DISSERTATION

ENVIRONMENTAL AFFECTS ON TEAMWORK:

CASE STUDY OF A TRAUMA AND SURGICAL

INTENSIVE CARE UNIT

Submitted by

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School of Education

In partial fulfillment of the requirements

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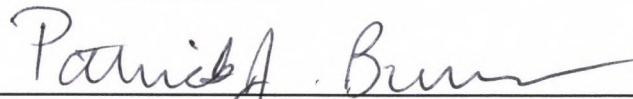
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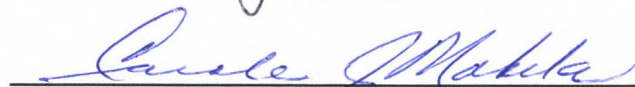
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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY DEBORA A. MONTGOMERY-COLBERT ENTITLED ENVIRONMENTAL AFFECTS ON TEAMWORK: CASE STUDY OF A TRAUMA AND SURGICAL INTENSIVE CARE UNIT BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.
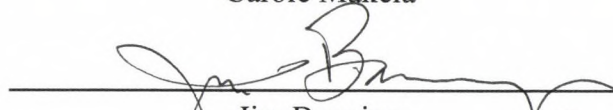
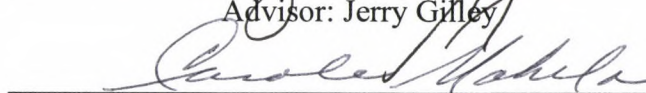Committee on Graduate Work

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ABSTRACT OF DISSERTATION

ENVIRONMENTAL AFFECTS ON TEAMWORK: CASE STUDY OF A TRAUMA

AND SURGICAL INTENSIVE CARE UNIT

The research was conducted to identify how the physical environment shapes

teamwork with regards to communications and role assignments in a Trauma and

Surgical Intensive Care Unit (TSICU). The site was selected due to my personal

experience with the trauma team and the environment. Ten team members included in the

study consisted of personnel from facilities, emergency room staff, surgeons, nursing

staff, trauma coordinators, and administrators. The participants were purposefully

selected with multiple sources of data being collected with both photo-solicitation and

photo-elicitation to bring deeper meaning to the interpretation of the data.

This qualitative study collected participants' descriptions of their perspectives

utilizing the photographs each individual took of their work environment. These

photographs were the catalyst for interviews to answer the research questions. The

photographs and interview comments were then analyzed and coded to identify

similarities and differences among the participants. The photographs were first sorted to

determine the number of pictures that were of the same areas and which pictures were the

outliers of lone environmental factors. Each of the photos and the participant responses

were coded and clustered to identify areas of focus. From these areas of focus, themes

environment on team efficiencies, the connections to the literature, and expansion of the current body of knowledge of the organizational effects.

The themes that emerged from this photo elicitation were rich descriptions of physical elements identifying positive environmental effects on teamwork within the trauma team. The themes that emerged from the photographs and interviews, including multi-agency teamwork, resuscitation room design, elevator and hallways, signage, patient rooms, equipment and supply rooms, communication, and roles and responsibilities, have shown that the physical environment has been deliberately built with teamwork as the main premise.

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The research and writing of this dissertation has been an incredible journey that has brought together all the pieces of this educational puzzle with me being able to utilize the knowledge and learning experience that has taken place over the last seven years. There are many people who have been an integral part of this passage that must be acknowledged and thanked beyond these words. I started this journey the year that my father was diagnosed with pancreatic cancer. I wish you were here with me physically. Thank you, Dad for loving me unconditionally my entire life and for asking me to finish this PhD. This is for you. I had no idea what a trek it would be! I would like to thank the following people for their support and encouragement:

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CHAPTER 1

"When I hear music I fear no danger, I am invulnerable, I see no foe. I am related to the earliest times and to the latest," (Henry David Thoreau, 1817-1862).

Introduction

The individual tune of one instrument complements the music of other instruments within the various orchestra sections to produce magnificent symphonies. Medical teams work in much the same manner as an orchestra with each team member having an individual part to play while maintaining harmony and grace within the whole.

This case study investigates the physical environment of the Medical Center of the Rockies (MCR) Trauma and Surgical Intensive Care Unit (TSICU) to examine the natural setting and its influence on the perspective of the team's organization and their ability to work together.

Poudre Valley Health System, Retrieved 3.8.08

MCR is a part of the Poudre Valley Health System which "provides a regional network of health care services for the people of northern Colorado, southern Wyoming,

and western Nebraska" (PVHS Homepage, retrieved 3/8/08). MCR opened for business in February of 2007. The MCR environment was designed with the overall mission "to provide innovative, high quality, comprehensive care that exceeds customer expectations. Taking care of patients is why Poudre Valley Health System exists. Taking great care of patients is why Poudre Valley Health System excels" (PVHS Facilities, retrieved 4/5/08).

Standing in the lobby, it's common to hear visitors' comments: "looks like a resort"," an expensive hotel", "welcoming"," a healing place", and many other descriptors. My first experience with MCR was taking my daughter, who was running an extremely high temperature and wasn't feeling very well, through the emergency room where we were welcomed into a clean, nicely decorated reception area. The person behind the desk wasted no time in getting us to see a nurse for an assessment. We were not asked for any insurance information, our full names or anything except the reason that we were there, before being taken to see the medical team. Prior to that day, we had not experienced this new system of entry into an emergency medical environment or seen this level of patient care. Our experiences had been waiting in the emergency room lobbies to fill out paperwork and then duplicate that paperwork several times over before ever seeing anyone qualified to assess the medical situation.

Little did I know at my initial entry into MCR that our family would be making many trips into this facility. Each entry point into MCR -- and we saw many of them over the course of a month -- was clean and inviting no matter the time of day or night. However, even in the midst of my family's emergency, the environment and the team's productivity were apparent as team members worked in harmony. As a lifelong student of organizational development, I recognized the extremely high level of well orchestrated

teamwork. I watched with a sense of wonder as different doctors, nurses, surgeons, and others worked together efficiently to care for patients.

The TSICU is a highly functional team of medical healthcare personnel from various units all working together to save lives. The level of communication, shift change pass through of information, computer systems that tie each team member to their patients, and the team effort witnessed by our family were extraordinary. There are surgeons, nurses, pulmonologists, disease control experts, facilities personnel, nutritionists, pharmacists, and others all working together in harmony in this life and death symphony. "And at the same time, you are of course a performer, but it's very important that you understand that your role as a performer is to get the best performance from those wonderful colleagues that you have the chance to work with" (Thomas, n.d.).

Organizational development, especially as it pertains to functional teams, is a highly researched yet growing area (e.g., French & Bell, 1995; Robinson & Cottrell, 2005; Rodriguez, 2007; Saltman, O'Dea, Farmer, et al, 2006; Szekendi, 2007). Teams are being studied in many different frameworks and the emerging research on environmental impacts on teams and how they function is expanding. The current leadership and management literature seems much more focused on what is not working within teams and their work than what is working from the organizational development perspective. However, the literature regarding architectural design and the documented impacts of environment on teams in the healthcare industry shows an increased awareness of positive teamwork as a result of physical environmental design (e.g., Berry, Parker, Coile, et al, 2004; Delvin & Arneill, 2003; Detmer, 2003; Eisenberg, Bowman, & Foster, 2001; Guenther, Vittori, & Atwood, 2006; Johnson & Baum, 2001) . Architectural design

and sustainable environmentally friendly buildings have been the focus of the healthcare industry for more than a decade (Guenther, Vittori, & Atwood, 2006). This trend began with the passage of several laws including Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. Ron Mace (1985) coined the phrase *Universal Design* to include architectural and product designs that provided equal access for everyone. Post-occupancy evaluations (POE) began in the late 1960s and have been traditionally completed with the use of surveys, questionnaires, site visits, and observations (Federal Facilities, 2001). Zimring and Rosenheck (2001) connect organizational learning to the POE to determine feedback loops regarding the physical environment's impact on organizations' performance and ability to make changes quickly and efficiently.

Environmental impacts on teamwork are interesting to research as the environment at MCR was deliberately designed with the functions of teams in mind. This case study has the potential to add to the body of knowledge with regard to teamwork in learning organizations, corporations, and other enterprises as design is utilized to bring workers together in new ways to promote and enhance the utilization of space and make processes more efficient and effective.

Research Question

The initial research question is: How does the physical environment shape teamwork with regards to communications and role assignments in a Trauma and Surgical Intensive Care Unit (TSICU)? This question came from my observations of doctors, nurses, pharmacists, surgeons, facilities, pulmonologists from all areas of the trauma center utilizing the same desk spaces, break rooms, and other shared spaces

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throughout MCR. This study is an examination of the MCR facility, specifically the shared spaces, and the environmental impacts on the TSICU team of various shifts. Team members included personnel from facilities, emergency room staff, surgeons, nursing staff, trauma coordinators, and administrators as the study's participants.

This initial question led to several operational questions: What are the influences of the physical environment on building and maintaining teamwork by creating shared work areas where people have the opportunity of close interaction? How has the design of MCR influenced communications and team efficiencies for TSICU team members?

Teams and teamwork are crucial to delivering services and the way business is conducted as teams make decisions and changes quickly and easily. This research strives to determine the influences of the physical environment on a team's effectiveness in a health care setting with life and death outcomes. According to Lencioni, "Not finance. Not strategy. Not technology. It is teamwork that remains the ultimate competitive advantage, both because it is so powerful and so rare" (2002, p. vii).

Significance of the Study

This research has the potential to add to the emerging body of knowledge regarding the uses of benchmarks from the research completed by the Board of Directors of The Center for Health Design (n.d.) and the theory of evidence-based design. One member, J. Malkin published *A Visual Reference for Evidence-based Design* (n.d.), that examines the useability of space in treatment areas, patient rooms, and other shared spaces. These findings suggest that sustainable design applications end at the lobby and the remaining environment lack "design features beyond the functional layout of equipment" (p. xii). Hamilton (2006) depicts "Evidence-based healthcare designs are

used to create environments that are therapeutic, supportive of family involvement, efficient for staff performance, and restorative for workers under stress." According to Zeisel, environmental behavior (EB) studies the way in which "a physical environment supports or interferes with behaviors taking place within in it, especially the side effects the setting has on relationships between individuals or groups" (2006, p. 191). The design integrates research, needs of the clients, input from the community, clients, staff, and others with sustainable design to create environments intended to increase patient and family experiences and improve cost-effectiveness of health care facilities.

In this case study, participants took photos of the areas in the TSICU environment, which became the bases of interviews to examine the influences of the physical environment design on the TSICU team functions, team communications and role assignments. This study also explored the influences of the surroundings on building and maintaining team efficiencies.

According to the *Green Guide for Health Care* (2008), more research is needed in optimizing team performance within the built environment and the sustainability of operations, which is what this study set out to determine. This study has several noteworthy dimentions as the information gathered through this case study may provide valuable insights for MCR and this information may be utilized in other areas of health care systems in future planning. This study also provides opportunity to develop tools to examine the environmental influences on teams from their perspectives in various areas of organizational development.

As I was in the midst of a life-changing experience, the team environment became extremely important. Because of my background in organizational development, team

cohesiveness became more apparent with each person I came in contact throughout the organization. The way in which the TSICU is laid out with computer access, conference rooms, patient room locations in relation to the nursing staff, and access to equipment available to the medical team, all seemed to have a positive influence on the ability of the team to perform. The review of the literature shows the environmental impacts on teamwork have been identified and integrated within the healthcare industry over the past decade; however there is a need to expand this research into other team environments (Forrester & Drexler, 1999; Nembhard & Edmondson, 2007; Tucker, Robinson, & Cottrell, 2005; et al.).

Teams

Teams have been identified as two or more people working toward a common goal. Teams are especially appropriate for performing tasks and responsibilities that are extremely complex and/or comprised of interdependent subtasks. In highly functional teams there are usually members with complementary skills, a common language, and the ability to generate synergy through coordinated efforts, which allow each member to maximize his/her strengths and minimize his/her weaknesses to meet the needs of the team (Saltman, et al., 2006).

According to the U.S. Office of Personnel Management

"Teams" are two or more people who must coordinate their activities to accomplish a common goal. Teams are a way of organizing people to support inter-dependence and cooperation that requires close coordination among the team members. Team performance includes both the outputs produced by the group or team as a whole, as well as the contribution of individual team members to the success of the team' (U.S. Office of Personnel Management, n.d.).

For the purpose of this study, the definition I use is a combination of these definitions. Within health care, teams would be highly functioning groups with a

common language and complementary skills needing to be highly organized to support each member providing the best care possible to patients. Teams in health care settings must perform under the pressures of the ultimate goal of saving lives, while many other teams may function at a high level but not in life or death situations.

History

For as long as humanity has been working together toward a common goal, initially to hunt and gather, teamwork has been essential to survival. It was in the 1950s when studies of organizational development teams were viewed in a different way, with individuals working together rather than separately to increase productivity, save time and money, increase communication, and utilize shared resources (French & Bell, 1995). Teams can bring increased productivity to an organization because they have much more flexibility to complete a project more quickly and efficiently than individuals working alone. "Teams out perform individuals acting alone or in large organizational groupings, especially when performance requires multiple skills, judgments, and experiences " (Katzenbach & Smith, 1996, p. 207). Successfully functioning teams have incorporated trust among team members, are not afraid to voice conflicting opinions, have a shared commitment to the goals of the team, and are willing to hold themselves accountable with a focus on attaining the mission of the team (Lencioni, 2002).

