet was so small that the work area was barely functional.

The support spaces were all located in the central core of the racetrack but were accessible from various points along the hallway. The medication room was adjacent to the central station and accessed through the central station. It was a small, closet-sized room with bi-fold doors that were always open. It was equipped with an AcuDose medication machine and some storage for supplies. It also had a small, counter top refrigerator. The supply room was about fifteen-feet down the hall from central station. All of the scanned clinical care supplies were stored in the supply room, however equipment was stored in another room on the unit. The supply room was equipped with a computer and scanning gun for scanning barcoded
supplies to charge to patients and for the hospital to track supply usage. Unit B had two clean utility rooms on opposite sides of the unit and one soiled utility. The equipment storage room was located adjacent to one of the clean supplies and was on the opposite side of the unit from the soiled utility.

**Operational Information of Unit B:**

Unit B was typically staffed at a four-to-one to one-to-five nurse to patient ratio. Day shift was typically staffed with five to six nurses, one charge nurse, three PCAs, one unit secretary, one clinical educator and one nurse manager. Night shift was typically staffed at four to five nurses with two PCAs and one unit secretary until midnight. Other hospital staff were commonly on the unit. Those staff included housekeeping, food service, physicians, various therapists, nursing students, and medical students. The addition of nursing and medical students increased the number of bodies on the unit significantly.

**Medication Delivery and Administration on Unit B:**

Medication delivery for Unit B differed slightly from Unit A, despite being in the same hospital. Unit B’s daily medications were delivered each morning to bins on a
shelf in the medication room. Day shift nurses move the bins from the shift to the drawers outside of each patient’s room. Additionally medications were ordered via fax from the central station and are delivered by a pharmacy courier who came to the unit about every sixty to ninety minutes. All controlled substances were stored in the AcuDose machine in the medication room.

Unit C

Built Environment of Unit C:

Unit C was a fairly new unit in a small community hospital that opened in 2007. The triangular unit was just less than 21,000 square feet with twenty-four beds. Four of the beds on the unit were considered Intensive Care Unit beds leaving twenty beds in the medical/surgical part of the unit. Since opening in October of 2007, the hospital has been plagued by a low census. The average census for this unit was 10.32 patients with an average length of stay of 3.87 days. This unit was the only open unit at this hospital so it sees a variety of patient types including pulmonary, cardiac, and orthopedic patients. The top three diagnostic related groupings (DRGs) for Unit C were joint replacement, chest pain, and sepsis.
The design of this triangular unit featured a large open support core in the middle of the unit between the three hallways. This open area housed a central station in the very center of the unit with small sub work areas radiating around it. The hospital’s staff called the small work areas perches. The perches were equipped with computers, telephones, and electrical outlets for nurses to plug their CarePoint carts into. The desktop computer and CarePoint carts gave nurses two options for documentation. Each corner of the support core of the unit was where various staff support spaces were located. These support spaces included supply room, equipment room, staff restroom, custodial closets, clean utility, soiled utility and a small work room that was used by PCAs to monitor telemetry patients. Additionally, there was a small nurse work station in the ICU area as well as a reception/greeting desk at the entrance to the unit. The reception desk was rarely used and was never used for nursing tasks. The scanned supply, nourishment, and medication rooms were immediately adjacent/accessible from the central open area as well as a physician’s dictation area. Two halls from the central open area led back to the ICU.
Figure 42. Floor plan of Unit C; Dark gray are staff work and support spaces, light gray area denotes patient rooms
and back up to the unit entrance and waiting room. These two hall ways had a variety of support spaces off of them and were used only by staff.

**Medication Delivery and Administration on Unit C:**

Medication delivery and administration was different on this unit because of the small size of the hospital. Each patient’s daily medications were delivered from pharmacy directly to the nurses’ CarePoint cart before the day shift nurses arrived. All medications that were ordered during the course of the day were delivered via pneumatic tube and were typically put in the medication room or given directly to the nurse. Controlled substances were stored in the AcuDose machine in the medication room. There was one medication room that served both the ICU and the medical/surgical unit.
### Summary: Unit A, Unit B, and Unit C

<table>
<thead>
<tr>
<th></th>
<th>Gross Size of Unit</th>
<th>Total Staff and Support Area*</th>
<th>Percentage of Staff area to entire gross SF of Unit</th>
<th>Central Station</th>
<th>Med Room*</th>
<th>Supply Room*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit A</strong></td>
<td>11,211 (in sq. ft.)</td>
<td>1,455.58 (in sq. ft.)</td>
<td>12.98%</td>
<td>176.13 (in sq. ft.)</td>
<td>102.72 (in sq. ft.)</td>
<td>284.98 (in sq. ft.)</td>
</tr>
<tr>
<td><strong>Unit B</strong></td>
<td>16,150 (in sq. ft.)</td>
<td>2,685.34 (in sq. ft.)</td>
<td>16.63%</td>
<td>428.01 (in sq. ft.)</td>
<td>54.43 (in sq. ft.)</td>
<td>143.48 (in sq. ft.)</td>
</tr>
<tr>
<td><strong>Unit C</strong></td>
<td>20,780 (in sq. ft.)</td>
<td>5,811.14 (in sq. ft.)</td>
<td>27.97%</td>
<td>313.75 (in sq. ft.)</td>
<td>145.61 (in sq. ft.)</td>
<td>132.31 (in sq. ft.)</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>16,047 (in sq. ft.)</td>
<td>3,317.35 (in sq. ft.)</td>
<td>20.67%</td>
<td>305.96 (in sq. ft.)</td>
<td>100.92 (in sq. ft.)</td>
<td>186.92 (in sq. ft.)</td>
</tr>
</tbody>
</table>

*This area calculation does not include any of the ante rooms on any unit

*Unit A does not have a dedicated med room. For this calculation I used the area that the AcuDose and counter space is in plus the additional floor space from the counter/wall to the desk that sits in the center of that room, which is the space that is used for medication purposes

*Supply room on Unit C is too small so some supplies are kept in an equipment storage room

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Figure 44. Summary chart and floor plan of case study units
CHAPTER 4: RESULTS

Overview of Chapter

This chapter discusses the actual results of the study, the actual cold, hard facts from the data collected, and is organized by unit. Each unit section starts with two “Day in the Life” stories giving best and worst case scenarios for nurses who work on the units and is followed by the results reported for the various work areas that have been studied (central nurse work area, sub work areas, supply room, and medication room).

Unit A: A Day in the Life

A Day in the Life- Best Case Scenario

Nurse: Traci  Age: 29  Night shift: L-Shape unit

My name is Traci and this is my typical day.

Its 6:30 pm and I am so happy to be back! I have been off for four days. This is my first shift back of two before I get another two days off. I am rested, renewed and I am ready to be back with my patients!
I am thrilled. I am assigned 5 rooms, but I only have 4 patients! One patient got discharged this afternoon/evening and they don’t think they are going to get someone new tonight. What happens on day shift tomorrow won’t affect my night tonight! WooHoo! Score one for the home team! It’s also great because I got assigned 5 rooms on the short hall RIGHT by the medication room, central station AND supply room. These rooms require the least amount of walking and physical labor which is a HUGE bonus. First things first... I need to get the low down on my patients from the day nurse. We are going to do that in the break room. There is just not a place to do it anywhere else.

Now that I am all caught up on each of my patients from day shift, I have a few minutes before I need to start getting evening medications ready. I will go check in with my patients and introduce myself and find out if they need anything. Luckily, with only 4 patients, that should be easy enough because they are all right together. Mr. Stuckey would like for me to bring him an extra blanket. I scored majorly by getting these rooms so close to everything I need. It’s all at my fingertips! Ms. Laurence said she was just fine and did not need anything. Mr. Parting had several
family members in his room so he was happily visiting. Mr. Perry was napping so I
did not interrupt that. Looks like not only do I have just 4 rooms, I have some easy,
laid back patients too! That always makes my job so much easier! I need to look
through their MARs and their charts a bit to get caught up a bit more on each of
them, but it seems like they are all straight forward cases. The day nurse said that 2
of them are being discharged tomorrow.

It also looks like I have most all the medications I need in my CarePoint cart. That
makes it easy. I will only have to make one trip to the AcuDose, which is just across
the hall anyhow. Let me do Mr. Parting’s medications first since he has one
medication in the AcuDose that I will have to retrieve and mix. I need to get one of
the other nurses to waste for me, but that’s easy enough. This AcuDose is so much
easier to use than the last hospital I worked at. There is also ample counter space
with this med room, which is also a huge plus over the last place I worked. Plus, with
the med room being so close to my rooms, I have plenty of time to get each
patient’s medications administered in the next 60 minutes! The only bad thing
about medication administration is dragging my cart into each patient’s rooms.
Luckily, though, my workstation is right here with the patients and since I only have four patients, I don’t have to lug it too far!! Knock, knock. "Mr. Parting. Wow! You have lots of family visiting you!! How are you doing this evening? I have your medications here. I will need to scan your bracelet, but then I will let you get back to visiting. Here is your cup of water and your pills. I will also need to put some medicine into your IV.... Yes Sir. That is it... just those pills and this medication in your IV. Yes sir, when you are ready we will make sure you get your sleeping pill that your doctor has prescribed. You just let me know and I will bring it to you. Thank you Mr. Parting... enjoy your time with you family.” Its patients and families like that that make me love and adore my job. He is one of the sweetest gentlemen and it can be nice to have a supportive family around like his.

Let me do Ms. Laurence since her room is right here. It’s always so nice when all the patient’s medications are right here in my cart. It makes my life so easy. “Hey there Ms. Laurence, are you having a good evening? Yes ma’am, you are good at Jeopardy. You know all the answers! Can I please scan your ID bracelet so I can give you medications? Yes, ma’am, I will be happy to bring you some juice. Did they just
give you water with your dinner? You would like apple or orange juice? Alright. I will go get it and bring it back to you.” That’s the other nice thing about these rooms I was assigned, they are close to the nourishment area too! I still have over 30 minutes left to distribute these medications to my last two patients and I am totally not rushed!! I can really give my patients the attention they deserve and do my job the way it is supposed to be done. Even other nurses on this unit with other room assignments can’t do that because they have to run all over tarnation for everything.

Mr. Stuckey only has 2 medications to take right now. He is one of the patients being discharged in the morning so he is a pretty straight forward case. Oops, I am out of pill cups. Let me run across the hall to get those from the med room before I go into his room. See... that’s another prime example of how these rooms make life so much easier. If I had been down in the hole- you know those rooms way down at the end of the long hall. I would have to trek ALL the way to here. I just have to walk across the hall. So much better! Okay... back to Mr. Stuckey. “Good evening Mr. Stuckey, Are you warmer now that you have that extra blanket? Good. I am glad to hear it. I have your medications here. You only have to take 2 small pills. Can I
please scan your bracelet before I give it to you? Thank you, sir. Here are your pills and your water. Is there anything else I can get you for now? Alright sir, I will come back and check on you after a while.” He is another sweet old man. He is happy to be going home in the morning. He told me he was ready to be back with his “sweetheart” as he called her. I love that with four patients and my room assignments; I can really connect with and get to know my patients. I don’t have to run around like a chicken with my head cut off but can really spend a little extra time at the bedside and really create a relationship with my patients. I find that is so critical, not only for my patient’s well-being, but also with my job satisfaction and stress levels.

Last up for medications is Mr. Perry. Hardest thing about Mr. Perry is his pills have to be ground up, but I have that contraption right here at my station. Knock, knock. "Mr. Perry. Sorry to have to wake you up, but it’s time for your evening medications. I will need to scan your bracelet with my barcode reader here and then I will let you go back to sleep. Yes, Sir. It is that easy. Here is your medicine
and here is a cup of water. Is there anything you need while I am in here? Alright sir, you can go back to sleep. I will come back in and check on you later.”

I will need to do all the documentation for all of my patients. Night shift is much easier documentation wise because I can work at my workstation here by my patients and not get interrupted. Plus the hall is not nearly as busy as day shift because I don’t have hospital staff and transporters and what not passing through. As a former day nurse, I think night shift is easier in some ways. My patients are asleep for the most part. They are not asking for anything or want for a thing. There are not tests and things they are going to, and they are not asking to get up to the bathroom or getting bathed or anything. It’s generally quiet on the unit which makes my life easier and much less stressful.

*A Day in the Life- Worst Case Scenario*

Nurse: Lorraine  Age: 46  Day shift: L-Shape unit

My name is Lorraine and this is my typical day.
It’s 6:30 am, I am arriving at the hospital for my last of 3 days of working. I am on my third 12-hour shift in a row and I am worn slap out. Hospital capacity is critical and they are trying to get any patients discharged that can be discharged. That’s great except for the past two days I have had 5 rooms, several discharges that have only led to new patients. When I got here two days ago, I was assigned the rooms down in the “hole.” You know… those rooms that used to be administrative offices that they turned in to patient rooms a few years back. They are miles from all the support and things I need. Most of us, nurses that is, dread getting assigned back there. It’s an extra 50 steps every single time I walk up to the station or to get meds and supplies. It’s an extra 50 steps there and 50 steps back. I like taking care of the same patients when I am working several days in a row, but sometimes I wonder if it is really worth it when I get assigned the “hole.” I must be walking a few extra miles every single shift just because of the stretch back to the things I need the most.

Anyhow. This is the unit and as usual for shift-change, it’s teaming with people. Each nurse is trying to get the latest on her patients. Sucks because we don’t really have a good place to do that and none of our work areas are conducive to giving report. I
usually just end up doing patient transfer conversations down in the hall even though I am certain we are in violation of HIPAA. OH well. What can I do?? I am set up for failure before I even step foot on this unit.

As has been our recent norm, the unit is full today. I have 5 patients, all down in the hole. I have several COPD patients, a pneumonia case, and then one in acute respiratory distress. Apparently RT has had to be up several times during the night to work with several patients. I guess this starts the “fun” part. I have one hour to get all of my patient’s meds. This will be a difficult task as most of my patients are on controlled substances. That means I have to go up to the med room to get what I need.

First patient, Mr. Horton has 5 meds, 2 of which are up in the med room. Trip one of the day to med room to get two meds. Unfortunately the med room is really loud and not conducive to mixing meds. AcuDose, check. Red square to mix, check. Meds mixed... I think I calculated that right. I hope there was no mistake but it’s just so loud and chaotic in there. Luckily in the chaos of so many people, there was a nurse
in the room to waste for me. Ok… Mr. Horton’s meds are ready to be administered.

Back down the hall. I have to make a quick stop at my cart to get the rest of his meds organized and I head into his room, dragging my cart with me. This cart wears me out… every time I have to administer medications, I have to drag this big ol’ beast of a cart into the room, just so I can scan the patient’s bracelet. It seems like there is some better option. Anyways, back to my day. So far so good… 4 minutes and I am already going into his room to administer his meds. “Good Morning Mr. Horton. I am your nurse today and I have your medications…. What’s that sir? You need help getting to the toilet? Yes Sir, I can help you do that. Let’s take your meds first and then we can do that.” All that and a quarter of my hour window is gone. On to the next patient….

Mrs. Clarey should be easy- she does not usually want too much and her family is almost always with her to help get her what she needs. She only has a few meds and luckily they are already in my cart… gotta love when I don’t have to make the trek back to the med room. Cart in tow, “Good Morning, Mrs. Clarey. I am Lorraine and I will be your nurse for today. I have your medications here. Let me scan your bracelet
... Thanks, Mrs. Clarey for taking your medications. I will be back to check on you in a few minutes.” Thank goodness, I made it out of the room without a trip.... Or maybe not. I don’t like it when my patients call out like that. “Yes Mrs. Clarey, I would be happy to get you an extra blanket and a tooth brush. Let me go down the hall and get that for you.” So much for not having to make the trip back down the hall.

Supply closet is pretty organized but still just takes time and is eating into my hour window and all the walking catches up on you after one shift, and especially after three in a row. Sign into the computer and grab the barcode reader, scan the tooth brush, grab the blanket... back down the hall for trip #2. “Here Mrs. Clarey, here is your blanket and your tooth brush.” Another 10 minutes and almost half of my window is gone to administer all my patients’ medications and I still have three more patients to go.

Mr. Thompson is a difficult patient. He is very demanding and always “needs” something. I have some of his medications here but unfortunately I have to go down to the med room to get his IV medication. This makes trip number 3 back down the hall. Med room seems to be a gathering spot. It’s busy and there is
already someone on the AcuDose. Tic-toc… my window is shrinking. Eh! Finally, sign in, get his meds, mix. Off I go back down the hall. “Good Morning Mr. Thompson. How are you this morning?… Already having a bad morning Mr. Thompson? What’s that you need, Mr. Thompson? Yes Sir, I will get you some lotion and I will get you another drink. Can I please scan your bracelet Mr. Thompson? Here is your medication and here is a cup of water. Please take these pills and I will hang your new IV bag…. No, this won’t hurt—I just need to switch these bags out. Mr. Thompson, you are not going to get better if you don’t take these medications… I know you don’t like taking pills, but we are trying to get you better so you can go home…. I know how much you want to go home… Yes Sir, I will help you move to the chair. Can you sit up on the side of the bed and I will help you up…. Mr. Thompson, hold on to my upper arms so that I can help brace you. Steady Mr. Thompson, be careful sitting back down in the chair. You would like a different what? I told you Mr. Thompson, I will bring you lotion and another drink. Okay Mr. Thompson, I will be fast…. I will be as quick as I can, sir.” Like I said… difficult patient and is killing my
efficiency. There is no way I can get these meds delivered now that I only have 15 minutes left and two more patients.

Next patient... Mr. Bonitz. He is usually pretty laid back and happy. Dang it! His MAR is out of whack. That’s what happens when they are here in the open near the patient rooms. People who shouldn’t be in them go through them. Adds to my stress and is a total HIPAA violation! Okay... back in order. He has one medication down in the med room- trip #4 down the hall, or maybe I should say jog! I am running out of time! Thank goodness, no one at the AcuDose. Meds in hand... and I so did not mix them in the red box. This time I am going to have to save time and mix them at my station. That’s not really allowed, but no one will ever know. Desperate times call for desperate measures. Mixed meds, gathered meds from CarePoint cart, cart in tow... and into the room. “Good morning Mr. Bonitz. I am here this morning with your meds. Let me scan your ID bracelet please. Yes sir, these are your meds to take by mouth. You only have one to take via IV.... No you won’t have to get pricked again, just going to change your bags. Oh and you need your catheter changed too sir? Yes Sir, I will send someone down to empty it. ... I will be back to check on you in
a few minutes. I need to deliver one more patients medications... Yes sir, when I come back I will bring you a cup of ice.” That wasn’t too bad...... Could have been worse.

One more patient and 8 minutes left. Oh lord... Mrs. Jackson. This is going to take a while. She has a ton of meds and she is a pill to get to take her pills! One of her meds is in the med room- run down the hall! Gather meds, and back to CarePoint cart.

Gather the rest of her meds... I swear this woman is like a hospitalized pharmacy... it’s like what is she NOT taking. “Good Morning Mrs. Jackson. It is time to scan your bracelet and take your medications. Here are your medications. Yes, ma’am, you need to take all of them. Yes, Ma’am... I will have your doctor come by when he comes to do rounds. Last I heard they were going to try to get you discharged today or tomorrow depending on what the doctor says.”

All of that and it has only been 62 minutes and I have hardly gotten going. It will be more trips like that back and forth down the hall for supplies and requests from patients for the next 11 hours. I really should go ahead and gather the lotion and all
that the various patients asked for and that I put off to get medications distributed.

I think I am going to document first before I forget something instead. I usually document at my COW in the hallway by my patient rooms, in part because there is no other place to work. The only problem is that I get interrupted regularly. Patients and families see me in the hall and think I am just twiddling my thumbs or something non-work related. They don’t realize I am working on my computer and doing important things. I would love to spend more time at my patient’s bedside but all this documentation and all the hoops they make me jump through, it is just not possible. I swear it is driving me from the job. I came into nursing because I want to take care of patients. I did not come into nursing because I want to sit a computer doing paper work for hours and hours on end. By the time I leave the hospital I am mentally exhausted and frustrated and I am physically at the very end of my rope. I swear it takes all I can to tie that knot and hang on. I wore a pedometer to work a month or two ago and walked over 7000 steps in 12 hours. I read somewhere online that the average nurse walks 4.2 miles and about 5300 steps. I walked a bunch
more steps and well over 4.2 miles. Needless to say, I am stressed. I am dissatisfied. And I am on the verge of needing to leave this field and leave the acute care setting.

Unit A: Data Results

Central Nurse Work Area:

Observation data gave great insight into the unit and to the users who worked in the various spaces and work areas. The focus groups and interviews provided personal preferences and feedback from the users. The centralized location of the central nurse work station on the unit was appreciated by the nurses who worked on the unit because it gave “easy access down either hall” and was such that you could “see to hunt someone down”. The location, when paired with it being the storage location of the charts, also meant that nurses believed it was a good place to catch doctors to discuss various patients. The observation of the central station showed that the central nurse work area was small with “very limited space” and was sometimes congested. The central nurse work area was used by variety of staff members including doctors, nurses, unit secretaries, and therapists. While the unit

Figure 47. Central station on unit A
Secretaries actually worked at the central station, nurses and physicians were often at the central station reviewing traditional paper charts that were stored there. The nurses and doctors rarely sat down and actually worked there on a computer or otherwise. Nurses noted during the focus groups that nurses did not work in that area in the same way the unit secretaries worked at the desk. Because the nurses did not actually work at the central station and were usually only there to pick up orders, it was “pretty efficient in that aspect.” (Focus Group Comment) The researcher saw that the nurses and doctors were often leaning over the central station desk looking at charts and a focus group comment stated the area was “just not conducive to working.” There was no good place for nurses to look at charts comfortably. The observations of the central nurse work station also showed that desk was two small for two unit secretaries to work at comfortably. The work area left staff little to no space to actually work and forced them to work in very close proximity to each other. The small size also limited the amount of storage for filing and storing forms and paper work. That became problematic because nurses would “have to go to multiple areas looking for forms.” (Focus Group Comment)
Additionally, the minimal storage and organization made “people throw things here and there and don’t really file things away.” The chart storage was also problematic. The charts location was not well organized and the rack, also known as a chart rand, did not work properly. The rand did not spin correctly when the paper charts were large because the charts would not slide all the way into the rand cubbies and the charts that stuck out from the rand would hit the wall. Finally, the central nurse work station was “not well lit” and the “lighting [was] not good.” (Interview and Focus Group Comments) The poor lighting was noted in the observations by the researcher and was mentioned by nursing staff during the focus groups as well as by the unit secretary during the interview phase.

**Short Hallway:**

The data collected about the short hallway gave interesting insight in to the strengths and limitations of this area of the unit. The strength of this area was that it was shorter and provided the nursing staff easier travel distances back to the medication room. The short hall was quickly noted as being very busy with a variety
of people passing through; one nurse even called it grand central station. The observations revealed that the short hall work areas were often stopping points for other hospital staff passing through the hall. For example, it was common to see transporters stopping to use the telephones at the nurses’ sub work areas. This observation was also mentioned by various nursing staff in the focus groups who noted that the stops caused interruptions to the nurses who worked at those sub work areas. The short hallway was a major thoroughfare for hospital traffic (most often staff from various other units and departments) and was specifically problematic during the day shift, Monday through Friday. The traffic caused more noise but also caused basic interruptions to nurses working in the hallway or moving through the hall. When nurses were working at their sub stations in that hall, there was no way for them to not be in the way when traffic was coming from both directions. The short hallway on Unit A was also a pre-designed traffic route for Tug, the pharmacy’s medication delivery and collection robot. Tug came through the hallway about once an hour, returning back to pharmacy the same way he came. His path was pre-determined. He moved somewhat slowly and was careful when in
operation. He crossed the hall mid-way down the hall (thus why the sub work stations were located on opposite sides of the hall in this hallway). His movements were controlled via computer and some sort of tracking device in the ceiling. Tug was a large piece of equipment and, while he did have cameras giving him some sense of and reaction to his surroundings, most of people moved to get out of his way versus making him move to get out of theirs. This unit is located in an original part of the hospital which made changing the width of the hallway unfeasible. This hallway was simply not wide enough to serve all the people that were coming and going through it and the equipment that many of the staff was pushing such as stretchers, linen carts, food carts, and blood-draw carts, particularly when Tug was around.

**Long Hallway:**

The data about the long hallways and the staff work areas on that hall showed that this hall also had its own strengths and limitations. The long hall was very long. The rooms that were added to the end of the hall, call the “hole,” added an extra 50
steps each direction as the nurses traveled back and forth to the medication room and supply room. (Number of steps mentioned during a focus group discussion) All nurses, but particularly the nurses on the long hall felt that they did a lot of walking up and down the hall hunting down and retrieving supplies. Nursing students also seemed to congregate on this hall. That added to the volume of people at the various work areas.

Generally, the sub work areas in the halls on this unit appeared to function well and nurses appreciated that the sub work areas were closer to their patients. Aside from the two narrow desks in the “hole”, the size of the work areas was adequate but could be larger as some nurses felt the “work area was not proportionally sized for the area being covered.” (Focus Group Comment) Nurses liked that they had a lockable drawer to store basic, commonly used IV equipment in. Nurses appreciated that the drawers provided “just a little bit of storage space” for “stuff we use to draw medicines.” (Focus Group Comments) Nurses also seemed to like that the CarePoint carts, which were often kept at the sub work areas in the hall, had drawers for medication storage because it “kept medication handy.” Nurses did
not like how heavy and cumbersome the CarePoint (COWs) carts were or that they often got in the way of traffic. Nurses mentioned during focus group discussions that the “COWs are not helping with long-term shoulder or back issues” and that they would do “anything to get rid of the COWs” (Focus Group Comments). The short hall traffic caused disruptions for nursing staff working at those sub work areas, particularly when people would stop to use the phone. Additionally, nurses noted that the location of the work areas in the halls was a privacy issue. Nurses always worked with their back to at least one direction of flow of traffic which meant that “anyone [could] walk up or pass by and see” what the nurses were charting electronically. The location of work areas in the hallway also led to distractions and interruptions by patients and families. The sub work area (work area and medication room combination) that was located behind the central nurse work area did not function as efficiently as the nurse would have hoped. The desk with computers took up a large amount of floor space and was wasted space because of its abnormal proportions and design. The nurses also noted that flow in the sub work area/med room was awkward and led to “bumping into people.”
Medication Room:

The medication room on unit A seemed to function effectively and efficiently with some slight issues due to the unit and room design. The medication room was actually shared space within a sub work area. While this did not affect the effectiveness or efficiency of the medication area, it seemed to be safety concern and was very atypical for medication rooms. There was not any controlled access to the medication areas. The AcuDose machine and medication dispensing and preparation area was part of a sub nurse work area where the door out to the short hall was never locked and the other side of the space opened to the nourishment area and then on to the central station. While the medication area was not its own room, the space provided for medication dispensing and prep seemed sufficient. Observations showed that the counter space seemed adequate for prepping medications and the necessary supplies appeared to be within easy reach; one shorter-statured nurse commented during a focus group discussion that the top shelves of the cabinets were hard to reach and required a step stool, though the
researcher never observed anyone retrieving items or supplies from the top shelves of the cabinets during any of the observations of Unit A.

**Supply Room:**

The supply room also functioned effectively and efficiently. The supply room on Unit A was the biggest of the three case study units. Unlike the other supply rooms in the study, this unit’s scanned supplies, linens, and even some equipment (BP machine, IV pumps and stands, and other clinical care equipment) were all stored such that nurses seemed know where to find the supplies they needed without having to do much searching or hunting.

**Staff Support Areas:**

Adjacent to the central nurses work station was a staff support area that house most of Unit A’s support spaces including the nourishment area, the break room (that was often used as a conference room), a small dictation room, and a desk for the case manager (which was in the break room). The location of the nourishment station was centrally located, but it had controlled access. Patients and families did
not have access to get ice or drinks as they needed or wanted, resulting in
interruptions to the staff that had to assist them. In and of its self, it was not a big
deal until “you think it is repeated all day long” which results in a lot of time being
spent doing things that could have really been done by the family or patient. (Focus
Group Comment) Additionally, the unit does not have any good work areas for
nurses to give report. Often the nurses will give report at shift changes in the break
room, which is also where the case manager’s desk is located. The break room
became a multi-purpose work area where nurses gave report, discussed patients
with the case worker, reviewed charts, and even took breaks for lunch or dinner.
<table>
<thead>
<tr>
<th>Area</th>
<th>#1 - Day*</th>
<th>#2 - Night</th>
<th>#3 - Weekend</th>
<th>#4 - Shift Change</th>
<th>Total Utilization Incidence (80 mins)</th>
<th>Avg # of Utilization Incidence</th>
</tr>
</thead>
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<tr>
<td>A. Central Nurse Work Area</td>
<td>29</td>
<td>16</td>
<td>26</td>
<td>40</td>
<td>111</td>
<td>27.75</td>
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<td></td>
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<td>9pm-9:20pm</td>
<td>12noon-12:20pm</td>
<td>6:30pm-6:50pm</td>
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<tr>
<td>B. Sub Work Area #1</td>
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<td>8</td>
<td>6</td>
<td>24</td>
<td>59</td>
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<td></td>
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<td>9:35pm-9:55pm</td>
<td>12:50pm-1:10pm</td>
<td>7:25pm-7:45pm</td>
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<td>17</td>
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<td>12:25pm-12:45pm</td>
<td>6:58pm-7:18pm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Sub Work Area #3</td>
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<td>25</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>10:52am-11:12am</td>
<td>10:25pm-10:45pm</td>
<td>1:33pm-1:55pm</td>
<td>6:07pm-6:27pm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Sub Work Area #4</td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>F. Supply Room</td>
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<td>0</td>
<td>3</td>
<td>5</td>
<td>8</td>
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<td>1:33pm-1:55pm</td>
<td>6:07pm-6:27pm</td>
<td></td>
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</tbody>
</table>

Sub Work Area #1 is observation on Short Hall
Sub Work Area #2 is observation on Long Hall
Sub Work Area #3 is observation in Medication Room (only counting those at work stations, not at med area)

*The number for the long hall includes all of the students and their professor on the unit; there were approximately 6-8 students that were repeated across several times- had the students not been there, the number of staff would have been more normal

Figure 58. Observation data from Unit A
Figure 59. Diagram of day shift observation data from all observation points
My name is Allison and this is my typical day on the unit.

This is only my second week back after being out on maternity leave for the past 3 months. Some weeks I work 2 shifts a week, other weeks I work 3 shifts. None the less, my schedule always falls that I never work more than 2 days in a row and that makes me a very happy girl. I never feel totally and utterly exhausted; at least not from the nursing work- my 12 week old baby girl paired with her 3 year old brother are a different story!

Today I have gotten assigned the rooms right by the central nurse station. That may not seem like such a big deal, but it is WONDERFUL. It puts everyone and everything I need right at my finger tips. My supplies, medications, nourishment and other nurses are all within eye shot of my rooms. This unit is not huge, but being back in the back corner can be a difficult place to be assigned. I have 5 patients at
the moment. I am getting another patient later this afternoon after her surgery. When I did patient transfer with the night nurse, she said they are all good, easy patients and that she thinks one man is going to get discharged today. I also like where I am because I can see when the doctors come on to the unit to do their rounds. There is no way I can miss them and then have to go hunt them down.

First thing I like to do when I get here is to go by and introduce myself to the patients and make sure they don’t need anything. After that I do morning medications. This unit is nice because all of the patient’s meds (besides the controlled substances of course) are kept in a lockable drawer outside each patient’s room and their MARs are right there too. It makes my job easier and more streamlined not constantly having to go somewhere or drag around a big cart to get medications to my patients.

Well, before time gets away from me let me start by talking to each of my patients. Knock, Knock. "Good Morning Mr. Penny. I am Allison. I will be your nurse today." "Is there anything you need at the moment? Yes, sir. I will be happy to bring
you a cup of ice. Is there anything else? Okay, I will bring that cup right back to you.”

With this nourishment station right here, I can easily get this ice without spending too much time or energy. It is helpful. Plus the way it is open to the hall makes it fairly easy for family to get what the patients need too. “Mr. Penny, here is your cup of ice. I will be back around in a little while to give you medications.” Mrs. Lockwood is next. “Good Morning, Mrs. Lockwood. I am Allison and will be your nurse today. I was just coming by to introduce myself and make sure you did not need anything. Alright, if you decide you need something, don’t hesitate to let me know.” Three more to introduce myself to and then I will start medication rounds. Knock, Knock. "Good Morning Mr. Henry. How are you this morning? I am Allison and I will be your nurse today. Is there anything you need before I bring you medicines back in a little a while? Really? Your daughter’s name is Allison too? It’s a good name! You would like an extra blanket? Yes Sir. I will bring that right back to you.” Again… clean linens are right here which make it so easy and so close but also makes me thankful for being assigned these rooms. There are definitely “good” rooms to be assigned and “not so good” rooms to be assigned. Next up, Mrs. Kirkland. “Good Morning
Mrs. Kirkland. I am Allison, your nurse for the day. Did you sleep well last night? You did? That’s great to hear. Is there anything you need before I start making morning medication rounds? Yes, Ma'am. I would be happy to bring you some apple juice. Let me run across the hall and get that.... Here ya go. I even opened it for you and put a straw in it. Alright, Mrs. Kirkland, I will be back in a little while with your medications.” Last up, Mr. Dong. Knock, Knock. "Good Morning Mr. Dong. I am your nurse today. My name is Allison. How are you doing this morning? You are great!! Oh—you are getting discharged today. I am sure you are ready to go home. Do you need anything before I start my morning medication rounds? Alright, well if you need something, don’t hesitate to let someone know. We will be happy to bring you whatever you need.”

They all seem like laid back, fairly happy patients. It makes my job easier to do when the patients are not needy and uptight. And looking at their various MARs, only 2 of my patients have medications that I have to retrieve from the AcuDose machine. That also makes my job easier!! I definitely got luck of the draw today when it comes to which rooms I got assigned and who my patients are!
I have an hour to get all of my patient’s medications delivered. This is one of those set-me-up-for-failure things because of rules and regulations. But luckily, I only have 5 patients and luckily my rooms are all close to the medication room which makes my job a little easier. First I am going to do my two patients with meds in the AcuDose. I will just get those two out of the way. I will do Mrs. Kirkland’s first. She just has one medication in the machine and the rest of her meds are in her drawer. Her one controlled medication is easy enough because it doesn’t even require another nurse to waste for me. I have her meds in hand from the AcuDose and her drawer. We do have to take our computers into the room, but since we just have laptops with little barcode scanners that are on a wheel system, it is not too bad.

“Alright Mrs. Kirkland here is your medication. You have these few pills to take and I will put this one into your IV. I also have a cup of water for you if you don’t have any of your drink left from breakfast.... Yes, ma’am... that is all you have to take. I am glad you are feeling better. That is just what we want to hear. I will come back later to check on you.” Next up is Mr. Penny. He also has a medication in the AcuDose. Some days, if I have 6 patients and all my patients have medications in the AcuDose I
will cheat and mix several patients medications at once. But days like today are simple by comparison and I have time to follow the rules and only do one at a time.

Mr. Penny has two meds in the AcuDose. One I have to have a nurse waste for me, but since most nurses are coming and going through the central station and with the med room being right next to it, it is easy enough to grab someone to come in and waste with me. I need to get the rest of his medications from the drawer. “Mr. Penny, I am back with your medications. Let me scan your bracelet and while you are taking your pills, I will put these medications in your IV. Yes sir, these are going to make you feel better and one of these IV medications is your pain meds. ... I hope they make you feel better too sir.” The last 3 patients should be quick. I had the PCA put cups of water at the work area outside each patient’s door. I just need to grab their meds, the cup, pull my computer in and done. “Mr. Dong, here are your meds. You only have 2 pills you need to take. One is your antibiotic. The other is the blood pressure medicine you have been taking for years. Yes, sir. That is it. Let me scan your bracelet and I will give you your meds and I have a cup of water for you too. Thanks, Mr. Dong. I will make sure to come back by when I talk to the doctor and
find out more about your discharge. Sit tight for now.” Mr. Henry is next up. He is sort of like a pharmacy, but it is okay because he is apparently really good at taking them and all of his meds are here in his drawer which means I don’t have to make a trip back to the AcuDose. “Mr. Henry. You are acting chipper this morning! I am here with your medications. No Sir, no shots today... just this cup of pills. Yes sir, I do need to scan your ID bracelet. Make sure you are who you say you are! Yes sir... I do have a cup for you with water and straw. I will come back by later and check on you.” Last up... Mrs. Lockwood. She only has 3 medications that are easy enough to administer. “Hey there, Mrs. Lockwood. I have your morning medications here. Can I please scan your ID bracelet? Yes Ma’am, I also have a cup of water for you. I know you said you were thirsty earlier. We will get you another cup of water. Here are your medications. Yes Ma’am, the doctors will come around a make their rounds this morning. Last I heard you were not getting discharged, but I will make sure he comes by talks to you when he comes up to the unit. Yes, Ma’am. I know you are ready to go home. I will come back later to check on you but you can always use the nurse call to let us know if you need something.”
That was easy enough. Some days it is just not possible to distribute all the medications in an hour. Some days I swear it takes ten times as long. I still need to put all the information in their charts and on their MARs, but at least all the medications have been administered for now. I will document in the MARs at each of the stations by their rooms but I will document in their charts at the central station. It is sort of hard to work at the COW in the hall. If a patient or family member sees you there, they assume you are not working. I want to be accessible to my patients but it is too easy for them to just walk up to me in the hall. That leads to distractions and mistakes. I find it easier to work at the central station, especially when my assigned rooms are so close. I get the “protection” of working at desk but I still have visual access to my patients. It is the best of both worlds.