Groups, as opposed to teams, are people who may work toward a common goal, sharing information while keeping their professional specialties separate. However, the team environment tends to blur areas of specialties to incorporate multi-skills to provide best practices and team achievements (Saltman, et al., 2006). Table 1 compares criteria characterizing specific differences between groups and teams including a shared

commitment, collaborative decision making, and a strong sense of purpose, which has been developed in association with the team and management.

Table 1: Comparison between groups and teams. (Saltman, O'Dea, Farmer, Veitch, Rosen, & Kidd, 2006, p. 55).

Criteria	Group	Team
Accountability	Individual	Individual and Collective
Commitment	Individual	Shared
Conflict Resolution	May be part of process	Essential part of process
Creativity and contribution	Not confined to tasks	Within tasks
Effectiveness measures	Direct external assessment of individual performance	Direct
Interactions	Information sharing	Problem solving
Leadership	Shared, determined by task	Strong leader
Measure of productivity	Sum of individual bests	Single
Operation	Discuss, decide, delegate	Discuss, decide, collaborate
Ownership	Individual work	Whole project
Participative decision making	Optional	Expected
Personal development	Optional	Expected
Purpose	Discrete for each member	Devised by team and management
Size	Small or larger	Defined and small
Skills	May be overlapping	Discrete for each member and sometimes under development
Trust	Optional	Developed and essential
Understandings	Can be different	Works towards shared goals
Work products	Individual	Unified, more than the sum of parts

Teams in Medical Environments

Teams of people from multiple agencies such as those in most medical centers, according to the literature, need to realize the importance of planning, sharing information, and having the support of upper management to function at a high level of efficiency (Robinson & Cottrell, 2005). Working together in a team environment is the preferred arrangement in health care fields (Saltman, et al., 2006). Multiagency teams in "palliative" health care have shown evidence of increased patient and family satisfaction and shorter patient stays, which decrease costs (Hearn & Higginson, 1998). Multiagency teams increase the need for communication among physicians, nurses, and other medical staff with the patient and family. To achieve improved patient care and satisfaction levels, members must be dedicated to the team and establish relationships in which

discussion and feedback are freely shared using multiple communication media --
electronically via phone, e-mail, computerized patient charts, and face-to-face, to
determine and deliver treatment methods. Health care professionals in multiagency teams
have higher levels of communication in an environment that has established shared
vision, goals, and roles (Miller, Jones, Barry, & Saunders, 2005). Another example is
emergency services personnel who develop a high level of trust within a team, allowing
for quick decisions and accountability to the team as well as those receiving services
(Lencioni, 2002).

"Just as music produces a kind of pleasure, [a team working in harmony in health
care has shown evidence] which human nature cannot do without" (Confucius, 551-479
BCE).

Environmental Considerations

Universal Design

The definition of universal design according to Sandhu (2001, p. 3.4), "is a
concept that extends beyond the issues with accessibility standards for people with
disabilities and offers a powerful rationale for responding to the broad diversity of users
who have to interact with the built environment." The concept of universal design began
in the United Kingdom in 1944 with accessibility of populations with disabilities to
housing, employment, and transportation. World War II veterans returning home needed
to be able to work to take care of their families which demanded accessibility to jobs
(Sandhu, Moore, Story, Sara-Serrano, & Mathaison, 2001).

By the 1960s, universal design became more inclusive of populations with
disabilities and had grown into a multidisciplinary design approach creating

environments for as many people as possible always taking into consideration human factors (Sandhu, 2001). The health care industry was instrumental in working with design for accessibility and usability of the environment and the spaces available. Examples of this inclusive design are included at MCR with adjustable computer stands, beds, and various other apparatus for health care providers and for patients with varying needs.

The term "Universal Design" was coined by Ron Mace in 1985 and focuses on social inclusion (Ostroff, 2001). This quickly transferred to other countries that expanded upon the idea that spaces and artifacts (stools, furniture, etc.) be more inclusive of all people and are not limited to mobility or disability. People are living longer and needing and demanding access to goods and services, which results in changes to architectural design and the design of consumer products from kitchen utensils to computers (Moore, 2001).

Post-occupancy Evaluation

Post-occupancy evaluation began over 30 years ago as a means to evaluate user satisfaction with buildings after completion and use for a period of time. According to the Federal Facilities Council (2001) "post-occupancy evaluation (POE) is a process for evaluating a building's performance once it's occupied. It is based on the idea that finding out about users' needs by systematically assessing human response to buildings and other designed spaces is a legitimate aim of building research" (p. v). POE is a way to encourage organizational learning, increase quality, and assess performance of the building/human interactions (Zimring & Rosenbeck, 2001). Corry (2001, p. 56.2) contends that POEs, evaluate buildings from "a universal design perspective effectively addresses the needs of all users."

Physical Environment and Behavior in Medical Facilities

Research conducted 35 years ago in environmental design, according to Calhoun, "entails consideration of need fulfillment at the individual, social and ecological levels of function" (1973, p. 50). It was determined research was needed to identify the environmental impacts that are part and parcel of sustainable design utilized to impact human behavior in eco-friendly surroundings. According to the U.S. Green Building Council in the *New Construction & Major Renovation Version 2.2 Reference Guide*, "Establishing sustainable design objectives and integrating building location and sustainable features as a metric for decision making encourages development and preservation or restoration practices that limit the environmental impact of buildings on local ecosystems" (2007, p. 21). Researchers need to become active participants to directly apply their perspective to the environment (Altman, 1973). Calhoun (1973) contends that without interacting with the individuals who utilize the structural environment, new paradigms would not be formed to guide the design process and assist in prioritizing design research for future universal needs. Research continues to show a need for work environments, which promotes design changes along with parallel cultural changes that provide opportunities for increased communications both planned and spontaneous to improve working conditions for team members and patient care (Detmer, 2003; Guenther, et al., 2006; Joseph, 2006).

In 1973 the non-profit U.S. Green Building Council was founded, which according to their website is:

> Composed of leaders from across the building industry working to advance buildings that are environmentally responsible, profitable and healthy places to live and work. Driving its mission to transform the built environment is the Council's LEED® (Leadership in Energy and Environmental Design) green

building certification system. LEED is a third party certification program and the nationally accepted benchmark for the design, construction, and operation of high performance green buildings." (http://usgbc.org; retrieved June, 10, 2008).

MCR brought together multiple stakeholders with architectural designers, building owners, engineers, construction companies, manager/owners, and others to fulfill their vision of "its own transformation to high-performance green building[s]" (U.S. Green Building Council, 2008). Eisenberg, Bowman, and Foster's research points out the need for employees' involvement into the design phase of construction to increase accessibility to needed technologies for optimum use.

Over the past decade, sustainable design in medical facilities has had great impacts on organization's operations and environments (Guenther, Vittori, & Atwood, 2006). MCR is a "LEED" Gold certified building, which means that construction was completed by meeting a certain number of energy and environmentally sound criteria. The building is made of "at least 20 percent recycled content and 50 percent of the materials— including stone, bricks and concrete—were obtained locally. Its recycling programs focused on concrete, drywall, wood, copper and steel diverting 79 percent of construction debris from the Larimer County landfill when MCR was under construction" (Poudre Valley Health Systems facilities features, Retrieved 4.5.08). This environmental mission can also be seen in the eco-friendly landscaping surrounding MCR.

Delimitations

The delimitations are utilizing the team of Medical Center of the Rockies (MCR) and specifically the TSICU team. The staff at the MCR's TSICU were professional and cared not just for my daughter but for our entire family. There was open communication with the doctors, nurses, specialists, and others so we knew what the prognoses were and

the plan of treatment which included participation of family members whenever possible. The participants, as members of the TSICU team in this case study, have been deliberately selected from the Emergency Department, Surgical Intensive Care Unit, Facilities, and Administration. It is likely the selection process is biased by the researcher because of the relationships which were established and assisted in gaining access to some of the team members. According to Creswell (1998), "The researcher needs to select a group (or an individual or individuals representative of a group) to study..." (p. 114), however he cautions qualitative researchers about the possibility of information being withheld or slanted if the researcher has past connections.

The physical environment of MCR is comforting and inviting for families with many amenities such as kitchens, showers, game rooms, and beds. Families are encouraged to be an integral part of the treatment of patients, which the physical design of the facility permits. Our family was able to stay in the TSICU unit throughout the month for as much time as we were able or desired. This environment has been deliberately selected for the research so the findings may not be generalized to other settings.

This case study utilizes photos and interviews of TSICU staff participants, the photographs were taken by the participants'. Instructions were given to participants to guide them in taking photographs of the design features and common areas important and conducive or detractive to a team environment. The data have been included in this examination of the direct role of the physical environment in the fostering and development of functional teams.

Assumptions

"Many hands make light work" is a saying that I've heard throughout my life. The assumption regarding teams and teamwork brought to the research is that teams are an effective way to utilize the strengths and minimize the weaknesses of each team member. Teams committed to a shared vision have open communication with feedback/accountability loops built in and the ability to make decisions quickly to meet the demands of the situation. These also are the building blocks for a successful organization. It is my assumption that people working in the healthcare system would naturally be committed to a team environment, which may not necessarily be accurate.

Assumptions regarding universal design have been a long term interest to the researcher. As a member of the Disabilities Advisory Commission to the City of Loveland, Colorado during the late 1980s to early 1990s, I was on the team that worked with city officials to develop standards for retrofitting existing buildings, crosswalks, curb cuts, and new building designs during the implementation of the Americans with Disabilities Act (ADA) of 1990. The guiding mission was: "The Disabilities Advisory Commission makes recommendations to the City Council on problems relating to handicapped persons and their interaction with the community. In addition, the commission reviews building and development plans and advises city staff on matters of handicapped accessibility" (City of Loveland, retrieved May 3, 2008). The Commission established a yearly event called "Barrier Awareness Day" in which members of the community come together to experience the barriers faced each day by people with disabilities. This event has brought about many changes within the city throughout the years. Being an advocate for accessibility for all peoples, this study brings together both

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areas of interest - teams and 'universal design' - into a project that explores a health care environment.

Researcher's Perspective

Throughout the research study, I have attempted to assure the credibility of the study by asking several questions including: Has the research been completed in a systematic way?; Why would anyone believe the information?; What are my personal lenses/biases?; What have I done as the researcher to ensure the reader knows these biases? Some of the lenses through which I view the world include the organizational performance and change perspective that looks at process and productivity of organizations and group interactions and a feminist research perspective in which "the goals are to establish collaborative and non-exploitative relationships, to place the researcher within the study so as to avoid objectification..." (Creswell, 1998, p. 83). One bias that needs to be divulged is awareness and activism for accessibility issues. Another bias I bring to the study is the fact that I did spend a significant time in the environment and have made some initial judgments including that SICU is a successful team! If the outcome of my personal experience had been different, I may have felt differently about the team environment. My initial contact with this team's environment began before this research project came about, however I do not think that the research would have been approached or interpreted any differently if this experience had not occurred. This has been an area of interest to me for many years and this experience brought together this interest with a facility and team to examine.

I spent an entire month in TSICU observing teamwork as the unit's patients came and went. Even in the times when I did not know whether there was a chance for hope in

my family's situation, I was inspired by the level of teamwork involved and the level of care given to the patients by the staff as well as to each other. After several days of standing back and surveying this multi-agency team in action, I asked to participate in the care of my loved one. At first, I was given simple tasks to keep busy like massaging legs and such. Soon I became an active member of the team within the TSICU assisting with dressing changes, personal care, repositioning my daughter, and other tasks.

My perspective as the researcher is one of being very much intrigued by the teamwork model that I witnessed firsthand in TSICU. Because of this experience, this research is an interpretation of the environment and the influences of the physical design on teamwork.

"There are two golden rules for an orchestra: start together and finish together. The public doesn't give a damn what goes on in between" (Sir Thomas Beecham).

CHAPTER 2

Review of Literature

"There are not more than five musical notes, yet the combinations of these five give rise to more melodies than can ever be heard" (Sun Tzu, 500 BC).

The review of literature begins by looking at research concerning teams and specifically teams in health care environments. The main ingredients for a successful team are a shared mission, an environment that provides mechanisms for clear and effective communication, clearly established roles and responsibilities, and the support of the administration (Forrester & Drexler, 1999; Gilley & Maycunich, 2000; Hearn & Higginson, 1998; et.al). A shared mission helps a team by providing a framework for communication, goals, accountability, and an environment where differing points of view can be aired. In health care settings, a shared mission and communication within teams are vital to the health and welfare of patients. Roles and responsibilities may not be as easy to define in health care where decisions must be made quickly and action taken immediately in some instances that tend to blur assignments. Communication becomes increasingly important as the team environment provides learning opportunities and accountability/feedback loops to improve patient care. (Joseph, 2006; Szekendi, 2007; Tucker, Nembhard & Edmondson, 2007).

The literature review examines architecture and design changes that have taken place since WWII. Universal Design is explored along with physical environmental influences on behavior including universal design and post-occupancy evaluation (POE) (Moore, 2001; Preiser, 2005; Szekendi, 2007; US Green Building Council, 2008; et al.). The definition and use of universal design has expanded through the years due to policy

changes and efforts to include all people in the initial design throughout the process to completion and occupancy of the building. The role of the behavioral sciences has been instrumental in increasing the use of universal design and how the built space will be utilized by obtaining feedback from people who are making use of the space through post-occupancy evaluations (Guenther, et al, 2006; Joseph, 2006; Lawton, 2001).