*A Day in the Life- Worst Case Scenario:*

Nurse: Devin  
Age: 47  
Day shift: Racetrack unit

My name is Devin—I’m the only guy on the unit and this is my typical day.
This is my 4\textsuperscript{th} shift this week. I am exhausted but we have a nurse who is out with the flu so we are short staffed. My day is just starting. I am already mentally and physically drained verging on utter exhaustion. I did have yesterday off, but after working the 3 days in a row before, one day is not enough time to recover. And worse yet is I have been assigned the rooms at the back of the unit. I hate those rooms. It’s a long walk to get anything or anyone. There is no good place to work except at my COW in the hall. I feel so isolated back there. Part of good nursing care is that we can have each other’s help but when I am back here, there is no help from other nurses. Not only am I on the back hall, I have 6 patients. This has nightmare written all over it. I had 2 of the patients earlier this week. They were nightmares too- constantly needing anything and everything. And, of course, complain about just about everything too.

It took so long to do transfer with the nurse who was on nights last night that I don’t have time to go by and talk to my patients. I only have time to do medications. That’s the other issue. 6 patients total and 4 of them have meds in the AcuDose machine. Back and forth for medications only makes it more impossible to do my
job. It is almost as if this hospital is trying to run me off from my job and make me fail before I ever even get to work each day... and then they wonder why we have so many nurses leaving to go elsewhere. They don’t get the stress we are under. They don’t understand more than the dollar—there is a lot more to the bottom line than a buck.

Alright- one hour, 6 patients, too many medications to count. First up- Mrs. Tomlin. She has 2 medications in the AcuDose and then some medication in the drawer outside her room. Trip one- through the break room to the medication room to get her meds. Luckily this time of the morning when everyone is giving medications it is easy to find a nurse to waste for me. Then, I have to walk back to through the break room (it saves me a few steps to cut through) to get her medications from her drawer. Of course it would be my luck that the drawer lock is jammed and does not want to open. Tick-tack is all I can think about- I essentially have 10 minutes to prepare and administer each of my patient’s medications. And when simple things like the keys and locks on the medication drawers don’t work, I only get more frustrated. Finally get it unlocked. I have to drag this darn computer
and then all the medications, and then can’t forget the cup of water. Knock, knock.

"Good morning Mrs. Tomlin. I am your nurse, Devin. I have you daily medications but I need to scan your ID bracelet first. Yes ma’am, I did bring you a cup of water. You want it without ice? Can you use this to take your pills and I will make sure you get another cup without ice. Yes Ma'am, I understand you have sensitive teeth....

Well you do have a straw so the cold water will not have to touch your teeth. Alright ma'am, just take these pills and I will put this other medication in your IV. No ma'am, no shots. I know—I don’t know too many people who do like shots, but when you are sick, you sometimes need them. Alright... yes ma'am, I do hear you. You only have 3 more pills to take. Can you please take those? We are trying to make you better so you can go home. I know I would want to go home too. No ma'am, I don’t control when you go home. Only your doctor can make that decision. One more pill. I know it is a big one. You think it is a horse pill? I can assure it is not. It is your antibiotic. You can swallow it. Yes ma’am. Thank you, Mrs. Tomlin. I will come back after I finish delivering other patient’s medications. Yes Ma'am... I promise.
Alright…. She is one of those patients who will ask you 10 million questions and get you trapped in the room. On to the next patient.

Oh goodness… Mr. Madison. He just might be the most unhappy person I have ever met in my life. I think he might truly hate life and everyone in it. He has several medications up in the AcuDose. Trip #2 of the morning to the med room. Alright—meds in hand, I need to get any medication in the drawer and then the daunting task of entering the room. Mr. Madison is in isolation so I have to gown up to go in. Apron, mask, gloves—everything. The one positive, I don’t have to take the computer, but still have to put on all this garb just to give him his meds. Some times with patients like him I just want to open the door and chuck it at them. I don’t… but the thought has crossed my mind. “Knock, knock. Mr. Madison. How are you this morning? I have your medications for you. No sir, I have not talked to the doctor, and I do know for certain you will not be going home today. I have your medications here and a cup of water for you. I know you don’t like taking medications but the only way you are going to get better is if you take them. No sir, I cannot make you take them, but I encourage you to do it. I know you don’t like me. Yes sir. I also
know that you think all these nurses on the unit are terrible. No sir, I did not know you had filed a complaint. Well, Mr. Madison. I need to put this medication in your IV. No, no shot. Just in your IV. I know Mr. Madison, you do not want us around. Yes. Mr. Madison, I will leave. But you have to take your medications first. Yes, I am serious. You have to swallow those pills before I can go. I will stay here all day if I have to. Hospital policy is I have to stay with you until you swallow them. You don’t like the hospital policy? I am sorry you don’t like that. I really do know that Mr. Madison. Is your family coming today? No? You told them they were not invited? Well. I am sorry about that Mr. Madison. You have 2 more pills to take. Yes sir, you can take them when you are ready. It may be a while before you are ready? You sure it can’t be now? Please Mr. Madison, I need to keep working but I really can’t leave until you take these medications. Thank you. One more. Yes. Just that one is left. Alright Mr. Madison, now that you have taken your medications I will leave. Let us know if you need anything, sir.” Like I said... he is the most difficult and unhappy person around. I give up on getting medications out in my 60 minute window. There is no way. I have done 2 patients and have used over half my time to do it. This is
how it goes for all the rest of them two. It’s the same story repeated again and again with all my patients... takes time the policy makers don’t understand. Today I have 6 patients... and it’s just not all going to get done. It can’t and it won’t.

On top of that, being back here in the back corner, there is no good place for me to do my documentation and charting. I sit in the hall until I get interrupted for the millionth time. Then I move up the station, but that comes at a major cost. I can’t see my patients or even their doors if I work up there. Plus the chaos of too many people working in cramped space makes for lots of distractions and errors and just a bad situation- Way too many conversations going on with people coming and going. It’s all just a mess. I am 47 years old. But when I leave here, I swear I feel like I am 80. I am looking for another job where the stress will be less because this just isn’t worth it. The pay is not that great for all the hoops I jump through, the hours I spend, and the wear and tear on my body. It is just not worth it.
Unit B: Results

Central Nurse Work Area:

The observations and focus groups at unit B showed some major differences in the functionality of the unit from other case study units. Though like Unit, Unit B had its own strengths and limitations. Generally, the unit seemed to function fairly well with some hiccups that caused added stress and reduced the efficiency and effectiveness of certain work areas and tasks. Unit B’s central nurse work station was the activity center and primary work area on the unit. The location at the front corner of the unit seemed to be mostly acceptable because it was visible to people arriving on the unit and nurses were able to cut through the break room to get to the back hallway. Nurses also appreciated the functionality of the unit to make their rounds. The central nurse work station was also the primary work area for the unit secretary who would “communicate with doctors and nurses and can tell [nurses] when doctors [were] on the floor.” This was especially helpful when the nurse was not working at the station. Visual access from the central station appeared to be a major concern amongst nurses and the unit manager. The central nurse work station
was located such that it did not have visual access to all four hallways. From the central station, nurses and staff could only see down the front two hallways, leaving the back two hallways with no visual access. The lack of visual access left the back halls “isolated.” (Focus Group Comment) It was very quickly noted during the observations, including the general and focused observations, that the central station was too small and had a tendency to be a chaotic work environment that “contribut[ed] to being stressed out.” (Focus Group Comment) At any given time there were multiple people working in and moving through the area. The layout of the central work areas was not conducive to that kind of traffic. Nurses commented that the area was simply “not big enough” and that the space was “congested, especially when physicians were around.” (Focus Group Comments) Additionally, the cords and clutter at the central station only added to the chaos that was felt. Nurses said they were “stacking stuff up and there [was] just not enough space.” (Focus Group Comment) The equipment consumed a substantial amount of the horizontal work surface leaving little space to open or review charts. Nurses believed the central station needed to have a “clean and streamline[d] look with no clutter”
where charts were put away and the equipment and cords were neatly configured and organized.

Noise was also an issue at the central station. The researcher noted during various observations that she could hear the conversations and happenings at central nurse work area from various other parts of the unit. The noise lends itself to HIPAA violations as well as satisfaction issues with both the patients and staff. The nursing staff and unit manager also mentioned the same problem during the focus groups and interview. The nurses mentioned during the focus groups that they “don’t realize how loud [they] get” because everyone is trying to have their own conversations at once in a fairly small area. The unit manager added that the unit “always gets complaints on Press-Ganey about noise... part can be controlled by staff but part is just the layout” and smooth finish materials that do nothing to attenuate sound. (Interview Comment)

Unit B also had Chart issues. The low, desk-like work surfaces meant that nurses were often leaning over desks looking at paper charts. Unit B also had chart issues. Charts were often left stacked up in various places around the central station and
often were not put away in the cubby system this unit used. The limited desk space also contributed to problems related to the traditional paper charts. Charts were too large to fit on the desk and it appeared to make it difficult to work on the computer with the paper chart on the desk next to you. Nurses mentioned that charts were often falling off the desk and onto the floor (often coming apart or pages falling out).

Desktop computers, at the central station and on the unit in general, were often at a premium. Sometimes there were simply not enough work stations for nurses, physicians, and therapists to use. The unit manager suggested that there was a concerted effort to try to “get the nurses out [of the central station] for the PTs and doctors but then they are trying to open charts on laptops.”

Finally, the last major limitation of the central station is the location of the nourishment station immediately adjacent to the area. Nurses liked that the nourishment station was near the central nurse station and was accessible to families and patients, but nurses and the unit manager said that it needed to be adjusted so that it is not so open to the nurse station. Nurses ultimately felt the area needed to be available and accessible but “not in the area it [was]” because of
privacy and HIPAA issues. The location of the nourishment station more or less in the central nurse work area meant “Patient’s families [were] witnessing conversations they really shouldn’t be hearing.” (Focus group and Interview Comments)

Sub Nurse Work Areas:

This unit did not have sub work areas in the same way either of the other two units in the study did. This unit’s primary sub work areas were small cubby work areas outside of each patient room. Nurses liked the convenience of the cubby work areas to the patients. It was good that they were close to the patients and their patient rooms. One nurse mentioned she used her substation as her main work area so she could keep a close eye on her critical patient. Other nurses mentioned that they can document on their COWs with fewer distractions because the cubbies are “kind of secluded in a way” and are removed from the hustle and bustle of the central nurse work area. The cubbies offered a place where nurses felt they could “kind of get away.” Additionally, nurses liked that there was a lockable drawer at each cubby to store their patient’s medications. They liked that their medications

Figure 65. “Cubby” sub work area
were easily accessible (except when some of the locks do not function properly) but that they did not have to use the huge CarePoint carts for their COWs like other units in the hospital and study. This unit used smaller COWs that were simply a laptop on a small rolling cart. The biggest limitation nurses felt about the sub work areas was that when they would work there, they often missed the doctors as they came on the unit.

This unit also had a small sub work area on one of the back hallways. This work area was a former closet-turned-work area and was very small. One nurse went so far as to say this work area was “a joke” and that they “don’t really have sub work areas.” (Focus Group Comments) Two of the three work stations were in what was the doorway to the closet however the “downside [was] the third seat [was] claustrophobic” because it was located between the closet walls without sufficient space for someone to comfortably sit between the desk and the wall behind the chair. Any staff working at the work area experienced issues of privacy because their backs were to the public hallway where passers-bys could see their computer's screen and “people can walk up and [the staff] does not know it.” (Focus Group
Comment) That sub work area was rarely used by nurses. It was most commonly used by PCAs.

**Supply and Medication Rooms:**

The support spaces seemed to be somewhat limited on this unit. The supply room was small and no equipment or linens were stored there as they were in Unit A. Nurses who came into the supply room during observations seemed to have a good understanding of where things were and were fairly quick at getting their needed supplies. The room was not huge, but it seemed to work functionally and all the supplies were kept in that one location. The medication room was very small—essentially a closet and it was noted during the observations that it was also very full. Nurses confirmed this observation during the focus group when several mentioned they needed “more room in the medication room.” (Focus Group Comment) The room was accessible via bi-fold doors, appearing to be traditional residential closet doors, which were never closed or locked. They did have the hardware to close and lock them with a padlock, but that was never observed during any observations and was mentioned as never being locked in the focus groups. The
“red-box” on the medication room counter was rarely free from clutter as it was supposed to be per protocols. Additionally, the room was so narrow that when the AcuDose drawers were opened, there was not enough room between the drawer and the wall for the nurse to stand. It was clear from the observations that the nursing staff of Unit B made the small medication room work, but it did not lend itself to efficiency or ergonomics.

Other Unit Results:

The focus groups gave insight into other aspects of the unit that reduced efficiency and effectiveness, added stress on the nurses, and reduced job satisfaction. All of the staff and support spaces are located in the core of the unit as is traditional in racetrack units. The doors into the various support spaces, such as the clean and soiled utility, supply room, and equipment storage, are located on different hallways. This added to the stress because “nurses are always walking.” (Focus Group Comment) Nurses also believed there were privacy issues across the unit. All of the work areas on this unit were open to the hallways where patients and visitors were often passing through. Nurses struggled “trying to keep it where it
[was] private but still be accessible to patients.” (Focus Group Comment) One nurse mentioned she had “been in hospitals where it was closed off and patients did not know where [nurses] were; we are not isolated here,” but there still needs to be some happy medium between being totally isolated and being accessible to serve their patients. Nurses also mentioned a need for windows and views to the outdoors. During the focus groups, one group said “we come in when it’s dark; we leave when it’s dark.” Finally, visual accessibility on this unit was not up to par in the opinion of the nurses or the unit manager. The unit manager suggested that he wanted to “be able see each and every room from a nurses station.” The way the unit was laid out, that was not possible.
### Figure 69. Observation Data from Unit B

<table>
<thead>
<tr>
<th>Area</th>
<th>#1 - Day*</th>
<th>#2 - Night</th>
<th>#3 - Weekend</th>
<th>#4 - Shift Change</th>
<th>Total Utilization Incidence (80 mins)</th>
<th>Avg # of Utilization Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Central Nurse Work Area</td>
<td>63 9:40am-10am</td>
<td>42 9:48pm-10:08pm</td>
<td>44 12:15pm-12:35pm</td>
<td>40 6:20pm-6:40pm</td>
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<tr>
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<td>E. Sub Work Area #4</td>
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<td>NA</td>
<td>NA</td>
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<td>----</td>
</tr>
<tr>
<td>F. Supply Room</td>
<td>3 11:25am-11:45am</td>
<td>1 10:36pm-10:56pm</td>
<td>0 2pm-2:20pm</td>
<td>3 7:30pm-7:50pm</td>
<td>7</td>
<td>1.75</td>
</tr>
<tr>
<td>G. Medication Room</td>
<td>2 10:58am-11:18am</td>
<td>8 10:12pm-10:32pm</td>
<td>1 1:35pm-1:55pm</td>
<td>5 5:56pm-6:16pm</td>
<td>16</td>
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</tr>
</tbody>
</table>

Sub Work Area #1 is observation on Back Right Corner
Sub Work Area #2 is observation on Back Left Corner and includes small closet work area

*The numbers for the work areas are abnormally high because nursing students as well as med students were on the unit that day, adding to the tally that showed up in the observation. There were approximately 8 students total on the unit that day.*
Figure 70 & 71. Diagrams of day shift observation data from central station and sub work areas
Figure 72 & 73. Diagrams of day shift observation data in medication and supply room
My name is Melissa and this is my typical day on the unit.  

I am a fairly young nurse having just finished nursing school 4 years ago. Our census today is really low. We have one patient down in ICU and only have 4 patients on the unit. That makes my job fairly easy in terms of walking and time because I only have 2 patients today or, I should say, at least for now. We may get one more patient later today but I am guessing they will give that patient to the other nurse as she is having a patient discharged in the next hour or two. First thing I do when I arrive on the unit is to do patient transfer with the night nurse. This unit has so many of these desks we call perches that it is easy to do transfer there. We have to be careful about patient confidentiality stuff when talking there, but it is pretty easy to do and makes for a nice place for the two nurses to sit down and go through each patient. After we go through each patient, I generally go into each
patient’s room just to do hourly rounding and to introduce myself. I like the personal relationship I get to have with my patients and going in and introducing me is a good way to do that. This morning I have 2 patients so I will introduce myself and get them anything they may want or need. After I do hourly rounding, I may look through the patient’s charts but likely will also start medications. We are such a small hospital, pharmacy delivers our patient’s meds directly to our carts each morning before I ever even get here. That saves me time in that I don’t have to go to the med room unless I am getting one of the controlled substances. One less step is always helpful, especially on days when our census is higher. Unfortunately we have a fluctuating census. One week will be full and at capacity. The next week our census will drop without any real rhyme or rhythm.

Knock, knock. "Good Morning, Mr. Carter. I am your nurse today. My name is Melissa. I just wanted to come by and say good morning and see if you needed anything. You are good? Did you eat your breakfast? I guess you thought it was good? Well, if you find you need anything, don’t hesitate to let me or someone else know. We want you to have what you need.” He seems like a pretty laid back
patient. Those are the kind I like. They are just go with the flow and are not difficult or needy.