The review of literature concludes by examining the research surrounding qualitative case studies which utilize photographs, interviews, and member checking for data collection to determine the feasibility of the use of pictures within the study (Banks, 2001; Crotty, 2006; Heath & Mills, 2008; et.al).

Creswell's (1998) definition of case study as "an exploration of a 'bounded system' or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context" (p. 61). A case study based upon a conceptual framework gives the research credibility by the design. Baxter and Jack (2008) contend that identifying participants, data sources, and in-depth analysis also increases trustworthiness.

Teams

Many characteristics of effective teams have been identified (French & Bell, 1995) including a clearly defined purpose with open communication and clear roles and responsibilities. Another important element to the team environment is that each team member needs to have active participation with effective listening skills and the ability to disagree with other members. To have open communication, key elements are ground rules for informed disagreement, building a shared mission, shared leadership, and self-

assessment, which are agreed upon by all team members and communicated to new personnel as they join the team.

Once teams have been formed with effective characteristics agreed upon by the members, teams become energized by cohesiveness and commitment. Trust is established as team members' work together to gain confidence in the skills and abilities of each individual team member. "High-performing teams develop the right mix of expertise" (Bolman & Deal, 2003, p. 105).

Communication is stressed as the main component to establishing a cohesive team environment in the literature. Communication is most effective if the team has developed a model which includes trust, the ability to disagree with team members in constructive ways to bring about solutions, a commitment to the direction and plan of the team, accountability to each other and the team, and a clear focus on achieving results (Lencioni, 2002). To achieve this level of communication takes commitment and dedication to the organization and to each other as team members.

Tensions in the structure of an organization regarding specializations and integration of roles and responsibilities can be addressed by a formal structure incorporated with a networked, more flexible environment (Bolman & Deal, 2003). The structure of teams, according to Bolman and Deal, have the ability to shape the purpose set by management to respond to the demands and opportunities, translate this purpose into measurable goals, "develop a common commitment to working relationships" and hold "themselves collectively accountable" (2003, p. 105-106).

Gilley and Maycunich contend that the administration in conjunction with human resource consultants require competencies in teamwork to plan, coordinate, and evaluate

team performance (2000, p. 245). Forrester and Drexler (1999) have developed a model

for "team-based organization performance" which includes the following critical issues:

> [F]ormation, getting the right pieces in place and fitting them
> together; dependability, making reliable connections between parts;
> focus, targeting the direction and goals of the organization and its
> accountability processes; buy-in, the ownership of and involvement
> in the organization's work and the issues of power and control;
> coordination, achieving smoothness and consistency in an
> organization's operations; impact, the impression the organization
> makes on itself and its clients; and vitality, the energy that starts and
> sustains the organization over time, and the capacity it has to learn
> and adapt (p. 36).

Team building meetings and exercises help to establish relationships among team

members and need to be conducted in an open environment so the purpose, goals,

processes, and assessments can be discussed and agreed upon. Several interventions have

been identified by French and Bell (1995) to assist in team building which increase cross

functionality, interdependency, and clearly defined roles and responsibilities so a team is

able to create an efficient model. "The reason team-building produces such powerful

positive results is because it is an intervention in harmony with the nature of

organizations as social systems" (French & Bell, 1995, p. 193). This type of environment

establishes an effective team able to make quick decisions and take the organization

forward in the fast-paced marketplace.

The culture of an organization and established rules of participation are keys to

determining the level of communications within teams (Szekendi, 2007). The culture of

an organization, which directly influences communications, can be changed and shaped

by the people involved to be either inclusive or exclusive depending on the relationships

among team members, administration, and the larger organization. London and Sessa

(2007) contend that teams need to integrate continuous learning with continuous

communications for teams to "become like a musical ensemble, always in synch" (p. 658).

Teamwork in Medical Environments

"I love to hear a choir. I love the humanity to see the faces of real people devoting themselves to a piece of music. I like the teamwork. It makes me feel optimistic about the human race when I see them cooperating like that" (Paul McCartney, n.d.).

Research conducted by Robinson and Cottrell (2005) explored the "impact of multi-agency participation on: professional beliefs; professional roles and identities; knowledge creation, including information-sharing; and activities at the boundaries between teams and agencies" (p. 548) within healthcare. Their study found that teams develop methods to communicate, disagree, and work together creatively if there are common values and a respectful, engaging environment. Establishment of team environments takes commitment at each level of the organization from senior management to doctors, nurses, and the entire staff, according to the literature. Rodriguez (2007) contends that multi-disciplinary health care teams provide opportunities to increase communications, which directly influences the care of patients. He concluded "Clinical teams appear to have the potential to provide superior quality relative to care by an individual physician" (Rodriguez, 2007, p. 102).

Communication

The primary focus of Szekendi's (2007) study, conducted with six medical teams in one medical facility, was to determine communication processes between advanced practice nurses and physicians and the effectiveness of these processes in patient care. The main form of communication continues to be "rounds" when doctors meet with the

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nurses and others to determine the course of action for the day. Other modes of communication were the pager system, email, and computerized medical records within the facility.

Szekendi (2007) in her research of "communication among advanced practice nurses and physicians working in teams in an acute care setting" concluded based on her findings that while these teams that she studied were established in the early 1970s, more research is needed to evaluate how teams are communicating and performing together to meet the needs of the patients.

The culture of the multi-agency health care teams can limit access to the exchange of knowledge within teams unless communication is clearly established so everyone has an increased understanding of the team goals and expectations. This may be difficult to accomplish within the health care system as the social structure of professional identities, status, and importance may directly interfere with communication systems (Robinson & Cottrell, 2005). To increase and improve communication among staff, training in communication skills, sustained team environment, consistency in communications, and an organizational structure with less hierarchy and more organizational support were found to be critical for effective communication, which improved care of patients (Szekendi, 2007). Clear communication with mechanisms for feedback must be integrated into the team environment to ensure all team members are included (Miller, Charles-Jones, Barry, & Saunders, 2005).

Roles and responsibilities

The establishment of roles within a team was identified as a barrier if the division of roles tended to be blurred. Areas of specialization became distorted as processes and

functions were redistributed to team members. One way to address this barrier is to have clear goals and objectives, which must be agreed upon by team members to clarify roles and responsibilities for service delivery and a shared direction within the team (Robinson & Cottrell, 2005). Concerns regarding resources and workloads decreased with the formation of goals and objectives because of a more defined vision and mission for the team. Another area connected with the blurring of specific roles, which can create considerable tensions among team members, is team member status as doctors, nurses, and other health care providers (Saltman, et al., 2006). Support from senior management is seen as crucial in the multi-agency team environment to encourage interaction among specializations. This support improved communications among team members as the informational exchanges among managers also increased.

Organizational support is necessary to set expectations of all team members on roles and responsibilities as well as how information is transferred among doctors, advanced practice nurses, and patients (Szekendi, 2007). Rodriguez (2007) explored the effects of team structure, role assignments, and organizational structure in a health care setting on the overall team experience and quality of care to the patients served and found organizational support is crucial for medical teams' ability to bring in required specialists or other team members when necessary for patient care.

Architecture

"I call architecture frozen music" (Johann Wolfgang von Goethe, 1749-1832).

Architectural design has changed since WWII when accessibility issues for returning veterans were examined and new paradigms created. The development of universal design standards lead the way with innovative design ideas for the world we

live in. Implementation of these principles has had a significant impact on the behavior of people living and working within accessible environments as has been seen in the research including post-occupancy evaluations.

Universal Design

The concept of accessibility began as a way to assist disabled veterans returning from wars back into the labor market to earn money to care for their families. Through the years accessibility expanded and legislation has been passed to provide access for people with all types of disabilities. Many policies, including Section 504 of the Rehabilitation Act and the Americans with Disabilities Act (ADA), have been developed in the United States to identify and rectify areas of inaccessibility (Osteroff, 2001). A set of standards was also adopted by the United Nations in 1993 for reasonable accommodations. These standards are not enforceable but are seen as important guidelines for accessibility as a social benefit and as "a moral obligation to implement as many of the provisions as they can" (Sara-Serrano & Mathiason, 2001, p. 11.3). The initial response to this legislation by the members of the United Nations was to retrofit facilities with accessibility-expanding elements such as grab bars, ramps, and parking spaces rather than new building design initiatives. It soon became apparent to architects that universal design could be implemented in new construction "both better and cheaper" to expand the accessibility for all people whether they had disabilities or not (Lawton, 2001).

The Center for Universal Design at North Carolina State University between 1994 and 1997 developed a set of guiding principles for universal design. The principles shown in figure 1 are intended to guide the design process with "functional integration" rather

than retrofitting existing designs which may carry social stigmas (Story, 2001).

Maslow's hierarchy of basic needs has been utilized and expanded upon in developing

universal design concepts.

The Principles of Universal Design
Version 2.0 – April 1, 1997
The Center for Universal Design
North Carolina State University
Compiled by advocates of universal design, listed in alphabetical order: Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story, and Gregg Vanderheiden.

Universal Design
The design of products and environments to be useable by all people, to the greatest extent possible without adaptation or specialized design.

PRINCIPLE 1: Equitable Use
The design is useful and marketable to people with diverse abilities.
Guidelines:
    1a. Provide the same means of use for all users: identical whenever possible; equivalent when not.
    1b. Avoid segregating or stigmatizing any users.
    1c. Provisions for privacy, security, and safety should be equally available to all users.
    1d. Make the design appealing to all users.

PRINCIPLE 2: Flexibility in Use
The design accommodates a wide range of individual preferences and abilities.
Guidelines:
    2a. Provide choice in methods of use.
    2b. Accommodate right- or left-handed access and use.
    2c. Facilitate the user's accuracy and precision.
    2d. Provide adaptability to the user's pace.

PRINCIPLE 3: Simple and Intuitive Use
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
Guidelines:
    3a. Eliminate unnecessary complexity.
    3b. Be consistent with user expectations and intuition.
    3c. Accommodate a wide range of literacy and language skills.
    3d. Arrange information consistent with its importance.
    3e. Provide effective prompting and feedback during and after task completion.

PRINCIPLE 4: Perceptible Information
The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
Guidelines:
    4a. Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
    4b. Provide adequate contrast between essential information and its surroundings.
    4c. Maximize "legibility" of essential information.
    4d. Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
    4e. Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

PRINCIPLE 5: Tolerance for Error
The design minimizes hazards and the adverse consequences of accidental or unintended actions.
Guidelines:
    5a. Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.

Figure 1. From Principles of Universal Design by Story, M.F., 2001, p. 10.7

The term universal design describes accessibility designs in all areas of people's daily lives including housing, employment, transportation, and health care. The implementation of universal design has the potential to bridge accessibility gaps among people around the globe; however, a "one size fits all" mentality does not work on a global scale, not even in one building. The concepts of universal design may need to be adapted for countries of varying social and economic status as the needs of the people are identified (Balaram, 2001).

Universal design standards have been expanded into every area of our lives and have resulted in mainstreaming the design process to include a much broader group of users (Lawton, 2001). According to Zeisel, "A particularly significant direction to pursue would be to evaluate more and different user groups to whom these principles apply and to determine the ways present environments do or do not support these needs" (2001, p.

8.13). Post-occupancy evaluation provides a method to study the effects of the physical environment and whether or not individual user's needs are met within the design.

Physical Environment and Behavior

Universal design standards and concepts need to be conveyed to constituency groups involved in the design process to appreciate the accessibility and utility that can be achieved. Consultants in the behavioral sciences are instrumental in furthering universal design. According to Lawton (2001, p. 7.12), the principles of behavioral design can be outlined as:

- Define the user group.
- Specify the ranges of user characteristics.
  - o Needs
  - o Competences
  - o Preferences
  - o Cultural and social patterns
- Define desired outcomes.
  - o Deficiency reduction
  - o Growth promotion
- Specify environmental affordances likely to enhance outcomes.
  - o Needs – meeting environmental features
  - o User-group-specific compensatory design features
  - o Consumer survey, focus group, and other approaches to elicit environmental preference
- Feedback cycle where universality is the goal.
  - o Redesign in expanded-design mode, according to the principles of universal design
  - o Redesign in special-user mode, preserving universality to the maximum degree possible while accommodating special needs
  - o Reshape both expanded and special-user trial designs in the direction of mainstreaming
- Post-occupancy evaluation.
  - o Observe environment in use
  - o Identify misuse, errors, and ambiguities of place designation
  - o Identify magnet areas or features
  - o Group discussion and instruction on optimal use of the environment

A balance of the behavioral design principles in the process that includes the users of the space allows for environments meeting the majority of needs. According to

Managing Office Technology (1998), there has been a growing popularity of design in group work spaces without much regard to the needs of the individual. Office space designs, assuming similar tasks, have concentrated on spaces conducive to collaboration and communication among groups of workers. However, there is a need to have space available where workers can concentrate without interference to process information, write reports, and be in a quiet environment. Managing Office Technology (1998) authors contend that asking employees about their needs in the work environment improves the overall design and allows for both the physical and sensory elements to be taken into consideration to provide work spaces that yield higher productivity from individuals and teams.

Design that addresses both universal design and behavioral design principles has become embedded into the missions of health care agencies to take "do no harm" beyond the doctor-patient relationship into entire community relationships and the health and well-being of all (Geunther, 2006). This can be seen at MCR as the welcoming environment extends beyond the front lobby into the patients' rooms, the cafeteria, the waiting areas, the surgical suite, and the intensive care units. According to the MCR website:

> "Special Features Support Goal of World-Class Care: To deliver the highest quality care for patients, Medical Center of the Rockies takes advantage of the latest medical technology, including a robotic-assisted surgical system, an electronic health records system, and advanced in-room telecommunications. The new hospital's family-centered design features all private rooms, complete with sleeper sofas for family members, and private corridors and elevators to move patients to and from their rooms.

> Medical Center of the Rockies was also designed with patient healing in mind. Most patient rooms enjoy a breathtaking view of Long's Peak. Walking trails,

courtyards with water features, and a rooftop terrace provide opportunities for patients and their families to relax and enjoy the outdoors.

Other special facility features include:

- family kitchens and showers
- a four-story atrium
- a sunlit chapel
- an outdoor pavilion
- "green building" construction

We also offer an outstanding environment for nursing practice - ... at the new Medical Center of the Rockies - with an exceptional staff dedicated to collaborative working relationships, teamwork, and excellent patient care" (https://vic.pvhs.org, retrieved 4.4.08).

MCR is Leadership in Energy and Environmental Design (LEED) Gold certified and employs more than 800 people. The marketing that is being done for this new hospital attracts patients and healthcare workers alike, as the main focus of the promotional materials is the quality environment (Loveland Chamber, 2008). The research conducted at MCR adds a different dimension to the POE as it has been done from an organizational performance and change perspective to explore the influences of the physical environment on building and maintaining a team within a hospital intensive care unit.

"As any jazz musician knows, it takes flexibility and adaptability for improvisation to create beauty" (Doc Childre and Bruce Cryer, From Chaos to Coherence).

Post-occupancy Evaluation

It was during the 1970s that post-occupancy evaluation (POE) was initially conceptualized as a method of measuring building design with regard to the needs of end users. POEs that are well developed to include universal design elements provide

feedback to "architects, interior designers, builders, owners, and manager of the needs of all users in all aspects of the built environment" (Corry, 2001, p. 56.1).

A process model was established to incorporate all of the universal design elements in contrast to the needs of the organization. Figure 2 shows this model, which has changed the way in which POEs are conducted within the built environment (Preiser, 2001a). The model ties the organizational performance to the environmental influences and establishes feedback loops for each universal design area.

Universal design principles versus performance criteria.
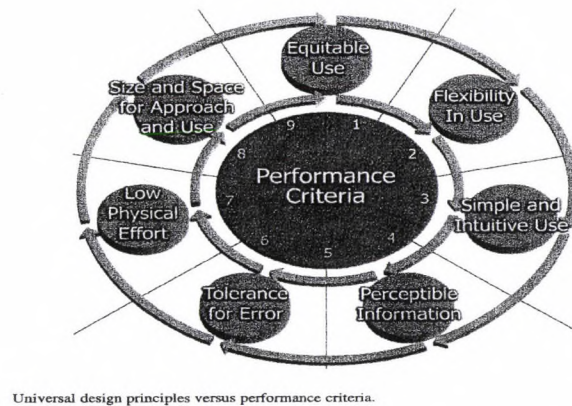
Figure 2: From Center for Universal Design (1997) in Learning from Our Buildings...(2001).

There have been many benefits identified by Zimring (2001) of conducting POEs including the following:

- Aids communication among stakeholders...

- Creates mechanisms for quality monitoring...

- Supports fine-tuning, settling-in and renovation of existing settings...

- Provides data that inform specific future decisions...

- Supports the improvement of building delivery and facility

  management process...

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- Supports development of policy as reflected in design and planning guides…

- Accelerates organizational learning by allowing decision makers to build on successes and not repeat failures (p. 45).

Some barriers that have been identified to post-occupancy evaluations are the "difficulty establishing a clear causal link between positive outcomes and the physical environment; reluctance by organizations and building professionals to participate in a process that may expose problems or failures or may be used as a method to focus (or deflect) blame; fear of soliciting feedback from occupants…may obligate an organization to make costly changes; and lack of participation by building users" (Federal Facilities, 2001).

As the world becomes more consumer driven there is growth in the area of quality control via continuous feedback loops. POE of universal design could become the feedback loop of evaluating user needs within the built environment. POEs completed with evaluation of universal design standards would help bridge the gaps between the building designers' and consumers' needs. POEs would help ensure a better functioning design for new developments if the information is utilized in simulation models of what does or does not work in an operational environment. While there are many product evaluations completed on the latest car, computer, or other products, there has not been much product evaluation research done in the built environment (Preiser, 2001a). This gap in the research may have been due to a lack of funding from architects, designers, or clients for POEs to be developed and administered, however the tide may be turning as

"additional case studies will be carried out and documented electronically while students are working for architectural and interior design firms" (Preiser, 2005, p. 177).

Case Study

The literature shows that even though considerable research has been done in universal design and the influences of the physical environment on accessibility, there remains a need for research in the area of the influences of the physical environment on the communications, role assignments, and team efficiencies within the health care system.

A case study was chosen for this research as this methodology "provides tools for researchers to study complex phenomena within their contexts" (Baxter & Jack, 2008, p. 544). This case study incorporates the participants and their views to describe what relationships emerge from the data utilizing varied data sources (photographs and interviews) to construct a framework upon which the case will be studied (Baxter & Jack, 2008; McCaslin & Scott, 2003; Tellis, 1997). The stages of "Photo-elicitation" as described by Rose (2007) are utilized to bring rich insightful information to the study. The research is based on "(1) how people interpret their experiences, (2) how they construct their worlds, and (3) what meaning they attribute to their experiences" (Merriam & Associates, 2002, p. 37-38). The epistemology as defined by *The American Heritage Dictionary* (retrieved July 15, 2008) as "the branch of philosophy that studies the nature of knowledge, its presuppositions and foundations and its extent and validity", of this study have a constructionist view. Crotty (2006) defines constructionism as "the view that all knowledge, and therefore all meaningful reality as such, is contingent upon

human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context" (p. 42).

According to Creswell (1998, p. 62), "Case study research holds a long, distinguished history across many disciplines." To have enough information to develop an in-depth study of the MCR TSICU team, data were collected from multiple sources including documents, physical artifacts, interviews, and observations. The researcher must take care to include only the relevant materials based on historical comparisons tied to the current research and test the research questions against other research findings (Banks, 2001; Brace-Govan, 2007; Heath, et al., 2008). Relevant materials associated with this research project were universal design concepts and the principles of post-occupancy evaluation to identify physical traces within the environment, influences of the architectural design on the communications, team efficiencies, and role assignments of the TSICU team members. Tellis (1997) identified sources of evidence and the strengths and weaknesses associated with each shown in Table 2.

Table 2: Types of Evidence. Tellis, 1997 p. 7

Source of Evidence	Strengths	Weaknesses
Documentation	• Stable – repeated review • Unobtrusive – exist prior to case study • Exact – names, etc. • Broad coverage – extended time span	• Retrievability – difficult • Biased selectivity • Reporting bias – reflects author bias • Access – may be blocked
Archival Records	• Save as above • Precise and quantitative	• Same as above • Privacy might inhibit access
Interviews	• Targeted – focuses on case study topic • Insightful – provides perceived causal inferences	• Bias due to poor questions • Response bias • Incomplete recollection • Reflexivity – interviewee expresses

		what interviewer wants to hear
Direct Observation	• Reality – covers events in real time • Contextual – covers event context	• Time consuming • Selectivity – might miss facts • Reflexivity – observer's presence might cause change • Cost – observers need time
Participant Observation Physical Artifacts	• Same as above • Insightful into interpersonal behavior • Insightful into cultural features • Insightful into technical operations	• Same as above • Bias due to investigator's actions • Selectivity • Availability

Physical traces within the environment can be seen in many different ways such as a path worn across the grass rather than people utilizing the sidewalk several feet away, chairs in a reception area rearranged to be closer together or farther apart, and the pattern of wear on carpeting within an environment. These traces allow researchers to determine the actual use of an area, which may be different than the planned use of the space. According to Zeisel, "from such traces designers and environment-behavior researchers begin to infer how an environment got to be the way it is, what decisions its designers and builders made about the place, how people actually use it, how they feel about their surroundings, and generally how that particular environment meets the needs of its users" (2006, p. 159).

The way in which the TSICU is laid out with computer access, conference rooms, patient room location in regard to the nursing staff, and access to equipment available to the medical team seemed to have a positive influence on the ability of the team to perform. Utilizing the participants' perspectives in the photographs they produce of the

environment tested the assumptions of the researcher regarding influences of the physical environment on teamwork.

Utilizing photography is a means to convey information about the physical environment to answer the research questions and document the culture (Emmison & Smith, 2000). Their research attempts to resist the preconceptions of how the physical space was designed for teamwork and team building by having the participants photograph the physical environment, which were then integrated into the interviews. The study utilized the research in the field to develop initial interview questions which focused the themes on what is actually occurring in the culture of TSICU and examined the participants perceptions of how space is utilized to either encourage or discourage teamwork.

According to Banks (2001), "it is important for the social researcher to distinguish between the form of a visual image and the content of a visual image" (p. 51). In this study the content of the image is the primary focus as the photographs were integrated into the interviews as the basis for answering the questions. The photographs were used to assist in the interviews to show the physical environment and determine the influence this environment has on teamwork and how the TSICU team utilize the space with regards to efficiencies including communication and role assignments.

The MCR TSICU research is an opportunity to bring universal design practices together with teams and organizational development in the medical arena to determine influences and add to the body of knowledge for each of these areas. The influence of building performance on team performance is a growing area of interest. This study attempts to "expand the body of knowledge around the long-term impact of sustainable

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operations initiatives" (Green Guide for Health Care, 2008, p. 3.29). This study may also provide new information to the stakeholders of MCR regarding the team environment and how this may be expanded to other units within the facility, which may be timely as the Poudre Health Systems is a growing organization.

"Like everything else in nature, music is a becoming, and it becomes its full self, when its sounds and laws are used by intelligent man for the production of harmony, and so made the vehicle of emotion and thought" (Theodore Mungers, n.d.).

CHAPTER 3

"A musical composition reflects such structure and cooperation in the way the elements work together to form a coherent whole" (Minai, as cited in Van Schalkwyk, 2002).

Methodology

The methodology is a photo-elicitation by Medical Center of the Rockies (MCR) team members who agreed to participate in this case study. This chapter examines each element of the qualitative case study and describes the design of the study including site and participant selection, data collection, coding, analysis, and trustworthiness.

Qualitative Research

The elemental tool for this study is qualitative research of how teamwork in the Trauma and Surgical Intensive Care Unit (TSICU) may or may not be influenced by the physical environment. Qualitative research allows the opportunity to examine the environment and develop a detailed report on what is happening in the natural setting– in this case the Medical Center of the Rockies (MCR) and specifically TSICU (Creswell, 1998).

Patton (1990) describes utilizing qualitative research to "inductively and holistically understand human experience [teamwork] in context-specific settings [the physical environment]" (p. 37). Qualitative methodology naturally expands the data collection and analysis process with inclusive and flexible characteristics (Shank, 2002). The research examined the human interactions within the TSICU physical environment by utilizing photographs taken by participants. Participants were instructed to take pictures of the natural setting depicting areas that either promote or detract from teamwork. The developed photos of each participant were integrated into the interviews

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to explore why specific pictures were taken or what each depicts about supporting/detracting from teamwork. Shank (2004) defines qualitative research as "systematic empirical inquiry into meaning" (p. 5). He explains that qualitative research design must be done systematically and thoroughly to find a larger meaning within the setting. It is a broad approach to understand some aspect of the complex world in which we live. In this case the research attempts to answer the questions of how the physical environment of TSICU influences relationships on teamwork.

Case Study

Case studies, according to Creswell (1998), are "an exploration of a 'bounded system' or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context" (p. 61). A case study was a natural fit for this research in which the teamwork culture of the TSICU was examined. The participants were purposefully selected with multiple sources of data being collected with both photo-solicitation and photo-elicitation to bring deeper meaning to the interpretation of the data.

The case study approach is a systematic opportunity to explore the team culture within a medical environment that had been in operation approximately three years at the time of this research. According to Creswell (1998), "Case study research holds a long, distinguished history across many disciplines" (p. 62) and allows for an extensive verbal commentary. Emmison and Smith (2000) contend the "use of this interview technique yields several benefits" (p. 36), including participants openly responding to the photographs. The participants only saw and commented on their own photographs. The interpretation of photographs in the individual interviews provides valuable insights into

the culture of the site and a rich description of the influences of the physical environment on teamwork.

According to Banning and Cunard (1996), both the functional and symbolic aspects of the setting need to be identified and examined to include the non-verbal communications within the physical environment including "signs and symbols; art work, posters, etc.; graffiti; and specific physical structures" (p. 40). The physical environment at MCR and specifically SICU was designed for individuals to function as a highly effective team. Included within the design are MCR logos and different symbols about teamwork, the organization as a whole, and the community.

Utilizing photographs in case studies has a history of clarifying the culture and the influences of the physical environment on teamwork within the surroundings (Banks, 2001; Bogdan & Biklen, 2003; Emmison & Smith, 2000). Photographs of the physical features at the site from the participants' perspective provide the foundation upon which the interviews were built so information gathered had a frame of reference for the participants. The case study methodology also included flexibility to change and expand inquiry as new information or trends emerged from the data so more complete and comprehensive understanding of teamwork and the influences of the physical environment adds to knowledge. Prior to the interviews of the TSICU team members, an initial pilot testing of the instructions and interview questions provided feedback so adjustments could be made and adapted to include only those questions applicable to the research and its focus on the environmental effects on the mission, vision and goals of the team, and the functionality of the space.