Let me check in on my other patient, Mr. Richards. “Good Morning Mr. Richards. I am Melissa. I will be your nurse today. I just wanted to come by and introduce myself. I will be bring your medications back in a little while. Is there anything else you need while I am here? You would like an extra blanket? It is kind of cool in here. Let me look and see what your thermostat is set at. You want it at 71? I will be happy to set it to that for you. Let me run and get that blanket for you.” That was another pretty easy patient. This will be a good, easy day.

Now that they know who I am, let me start getting meds ready. I usually check before my hour window starts to make sure all the meds that can be in my cart are there and just make sure I am not missing anything. I have both of my patients’ meds here in my cart. Some of Mr. Carter’s medications are in the AcuDose machine in the medication room. Let me gather those meds. He has several pills and several medications that go in his IV. I need to run into the supply room and get a bag of fluids too. His night nurse said he was low. Alright- I have his fluids, I have
his meds and I have a cup of water. This is the one bad thing- this is a new hospital, but we still have these HUGE, heavy COWS we have to take into each patient’s room. I understand having to scan ID bracelets but it seems something that didn’t weigh 50 pounds would be a better option. Knock, knock. "Good Morning Mr. Carter. I am back with your medications. Can I scan your bracelet? Here is a cup of water too. I will also hang your new medications and new bag of fluids since your IV alarm is about to start going off. Is there anything else you need while I am in here? You would like some jell-o and some juice? Yes sir, I will be happy to bring that to you. Let me finishing getting your IV stuff sorted out and then I will go get those for you.” It’s easy enough with just 2 patients to get the things they ask for even while I am doing medications. Nurses get an hour window to get all medications administered. When you only have 2 patients to administer meds to, that is ample time. If I had the usual 4-6 patients, that gets much more complicated and much more stressful.

Mr. Richards is next. He also has one medication in the AcuDose. I need to get a nurse to waste for me though. With only 2 nurses and one manager on duty today,
hopefully someone will be around. Okay. Have the medications from the AcuDose.
Let me grab him a cup of water and then take him his medications. “Hello Mr. Richards. I am back with your medications. You are a little sore? Well I will find out what your doctor wants to do about pain medicine when he comes up for morning rounds. For now, I have your other medications which might help you feel better.
Yes, sir I hope they do too. Let me scan your ID bracelet, please. Yes sir, I did remember to bring you a cup of water. Is there anything else I can get you while I am here? You want to get moved to your chair. Let me get someone to help you do that. Is there anything else? Alright sir, I will come back in and check on you a little later.”

We keep MARs at the perches. This makes it easy to document medication administration there. Really, in general that’s where I do almost all of my documentation. It’s close to my patients. In fact, today my two patients are right here where I can see into their rooms. We have a place to plug in our COWs, plus we have a desktop computer at each station. It makes for an easy work environment.
Only thing that could make it better is if I had a lockable drawer to keep my personal
stuff there. Oh... and if family and patients would not interrupt us. We are slightly protected because the counter is taller on the public side, but it is still very inviting to patients and families to walk up and ask us questions or talk to us. I guess in comparison the last hospital I worked at, this is much better.

Days like today when our patient load is so low, I feel like I am sort of twiddling my thumbs some of the time. But I guess it is better than the opposite of not having enough time to get everything done. I can’t complain that I have plenty of time to spend with my patients in their rooms and at their bedsides, plenty of time to do all the documentation I have to do and can do it all without feeling like a chicken with my head cut off. It makes for a sort of slow pace, but I don’t feel ragged or run down at the end of the day either. This is a good unit to work on.

A Day in the Life- Worst Case Scenario

Nurse: Wendy Age: 57 Day shift: Triangle

My name is Wendy and this is my typical day on the unit.

I have been a nurse since I was 22. Needless to say, I've been around a while. Our census today is about the same as it has been the past few days. We have eight
patients on the unit with one down in ICU. I have four of the patients and the other nurse has three while our Nurse IV has the one other one because that patient is getting discharged. I have been working the past two days so today is my last of three in a row. I need a break. I am getting too old to do this job. When I get to work in the morning, I clock in and put my stuff in the locker room. After that, I always do report with the night shift nurse who had my patients. Most of us do report at the perches but sometimes it gets so hard to hear. I am no spring chicken and with all the noise and jibber jabber of the other nurses doing report, I have to ask the nurses to repeat things over and over again so that I can hear them. After report I verify that my patients’ medications are all in my cart. Those computers on wheels are way too dang big. By the end of the first day I work, I am sore from pushing it around the unit. I only get sorer each day I work. My husband keeps telling me I should start working at a doctor’s office because it would be less physical labor and less stressful and probably less than a 12-hour shift. I need to stop complaining and get back to work.
First thing, I need to administer my morning medications. My first patient is a “usual” here on the unit because he has severe diabetes and refused to take his medications as he should and eat right. Mr. Corley was admitted because of an infection in his foot that was a byproduct of his diabetes. He has been prescribed medications for a variety of chronic health problems he has as well as this infection. None of his medications are controlled substances, though, so they are all here in my cart. Knock, Knock. "Mr. Corley, I am Wendy and I am your nurse today. I am here to bring you your medications. Can you verify your date of birth for me?... I know you don’t want me to know how old you are, but I need to verify that I do, in fact, have THE Mr. Corley these medications belong to. Yes, sir. I do understand you do not like me giving you medicine.... I know you don’t take your medications at home. Can I also scan your ID bracelet? Thank you. Here are your medications Mr. Corley. That is your diabetes medications, your high blood pressure medications, an antibiotic, and then your other prescriptions. I also will put some medications into your IV.... Yes Sir, that’s all for a few hours. I know you don’t like to take your pills. But the sooner you take them, the sooner you will be able to get out of here. It is
important that you take all of them and not just some of them. Mr. Corley, let’s not make it harder than it already is. Alright Mr. Corley, I need to go, but let us know if you need anything else.”

Its patients like Mr. Corley that makes it impossible for me to get my meds out in a timely manner. Next patient is Mrs. Hamilton. She is a pill about her pills too. She has to go through and have me tell her what each one is and she always needs something every time I go in there. With her, it is never fast. Oh man- I need to go get some medications for her from the AcuDose and I need to find a nurse to waste for me. One of the bad things about being on a unit that has such a low census is you can’t always find a nurse when you need one, especially during medication administration because the one or two other nurses on the unit are often in with patients. Luckily she can waste for me and I can finish getting medications administered.

   Knock, knock. "Mrs. Hamilton. How are you doing this morning?... I am glad you are doing well and that you slept okay. I am Wendy. I will be your nurse today. I am here with your medications. Can you tell me your birthday day?... That’s exciting
that you share your birthday with your great grandson... I am sure it is a blessing.

Mrs. Hamilton, I need to scan your bracelet too. Can you let me do that? Thank you ma'am. Here are your medications. Yes Ma'am, I will tell you what they are. Those two medications are for your diabetes. This one is your Lipitor that controls your high cholesterol. This is your prevacid for your acid reflux. These last two are for your high blood pressure. They are Levatol and Norvasc. This other medication is the antibiotic that’s helping clear up your lungs. And this is the steroid they have you on to help your breathing and all. Here is a cup of water for your to take those medications. Can I get you anything else? You would rather apple juice. Yes Mrs. Hamilton, I will be happy to get that for you. Is there anything else? ... Mrs. Hamilton, here is your apple juice. I will come back and check on you in a little while. Yes Ma'am, I will be back.”

Ugh. It is a darn good thing I only have four patients today. I have twenty minutes left in my medication administration window, and still have two patients left to administer medications to. Most days I just can’t win... And they wonder why we have had so much turn-over. Anyways. Mr. Howell is next. I think I remember I have
all of his medications in the cart here. If so, hallelujah. Thank goodness yes. Hopefully he is an easy patient. I have not met him yet. Knock, Knock. "Mr. Howell. Good Morning, Sir. How are you today? I am sorry sir? You are at the hospital. You came here in an ambulance a few days ago because you fell at your house. Yes sir, do you remember that? Mr. Howell I am here to give you your medication. Can I please scan your bracelet? Yes Sir, I have to scan your bracelet. You have several medications here sir. Can you swallow them for me? I have a cup of water here for you. Yes Sir. I can get you some jell-o. Is there anything else you would like? A blanket? You are cold? I will get you a blanket, but I can set your thermostat right here. What would you like it set at? 79? Why don’t I set it at 72 and if you are still cold with the blanket and it set at 72, we will readjust it then. That is not okay? 79? I can’t set it that high but let me go get your blanket. I will be right back.... Mr. Howell here is your Jell-o and here is your blanket. ... yes sir, we can get one of techs in here to help you go the bathroom. Let me get you some help... Mr. Howell I will send someone in here and I will come back and check on you in a little while."
Last patient to administer medication is Ms. Bonneville. She had hip replacement. Poor lady does not have any family so she has been here by herself. Knock, knock.

"Good Morning Ms. Bonneville. How are you are you? You have had an okay night? You are in pain? Let me go ahead and give you these medications and I will go get you the added pain pill. Yes Ma'am, I know you want it and need it. Have you gotten your breakfast yet? No? Really?... it should have been delivered. That is very strange. I will find out about it for you. In the meantime I will get you a fruit cup from the nourishment station... Okay... here is your fruit cup and I also brought a pack of crackers if you want them. Can I scan your bracelet? Also, what is you date of birth? Yes, it all matches up. Here is your medication and a cup of water. I am sorry? Oh- it is your antibiotic, a pain medication and then the usual medications you take at home... Yes Ma'am, I will be happy to get you a blanket, too, and an extra pillow... Here you go- a pillow and a blanket. Alright Ms. Bonneville. I will be back to check on you later, but let us know if you need anything.”

Some days I am so happy our census is so low. Here I had four patients and it took me an hour and twenty minutes to dispense all the medications. It was not because I
was dragging my feet; I moved as fast as I could. I just had patients who wanted and
needed things. And then had a few that wanted to chat and talk. Now, because it
took me more than an hour, I will get raked by the management. This unit might
work better if it were at a higher census but right now, this is just not good. It’s a
waste of space and it makes us have to walk all over creation gathering supplies.
Plus our supply room is so small, I feel like I never know if they have the stuff I need
in the supply room or if it is down the hall in the equipment room. It’s unacceptable.
Maybe I should take my husband’s advice and go to work at a doctor’s office.
Goodness knows it would be less stressful and less physically demanding.

**Unit C: Results**

Very quickly, it was obvious to the researcher that Unit C was distinctly different
from the other case study units. Units A and B were older units in an older hospital
whereas Unit C was a new unit in a newer hospital. The other obvious difference
was that this unit had a much lower census—Units A and B were both full during the
observations while Unit C was typically less than half full. Just as with the other
units, however, the strengths and limitations of the unit emerged during the observations, focus groups and interviews.

**Central Nurse Work Area:**

The central area of the unit was a large, open space with the central station at the center and sub work areas around it closer to the patient rooms. Nurses liked that the central station was “right between all three hallways... [because they had] access to all the rooms even if they aren’t [that specific nurses] rooms.” The central station appeared to have a lot of wasted space. Generally, observations showed that only one or two people were actually working for extended periods of time at the central station with various other staff members passing through. Nurses almost exclusively worked at the sub work areas, leaving the unit secretary and periodically this hospital's equivalent of a unit manager, called a Nurse IV, actually working at the central station. An issue raised by nursing staff during the focus groups was that visitors often walked up to the central station to talk to the unit secretary or to ask directions. Many patient care units use the unit secretary as an informal greeter in addition to her/his secretarial duties. It was logical on the visitors’ behalf, but
problematic to the nursing staff since the nursing staff preferred a more private space limited to hospital staff.

The physical size of the central work area was much larger than it needed to be, even when there was various hospital staff congregated there. The nursing staff added that the large area “increases the noise” and “can be a good but also a bad thing.” (Focus Group Comments) Additionally, there was no specific built-in place to store traditional paper charts. The charts were stored on a rolling cart, but the cart did not work effectively since not all charts fit appropriately and it was often in the way. One nurse specifically said that “chart racks on wheels stink” because the slots to store the charts are simply not big enough. Noise was another issue for Unit C's central nurse work station. Because the whole central staff area of the unit was open from one side of the unit to the other, there was no good way to attenuate the sound. The acoustics were bad because everything echoed out which “leads to added stress.” (Focus Group Comment) Nurses and management said that the noise is a patient and staff satisfaction problem. Additionally, because the central area is so open, patients and families just walk past the perches and up to the central
station. Nurses noted that it can be a major HIPAA issue when visitors and patients come to the central station where a variety of patient information was often open or being discussed. The extreme openness also became an issue because it lent itself to the central nurse work station becoming a social gathering place. The researcher noticed that the central station had more social, non-work related conversations and activities than the other two units. The researcher noticed PT and other therapists and nurses congregating around the central station to socialize. Other units’ social activity was usually just seen in the break room. The researcher did not notice much social interaction between the nursing staff and the off-unit staff (PT, RT, etc) on Units A and B aside from patient related interactions where as Unit C seemed to have a lot more social interactions between unit staff and off-unit staff.

**Sub Nurse Work Areas:**

The sub work areas were the nurses’ most common work area and where they did their documentation. Nurses liked that these perches put them “right there at [their] patients” with “easy access to coworker’s patients” as well as close to “central and support spaces.” (Focus Group comments) The downside of being right
at the patient room was that it can be hard to guard everything for HIPAA purposes and work is easily interrupted by families and patients. Nurses felt the size was adequate and offered plenty of counter space. Most nurses used the desktops that each perch was equipped with and would occasionally document on their CarePoint Cart computers when they were plugged in at their perches. When nurses used their COWs, observations showed that about 50% of the nurses worked at the COWs standing while the other half would pull up their height-adjustable chairs to sit down. For the most part, nurses left their COWs plugged in at their perches, only moving them to take them into the patient rooms to administer medication. Nurses liked that it was “easy to plug up the cart and not trip over the cords.”(Focus Group Comment) MARs were also kept at the sub work areas which improved the efficiency and effectiveness of nurses administering medications. As with the central nurse work area, many nurses mentioned that the perches can be loud because of how open the central area of the unit was. One nurse specifically mentioned that it can be a “hindrance when trying to give report” because you “hear the jibber jabber and makes it hard to concentrate.”(Focus Group Comments) Nurses also mentioned
that there was no storage at the sub work area. This was problematic because there was no place for “stuff to be close but safe and out of sight.” (Focus Group Comment)

**Medication Room:**

Adjacent to the central station and accessible from the large, central open area was a large medication room. The room was adequately sized, particularly for the low census. Additionally, the room is well organized with no clutter on the counters or elsewhere. Everything appeared to have a place and be put away. Nurses noted during focus groups that they liked that it was adjacent to the central nurse work station and fairly centrally located on the unit. They did not however like that it was shared with the ICU. The med/surg nurses felt the ICU needed their own medication room or medication dispensing machine so that ICU nurses would not need to leave the unit to retrieve medications.

**Supply Room(s):**

The supply room had some major limitations that were noted during the observations and then confirmed during the focus groups and interviews. The supply
room is severely under-sized for a unit of this size and the types of patients this unit saw. The small size resulted in some supplies being stored in one location while other supplies were stored in another location. This decreased nurses’ efficiency and increased the nurses’ travel distances when they had to go multiple places to find their needed supplies. Nurses commented that the supply room was not organized. Nurses liked that the supply room was adjacent to the central station but disliked that it was long walk from some of the patient rooms to the supply room, such as the rooms near the front of the unit.

**Other Unit Results:**

Generally, nurses seemed to be happy with the unit design. One nurse went so far as to say that the “layout [was] perfect” because the nurse work areas are all centrally located (apart from the front greeter/reception desk and the ICU work area). Nurses commented that the nourishment station needed to be opened to patients and families. It was staff-controlled access at the time of the observations, but nurses did not believe there was any reason for the restriction. Night nurses repeatedly mentioned that they needed to have access to the nurse call system from
the perches. Because the unit is not staffed with a unit secretary at the central station during the night, nurses who worked at the perches had to walk to the central station to answer the nurse call system.

Finally, nurses felt that the “biggest thing of nursing is support” and that “without it, you cannot be effective.” (Focus Group Comment) Nurses believed this unit was effective because “everything [was] centrally located” with “visual access to other nurses and not having to walk too far.” (Focus Group Comments)
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<th></th>
<th>#1- Day</th>
<th>#2- Night</th>
<th>#3- Weekend</th>
<th>#4- Shift Change</th>
<th>Total Utilization Incidence (80 mins)</th>
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<td>2.25</td>
</tr>
<tr>
<td></td>
<td>10:04am-10:24am</td>
<td>9pm-9:20pm</td>
<td>12:43pm-1:03pm</td>
<td>5:45pm-6:05pm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Medication Room</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>14</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>10:28am-10:48am</td>
<td>9:48pm-10:08pm</td>
<td>11:32am-11:52am</td>
<td>6:57pm-7:17pm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sub Work Area #1 is observation of all perches around the central station
Sub Work Area #2 is observation in ICU Area
Sub Work Area #3 is observation at Reception Desk**
Sub Work Area #4 is observation in Equipment Room of Supply

**The reception desk is not used for nursing care. It is rarely used by anyone but when it is in use, it is by a volunteer serving as a greeter. In the weekend observation, there was a volunteer who was working at that area over the course of the observation.

Figure 82. Observation data from Unit C
Figure 83 & 84. Diagrams of day shift observation data from central station and sub work areas around central station.
Figure 85 & 86. Diagrams of day shift observation data from ICU perch and Reception Perch
Figure 87 & 88. Diagrams of day shift observation data from Supply room(s) and Medication room
CHAPTER 5: SYNTHESIS AND APPLICATION

Overview of Chapter:
This chapter takes the results that were discussed in Chapter 4 and explains what
the data mean in tangible terms that can be applied to the unit by designers and
hospital administration. The chapter starts with a general synthesis of the research
and data. It then goes into the synthesis and application of each unit studied by
filtering the data from Chapter four through the Environmental Press Theory lens.
Data common across the units is then organized into a generalizable “presser-
recommendation” section that suggests ways that findings from the research can be
fed forward for future use. Finally, the chapter concludes with a section of other
findings that do not necessarily fit within the presser/cause/effect/recommendation
filter, but nonetheless provide important information that architects and designers
need to know.