Pictures and narrative developed from collecting and coding of interview data regarding a culture can add dimensions to the research which words alone cannot (Banks, 2001; Brace-Govan, 2007; Heath, et al., 2008). As the proverb states, "A picture is worth a thousand words." I would not be able to adequately describe the environment established at MCR; particularly within TSICU, with words alone; photographs provide a medium to explore the connections of teamwork and physical environment. According to Branch (2003), visual studies can be conducted to describe the relationships of environments and individuals or elicit deeper conceptual perspectives of the photographs.

Weber and Mitchell (2004) contend that art-based research helps to bring the common everyday surroundings into a new light where there are new and different ways to see things. Utilization of photography allows the establishment of perceptual relationships between the environment and the individuals within the culture. In this study the photographs show the sustainable design of the environment in a way that can be a more in-depth exploration with interviews about the effects on teamwork from the perspective of the team members. Photographs can also be used to enhance and broaden the understanding of language and to tell the larger story (Branch, 2003).

Photo-elicitation

The six stages of photo-elicitation as outlined by Rose (2007, p. 241) were utilized in this case study to focus the research to include a rich description of the participants' experiences of the environment at MCR. These six basic stages included:

1. An initial group meeting with participants to explain the study requirements and focus on the research questions that were addressed (approximately 30 minutes).

2. Participants were each given a camera and a set of instructions to direct the types of photographs to be taken (over a two week period).

3. Photographs were developed, coded as the basis for interviews with each participant.

4. Interviews were conducted with individual participants (45 minutes to 1 hour). Transcription of interview data with feedback from participants for revisions or additions to the data.

5. Data from the interviews and photographs interpreted using content analysis to identify emerging themes.

6. The completed research was presented to participants.

Site/Participants

The site was selected based on a month-long experience that I had with MCR and TSICU. The LEED certification of MCR gave me another reason to select this site as it connects the case study to the post occupancy evaluations reviewed in the literature. The physical environment and how the team functions within it are the focus.

Permissions for research were secured and meetings set with TSICU staff for a 10 minute presentation explaining the study to identify up to 12 participants from across the TSICU team to volunteer to participate in the study by taking pictures and participating in a 30 to 60 minute interview once the pictures were developed.

Procedures

Prior to the research commencing, permissions and letters of cooperation were acquired from the administration of Poudre Valley Health Systems, the Medical Center of the Rockies, the Trauma and Surgical Intensive Care Unit (Appendix A), and the

Colorado State University Research Integrity & Compliance Office. The application for New Human Research Review was completed and submitted to the Institutional Review Board. Receiving the consent forms (Appendix B), which were integrated into the initial instructional meeting helped to "protect the rights and welfare of research subjects, to provide guidance on research integrity issues, and to assist the research community in conducting and promoting responsible and ethical research" (RICRO Home Page, retrieved 7/20/08).

Identification of participants was discussed with the administration to obtain the widest possible inclusion of the TSICU staff (i.e., physicians, trauma nurses, emergency room personnel, administrators, facilities staff, etc.). I attended staff meetings to present the study to ensure participation from across the TSICU team on various shifts. A signup sheet was handed out in the staff meetings so that participants had an opportunity to contribute to the study. I attended a total of two staff meetings with the TSICU nursing staff and the facilities staff. Eight of the nursing and three facilities staff members volunteered to participate in the study. Three of the original participants opted out of the study due to time constraints. One surgeon was initially invited to participate in the study. During the interview process an emergency room doctor and the trauma coordinator were identified and subsequently sent invitations to participate and agreed. The final number of participants was ten with representation from the nursing staff leadership, nursing staff, facilities, trauma coordination, administration, surgery, and emergency room personnel.

Once the participants had been identified,. The initial meetings (several were held for those participants from different work areas and shifts) explained the consent form and requirements of the study to the participants. Coded Kodak Single Use, 27 picture

cameras, were distributed with the understanding participants could return the camera to the drop box any time within a two-week period.

Coding started prior to meeting with the participants to ensure that all areas within the team had a participant and that the cameras, photographs, and interviews could be kept together. Names for participants were utilized to set up meetings, interviews, and to ensure participation from across the team and were kept separate from all coded materials.

Data Collection

Photographs taken from the participants' perspective of the environment were to assess whether the spaces and features of the environment are designed to bring people together and influence their communication, roles, and responsibilities. Disposable cameras, Coded Kodak Single Use, 27 picture cameras, were selected for this photo elicitation to ensure consistency of equipment for all participants. Utilizing disposable cameras also ensured standardized pictures, the number of pictures, and the ability to identify each camera for both the interviews and coding of data with patterns and themes that emerge (Rose, 2007, p. 241). Photographs were taken over a two week period with instructions to identify and photograph areas not identifiable people, that either enhance or detract from teamwork in regards to communications, team efficiencies, and role assignments.

Cameras were gathered from participants and the photographs developed. Pictures were coded by participant number and entered into a database, ensuring participant anonymity in the analysis of the data. Each participant's photographs guided and informed the interview questions (Appendix D), which asked participants why certain

photographs were taken, their reasoning about the physical environment, and the positive aspects or barriers on teamwork depicted in each photo. Interview transcriptions were sent to each individual member for revisions or additions, five were returned with edits, which provide clarity and credibility to the study and the others were sent one reminder to send edits within the week or the original transcription would be used.

Utilizing several data sources – photo-elicitation, interviews, and member checking add to the credibility of this case study by examining the participant perspectives of the photos and what influences the physical environment has on the building and maintaining a team (Creswell, 1998, p. 213). Field notes were completed by the researcher throughout the study for possible additions to the findings from interviews with participants.

Analysis

A database was utilized to "track and organize data sources including notes, key documents, tabular materials, narratives, photographs, and audio files" (Baxter & Jack, 2008) for analysis. The examination of the data returns to the research questions to focus on the materials directly associated with the case. The analysis utilized the techniques of "pattern-matching" and "explanation building" (Tellis, 1997) and "categorical aggregation" (Creswell, 1998) to show that the data were collected, coded, and analyzed to allow the information to emerge from the photos and interviews and enhance the study. Once the photographs were developed and individual interviews with the participants were completed, data were transcribed and categorized by photographs. The photographs and interview comments were then analyzed and coded to identify similarities and differences among the participants. The photographs were first sorted to determine the number of pictures that were of the same areas and which pictures were the outliers of

lone environmental factors. Each of the photos and the participant responses were coded and clustered to identify areas of focus. From these areas of focus, themes emerged from the data, which were analyzed to determine influences of the physical environment on team efficiencies, the connections to the literature, and expansion of the current body of knowledge of the organizational effects. The themes were categorized by the story that unfolded with each interview regarding the multi-agency team environment starting at the Emergency Entrance doors amid the care and communication that resonated down the hallways and through many areas within MCR.

Trustworthiness

The research was conducted in a purposeful manner to find out if the physical environment has a perceived influence on teamwork, both in the way the team functions and how the team relates to the individual team members. The group was defined and the questions framed due to my curiosity about the team culture. I have turned to the literature to review current research in the field and the researcher is prepared for the fieldwork necessary to test the research questions against other findings (Heath, et al., 2008). The trustworthiness of the study was developed by gaining necessary consents, utilizing a systematic case study methodology, identifying and including my personal biases with the ties to the reasons why this particular study is relevant to me, utilizing the literature reviewed, and making use of the methodology with regards to the data collection and research process. In the spirit of qualitative inquiry, this study attempts to be comprehensive in "producing knowledge relevant to the understanding of such roles and cultural systems in general (Creswell, 1998, p. 324).

CHAPTER 4

Findings

The initial research question for this study was: How does the physical environment shape teamwork with regards to communications and role assignments in a Trauma and Surgical Intensive Care Unit (TSICU)? This question brought up operational questions: What are the influences of the physical environment on building and maintaining teamwork by creating shared work areas where people have the opportunity of close interaction? How has the design of The Medical Center of the Rockies (MCR) influenced communications, team efficiencies, and the level of care patients receive from TSICU team members?

Gaining all the permissions to conduct the study took many months of working to identify the various gatekeepers and going through multiple IRB approval processes. Once permissions were received, the collection of data began in January and concluded with the final interview in April, 2010. Two staff meetings were attended which identified the majority of the participants.

There were 10 participants including team members from facilities, emergency room physicians, surgeons, nursing staff, education and leadership staff, trauma coordinators, and administrators from different areas within the hospital who all work together on the trauma team within the TSICU toward the same mission, "to provide innovative, high quality, comprehensive care that exceeds customer expectations" (PVHS Facilities, retrieved 4/5/08). Some are behind the scenes partners keeping the equipment

and the environment in tip top shape so that it works continuously; others are working directly to save lives.

Of the 10 participants, two were male, eight female, and four hold administrative or leadership positions. Seven volunteered at staff meeting presentations, three were individually invited to participate and agreed, and two people declined the invitation. These demographics did not appear to influence the photographs that were taken with respect to teamwork in the environment. There was an average of 19 pictures taken by each participant, and an average of 13 pages of interview transcriptions. The interviews were transcribed and the tapes destroyed. The data were coded to determine themes that emerged showing the environmental effects on teamwork amid this trauma team and surgical intensive care unit. Once the data were sorted into the various themes that emerged the following results were documented. The themes are presented from my perspective of moving through the environment from the emergency department, through the Surgical Intensive Care Unit. The following table depicts the 185 photographs taken by participants and the various themes that emerged from the data:

Table 3: Photographs and Themes

Photograph Description	Number of Pictures	Themes from Interviews
Emergency Entrance	3	Multi-agency, teamwork, communication
Ambulance/Helipad Entrance	6	Multi-agency, teamwork, communication
Officer's Lounge/Break Area	6	Central meeting, access, convenience, care of other team members, communication
Lockers	3	Team care, accessibility, communication
Mail Bins	3	Efficient, communication
Bulletin Boards/Grease Boards	10	Communication, recognition, references, information, education, shared goals
Resuscitation Rooms	6	Patient centered, designed for efficiency,

		communication
Elevators	3	Oversized for efficiency, teamwork
Hallways/Doorways	18	Ease of access, clutter free, efficient movement
Signage	3	Up to date, accessibility, communication
Patient Rooms	9	Patient centered, designed for efficiency, communication
Specialized Equipment (auto pulse, ct scan, x-ray, sterile processing, pyxis, labels	13	Organized, life saving, time saver, efficient, conveniently located, communication
Carts	9	Efficiency, time saver, teamwork, organized, readily available
Storage	8	Teamwork, organized, efficiency
Computers	19	Connectedness, monitor patients, monitor building
Charts	2	Efficient, communication
Phones/Faxes	6	Communication, efficiencies, protocols, time saver
Conference Room	7	Community, shared information, staff recognition, "Bubble Room"
Tube System	3	Time saver, efficient, connects team across MCR
Uniforms	2	Clear roles and responsibilities, professionalism, communication
Location of Efficiencies (nurses station, anti-room, lab station,	9	Roles and responsibilities, designed for efficiency, team coordination
Building Plans	5	Designed for efficiency, team coordination, team alignment, steering committee, footprint
Office Areas	6	Uniform space, equality of team members
Lighting, Heating, Ventilation	14	Monitored 24/7, dimmers in patient rooms would be helpful
Windows	4	Makes everyone feel better, wonderful view
Waste Disposal	2	Teamwork, LEED Gold
Employee Recognition	4	Increases teamwork, motivation, information, encouragement, communication
Family/Patient Recognition	3	Community, includes family members in team
Reference Materials	4	Easily accessible, communication, valuable to team efforts

The study utilizes "categorical aggregation" (Creswell, 1998, p. 153-154) that allows the interconnected data to be pulled out to distinguish the central themes. Photographs depicting waste disposal and family/patient recognition were not included in the results although they were seen as important by the team, these photographs and interview comments did not directly pertain to the environmental effects on teamwork.

Results

Figure 3: Emergency Department Entrance

The case study regarding teams and teamwork starts at the Emergency Entrance where the various members of the team converge to save lives. According to Participant #8, "when you think of true emergencies, think of all the people that it has taken to save those people and all the advancements …and the type of teamwork that it takes and it all starts through that door." The design of the MCR environment and the focus on teams and teamwork are seen from the moment a patient begins to receive trauma care.

Teams/Teamwork in Medical Environments

Multi-agency teamwork is extremely important at MCR and to the Trauma Unit because of the large area supported by their services. According to Participant #8, "we serve southern Wyoming, eastern Kansas, southeastern Nebraska, and everything from the Longmont exit north to the state line in Colorado." Another participant noted that the

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inclusion of outside service providers in the original planning is something the MCR had

done very well, for example bringing in ambulances to confer with the trauma and
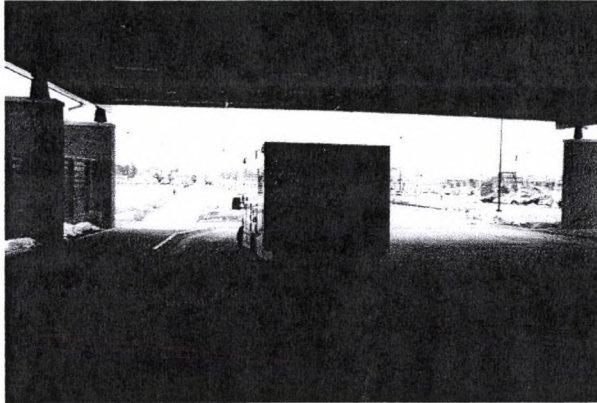
surgical team.

Figure 4: Ambulance Entrance

Participant #10 comments:

"This picture is of the Ambulance entrance and we designed it with a really wide

apron so that you can park up to three ambulances at a time without having to

maneuver and back in,…so that the trauma team can come out and receive report

from the medics on the apron."

MCR has integrated multi-agency input into the planning of the building to ensure

that patients and staff alike are well taken care of and know they are valued individuals.

The environment has been designed to be accessible and sustainable to staff needs, so

that the trauma team is better equipped to meet the needs of patients. The physical

environment and the level of communication among team members create a highly

efficient atmosphere to optimize team performance, which according to the literature

review not only increases patient care, but is more cost effective for the community

(Robinson & Cottrell, 2005; Rodriguez, 2007). According to participant #8, "when you

think about emergency medicine 15% of all patients who come in the emergency room

truly have emergencies." The environment must be set up for efficiencies to save lives.

One way that MCR and the trauma team have increased the communication between

agencies is to establish a permanent area for their team members.
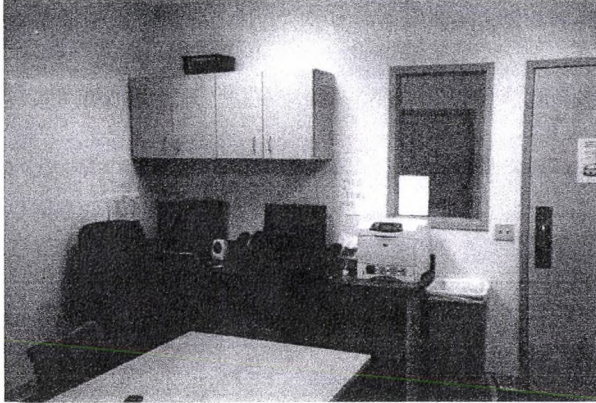

Figure 5: Uniformed Officers Lounge

MCR has built in a "Uniformed Officers" lounge conveniently located beside the

ambulance entrance which provides the multiple agencies that work as part of the trauma

team a space to conduct their work or relax for a moment. According to Participant #10,

"We really do value the EMS (Emergency Medical Services) providers as important team

members and they have some vital work to do. We have created a work room dedicated

specifically to the uniformed team members, whether it's EMS, fire, or police."

Participant #12 contends, "We want them to come to MCR, so we gave them quarters

where they can sit down, work on their computers, we give them special lockers where

they can … keep some equipment here on a permanent basis."

Figure 6: EMS Lockers

Participant #10 added, "We created these big lockers for them [to] store their supplies and have it locked up with their own key and not have to go all the way back to their base station to resupply their vehicles before they are back in service. Having the necessary supplies readily available allows the teams from various agencies to get back immediately into service."

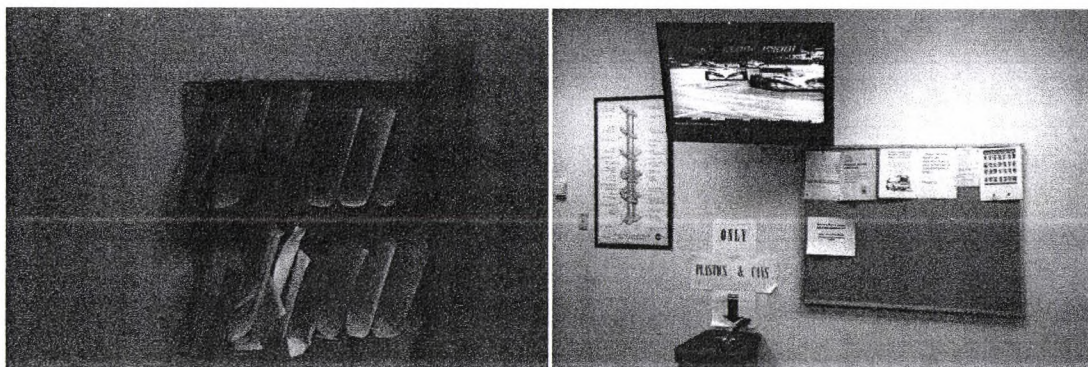Figure 7: EMS Mail Bins, Bulletin Boards, Computer Systems

According to Participant #12,

They [EMS] are going to pick MCR every time, because we treat them well. … If they deliver a patient here and they've got an extra [few] minutes, they can get on the internet, sit down, have a cup of coffee and a donut, they can clean their equipment, or do what they need to do and it makes them …part of the team of PVHS.

When a patient arrives at MCR, the first stop may be in one of the major trauma resuscitation rooms which were designed to assist the trauma team work efficiently in saving lives. Following are several participants' view of the resuscitation room:
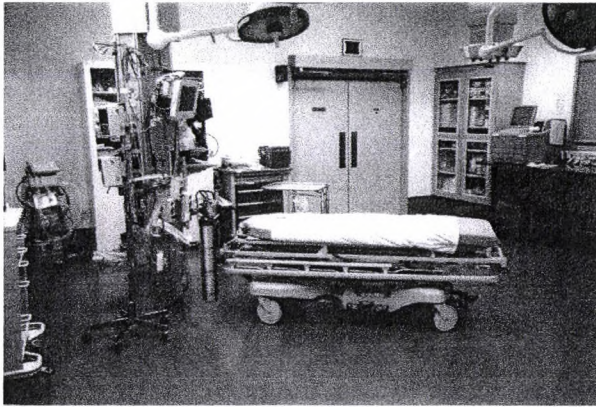

Figure 8: Resuscitation Room

"This is a picture of the major trauma resuscitation room from the EMS arrival door looking in, showing that the door in the back is actually the door into the CAT scanner and how the room was designed for efficiency" (Participant #10). The room was designed so the trauma team can maneuver all the way around the patient, with the use of power columns which have multiple uses instead of head rails seen in the design of older hospitals. The power columns hold all of the physiological monitoring equipment and are equipped with oxygen and other life saving gases. The columns have appendages so that other devices can be utilized from a central location. The resuscitation rooms were set up for team efficiency and are arranged so that many different disciplines of the trauma team have the equipment and supplies needed to manage patient care. All of the supply cabinets are fully stocked and all of the equipment potentially needed for resuscitation are conveniently located in the room.

"I've spent a lot of time in resuscitation rooms and [while] the average person walks in and thinks that they are a cold sterile environment, this room is like

home to me, it has got everything in it we could ever need to save a life. The whole room is strategically designed to minimize how much work you have to do to save somebody" (Participant #8).

Participant #12 described the team environment in the trauma resuscitation rooms as showing teamwork between radiology, environmental services, biomedical, facilities, and the Emergency Department. "It's so important that your trauma rooms be super efficient and functional. You see the teamwork effort that it takes all in this one picture. Notice that everything is pristine …we make very special effort to make sure that everything stays up and functioning. I think five years from now, you can come in here and take that same picture and it will look just the same. … The teamwork will still be there because that's what PVHS does the best, work on teams."
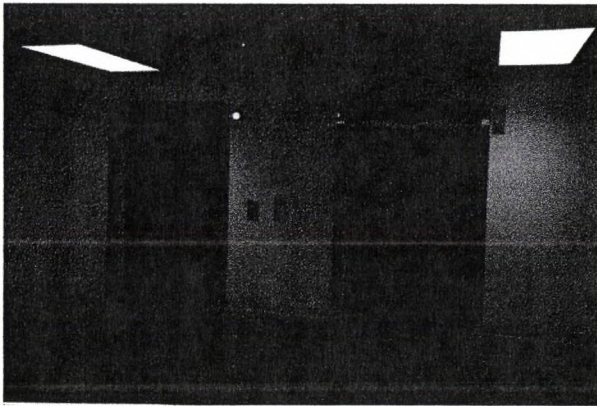

Figure 9: Oversized Elevators

Transporting the patient from the Emergency Department has also been designed with team efficiencies in mind as the TSICU and Operating Rooms are directly over the Emergency Department with two oversized elevators that hold the patient, equipment, and the team of healthcare workers.

Participant #12 explained the structural design that went into the placement of the various departments to provide team functionality with the dual oversized elevators as the central point of transporting patients and materials needed in trauma care.

The structure of the elevators services vertically all our customers. … It has SPD (Sterile Processing Department) on one floor, and then you go up and you're in the ED (Emergency Department), and then you go up another one and you're in the OR (Operating Rooms). So the functionality for the teams, they can get materials up and down here very, very quickly. … The teamwork effort here is these people feel like they're directly next to the ED trauma and directly next to the OR and they are really not. … That way we can get anything we need – equipment, people, technicians, all on a team coming up and down the elevator and go right to the source of our trauma… it's all in the design.
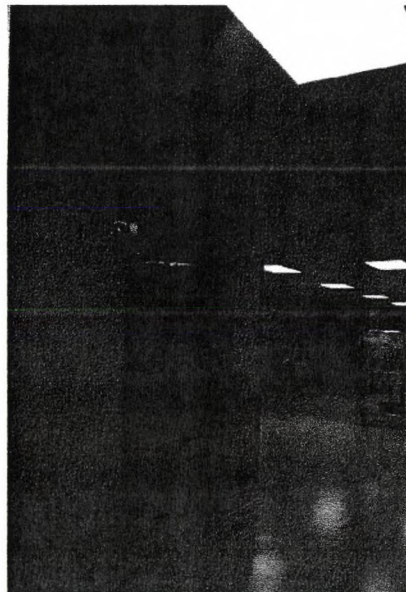

Figure 10: Design Elements for Efficiency

Another design element that was considered when planning for the trauma unit was the size of the space and the redundancy of equipment seen in the resuscitation rooms, the trauma unit, and with the elevator system. This is important to the trauma

team for efficiency as participant #12 explained, "When we're transporting patients up and down the elevators lots of time we have more equipment than what will fit into one [standard sized] elevator – whole teams of people move into the elevators and we have to be able to run them up almost simultaneously to deliver them on the floor. So the equipment and the bed and all of the team can get up in the elevators quickly. It's the redundancy that helps too – so that their staff has one of the elevators functional at all times. So that's part of the teamwork is getting in there and the other part is that we keep at least one set of elevators operational all the time." Participant #4 had this to add regarding the transporting of patients for labs and other tests,

> We have to take … the patient bed, the respiratory therapist with the ventilator, the nurse, any IV poles, … we've got a transfer team member, sometimes if the patient is unstable we have a couple of nurses accompanying – and trying to get that entire team into a regular size elevator is not really feasible. So we have two extra size elevators that the hospital built as trauma elevators.
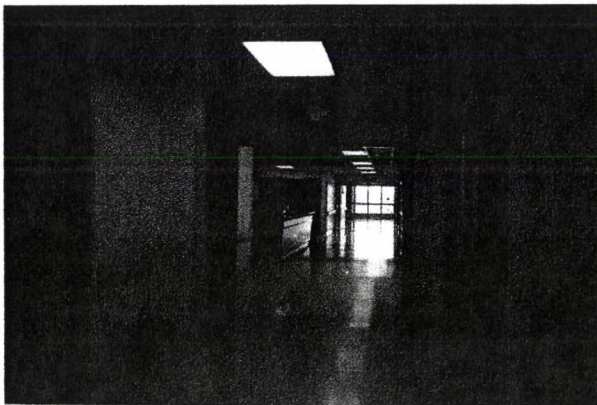

Figure 11: Hallways

The design also has very few hallways to maneuver when transporting a patient either directly to the TSICU or to surgery if necessary. MCR was designed with ten-foot wide hallways rather than the standard eight-foot width to provide for easy access for

staff, patients, and the general public. Participant #12 stated, "We've designed the building with that extra space so that people can do their jobs easier." According to Participant #9, "[the hallways are] open areas ... [which are] a clutter free environment. ... The [hallways] are all open and clean and it doesn't matter whether it's to the public or the workers, it's a clean environment and everybody takes care of everybody else."

Participant #12 commented that keeping all of the equipment throughout the facility is teamwork.

The teams that we designed here, this interplay, is all kept functional by the facilities department. Every single door is automated on major paths, and we keep those doors fully operational 24/7. We get those doors operational so that it's seamless to the [rest of the teams]. We know the major corridors and the major ways that they move patients and we keep those perfectly operational all the time.

Figure 12: Directional Signage

Another example of how MCR has designed the environment for ease of access is the directional signage seen throughout the facility. According to Participant #12 these signs are kept updated with any changes that may occur and are a reflection of the various departments within the facility.

We try to keep these [directional signs] updated, so when things change, like they move mammography to someplace else or we put in another office, we change these signs to reflect what's really going on in the building. ... Keeping our signage pristine and all of it correct is really a good functionality so that our team doesn't waste time.

The teamwork design is continued within the unit as patients' are transferred into the Surgical Intensive Care Unit (SICU) for critical care. Eight of the ten participants took pictures of the patients' rooms as a vital part of the teamwork that takes place in the trauma unit.
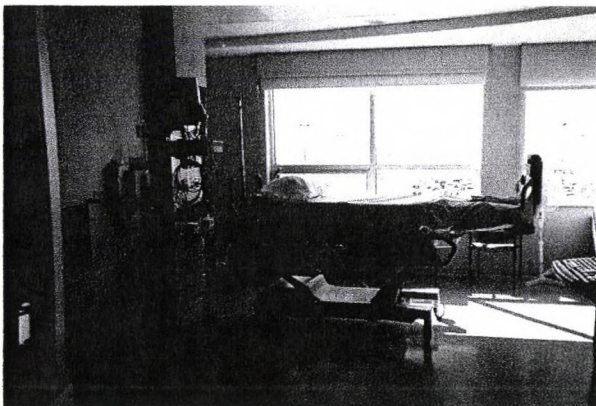
Figure 13: Surgical Intensive Care Unit Patient Room

The SICU patient rooms were designed with the same type of plan including the central columns with monitors and equipment being continued from the resuscitation rooms. According to participant #4, "The bed is the central piece of the room with the tower behind it where different team members ... can work around ... the patient without getting into each other's way." Participant #6 talked about the day to day working environment as "the nice thing about the way they designed this, if ... [there are] family members who want to stand here, you don't have to make them move, you can just walk behind the pole – you have access from every [side]." The design is very efficient for the

multidisciplinary team having all of the equipment centralized for the whole team to be able to work together." Participant 2 stated, the rooms allow us "give better care to our patients." Participant #5 added, "The [rooms] are tremendous, honestly for an ICU, these rooms are huge." The built in redundancy with equipment and supplies similarly located in each patient room was commented on by several participants. "Every room is identical, so you can go to any room and you know where you need that piece of equipment because it's all set up the same standard in all the rooms."