General Synthesis
First and foremost, “successful design will provide appropriate space and
equipment to perform each task, but will not preclude personal variations in
performance of that task” regardless of whether the unit being designed is new construction or is a renovation to an existing facility (Goldstein, 1979, 22) and as Lawton suggests “A small improvement in environmental quality could make all the difference in the world.” (Lawton, 1980, 10) This research study shows a clear relationship between environmental press, the built environment, and their effect on the nurses. It provides insight into how to improve the three case study units as well as generalizable information that can be used to improve future work areas. Ultimately, the findings from each unit showed a cause-effect relationship that could be remediated by a design recommendation. These unit cause-effect-recommendation findings were found to be similar across units and are sufficiently generalizable to provide insight and guidelines for future design work.

**Unit A- Synthesis and Application**

*Environmental Press causing Increased Travel Distances:*

Certain aspects of the built environment of Unit A caused added press to the users in this study, the nurses. Due to the general layout of the unit, the location of supplies in relation to certain patient rooms, and in particular, the long hall’s rooms
referred to as the “hole”, travel distances were increased to levels that were unsatisfactory to the nursing staff. The effect of this environment press was added fatigue, added stress, and reduced job satisfaction. The recommendation is to provide a small decentralized support space closer to “the hole” thus reducing travel distances, fatigue, and stress while increasing overall job satisfaction. The space could potentially be located at the current break/locker room. This support space would need to have scanned supplies, clean linens, and a vitals machine at minimum. The par level of the supplies could be substantially lower than the main supply room.

**Environmental Press Causing Privacy/Interruptions:**

The location of the nursing work areas in the hallways where nurses have their backs to the hallway where people come and go has created an environmental press that causes issues of privacy and constant interruptions. The effect of this press is added stress and lower nursing efficiency. The recommendation to reduce the numbers of interruptions and increase privacy is to provide a small work area adjacent to the central station where nurses could chart and do documentation
away from their sub work areas for the times nurses are assigned rooms with demanding patients and/or families.

*Environmental Press Causing Disorganization*

The lack of space and storage on the unit, as well as a lack of attention to organization by users, has caused significant disorganization. The effect of the disorganization is lower efficiency, added stress and, ultimately, lower effectiveness. To remediate this problem, the central nurse work area and work areas beyond (all of the staff support space that is around/adjacent to the central nurse work area such as the med room, diction area, break room, etc) need to be reorganized such that charts have specific places, forms and paper work have a designated area, and other items and paper work were not just left lying around. To improve organization, an honest effort by the user to put things away when they are done with them would be required. Charts need to have a specific storage system organized by the status of the patient's chart. There would be three chart areas. One for charts with orders that are waiting to be transcribed by the unit secretary; one for charts that are awaiting sign-off by the nurses; and finally, a third area for charts that were not
in use. These charts should be stored in one general location, but should be divided as mentioned above.

**Environmental Press Causing Medication Administration Problems:**

Medication administration also contributes to environmental press. The travel distance from “the hole” to medication room, the hospital’s requirement to push the CarePoint Cart into the patient room to administer medications, and the protocols and procedures requiring nurses to administer medications to all of her/his patients in a one-hour window have caused the nurses both stress and fatigue. The recommendation to alleviate the added stress and fatigue is to use some other method for scanning ID bracelets and medications. The CarePoint Carts are simply too heavy and there are other handheld devices and smaller COWs that could serve the same purpose. Medication stored in the CarePoint Cart could remain in the CarePoint cart at the sub work area or even be stored in some location in or near the patient rooms while allowing the nurses to use some sort of hand held device to scan bracelets and medications. Discontinuing the practice of having nurses move the 50+ pound CarePoint Carts into the patient rooms would decrease
the physical demands, thus reducing the fatigue and the added stress of having to move the equipment.

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>EFFECT</th>
<th>RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental Pressures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Layout of unit and location of supplies (ex: &quot;The Hole&quot;)</td>
<td>Increased Travel Distances</td>
<td>Fatigue, added stress, reduced job satisfaction</td>
</tr>
<tr>
<td>Location of nursing work areas in relation to patient rooms/hallways and the design of the sub work areas (with nurses’ backs to hallway)</td>
<td>Issues of Privacy and Interruptions</td>
<td>Added stress, lower efficiency</td>
</tr>
<tr>
<td>Lack of space, storage, and general organization by the users</td>
<td>Disorganization</td>
<td>Lower efficiency, added stress, lower effectiveness</td>
</tr>
<tr>
<td>Travel distance from &quot;the hole&quot;, requirement to push COW into patient room to administer medications, and the protocols and procedures that have been set in place (1-hour window)</td>
<td>Medication Administration Problems</td>
<td>Fatigue, added stress</td>
</tr>
</tbody>
</table>

*Figure 90. Chart of Cause-Effect-Recommendation for Unit A*
Unit B- Synthesis and Application

*Environmental Press Causing Increased Travel Distances:*

Like Unit A, Unit B had its own environmental pressers that led to a variety of effects on the nursing staff. However, with some renovations based on the recommendations, these pressers and effects can be alleviated. The unit design, specifically the location of the primary nurse work area and support spaces in relation to the patient rooms (most often the rooms on the back halls) results in environmental pressers from increased travel distances. The effect is that nurses have added fatigue from increased amounts of walking to go back and forth to the support spaces to get need supplies and medication and to get to the nurses’ primary work area at the central station. The increased travel distances also affect the nurses’ stress levels because they are spending more time gathering their supplies and medications, particularly when nurses are trying to administer medication to all of her/his patients in a 60-minute window. To reduce the press of the increased travel distances, this unit needs a multi-user sub nurse work area on the back hallway. This would allow nurses who are assigned to the back rooms a
primary work area away from the central station that is closer to the patients. This unit is not large enough to support a decentralized medication room, but a small supply closet with the most commonly used supplies could be very beneficial as well. These changes could greatly reduce the environmental press and have positive effects on a variety of aspects of nursing care.

*Environmental Press Causing Chaotic Central Nurse Work Area:*

The central nurse work area causes significant environmental press than even the most competent (per Lawton's suggestion of competency as a person's ability to withstand and adjust to the various environmental press) person could handle. The design of the central nurse work area, the finish materials, and the sheer number of users cause a chaotic environment that would push anyone to their breaking point. The effects of the chaos can be seen in lower efficiency of nursing work, added stress, lower levels of effectiveness, added distractions (which are the single largest cause of medical errors) and excessive noise. Ultimately, the central nurse work area needs a total redesign to reduce the environmental press on the users. The layout needs to be significantly improved and sound attenuating materials need to be
added across the unit. In addition to the physical changes of the central nurse work station, the addition of a true sub work area on the back hallway would reduce the number of users, also reducing the press of the environment.

*Environmental Press Causing a Struggle to Find Conducive Work Areas*

The lack of sub work areas in Unit B causes significant environmental press. It forces nurses to work in the distracting and stressful environment of the central nurse work station. The effect of this presser is added stress, privacy and HIPAA violations, lower nursing efficiency, lower levels of effectiveness, and distractions which, again, are the leading cause of medical errors in hospitals. The recommendation would be to renovate this unit to create a true sub work area, preferably on the back hall. Nurses like the existing cubbies and they seem to work okay, but they are not satisfactory as true sub work areas because they are too small for most nursing documentation tasks. The addition of a new sub work area for multiple users would alleviate several pressers and their effects.
Environmental Press Causing Lack of Visibility:

Finally, for Unit B, the lack of visibility to patient rooms due to the design and location of the nursing work areas leads to environmental press. This press causes added fatigue because nurses feel like they have to walk by their assigned rooms regularly to check on their patients since they cannot see them from their nurse work areas. With greater travel distances comes greater fatigue. This environmental presser also causes added stress because nurses worry when they don’t have visual access to their patients. The best way to alleviate this press is to provide a clear view to each patient room door from a nurse work area that is regularly used by nurses. On Unit B, that would require adding a sub nurse work area for two to three nurses/PCAs on the back corner of the unit where the unit manager’s office is currently. This would allow the central nurse work area to have visibility to the front two hallways’ patient rooms and the new sub work area to have visibility to the back two hallways’ patient rooms. It is also critical that the sub work area is commonly used throughout the day. It does no good to be able to see a patient room door from a work area that is rarely or never used by nurses. The addition of a sub work
area on the back corner of Unit B would alleviate many of the environmental pressers and reduce the negative effects they have on the nursing staff.

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>EFFECT</th>
<th>RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Pressers</td>
<td>Cause</td>
<td>Effect on Nurses</td>
</tr>
<tr>
<td>Unit design, location of primary nurse work area, and support spaces in relation to patient rooms (specifically the back halls)</td>
<td>Increased Travel Distances</td>
<td>Fatigue, added stress</td>
</tr>
<tr>
<td>Location of nursing work areas (outside patient rooms) and location of the nourishment station</td>
<td>Issues Privacy and Interruptions</td>
<td>Added stress, lower efficiency</td>
</tr>
<tr>
<td>Work area design, finish materials, number of users</td>
<td>Chaotic Central Nurse Work Area</td>
<td>Lower efficiency, added stress, lower effectiveness, excessive noise, distractions</td>
</tr>
<tr>
<td>Lack of sub nurse work area</td>
<td>Struggle to find conducive work areas</td>
<td>Added stress, privacy/HIPPA issues, lower efficiency, lower effectiveness, distractions</td>
</tr>
<tr>
<td>Unit design and location of nurse work area(s)</td>
<td>Lack of Visibility</td>
<td>Fatigue, added stress</td>
</tr>
</tbody>
</table>

Figure 91. Chart of Cause-Effect-Recommendation for Unit B
Unit C - Synthesis and Application

Environmental Press Causing Increased Sound/Noise:

Unit C had fewer environmental pressers, which could be attributed to it being a relatively new unit. The open design of the central area of the unit and the lack of sound attenuating materials and designs are major environmental pressers causing increased sound and noise on the unit. The noise causes added stress and distractions leading to potential increases in medical errors. The best recommendation for this area is to provide some sort of sound attenuation in the central open area between the perches where the central nurse work station. One nurse suggested carpeting the areas that are not patient care areas like the large open area. That same nurse added that not only would the carpet help with sound attenuation, it would help reduce physical stress on the nurses’ knees and joints because it was a softer surface. She acknowledged that she did not think carpet should be put in the halls or in clinical care spaces. She was only suggesting that carpet be put in work areas such as the large open work area. Nurses who were
participating in the focus group where this nurse made the carpet suggestion agreed with her that carpet could significantly reduce noise problems.

*Environmental Press Causing Disorganization:*

Unit C, like Unit A and Unit B, had organization issues which caused environmental press related to the lack of storage space at sub work areas as well as general disorganization of the work areas across the unit. The disorganized work areas added to nurses' stress, increased levels of fatigued, and led to ineffectiveness. Patient care units, Unit C included, need to be organized. Everything needs to have a place and be put away. Necessary forms and paper work should be filed at the central station and, in some cases, at the sub work areas if that is where nurses are working. If everything has a place and is put away when it is not in use, nurses don’t have the stress of trying to hunt things down. Being organized reduces fatigue because it reduces travel to search for necessary items and increases effectiveness because nurses do not have to spend time looking for things.
Generalizable Findings: Presser-Effect-Recommendation

Based on the findings from each of the case study units, it was clear that there were generalizable findings that could be applied to medical/surgical units across the board. The various pressers related to noise, privacy, visibility, travel distances, charting space, and organization seem to be of greatest importance and seemed to be common, to a certain degree, across all three of the case study units.

Environmental Press and Noise:

Noise is caused by environmental pressers such as the design of the unit (including the unit typology, location of work areas, etc) and by the various chosen

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>EFFECT</th>
<th>RECOMMENDATION</th>
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<tbody>
<tr>
<td>Open design (central area) and lack of sound attenuation</td>
<td>Increased Sound/Noise</td>
<td>Added stress, distraction</td>
</tr>
<tr>
<td>Lack of specific storage at sub work areas as well as general unorganization of work areas across the unit (Perches and central station)</td>
<td>Disorganization</td>
<td>Added stress, fatigue, ineffectiveness</td>
</tr>
</tbody>
</table>

Figure 92. Chart of Cause-Effect-Recommendation for Unit C
finish materials. The effect of these pressers and noise on nurses is added stress, lower job satisfaction, greater distractions, and ultimately increased medical errors (medication, charting, etc.). Providing various types of sound attenuation that are specific to each area can reduce the environmental press and its negative effects on the nursing staff. This can include using sound attenuating materials in areas where noise is likely to echo and locating and designing the nurse work areas such that they are less likely to have negative effects on the staff and patients that can be contributed to noise and sound.

*Environmental Press and Privacy:*

Privacy was another issue that was a noted problem on each of the three case study units. The environmental presser in this case were design features of the nursing work areas that reduced privacy. These caused added stress for the nurses who were constantly worried about privacy and HIPAA violations, and added effort because the nurses had to cover patient information when people walked up or passed by. The recommendation to improve the environmental press is that when designing nurse work areas, nurses working in a work area should never have their
back to the hallway, computer screens should face away from the hallways, and the design should support being out of sight when nurses have them open to work on them, and generally out of sight as much as is feasible.

**Environmental Press and Visibility:**

Visibility was a common topic of conversation on the case study units and is critical for all patient care units. Unit design and layout as well as the specific locations of nursing work areas in relation to hallways and patient rooms can be a source of environmental press. When nurses have limited visibility to their patients from their nurse work areas, it adds stress, increases fatigue, and reduces job satisfaction. It is critical that architects and designers design units such that each and every patient room door is visible from a nurse work station that will be regularly used throughout the day. Ideally, every patient room door should be visible from the central nurse work station, but when that is not possible, doors should be visible from some other sub work area. Additionally, all hallways should be visible from the central nurse work area. By providing visibility down every hallway from the central nurse work station, it ensures that in a code or other critical situation,
and even in every day activity, the unit secretary or other staff member can easily find anyone who would be needed.

**Environmental Press and Travel Distances:**

As mentioned earlier in the literature review, the average medical/surgical nurse walks 4.1 miles during a typical 12-hour shift. Increased travel distances is from environmental press related to the location of nursing work areas and support spaces in relation to the patient rooms. Increased travel distances affect the nurses by adding stress and fatigue and ultimately lead to dissatisfaction with their jobs. All travel distance (between work areas, patient rooms, support spaces, etc) should be within acceptable distances.

**Environmental Press and Charting Space:**

Places to open paper charts appeared to be a common problem in older facilities. The environmental pressers of nursing work area design and work surfaces available to nurses caused the issues related to charting space. Lack of charting space adds stress to already stressed nurses and decreases job satisfaction. It is critical for designers to provide plenty of space for charting and doing documentation. That
includes work stations for documenting in electronic medical records as well as space for opening traditional paper charts. The majority of US hospitals are transitioning to a paperless records system. The key is that they are transitioning; most hospitals are not to the point of being totally paperless. This means that nursing work areas have to account for the fact that nurses are working electronically and on paper. The nursing work areas need counter depths appropriate to opening traditional, vertically-oriented paper charts.

*Environmental Press and Organization:*

Finally, organization, or lack thereof, plagues most patient care units and nursing work areas. The environmental pressers include the design of the nursing work areas, the inclusion (or not) of appropriate storage, and users’ use of provided space. When patient care units and nursing work areas are disorganized, it adds to nurses’ stress, increases fatigue, and reduces efficiency and effectiveness. Work areas need to be neat, orderly, and organized. It is important that stations be organized both visually and physically. Forms and other paper work need to have a specific location where they are filed. Charts need to be organized and put away
when they are not in use and may even be organized based on what is happening with the patient (organized by whether or not there are open orders in the chart, etc). Some forms need to be duplicated at both the central station and the sub work area where nurses are actually working. When everything has place and is put away, it can reduce desk clutter, and improve usable desk space.
<table>
<thead>
<tr>
<th>CAUSE</th>
<th>EFFECT</th>
<th>RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design of unit and work areas (including finish materials)</td>
<td>Added stress, dissatisfaction, distraction, errors</td>
<td>Provide various types of sound attenuation specific to each area including use of attenuating materials and the location and design of nurse work areas</td>
</tr>
<tr>
<td>Design of nursing work areas</td>
<td>Added stress, added work</td>
<td>Nurses working on charts should never have their backs to hallways; work areas should be designed such that charts are out of sight</td>
</tr>
<tr>
<td>Unit design and layout (including specific location of nursing work areas)</td>
<td>Added stress, fatigue</td>
<td>Nurses should be able to see each patient room door from a nurse work station; all hallways should be visible from the central nurse work area</td>
</tr>
<tr>
<td>Location of nursing work areas and support spaces in relation to patient rooms</td>
<td>Added stress, fatigue, dissatisfaction</td>
<td>All travel distance (between work areas, patient rooms, support spaces, etc) should be within acceptable distances</td>
</tr>
<tr>
<td>Design of nursing work areas and desk surfaces</td>
<td>Added stress, dissatisfaction</td>
<td>Provide plenty of space for charting including counter space for opening paper charts</td>
</tr>
<tr>
<td>Design of nursing work areas, inclusion of appropriate storage and the users' use of provided storage</td>
<td>Added stress, fatigue, inefficiency and ineffectiveness</td>
<td>Work areas need to be neat, orderly, and organized. Forms and other paper work need to have a specific location they are filed. Charts need to be organized. Some forms need to be duplicated at both the central station and the sub work area</td>
</tr>
</tbody>
</table>

Figure 93. Chart of Cause-Effect-Recommendation for future design (generalizable findings)
Other Significant Findings: Findings Found in Multiple Case Study Units

In addition to identifying environmental features causing press that can have positive or negative effects on nurses, this research also found generalizable information that is critical for designers and architects to understand and consider when designing nursing work areas. The information ranged from nurses’ preferences about work areas to the equipment they need to the various types of work areas.

_Nurses and Their Proximity to Patients and Other Staff:_

Generally, nurses want to work close to their patients, close to the central nurse work station and within ear/eye shot of their fellow nurses’ work station. A huge part of nursing effectiveness is supporting and receiving support from their fellow nurses. This means they need to have visual and, when needed, audible access to them.