MCR building is LEED Gold certified and has been planned, designed, and built with multidisciplinary team efficiency at the forefront. This same type of planning has gone into the functionality of the specialized equipment that is essential for teamwork. The photo ethnography has given many views of how teamwork takes place at MCR in the SICU with the trauma team. The equipment, storage, and carts are all seen as contributing to the teamwork efforts of the trauma team.
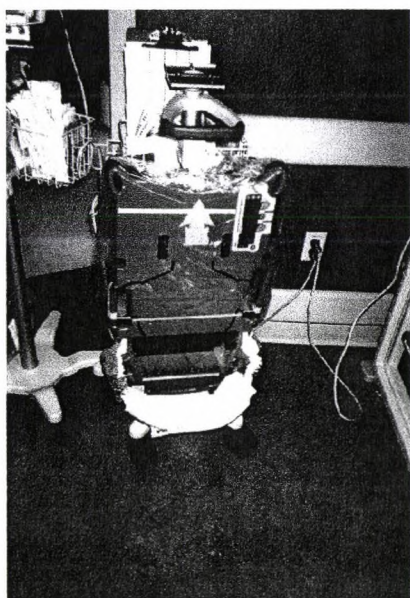

Figure 14: MCR Auto Pulse

This is a photograph of the MCR auto pulse, an automatic compression device, which is another way that CPR is performed. Two of the participants identified this piece

of equipment as conducive to their teamwork. "It takes teamwork to put it under the patient in order to use the equipment" (Participant #1). The auto pulse equipment allows the team to tend to various patient needs without exhausting the teams resources by performing CPR. Participant #7 states, "we've had great outcomes with it because the skilled hands are now not being exhausted doing CPR. CPR is one of the most important things in that situation, but now your skilled hands are not doing CPR, they are actually doing other things for patient, such as starting an IV, medication, or helping the doctor with other procedures or treatments to save lives."

The specialized carts are constructed for team efficiencies with each one containing everything necessary for a certain life saving procedure. Team members know they have all the equipment needed in one place and that the cart will be stocked the same way each time. In the three pictures below are four emergency procedure carts (left), a crash cart (middle), and a pediatric cart (right).
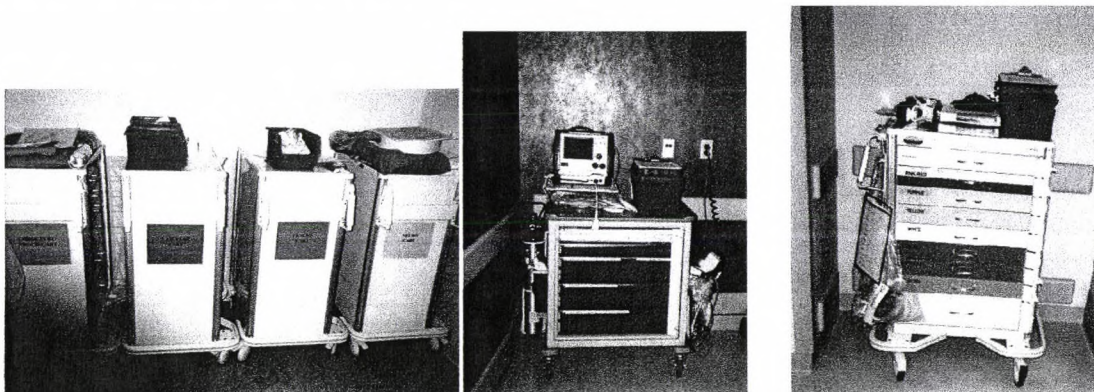

Figure 15: Medical Carts

According to participant #1, "it helps us to be prepared when a doctor says, 'I want to do this right now,' we just grab the pull cart and take it to the room. And this the resuscitation cart...and that's one of the biggest things... this it's definitely all about teamwork and ...we go through some training to ... know where things are and grab -

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them quickly and to have everything you need." Participant #10 stated, "We have these [crash] carts that are very standardized, not only the emergency room, but the whole hospital, ... so that if you respond to a cardiac resuscitation in the emergency room, or in the ICU, or [anywhere in the hospital], someone will pull this cart and you will know exactly where to find everything because it's the same everywhere."

The pediatric carts are described as being a necessity when working with children as they are color coded by the child's size. Participant #10 stated, "we just keep everything in a drawer based on the length of the child and it makes for a lot more efficient resuscitation." Participant #1added, "it's really cool ... they have the patient meds and supplies that are needed for children."

The supply/stock rooms are another area identified by the participants that have been designed for accessible teamwork to make caring for patients efficient, with the taking ownership of how the supply room is organized and labeled for ease of access.

Figure 16: SICU Supply Room

According to Participant #2, "We try to organize it by section, the respiratory section, iv section, general care section, the iv tubing section and that just makes things go smoother so that if you have a general idea of what you're looking for, you don't have to spend your time looking through everything." Participant #7 states, "We only have

what we use on a daily or weekly basis... the most frequently used right in the center, eye level and then the things that are less and less frequently used go out to the bottom and tops of the shelves." "Basically it's all the supplies we'd use for basically any procedure ...We have people from central supply ... stock this for us daily."

Supply rooms in other areas of the hospital are also organized for team efficiencies. These supply rooms are stocked with the tools, parts, and equipment needed to maintain the entire hospital 24 hours a day, every day. Much attention has been given to organizational detail to have tools and materials efficiently located for accessibility, as seen in the photo below.
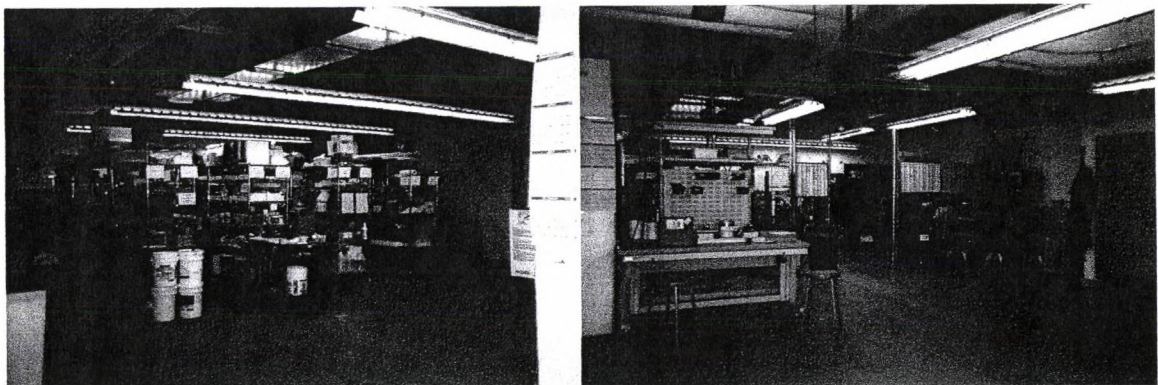
Figure 17: Facilities Supply/Stock Rooms

According to Participant #9,

> This is showing our inventory and stock that we try to keep on hand ...we've had to learn what we use then make sure we have it on the shelf so we can deal with problems on a daily basis. And in the shop area we've got all the tools that we need ... and that's important.

The amount of equipment required to keep the entire Trauma unit and SICU running smoothly is unparalleled in most industries. This equipment ranges from computer systems to track patient care and the environmental factors within MCR to bulletin boards used for team communication tools.
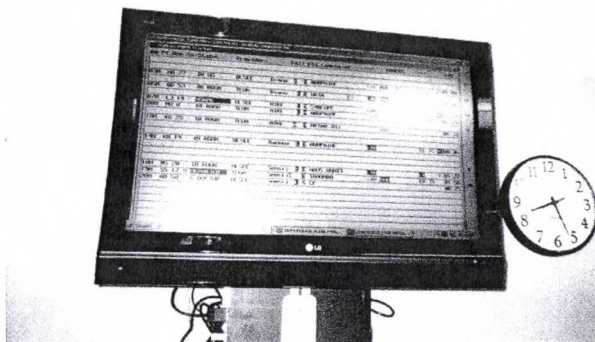
Figure 18: Computerized Patient Tracker System

The technical equipment that has been installed across MCR aids in teamwork

functions as communication is crucial to efficiency among the various disciplines that

work together. "This is a picture of our tracker, this is how we keep track of every patient

in the Emergency Department and who's taking care of them. This is really the main

center of control for us in the Emergency Department because it's the only place where

you can look at and know everything that is going on in the department at once"

(Participant #8). The same information regarding each patient on the unit is all tied into a

central computer system in the SICU environment.

Figure 19: Central Nurses Station in SICU

The Central Nurses station including the central monitor is another example of the

teamwork that is a continuous process of monitoring patients with electronic records for

the SICU team. Participant #1 stated, "This is our Central monitor where all of the

patients' vital signs are constantly monitored. The central monitor is very much a teamwork thing because when an alarm goes off we all take responsibility and ownership." Participant #4 commented:

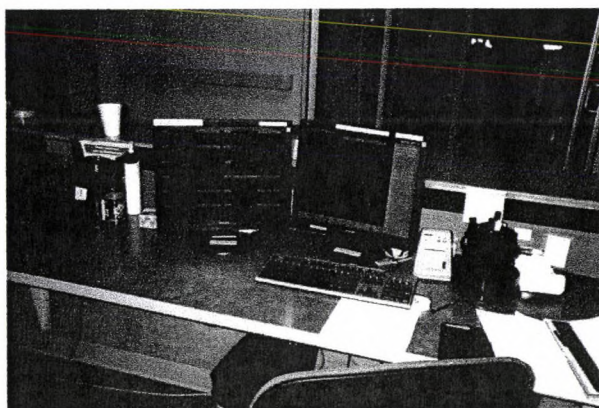This is where we have our multi-disciplinary rounds. In the morning, it is a central location where everybody comes for the overview of each patient and you can still [communicate] with other units, SICU team members, pulmonologists and respiratory therapy, PT [Physical Therapy], OT [Occupational Therapy], Speech Therapy, and Rehab, without having to go to a different space. You also have access to the computers so that you can look up patients' labs and have all of their information right at our fingertips.

According to another participant:

There's another terminal there with a computer that has a higher resolution, so that when we're able to look at imaging from the system at the same time that the radiologists are looking at them, so you can really get a feel for what the images are telling you. This is conveniently located by the families so that you can show them what is going on with their loved ones, which is important especially in the SICU (Participant #5).

The central control systems seen throughout the physical environment for maintaining temperature, lighting, and automated systems are vital to teamwork.
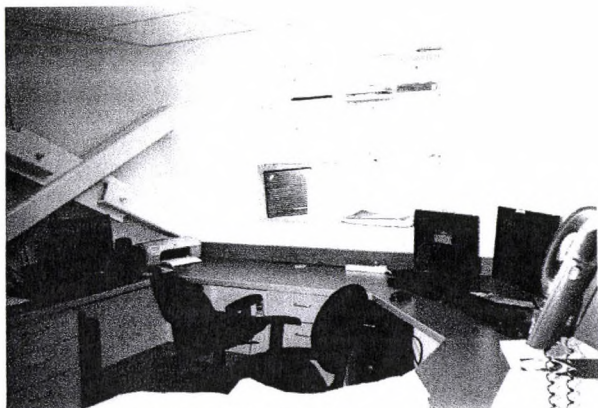
Figure 20: Central Facilities Monitor

According to Participant #9:

This is our control room where we can monitor multiple systems. We are able to monitor the generators, the tube system, the building automation system which tells you about the heating and cooling. Everything, anything that's got a data point in this building goes through that computer and if we have a problem … we can look at that specific area and fix it. Sometimes we just make an appearance anyway, but we can usually fix whatever's wrong without ever going there.

Communication

Communication at MCR can be seen in many different ways throughout the trauma unit. Communication was one of the major themes that emerged from the photo-elicitation techniques utilized in the research – feedback loops were efficient – a concern about the use of the elevators was brought up by one of the first participants interviewed – within a week another participant reported that the concern had been addressed and a solution had been implemented.