Nurses want work areas that are a balance between being accessible to their patients and families but also somewhat protected—protected to minimize interruption but also protected for privacy reasons.
Decentralizing Work Areas:

The trend in today’s hospitals is towards a decentralized system where nurse work areas, and often support spaces, are decentralized. Designers need to have a clear understanding of how the unit will be staffed as well as who will be working where when designing nursing work areas. Central stations need to be centrally located and have visual access to all the halls on the unit. Sub work areas need to be designed so that they meet the staffing patterns the hospital is planning on implementing as well as the intended work area usage. If there will be only one or two sub nurse work areas serving the entire unit, the sub work areas need to be sized and designed such that the vital number of nurses can work effectively at the station. If the unit is going to be more like Unit C where each sub work area is serving one nurse and one nurses’ patients, then the work area should be designed such that it is appropriate for 1-2 nurses. Sub work areas need to provide some space to lock up belongings as well as files for forms and necessary paperwork. If the unit is going to use a computer on wheels, sub work areas need to provide an easy
place to plug those in (the outlet cannot be under the desk) and to use them as needed.

_Proximity of Equipment:_

It is critical that nursing work areas have all of the necessary equipment close at hand, available at all work stations, and the right number to meet the needs of the staff. Each nurse needs his/her own computer for doing documentation. The computer can be from a computer on wheels (COW), laptop, tablet, or a desktop computer. Research done during this study shows that, when given the option to work at their COW versus a desktop computer, most nurses preferred to work at a desktop computer. Telephones are another necessary piece of equipment that needs to be provided at every nurse work area, sometimes with multiple phones if it is a large multi-user station. Access to telephones seems to be especially critical in work areas that are not immediately around the central station. Nurses want to be able to take phone calls from physicians at their work areas; nurses also want to be able to call for help and assistance without having to walk extra steps to find or get someone. Additionally, the nurse call system should be accessible from the
substations. This is most commonly a problem when the nurse call is only accessibly at the central station (so that the unit secretary can answer it during the day) but then at night when no one is working at the central station, nurses have to walk back to the central station when a patient is calling the nurse call system.

**Central Nurse Station:**

As mentioned before, the central station needs to be organized both visually and physically. Everything needs to have a place to reduce desk clutter and improve desk space which will ultimately lead to increased efficiency and reduced stress and frustration. It is also important for designers to remember different types of people are working at central work areas in a variety of ways - work surfaces need to reflect that. For example, when nurses and doctors are discussing patients, they are doing it standing while looking through patient’s paper charts. There should be a work surface that is conducive to having these private discussions. (Private to avoid HIPAA violations, standing height surfaces to reduce physical strains, at or near the central station to reduce travel distances, etc.) Charts need to have a specific home (not a rolling cart.....) that is designed such that even thick charts will fit in it with ease.
Depending on how orders are done on the unit/hospital, there may be a need to have multiple specific locations for charts based on charts with orders that need transcribing, charts that need to be signed off on, and charts that are not in use. Ideally, hospitals would use a totally electronic medical records system, but in today’s world, most hospitals cannot and do not do it in its entirety. This means nurses are working electronically and on paper charts—their work areas need to reflect that combination. As mentioned before, it appears most nurses prefer to work at desktop computer when given the option. Additionally, since most charts are vertically oriented, desk spaces, countertops, and related surfaces need to be deep enough for a chart to be able to be opened and used. Designers must also consider that the unit secretary(ies) are commonly working at the central station working on a computer and with charts. Computer work areas need to have work surfaces around the computer such that charts can be opened without falling off the desk or being overly visible to passers-by. Finally, in units where management wants nurses to work closer to their patients at sub work areas, those sub work areas must be conducive to nursing work. It’s impossible to open a traditional paper chart on a
COW's work surface. If the hospital is going to use COWS as their primary charting computer for nurses, nurses need to be provided with an easy way to work on their COWs while having a chart open on a surface of some sort.

Supply Room:

The supply room also has its own needs and requirements. The supply room must be well-lit and well organized, including clearly labeling the bins supplies are stored in. Ideally, most commonly used supplies would be kept in a comfortable ergonomic zone. If a central, single supply room is going to be used, it is critical that the room is large enough to store all the supplies the unit is going to use and need; when a room's design is too small, it forces the hospital staff and administration to put some supplies elsewhere. That leads to added staff stress of having to hunt down supplies and added fatigue from the longer travel distances of going multiple places. When a decentralized model is going to be used, supply rooms can be slightly smaller though they still need to be adequately sized. However, generally when a decentralized system is used, the par level is lower, often significantly lower. It is also critical that the supply rooms be identical in terms of the supplies stored there. It cannot be a
situation where some supplies are kept in one supply room and other supplies are stored in the others. Nurses have enough to remember without having to keep up with what supplies are kept in what supply room. Again, decentralized supply rooms can be kept at a lower par level than they would be if it was one central supply. Finally, almost all hospitals use a barcode system for billing supplies to patients and tracking stock in the supply room. Supply rooms should be designed such that a computer is built in near the entrance to the supply room. This allows for a smooth, easy, series of tasks for a nurse to get her supplies. If the computer is right by the door, she can sign in, grab the barcode scanner and proceed with gathering the supplies she needs and then return the scanner and sign out of the computer as she walks out of the door. When the computer is across the room from the door, designers are added extra steps that add up quickly over the course of a 12-hours shift.

**Medication Room:**

The needs of the medication room are also important for designers to understand in order to improve efficiency and effectiveness. The medication room needs to be
locked with controlled access. The room needs to be sized appropriately for the number of beds on the unit and should be, at minimum, large enough for two to three nurses to be in the room at any given time. This is important because certain medications have to be “wasted” which requires one nurse to get a controlled medication and another signing off that the correct amount was “wasted” into the trash bin.

**User Preferences: Unit Typologies**

Part of the focus groups and interviews was a sorting task to understand user preferences when it came to unit typologies. For the sorting task, nurses and unit managers were given a set of cards, each with a various unit typology on it diagramming the typology and location of the work areas and support spaces. The participants were asked to organize the cards from their favorite to their least favorite. Once the cards were organized, there was a discussion as to why they chose their top and bottom two typologies. A tally was kept of what was the first and second choice and last and second to last choices for each participant or group.
First Overall Choice:

The first overall choice, that is the typology that was chosen the most times as a first or second choice was the courtyard typology. Nurses who chose this typology as one of their top two choices liked that it had easy access to the decentralized support spaces including the decentralized medication and supply rooms. They liked that there were multiple supply rooms. Some nurses wondered how well the supply room would be stocked but there seemed to be a general consensus that it would be an efficient and effective design typology. They also noted that there was easy access from sub work areas to patients and from sub work area/patients to support spaces. Nurses believed the travel distances would be better in the courtyard typology. Not one nurse mentioned the access to natural light when talking about the courtyard but several did mention during the interviews/focus groups that they would like views to the outside/natural light on their own units, which would be an additional strength of this unit design. Finally, nurses thought the typology was cleaner and less complicated than some of the other typologies and offered greater visual access.
Second Overall Choice:

The second overall choice was a tie between the racetrack typology and the cross-hall typology. Participants who chose the cross-hall liked that the typology design offered easy access to the patient rooms from the sub work areas and back to the central and support areas. Nurses liked that in a typology like the cross-hall, they would be working near their patients. Nurses commented that the central station was actually centrally located, which is a positive aspect of the design to them. The nurses believed the decentralized sub work stations near the patient rooms would work well. They also liked that there were lots of sub work areas. They felt the overall- “T” is a good shape and lends itself to nursing tasks. One nurse added that the design allows for patients that need to be secluded to be secluded while still allowing for things to be centrally located. Nurses who chose the racetrack typology liked that there was visibility from the central station. They also commented that staff would not have to go hunt people down because of the location of the sub stations and central station. They also added that the central station is in fact
centrally located and that substations offer close proximity to the central station and to the patients.

**Last Choice:**

Just as nurses had strong opinions about what they did like, they also had strong opinions about what they did not like. The overall bottom choice was the L-Shape. Nurses believed it was too long from one end of the unit to the other and that the travel distances between staff areas were too far. Because of the shape of the unit, nurses cannot see down both halls and are forced to go hunt people down. Other nurses added that the shape does not lend itself to helping other nurses out because the substations are too far apart. This unit typology was described as “sprawled out” and “just too big.” (Focus Group Comments) The size issue could be a case of how the unit typology was diagrammed, but size is still a legitimate concern and something designers must consider.

**Second from Last Choice:**

The next to the last choice overall was the semi-radial plan. Nurses believed the unit was too long, adding to the walking and travel distances. Again, as before, this
could be a case of how the unit typology was diagrammed. Nurses worried “Patients are too far from central, main area” if they were down at either end of the semi-radial plan. Additionally, nurses working at ends of the hall have a significantly longer walk back to central work station and support areas (supply and medication room). The design would force nurses to go hunt people down because of the curve in the design and does not lend itself to nurses helping out their fellow nurses. Nurses feel strongly that nursing is a team deal and it is important for the design of the unit to facilitate that team interaction and support.
CHAPTER 6: CONCLUSIONS

Overview of Chapter

This chapter provides some conclusions and wraps up this study. It begins with an overview and recap of the study and then discusses the limitations of the study. After the limitations, the chapter presents some of the lessons learned from the chosen research methods. The chapter concludes with next steps for future research.

Recap of Study

This study was a qualitative study for descriptive understanding. The archival research allowed the researcher to get a general understanding of the unit prior to the observations. The observations provided information about the numbers and types of users at each of the work areas and provided a way to understand how the unit was actually functioning and working. The focus groups and interviews gave the researcher insight into user preferences and opinions. Together, these two aspects combined to give some rich data that will serve to not only improve the case study
units but can, and hopefully will, provide a basis for standards and recommendations for design in new construction and renovations across the board.

**Limitations of the Study**

As with any research study, this study had limitations because of the chosen research methods as well as various uncontrollable factors. This study was a qualitative study for descriptive understanding. That meant there was no experimental data collected. That, in and of itself, is a limitation. Another limitation of the study was that all of the case study units were in the same hospital system—Units A and B were at one hospital and Unit C was at another hospital, but all were from the same hospital system. This was a limitation because other factors related to nursing work areas could be absent from this hospital system or only at this system’s hospitals. Census levels were a limitation at Unit C. The census was very low and there was some nurse and managerial turnover during the research process. This could have affected the study, even if indirectly. Finally, because of low nurse response to the recruitment email, focus groups were done more as interviews on
the unit during lunch and dinner breaks. Finally, the general observations were done during various windows of time.

Lessons Learned

There were several key lessons learned from the chosen research methods of this study. First, focus groups are hard to make work. There are major challenges in recruiting participants. Ultimately the focus groups on this unit were done more as interviews or small focus groups with nurses who were taking a break for either lunch or dinner. They were done on the units in the rooms where the nurses most often ate. The same set of questions that had been planned for the formal focus groups were used, but sometimes there was just one participant and other times there were two to four participants.

As part of the focus groups (and interviews), a sorting task was completed to find users' preferences about unit typologies. The groups were given a stack of eleven cards, each with a different typology. Eleven cards were too many options. I had two participants who refused to participate in the sorting task because they were
overwhelmed by the number of choices. Finally, as the researcher, I would do the
shift change observations differently if I had it to do again. I would do the shift
change observation over several days instead of observing shift change over a two
hour window like I used for all of the other focused observations. Shift change really
occurs more in a thirty minute to one hour window and I was not necessarily
observing the right thing at the right time. For example, I should have spent about
an hour watching shift change at the central station from 6:30-7:30. The next day I
should have observed the sub work areas during the specific 6:30-7:30 time frame.
Then, the next day I should have observed the support spaces during the same time
frame. I think that if I had done the shift change observations like that I would have
had a better understanding of what really happens during the shift change. I am
certain while I was observing the supply closet for the 20-minute interval I probably
missed some great data about what was going on elsewhere on the unit (since no
one was coming into the supply room).
Next Steps

This study has not revealed all of the answer to the endless possibilities of design in nursing work area settings. It has, however, provided tremendous insight into improving the efficiency and effectiveness of nursing work areas. It has revealed many of the complexities of nursing work and how the work relates to the unit design and built environment. However, this research study was a first step in understanding nursing work areas in acute care, medical/surgical patient care units. This study did do some observation of the support spaces, but none of the questions in the focus groups or interviews addressed the functionality of support spaces. (There was one question that asked about how decentralizing support spaces could increase efficiency and effectiveness, but none were specifically about how support spaces work.) Additional studies could be done just on understanding and improving the design of support spaces such as the medication room and the supply room. Additionally, more specific study needs to be done on the strengths and limitations of decentralizing nurse work areas and support spaces. This study did not reveal any findings as to the types of decentralized spaces that work best or any actually design
information. It only revealed that, based on the decentralizing support space question in the interviews and focus groups, nurses believe decentralizing support spaces would increase efficiency and effectiveness.
IRB APPLICATION

Improving the effectiveness of Nursing Work Area design in Inpatient Care Units:

Study Protocol--Draft Date: July 26, 2010

I. RESEARCH TITLE:

Improving the Effectiveness of Nursing Work Area design in Inpatient Care Units

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IV. ABSTRACT:

Nurses are the primary care givers for patients admitted to hospitals overnight and the design of the physical environment impacts the operational effectiveness of care delivery. Many nursing tasks are repeated across multiple patients (such as documentation, administer medications, assessing patients, etc), and there are strict protocols and procedures for how to administer these tasks to ensure the delivery of high quality care. A nursing model is often chosen by a nurse administrator who oversees its implementation in an effort to provide effective care delivery to patients admitted on a nursing unit in a hospital. Throughout the unit there are various nurse work areas strategically placed to help support the successful completion of nursing tasks. These work areas provide nurses with the necessary resources (such as access to patient medical information; access to medications, supplies and equipment; and access to horizontal surfaces to work on or set up supplies) to care for ill patients. These work areas also serve as the primary locations to collaborate with other staff to coordinate care delivery for patients. The design of these work areas vary considerably across units, yet it is unknown if certain approaches or design attributes are more or less effective for supporting nursing tasks. Therefore, the aim of this study is to investigate relationships between the design of key nursing work areas and operational effectiveness in general medical surgical patient care units. The primary nurse work areas investigated in this study include the central nurse station, fixed subwork areas, and the support work areas for medication dispensing and nursing administration. These nurse work areas will
be investigated to determine the **spatial considerations** of different work areas for nurses (including size, types of activities performed, number and type of people using the work place), the **technical requirements** (such as lighting, electrical utility, technological, etc) and the **behavioral requirements** (visibility, acoustical privacy, collaboration, acceptable travel distances, etc). In addition to studying the nursing work areas specifically, the context of the work areas will also be studied to ascertain necessary functional relationships to improve operational effectiveness within the areas and adjacencies.

Utilizing a case study research approach, multiple data collection methods will be employed to study operational effectiveness of nursing care delivery in relation to design attributes of nursing work areas. Through a qualitative investigation, existing nurse work areas (central nurse station, sub-nurse work stations, and support work areas including medication dispensing and administration areas) will be studied on three different nursing units with varying designs of nursing work areas. In addition to studying work areas in an existing nursing unit, nursing personnel will be asked to sort and rank their preferences of different approaches to these key work areas. The intent is to connect physical design options to perceived improvements in operational effectiveness of nursing tasks performed at these locations.

The study will be organized in four phases: 1) Archival research of facility and organizational data on the nursing unit 2) Observations of public nurse work areas on the unit including the central nurse work station, subwork stations, and medication delivery 3) Interviews and focus groups of nursing personnel; and 4) Overall analysis and dissemination of research findings.

**Research Questions:**
This research project aims to answer the following questions:
- What nursing tasks are performed (both generally and step-by-step) in key work areas (the central nurse station, sub-nurse work stations, and support
work areas specifically including medication dispensing and administration areas)?

- What are the different design approaches to nurse work areas evidenced in practice?
- What are the design requirements for nurse work areas as investigated through three case studies?
- What contextual requirements (such as functional relationships to other areas, acceptable travel distances and visibility thresholds) are necessary to make primary work areas operationally effective?

The study will be organized into four phases outlined below:

**Phase I: Archival Data Collection, Verification, Guided Walk-through & Analysis.**

The first phase includes three primary steps: remote collection of archival data (facility and operations), the onsite verification of facility data, a guided walk-through of the unit with the nursing manager and photographic documentation of the nursing work areas. Following the collection of all data an overall analysis will be performed to create a nursing unit profile including details on the nurse work area to be studied. The following details each step:

**A. Remote Collection of Existing Information Procedure: Facility and Operational Data**

The collection of facility data from the facility manager and operational data from the nursing unit manager will provide a descriptive account of the physical and clinical characteristics of the nursing units studied. Below is a list of the types of data that will be collected as available for release by the hospital as well as whom the information will come from:
Medical/Surgical Patient Care Unit: Information from the Unit Nurse Manager

a. Patient Composition (including average length of stay, diagnostic related groupings, patient census etc)

b. Staff Composition (number of nurses, nurse extenders, physicians, support staff, etc organized by shift they work)

Medical/Surgical Patient Care Unit: Information from the Facility Manager at Hospital

c. Overall hospital floor plan (to show unit location and orientation of medical/surgical inpatient care unit/nursing unit in relation to overall hospital)

d. Nursing Unit Floor Plan

e. Existing photographs of the hospital/unit (central work station, sub work stations [if applicable], patient room, scanned supply closet, medication room and any other areas the researcher deems appropriate and available)

f. Space program for the unit (if available) (Organized specifically by space with current square footage of each space. If current space program is not available, the researcher will develop a space program from the floor plans and verify it when onsite to ensure the spaces are still used as shown in plan.)

Instrument: A facility and patient care unit spreadsheet document was created to record the data elements listed in the data collection instrument. (See attached Plan Take-off procedure.)

Process: Hospital and unit archival data will be collected over a two- to three-week period prior to conducting the first on-site visit. The researcher will contact the facility manager and the unit manager. Each manager will be sent a data request
email requesting specific information related to the unit and facility (see attached data request emails). Architectural drawings of the hospital and units will be studied to find the data included on the Plan Take-off Procedure attached. All collected data (both the information taken from the architectural drawings by a research team member as well as the information from the managers) will be documented on the Plan Take-off Procedure attached. Only aggregate data will be collected and presented.

Data analysis: Data collected will be analyzed and presented in profile format to provide a basic overview of the hospitals, units and the various nursing work areas on each unit. The data collected in this step will be verified in the next step for accuracy and to mark any changes or renovations to the unit and nursing work areas. All identifiable information about each hospital removed to ensure anonymity and confidentiality.

B. On-site Verification, Guided Walk-through and Photographic Documentation:

On-site activities will be performed to verify facility information documented from the floor plans, orient the researcher to the unit through a guided tour of the nursing unit and capture the physical characteristics of the studied nursing work areas through photographs. Below is a detailed description of the activities:

1. Guided Walk-Through: The unit manager will provide the researcher(s) with a guided walk-through of the unit. The researcher will complete the Guided Walk-through procedure (see attached instrument) during and immediately following the walk-through. The researcher will also make note of any comments, suggestions, and/or remarks made by the nurse manager during the walk-through on the Guided Walk-through procedure form. The researcher may ask questions as needed for verification and clarification as necessary during the walk-through.

2. Verification of Facility Information: Data collected during the first step of phase I on the Plan Take-off procedure will be verified with on-site unit conditions as well as clarify any unclear items or unanswered questions
about the unit and facility that arise during step A of Phase I. A specific spreadsheet/checklist used for each unit verification will be developed based on any questions, concerns and uncertainties that are found during the data collection step (Step A of Phase I) on the Plan Take-off Procedure.

3. **Photographic Profile:** The purpose of the photographic profile is to create a visual account of the nursing work areas on the medical/surgical inpatient care unit at each of the studied hospitals.

**Instruments:** Step B of Phase I requires two instruments. The first data collection instrument in this phase of the research project is the *Guided Walk-through procedure*. (See attached) It will be completed during and immediately following the guided walk-through. The second instrument, the *verification checklist*, is a spreadsheet specifically designed to answer questions and any necessary clarifications that arise during the completion of the Plan Take-off procedure. The *verification checklist* will be developed individually for each unit studied based on the archival findings from step A of phase I. It will be developed for clarification and verification purposes only and will be created between Steps A and B of Phase I. Finally, photographs will be taken to capture the nursing work areas visually. All photographs will be taken by the researcher in public areas on the medical/surgical inpatient care units being studied and will be of the different areas observation shows nurses are working in. No people will be in any the photographs and no personally identifiable information will be visible.

**Process:** A guided tour of the medical/surgical inpatient care unit will be the first activity for the researcher once she arrives on the site. The tour will take approximately 20 to 30 minutes. The researcher will complete the *Guided Walk-through procedure* which contains a series of predetermined questions as well as a floor plan. The questionnaire part of the *Guided Walk-through procedure* and any annotations on the provided floor plan, including notes to record impressions and comments made by the nurse manager during the tour, will be noted during and immediately following the guided walk-through. During the tour, the researcher may ask the unit manager questions for verification and clarification purposes. Any questions asked will be specific to the data being collected on the *Guided Walk-
through procedure. Following the tour, the researcher will complete the verification checklist. While completing the verification checklist, the researcher will also take the necessary photographs to visually document each nursing work area. All photographs will be taken without staff, family or patients present to maintain confidentiality and anonymity.

Descriptive analysis: An analysis will be performed to validate and verify the floor plans and other nursing work areas on the patient care unit. A detailed unit profile will be created including annotated floor plans, unit demographics, and details about each nursing work area (the activities performed at each area, the people using the spaces, and the equipment needed at each area will be collected). In summary, the analysis will provide the technical characteristics of the units and each nursing work area. The outcomes of phase I will include a descriptive account of the unit characteristics including the facility and operations.

Phase II: On-site Observations.

The second phase of the research, the on-site observations, will include two steps. The first step will be a general observation of the public areas focusing on areas nurses work in/at most often (including the central nurse work stations, sub nurse work stations, medication room, and clean supply). The second step of phase II will be focused observations of specific nurse work areas during four specific times of day. Both the formal and informal observations will follow the procedures found in the two observation data collection tools attached and will document the data found in that instrument. The final step of this phase will be analysis of the data collected through the observations. Phase II will take approximately four weeks to complete.

A. General Observation:

The first observation will be a general observation done during a typical week-day daytime shift for approximately two hours. This observation will allow the researcher to become more familiar with the unit, the activities performed by the
nursing staff, and the movement to and from the nursing work areas studied. This initial observation will provide an overall understanding of the patterns and usage of each nursing work area. The time of the 2-hour observation will be scheduled based on the observation window the unit manager believes will provide the best overview and general observation data.

Instrument: The instrument for the first observation is the General Nursing Work Area Observation instrument. The instrument will be a series of floor plans of the unit including an overall unit floor plan as well as enlarged, detailed floor plans of each work area being studied. The instrument will be specific to each hospital being studied and will be created once the floor plans for each hospital have been collected and analyzed in Phase I. Additionally, all observations will be done in public areas and will not require informed consent.

Process: The first observation will begin when the researcher arrives on the unit. Once the researcher arrives on the unit, she will alert the unit manager that she is on-site and will immediately begin her observation. During the general observation, the researcher will observe the work areas from a public area vantage point. The researcher will spend the majority of the general observation viewing the unit activity from the central nurse work area including noting who, how many and where staff are working and in what work areas they appear to work in most often. The researcher will also walk the unit several times during the observation to capture any possible information about where nurses are working in the hallway and how nurse use the various work environments on the unit. This step will be for observation purposes and the researcher will not interact with the staff. Once the two-hour observation is completed, the researcher will thank the unit manager and let him/her know that the observation has been completed. At that point, the researcher will leave the unit.

Data analysis: The observation data will be analyzed to discover patterns that emerge from the data as well as specific information related to the nursing work areas at each hospital. This data, combined with the data On-site Verification, Guided Walk-through and Photographic Documentation step of the first phase will
be used to develop several specific questions for the focus groups and interviews as well as feedback specific to each hospital unit.

**B. Focused Observation of Specific Nursing Work Areas:**

The second step of phase II is a series of focused observations observing the specific nursing work areas (Central Nurse Work Station, Sub Nurse Work Stations, support spaces such as clean supply and medication room). These observations will capture data for specific time periods at specific intervals and will collect who, how many, and where staff are working during a timed, specific window of time. There will be a total of four focused observations that occur during specific times and shifts to allow a greater understanding of how each nursing work area is used during different times of the day as well as during different shifts and times of the week. Each observation will last approximately 2 hours. The focused observations will predominantly be looking for information related to the users including who is using the areas, how many people are in the area, and how the staff work in the area, etc. Other data such tasks (the types of tasks and the needs related to the tasks) and physical characteristics of each nursing work area (work surfaces, seating, lighting, etc.) may also be captured.

1. **Focused Observation #1:** Focused observation #1 will be an observation from 10am to 12noon during a typical week day shift.

2. **Focused Observation #2:** Focused observation #2 will be an observation from 9pm to 11pm during a typical weekend night shift.

3. **Focused Observation #3:** Focused observation #3 will be an observation from 12noon to 2pm during a typical weekend shift.

4. **Focused Observation #4:** Focused observation #4 will be an observation during a typical week day shift change. The specific observation window will be determined by each hospital’s shift schedule. As with all of the focused observations, it will last two hours.
**Instrument:** The *Formal Nursing Work Area Observations* instrument for the four focused observations will be developed for each specific work area at each specific hospital once the research team gets the floor plans in phase I. An example of this data collection tool is attached with an example floor plan where each hospital and work area specific floor plan will be included. All observations will be done in public areas and will not require informed consent.

**Process:** The four focused observations will provide specific information about the nursing work areas (central nurse work station, sub nurse work stations, and support spaces including the medication room and clean supply room) including usage patterns and users. For each observation, the researcher will arrive on the unit and immediately let the unit manager or shift manager know that she has arrived on the unit. Once the manager knows the researcher is on-site, she will begin her two-hour observation recording all observation data on the *Formal Nursing Work Area Observations* form. She will spend 24 minutes of time at each of the specific nursing work areas gathering data at specific intervals of time (every 2 minutes). The researcher will collect data about users (nursing staff, other staff, patients, and visitors), number of people in the area, location of people in the area, and general comments about what was going on. This same process will be repeated until all areas have been observed. All of the observations will be done in public areas. Once the two-hour observation is completed, the researcher will let the unit manager know the observation is over and will thank him/her. The researcher will then leave the unit.

**Data analysis:** Content analysis will be used to analyze the observation data. This will all patterns from the data to emerge about each specific nursing work area studied. Re-occurring thematic areas discovered in the data will be used to develop supplemental questions for the focus groups and interview that will be done in phase III.

**Phase III: Interviews and Focus groups**
Phase III will begin with an interview with the unit manager of each unit studied to get the perspective of the nursing administrator for each unit. Following the interview, focus groups with nurses who work on each unit will be conducted to gain insight into the staff that most commonly use the nursing work areas.

1. Interview with the Unit Manager: The interview will last approximately 30 minutes and will provide insight into the nursing work areas on the unit from the nursing administrator’s perspective.

   Instrument: The data collection instrument for this step of phase III is the Interview Procedure and Questions. This instrument includes a list of questions developed prior to the commencement of the research. In addition, up to five supplemental questions will be developed from the observations. The questions for the interview are very similar to those asked the focus groups (the next step in this phase of the research). There are slight variations to account for the unit managers administrative role on the unit.

   Process: The interview time will be arranged through email or telephone based on the unit manager’s schedule and availability. Before the interview begins, the researcher will read through the informed consent form and ensure the unit manager understands the form and signs consent. Once the form has been signed, the researcher will begin the interview, asking each question that has been developed and documenting the responses on the Interview Procedure and Questions form attached. The interview will last approximately 30 minutes and will be audio recorded. Once all the questions have been answered, the research will thank the nurse manager and leave the unit.

   Data analysis: The data collected during the interview will provide qualitative information from the administrator of the unit. This will help provide further insight into the nurse manger sees his/her staff working in the nursing work areas, any comments or feedback they have given her, as well as what she perceives to be the
nursing staff’s perspective. All possible identifying information about the interviewee will be removed to ensure anonymity and confidentiality.

2. Focus Groups with Nursing Staff: The second step of phase III will include 2 to 3 focus groups with 4 to 8 nurses. The focus groups will answer the questions found in the Focus Group Procedure and Questions. The focus group questions are similar to those asked in the interview however there are specific questions focusing on the direct patient care staff perspective of nursing work areas. The questions will focus on nursing staff perception and preferences.

Instrument: The data collection instrument for this step of phase III is the Focus Group Procedure and Questions. The focus group questions will consist of up to fifteen questions. Ten of the questions were developed prior to the research starting while the remaining five questions will be developed based on the observations and research findings from phase I and II. The focus group will include questions about the nursing work areas as well as a sorting task of ideal work area designs and preferences. There are questions about how/if the central nurse work station and sub nurse work stations meet the needs of the users, how/why the built environment does or does not meet the needs and support the tasks of the nursing staff, and what preferences nursing staff have when it comes to the areas that they use and work in most often.

Process: For the focus groups, an email will be sent to all nurses working on the unit inviting them to participate in a 45 minute focus group. (see attached recruitment email) Each focus group will include up to 8 participants and will be organized around the participant’s schedules. Once all participants arrive at the assigned meeting area, the researcher will read through and answer any questions about the informed consent form. The participants will be reminded that the focus group discussion is confidential and that the meeting will be audio recorded for analysis purposes. Each participant will then sign the form. Once the forms are signed, completed and collected, the researcher will ask each of the questions in the Focus Group Procedure and Questions. The first part will include a discussion of the first six questions. The second part of the focus group will be a short sorting task that asks
the participants to rank various unit configurations and nursing work areas based on preference and then a discussion based on those preferences. Once all questions have been asked, the participants will be thanked for their time. Participants are typically awarded pride points by the hospital system for participation in research projects.

*Data analysis:* Content analysis will be used to analyze the data collected during the focus group. This will provide qualitative information from the nursing staff on the unit. This will help provide further insight into how the staff work in the nursing work areas and what their perceived preferences are. All potentially identifiable information will be removed in the analysis to ensure anonymity and confidentiality of participants.

**Phase IV: Post-Research Follow up, Overall Analysis & Dissemination.**

The final phase will be an overall analysis of all the data collected through each phase of the research, post-research follow up at each of the studied units, and dissemination of the research findings. The observation data will be analyzed using descriptive analysis. This type of analysis will look at the frequency, means, average, mode, and median. It will include measures of central tendency and variability to look at what happens in the given work areas within a given period of time. Standard deviation is a measure of variability that will be used to discover consistency. The qualitative data from the interviews and focus groups will be analyzed using content analysis. This will be done through transcribing the recorded interviews, identifying patterns through codes (essentially topics that are reoccurring through the interview and focus groups) and then pulling quotes related to those codes. These codes and quotes will be used to identify consistencies across the focus group and consistencies across the unit and ultimately, once all three units have been studied, the content analysis will identify consistencies across the board. The research findings will be used to develop design guidelines for the specific work areas researched for use by architects and designers to improve the satisfaction, efficiency, and effectiveness of nursing work areas. Additionally feedback will be given to each unit studied on specific problem areas and how those work areas can
be improved. This information will be given through a brief write-up and presentation to each unit manager. All of the research findings will be disseminated through a thesis presentation as well as a thesis manuscript that will be approved by my committee chair and submitted to the university per thesis manuscript requirements. This phase will take approximately 12-14 weeks to complete and will be done during the fall semester of 2010. The final draft of the thesis manuscript will be submitted to the Clemson University Graduate School per the Graduate School’s policy by November 24, 2010.

**Anticipated Outcomes**

It is believed that the findings of this research will provide evidence into what types of nursing work areas (including the size, number, and physical characteristics) are most effective for nurses’ efficiency and satisfaction. The Archival data collection phase (phase I) will provide an overview of each hospital being studied. The on-site observations (phase II) will provide specific information about the users, how the users use the space, and where they work. The interview and focus group in Phase III will provide information about the users opinion, beliefs, and preferences. Each phase of this research will come together and provide insight into how to improve the overall design of nursing work areas from the architect and designers prospective. It will give designers a better understanding of the people and processes they are designing for. Finally, it will give a basis for future research as current literature shows that very little research has been done on nursing work areas.

**Issues of Confidentiality and Anonymity**

The research team will do everything possible to protect the privacy of all participants. The following procedures will be followed to ensure your personal information is kept confidential in this study:

- The data collected about participants will be kept private to the extent allowed by law. To protect participants’ privacy, all records will be kept
under a code number rather than by name. These records will be kept in locked files and only specific members of the research team will be allowed to look at them. All names and any other fact that might point to a specific participant will not appear when the results of this study are presented or published.

- Any data collected will be shared with the research team as necessary with no specific identifiers of administrators, clinical staff, or support personnel.
- In the final report, the name of the hospital and unit will be kept confidential, unless express written permission is granted by the administrator of the institution.
- All consent forms containing signatures will be kept separate from data generated and stored in a secure location. When the study is completed, all files will be in a locked file cabinet for archival purposes. Once all of the research has been completed and thesis manuscript written, all files will be destroyed.
- In the rare case this research study is evaluated by an oversight agency such as the Clemson University Institutional Review Board or the Federal Office for Human Research Protections, which would require that the research team share the information collected from participants, all information would only be used to determine if this study was conducted properly and adequately protected the rights of participants.
- The entire process will comply with all applicable HIPAA requirements. There will be no penalty for non-participation or withdrawal and any participant decision will be kept confidential. Participants may cancel their permission at any time by writing to Laura Hamm at the address given below. In the event of any publication regarding this study, no identifying information will be disclosed.

**Risks and Benefits to Participants**

The risks involved in completing this study are minimal and are similar to the participants' regular level of risk or discomfort during work. There is a minimal risk
that confidentiality may be breached; however the research personnel will maintain procedures to mitigate this risk. Any data reported will be in summarized form (along with other observations from other respondents) and will not be able to be attributed to a single person. Participants are not likely to directly benefit in any way from participation in this study.
**APPENDICIES**

*Plan Take-Off Procedure Tool*

The following is the 3-page research tool that was used during Phase I of the research study in the archival research phase.

<table>
<thead>
<tr>
<th>Plan Take-off Procedure</th>
<th>Hospital:</th>
<th>Team Member:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facility Wide Information</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. What is the square footage of this hospital facility?</td>
<td>Facility Manager</td>
<td>Comments:</td>
</tr>
<tr>
<td>2. What is the total number of beds in the hospital?</td>
<td>Facility Manager</td>
<td>Comments:</td>
</tr>
<tr>
<td>3. What is total square footage per bed</td>
<td>Divide answers from above</td>
<td>Comments:</td>
</tr>
</tbody>
</table>

| **Unit Wide Information** | | |
| 4. What is the square footage of the unit? | Arch/Construction Drawings | Comments: |
| 5. What is the total number of beds on the unit? | Unit Manager | Comments: |
| 6. Describe the nursing unit typology: Is it racetrack, radial, triangular, etc.? | Arch/Construction Drawings | Comments: |
| 7. What type of nursing work areas are there in this unit? (Central, Substation, etc.) Please describe. How many sub stations are there and where are they located? | Arch/Construction Drawings | Comments: |
| 8. Are the patient rooms on the unit same-handed or mirrored? | Arch/Construction Drawings | Comments: |
| 9. Where is the nourishment station located? | Arch/Construction Drawings | Comments: |
| 10. Amount and location of storage on unit (describe use and square footage) | Arch/Construction Drawings | Comments: |

<p>| <strong>Central Nurse Work Station</strong> | | |
| 11. What is the size of the central nurse work station? (square feet) | Arch/Construction Drawings | Comments: |
| 12. How many patient rooms can nurses see into from the central nurse work station? | Arch/Construction Drawings | Comments: |
| 13. Can nurses see any of the patient’s heads from the central nurse work station? If so, how many? | Arch/Construction Drawings | Yes / No | Comments: |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Source</th>
<th>Average:</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the average distance from the patient bed to the central nurse station?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much and what kind of storage is provided?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much counter/work space is provided in the central nurse work station?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What are the heights of the various work surfaces?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there any support spaces located adjacent to the central nurse work area? If so, what spaces and briefly describe them and their location.</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What type of materials are used in the central nurse work station?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sub Nurse Work Stations

<table>
<thead>
<tr>
<th>Question</th>
<th>Source</th>
<th>Average:</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>What types of sub work stations are there? Describe location, number of each type, etc.</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there any support spaces located adjacent to any of the sub work stations? If so, what spaces and briefly describe them and their location.</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the travel distance from the work station serving 4-6 patients to the patient bed?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the travel distance from the work station serving 1-2 patients to the patient bed?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the travel distance from the work station serving 4-6 patients to the central station?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the travel distance from the work station serving 1-2 patients to the central station?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If there is an in-room work station, please describe it. (Location, approximate size, etc)</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can nurses see any of the patient’s heads from the sub work station serving 4-6 patients? If so, how many?</td>
<td>Arch/Construction Drawings</td>
<td>Yes No</td>
<td></td>
</tr>
<tr>
<td>Can nurses see any of the patient’s heads from the sub work station serving 1-2 patients? If so, how many?</td>
<td>Arch/Construction Drawings</td>
<td>Yes No</td>
<td></td>
</tr>
<tr>
<td>How much counter/work space is provided at the sub station serving 4-6 patients?</td>
<td>Arch/Construction Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>Source</td>
<td>Comments</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>----------</td>
</tr>
<tr>
<td>28</td>
<td>What are the heights of the various work surfaces at the work station serving 4-6 patients?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>How much counter/work space is provided at the sub station serving 1-2 patients?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>What are the heights of the various work surfaces at the work station serving 1-2 patients?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>What type of materials are used in the sub work stations?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
</tbody>
</table>

**Medication Room/Medication Administration**

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Source</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>Describe the medication room. Is there one centrally located? Multiple? Where is it located on the unit?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>How large is the medication room?</td>
<td>Arch/Construction Drawings</td>
<td>Comments:</td>
</tr>
<tr>
<td></td>
<td>Is there a medication dispensing unit in the medication room? Or is there one elsewhere on the unit? Please describe.</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>What is the <em>travel distance</em> from the medication room to the patient bed the room serves?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>What is the travel distance from the medication room to the central nurse work station?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>What is the travel distance from the medication room to sub work stations?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Is there a lockable medication drawer for each patient? If so, where is it? (in-room, immediately outside room, in movable cart)</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
</tbody>
</table>

**Clean Supply**

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Source</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>Describe the supply room. Is there one centrally located? Multiple? Where is it located on the unit?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>How much space is allocated for clean supply?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>What is the <em>travel distance</em> from the clean supply closet to the patient room?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>What is the <em>travel distance</em> from the clean supply closet to the central nurse work station?</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>How much space is provided for <em>actual storage</em> in the clean supply room? (Built-in shelves or other system)</td>
<td>Arch/Construction Drawings</td>
<td></td>
</tr>
</tbody>
</table>
Observation Tools

This section has the two tools that were submitted to the IRB office for review. The first is the 1-page general observation tool. The second is the 3-page formal observation tool. Each was customized to the unit being observed with the appropriate work areas. The formal observation tools used on-site were more pages because of the various work areas.

<table>
<thead>
<tr>
<th>General Nursing Work Area Observation</th>
<th>Hospital:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Member(s):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The purpose of the Nursing Work Area Observation is to gain understanding of how the nursing work areas are used and what tasks are done where. It is imperative for designers to have an understanding of what happens in specific spaces in order to provide designs that meet those needs. This task will be completed by Laura Hamm through observation of the activities at different nursing work areas on the medical/surgical unit. The observations will be done for 2 hours. During this observation, the researcher may ask informal questions to staff for clarification purposes, however it will predominately be solely observations.

Hospital Floor Plan

EXAMPLE FLOOR PLAN

ANNOTATIONS AND OBSERVATIONS RELATED TO THE UNIT
Formal Nursing Work Area Observations

The purpose of the Nursing Work Area Observation is to gain understanding of how the nursing work areas are used and what tasks are done where. It is imperative for designers to have an understanding of what happens in specific spaces in order to provide designs that meet those needs. This task will be completed by Laura Harris through observation of the activities at different nursing work areas on the medical/surgical unit. The observations will be done for approximately 2 hours over a series of several days and shifts, as outlined in the IRB form. The process will be collecting the data below at every two minutes for a total of 24 minutes. This 24 minute process will be repeated at each of the nursing work areas. The researcher will not ask any questions during the observation and no informed consent will be required.

Work Area Snap-Shots: Central Nurse Work Station

Example Floor Plan

Time: ______________
Snapshot: _________ of _________
# of People: _________
Loc. of People: Mark "N" for nursing staff, "S" for other staff, "P" for patient, and "V" for visitors
Type of person: ______________
____________________________
____________________________

Notes and Observations: 
Formal Nursing Work Area Observations

The purpose of the Nursing Work Area Observation is to gain understanding of how the nursing work areas are used and what tasks are done where. It is imperative for designers to have an understanding of what happens in specific spaces in order to provide designs that meet these needs. This task will be completed by Laura Hamn through observation of the activities at different nursing work areas on the medical/surgical unit. The observations will be done for approximately 2 hours over a series of several days and shifts as outlined in the IRB form. The process will be collecting the data below at every two minutes for a total of 24 minutes. This 24-minute process will be repeated at each of the nursing work areas. The researcher will not ask any questions during the observation and no informed consent will be required.

**Work Area Snap-Shots: Sub Nurse Work Station**

<table>
<thead>
<tr>
<th>Time:</th>
<th>Snapshot:</th>
<th># of People:</th>
<th>Loc. of People:</th>
<th>Type of person:</th>
<th>Notes and Observations:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mark &quot;N&quot; for nursing staff, &quot;S&quot; for other staff, &quot;P&quot; for patient, and &quot;V&quot; for visitors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The purpose of the Nursing Work Area Observation is to gain understanding of how the nursing work areas are used and what tasks are done where. It is imperative for designers to have an understanding of what happens in specific spaces in order to provide designs that meet those needs. This task will be completed by Laura Harn through observation of the activities at different nursing work areas on the medical/surgical unit. The observations will be done for approximately 2 hours over a series of several days and shifts as outlined in the IRB form. The process will be collecting the data below at every two minutes for a total of 24 minutes. This 24 minute process will be repeated at each of the nursing work areas. The researcher will not ask any questions during the observation and no informed consent will be required.

**Work Area Snap-Shots: Support Spaces**

**Medication Room:**
- Time: 
- Snapshot: ___ of ___
- # of People:

**Loc. of People:** Mark "N" for nursing staff, "S" for other staff, "P" for patient, and "V" for visitors

**Type of person:** 

**Scanned Supply Room:**
- Time: 
- Snapshot: ___ of ___
- # of People:

**Loc. of People:** Mark "N" for nursing staff, "S" for other staff, "P" for patient, and "V" for visitors

**Type of person:** 

**Notes and Observations:**
Interview and Focus Tools

This section has the two data collection tools as well as the informed consent forms that were used during the interviews and focus groups. Each consent form was customized during the study to name each unit and hospital. The questions for interviews and focus groups were the same.

<table>
<thead>
<tr>
<th>Interview Procedure and Questions</th>
<th>Hospital: Team Member(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>The purpose of the interview is to get insight from an administrator that has direct knowledge and work experience on the studied medical/surgical patient care unit. The nurse manager for the unit will be interviewed. The interview will take place in Phase III of the research.</td>
<td></td>
</tr>
</tbody>
</table>

**Central Nurse Work Area**

2. What are the top 3 aspects of the design of your central nurse work area that make it effective for nursing care?
3. What are the top 3 aspects of the design of your central nurse work area that make it ineffective for nursing care?
4. What are the barriers to accomplishing (insert top 3 tasks discovered in the guided walk through)

**Sub Nurse Work Stations**

6. What are the top 3 aspects of the design of your sub nurse work stations that make it effective for nursing care?
7. What are the top 3 aspects of the design of your sub nurse work stations that make it ineffective for nursing care?
8. What are the barriers to accomplishing (insert top 3 tasks discovered in the guided walk through)

**Preferences of Nursing Work Area Design**

9. Here are several different types of nursing units. Please rank these with 1 being your favorite nursing unit configuration in terms of supporting the delivery of nursing tasks. – Once ranked: What are your top two choices and why? What are your last two choices and why?

10. Now that you have seen several different types of nursing units, what are the benefits of the medical/surgical unit here at this hospital? Does it perform efficiently during the course of daily nursing routines and tasks? Is it effective in supporting/influencing staff satisfaction such as stress reduction, long-term wellness, staff comfort, and staff efficiency? How so?

11. How could nursing work areas be improved on your unit?
12. In your opinion, what are the ideal adjacencies to the central nurse work area and the sub nurse work stations.

**Supplemental Questions (developed during phase I and II of the research)**

13
14
15
15
## Focus Group Procedure and Questions

The purpose of the focus groups is to get insight from the staff that work on the medical/surgical unit on a regular basis. There will be several focus groups at each hospital. Every attempt will be made to ensure a good cross section of the nursing staff is recruited and participates. Each person participating in the focus group will sign an informed consent agreement and a confidentiality agreement to ensure that participants feel comfortable being totally open and honest about their comments and suggestions.

The focus groups will take place at each hospital after the building walkthrough, observations, and interviews have been completed.

### Central Nurse Work Area


2. What are the top 3 aspects of the design of your central nurse work area that make it effective for nursing care?

3. What are the top 3 aspects of the design of your central nurse work area that make it ineffective for nursing care?

4. What are the barriers to accomplishing [insert top 3 tasks discovered in the guided walk through]

### Sub Nurse Work Stations


6. What are the top 3 aspects of the design of your sub nurse work stations that make it effective for nursing care?

7. What are the top 3 aspects of the design of your sub nurse work stations that make it ineffective for nursing care?

8. What are the barriers to accomplishing [insert top 3 tasks discovered in the guided walk through]

### Preferences of Nursing Work Area Design

9. Here are several different types of nursing units. Please rank these with 1 being your favorite nursing unit configuration in terms of supporting the delivery of nursing tasks. – Once ranked: What are your top two choices and why? What are your last two choices and why?

10. Now that you have seen several different types of nursing units, what are the benefits of the medical/surgical unit here at this hospital? Does it perform efficiently during the course of daily nursing routines and tasks? Is it effective in supporting/influencing staff satisfaction such as stress reduction, long-term wellness, staff comfort, and staff efficiency? How so?

11. How could nursing work areas be improved on your unit?

12. In your opinion, what are the ideal adjacencies to the central nurse work area and the sub nurse work stations.

### Supplemental Questions (developed during phase I and II of the research)

13

14

15

15
Consent Form for Participation in a Research Study
Laura Hamm and Clemson University

Improving the Work-Environment for Nursing Staff- Interviews

You are invited to participate in a research study being done by Laura Hamm, a graduate student at Clemson University in the School of Architecture, and conducted at [insert hospital unit A and B - Spartanburg Regional Medical Center (4-Tower and 4-West) and The Village Hospital at Pelham (3rd Floor Med/Surg)]. You are being asked to volunteer since you meet the requirements for participation in this study. You should read the information read the information below and ask questions about anything you do not understand before deciding if you wish to participate. If you choose not to participate, there will be no loss of compensation, benefits, or services to which you are otherwise entitled.

Purpose of the study
The purpose of this research is to understand how the physical environment of the medical/surgical patient care unit at [insert hospital unit A and B - Spartanburg Regional Medical Center (4-Tower and 4-West) and The Village Hospital at Pelham (3rd Floor Med/Surg)] effects the direct patient care staff including their clinical efficiency and effectiveness.

Procedure
If you volunteer to participate in this part of the study, the research team will divide the participants into discussion groups based on shift most commonly worked (day, night, weekend day, and weekend night). Each group will include 4-8 participants and will take about 45 minutes to complete. During the focus group, the facilitator (Laura Hamm) will lead a discussion using a standard list of questions. They research will keep all comments made in the focus group confidential. However, we cannot assure full confidentiality due to other participants and their possible disclosure or repeating of...
information shared. In an effort to thwart possible disclosure, we will instruct all participants to keep the comments made during the session confidential. This study should last through November 2010.

**Potential Risks and Discomforts**
The risks involved in completing this study are minimal and are similar to your regular level of risk or discomfort during work. There is a minimal risk that confidentiality (knowledge of your work performance) may be breached; however the research personnel will maintain procedures to mitigate this risk. Any data reported will be in summarized form (along with other observations from other respondents) and will not be able to be attributed to a single person. Given the demands nursing, participation in this focus group will interrupt your daily work and task completion for about 45 minutes.

**Anticipated Benefits to Participants**
You are not likely to directly benefit in any way from participation in this study. However, we hope that this research will help us determine factors of the medical/surgical patient care unit at [insert hospital unit A and B - Spartanburg Regional Medical Center (4-Tower and 4-West) and The Village Hospital at Pelham (3rd Floor Med/Surg)] that affect the nursing staff efficiency, effectiveness and satisfaction.

**Third Party Compensation**
This research is being done by a graduate student for a master’s of science thesis project thus no compensation will be given to the student researcher or other parties. The unit manager and staff will not receive reimbursement dollars or credits for your participation.

**Confidentiality**
The research team will do everything we can to protect your privacy. The following procedures will be followed to ensure your personal information is kept confidential in this study:

The data collected about you will be kept private to the extent allowed by law. To protect your privacy, your records will be kept under a code number rather than by name. These records will be kept in locked files and only specific members of the research team will be allowed to look at them. Your name and any other fact that might point to you will not appear when the results of this study are presented or published.

This consent form, which contains your signature, will be kept separate from data generated from this experiment in a secure location. When the study is completed, all files will be in a locked file cabinet for archival purposes. Once all of the research has been completed and thesis manuscript written, all files will be destroyed.

In rare cases, a research study will be evaluated by an oversight agency such as the Clemson University Institutional Review Board or the Federal Office for Human Research Protections, which would require that we share the information we collect from you. If this happens, the information would only be used to determine if this study was conducted properly and adequately protected your rights as a participant.

Furthermore, the entire process will comply with all applicable HIPAA requirements. There is no penalty for non-participation or withdrawal and your decision will be kept confidential. You may cancel you permission at any time by writing to Laura Hamm at the address given below. In the event of any publication regarding this study, your identification will not be disclosed.

**Study Completion**

This study is expected to end after all participants have completed each research component and all information has been gathered. This research will be completed by November 2010.

**Identification of Investigators**
If you have any question or concerns about this study or any problems arise, please contact Dr. Dina Battisto (864-656-3900) or Laura Ham (803-463-9678) at Clemson University. If you have any questions or concerns about your rights as a research participant, please contact Clemson University Institutional Review Board at 864-656-6460.

Rights of Research Participants
You participation in this study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

If you have any questions, comments or concerns, particularly regarding research ethics and rights, please contact the following:
  Talley Kayser  
  Research Compliance/IRB Program Manager  
  Spartanburg Regional Healthcare System  
  (864)560-1957

Signature of Research Participant
I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study and have been given a copy of this form.

Participant's Name: ________________________________

Participant's Signature: ___________________________ Date: ____________

Address: ________________________________________
Consent Form for Participation in a Research Study

Laura Hamm and Clemson University

Improving the Work-Environment for Nursing Staff- Focus Groups

You are invited to participate in a research study being done by Laura Hamm, a graduate student at Clemson University in the School of Architecture, and conducted at [insert hospital unit A and B - Spartanburg Regional Medical Center (4-Tower and 4-West) and The Village Hospital at Pelham (3rd Floor Med/Surg)]. You are being asked to volunteer since you meet the requirements for participation in this study. You should read the information below and ask questions about anything you do not understand before deciding if you wish to participate. If you choose not to participate, there will be no loss of compensation, benefits, or services to which you are otherwise entitled.

Purpose of the study
The purpose of this research is to understand how the physical environment of the medical/surgical patient care unit at [insert hospital unit A and B - Spartanburg Regional
Medical Center (4-Tower and 4-West) and The Village Hospital at Pelham (3rd Floor Med/Surg) effects the direct patient care staff including their clinical efficiency and effectiveness.

**Procedure**
If you volunteer to participate in this part of the study, the research team will divide the participants into discussion groups based on shift most commonly worked (day, night, weekend day, and weekend night). Each group will include 4-8 participants and will take about 45 minutes to complete. During the focus group, the facilitator (Laura Hamm) will lead a discussion using a standard list of questions. They research will keep all comments made in the focus group confidential. However, we cannot assure full confidentiality due to other participants and their possible disclosure or repeating of information shared. In an effort to thwart possible disclosure, we will instruct all participants to keep the comments made during the session confidential. This study should last through November 2010.

**Potential Risks and Discomforts**
The risks involved in completing this study are minimal and are similar to your regular level of risk or discomfort during work. There is a minimal risk that confidentiality (knowledge of your work performance) may be breached; however the research personnel will maintain procedures to mitigate this risk. Any data reported will be in summarized form (along with other observations from other respondents) and will not be able to be attributed to a single person. Given the demands nursing, participation in this focus group will interrupt your daily work and task completion for about 45 minutes.

**Anticipated Benefits to Participants**
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This research is being done by a graduate student for a master’s of science thesis project thus no compensation will be given to the student researcher or other parties. The unit manager and staff will not receive reimbursement dollars or credits for your participation.

**Confidentiality**
The research team will do everything we can to protect your privacy. The following procedures will be followed to ensure your personal information is kept confidential in this study:
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In rare cases, a research study will be evaluated by an oversight agency such as the Clemson University Institutional Review Board or the Federal Office for Human Research Protections, which would require that we share the information we collect from you. If this happens, the information would only be used to determine if this study was conducted properly and adequately protected your rights as a participant. Furthermore, the entire process will comply with all applicable HIPAA requirements. There is no penalty for non-participation or withdrawal and your decision will be kept confidential. You may cancel you permission at any time by writing to Laura Hamm at
the address given below. In the event of any publication regarding this study, your identification will not be disclosed.

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Talley Kayser
Research Compliance/IRB Program Manager
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**Signature of Research Participant**
I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study and have been given a copy of this form.

Participant’s Name: ___________________________________________

Participant’s Signature:_________________________ Date: ____________

Address: _____________________________________________________________________

Signature of Witness

Witness’s Name: ___________________________________________

Witness’s Signature: ____________________ Date: _____________
CREDITS

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Fig. 22. Chart: from Lawton's *Environment and aging*, p.10

Fig. 23. Plans: Produced during research study

Fig. 24. Chart: Produced during research study

Fig. 25. Chart: Produced during research study

Fig. 26. Photo: from photo-documentation of research case study units

Fig. 27. Plan: Produced during research study

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Fig. 35. Photo: from photo-documentation of research case study units

Fig. 36. Plan: Produced during research study

Fig. 37. Photo: from photo-documentation of research case study units
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