There are many different ways communication takes place within the SICU, paper orders (put into specific bins assigned to each patient), email communications, bulletin

boards, and staff meetings to name some. The participants had this to say about the various modes of communication:
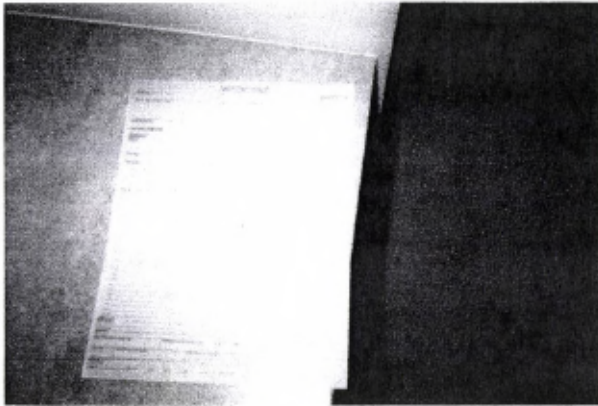
Figure 21: Patient Chart

"This is a picture of our charts…, it's the thing that ties everything together for a patient, it allows [the doctor] to order everything, running lab tests or x-rays, order medications, and other things, then it goes to the nurse so that they can do any intervention that is needed. The chart is an indirect way of communicating. (Participant #8).
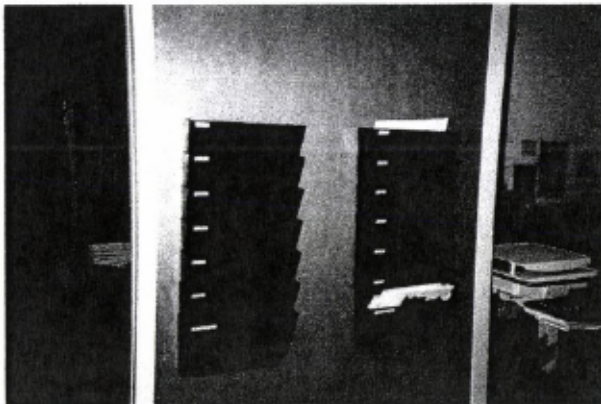
Figure 22: Communication Bins in SICU

Just prior to the data collection in early 2010, these new communication bins had been added to the SICU area for better efficiency in patient care. The bins were seen as a beneficial means of communication. Participant #1 said, "Once the orders were given

from the physician to the charge nurse, now they put them in this box so the nurse can pick them up and review, this is our way of communicating." Participant #6 contended, "When there's a new order, like a doctor signs a new order on the chart …[the nurse] gets a copy of the order without having to grab the chart away from the doctors or whoever is writing the notes." The bins have assisted the trauma team's efficiencies in caring for patients.

Figure 23: Computer on Wheels

Participant #1 identified this picture as, "our wonderful computers and they are used all the time – and we share them with all kinds of disciplines." Participant #7 added, "our computer on wheels, … we've been able to have one per room and it makes [charting and patient care] more efficient. According to Participant #10, "This is our method of charting for patients and communicating to each other. The nurses are able to register the patient at the bedside, and complete all documentation right there on the computer. …So rather than a centralized nurses' station – it decentralizes them and keeps the nurses with the patients."
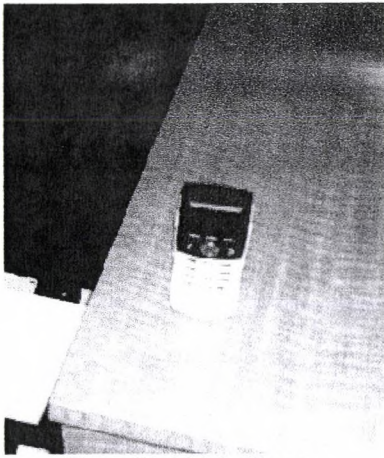
Figure 24: Mobile Phones

Another communication tool was identified in the photos and interviews as the mobile phone system which allows the team to be closely connected. According to Participant #1, "this is our lovely phones that we carry around ... you can call [another team member and they] can call you right back." The phone system is identified as a time saver which is essential in a trauma unit. Participant #1 continues "it's very useful if you go with your patient to another unit and you don't have a piece of equipment..., you can call [other team members]... and they can come help. It's another way to communicate with everybody." Participant #2 adds these comments, "Our personal phones ... make communication a lot easier."

The design of the environment at MCR enhances communications with areas set up for conferencing. Within the conferencing areas there are professional development opportunities and incentive programs posted on various bulletin boards for the staff as seen in the following narrative from six of the ten participants. The "Bubble Room" was one of the most photographed areas in this study.
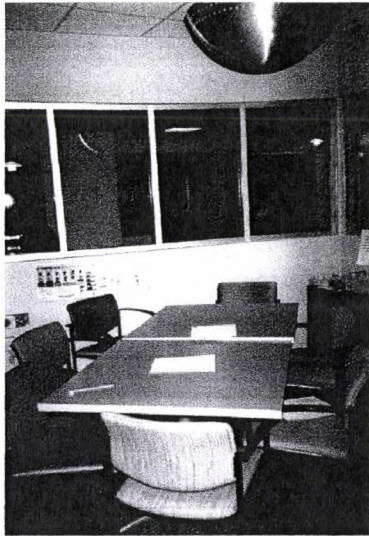
Figure 25: Conference "Bubble Room"

According to the participants the "bubble room" is the place that the trauma team from the SICU congregates at shift changes to communicate reports on patients in the one area where they are able to see the entire unit. This is the conference room that is utilized to discuss patient care with physicians, specialists, and family members. According to Participant #5, "It's nice because with the windows, you can still see out to see exactly what's going on, but there was some privacy, it's a very nice place to for communication." Participant #6 stated, "This is ... where we give report at the beginning of every shift... with the charge nurse and the charge nurse from the shift prior." Participant #4 added that this room adds to patient care because "on crazy days this is where we tend to eat lunch ... you can at least sit down and still be able to see the monitors and see what's happening with the unit."
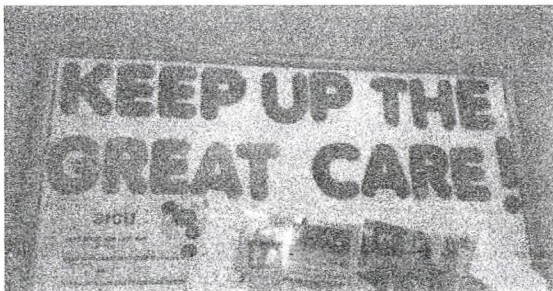
Figure 26: Bulletin Board in "Bubble Room"

Participant #2 took this picture of one of the bulletin boards and commented, "This is motivational … it reminds us that we're doing a good job and that you know to keep up the good work. I think encouragement is always a better motivator than criticism."
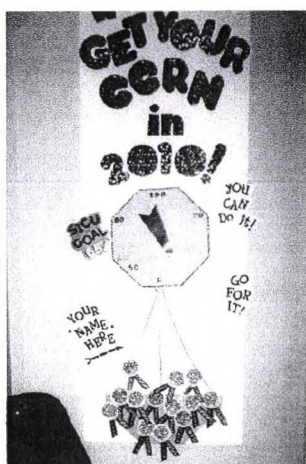
Figure 27: Bulletin Board showing certification progress

Participant #7 commented, "This is a CCRN [Critical Care Registered Nursing] board. One of [the] directives at the beginning of the year was that each unit get 65% certification in their unit, which for the SICU it is the Critical Care Nursing certificate. The hospital pays for your certification and to maintain it. [We developed] something creative to get … buy-in, provides an incentive and tries to visually show [the unit's progress]."

Another means of communicating within the entire hospital is the tube system which delivers labs, prescriptions, mail, and many other items around the hospital. Pictured below is the system as it is seen on the SICU unit and in the mechanical room which houses the control unit of the system.
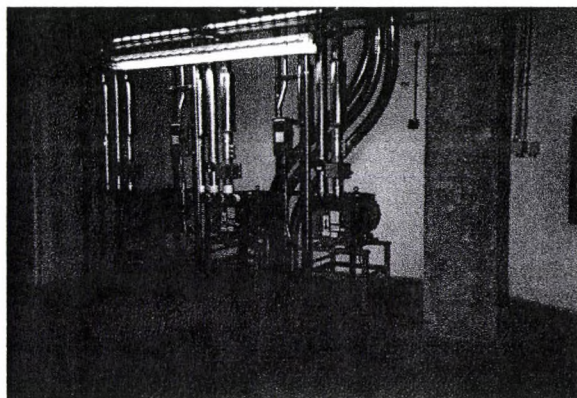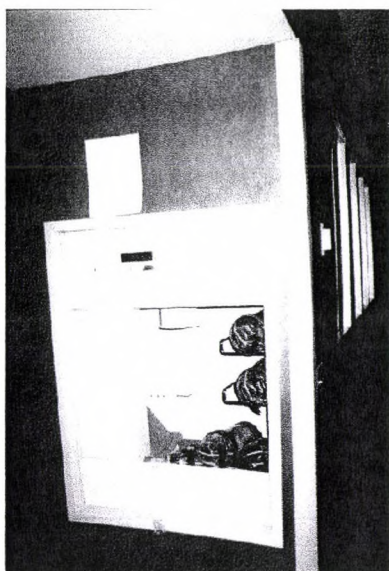
Figure 28: Tube System

Participant #6 states, "This is a picture of the tube system. And this is another integral part with teamwork, especially with the pharmacy and with laboratories; you don't have to runners so it's a lot quicker and much more efficient."

Participant #9 explained:

This is a picture showing the mechanical room – all the tube systems that go to all the different nursing departments, pharmacy, labs, ER, important instructions, medications, and anything else all get sent through these tubes right directly to the floors.

It's a time saver and is much more efficient. We don't have to have a runner which is what it used to be in the old days. We used to have to take everything by hand and mistakes were made that way – a lot more mistakes because [of this system there are less mistakes] we also can track –where these went – our tube system has a computer system and it tells you exactly where it went, what time, it's all there.

Roles and Responsibilities

The various roles and responsibilities seen in a trauma intensive care unit include doctors, nurses, emergency medical technicians, surgeons, and many others who are required for saving lives. One way of communicating roles and responsibilities to the team and to the general public at MCR are the different colored uniforms worn by the team members.

Figure 29: Doctors Coat

Participant #8 explains, "the coat [is] our presentation to the general public about being professional." Another participant expounds this type of communication with a picture showing the various colors of uniforms.

Figure 30: Legs in different colored scrubs

Participant #4 stated,

this [picture shows] the OR team moving a patient. I was trying to get was all of the different colors of pants [without the people] that were involved. All of the RNs in the hospital wear blue, either light blue for the trauma side or dark blue for the cardiac side. All respiratory therapy wears green, physical therapy, occupational therapy wear tan, lab wears black. Everybody is color coordinated based on their role and job description.

Another way that roles and responsibilities were identified during data collection was the positioning of the team members within in the trauma unit.
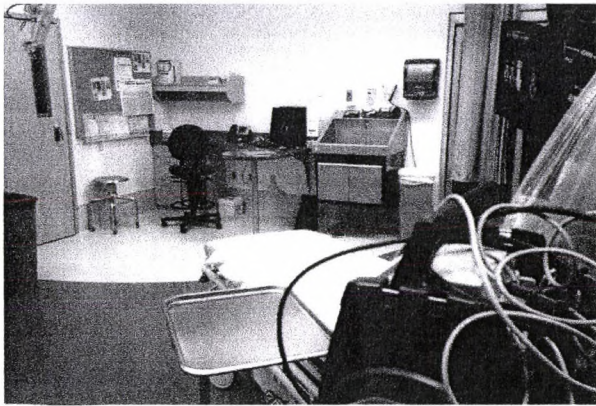
Figure 31: Charge Nurses Station in Resuscitation Room

Participant #10 explains this picture as showing "the role of the chief trauma nurse sits here ... looking at the big picture to anticipate needs and assign people. S/he's kind of directing, orchestrating, and documenting from this position, all of the people on the trauma team who have defined roles."

Architecture
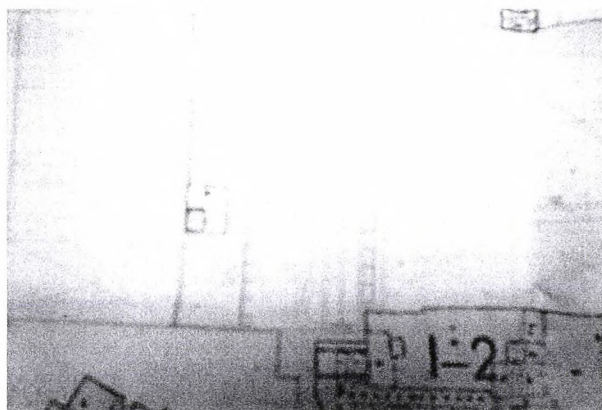
Figure 32: Building Plans for MCR

Communication was an integral part of MCR design with the people who would be utilizing the environment before the building was started. The level of shared input and communication given to the planning of the MCR building was seen in the responses of several participants. A steering committee was implemented with five people from the Poudre Valley Health Systems team, including Trauma Services, the Director of the Neuro-Intensive Care Unit, the Director of the Cardiac Program, Director of Operations, and the Director of the Mother/Family Care unit. The steering committee members were the key contacts for each department and they conducted focus groups with the clinicians and others who utilize the environment. According to #10:

> We brought the ER nurses in to give us ideas of how the space should be
> configured, the same way with the Intensive Care Units, and then we rented a
> warehouse to have the construction people actually mock up the patient rooms.
> Even though we saw it on the blueprints and the space looked functional, once the
> rooms were mocked up, and all the equipment was brought in, the space was
> really cramped."

They were able to make the decision to reduce the number of rooms so they could spread out the footprint of each room so there was plenty of room to meet patient and staff needs. The location of the power columns in the rooms was changed to accommodate resuscitation and other functions that would be taking place in the environment.

The trauma center was designed as a stacked unit with the central supply, sterilizing processing area, and facilities in the basement, right below the Emergency Department (first floor), which is right below the Surgical Unit, and Surgical Intensive Care Unit (second floor) – all developed around the elevators which are oversized to accommodate an entire resuscitation team for optimum patient care. According to #12:

> This is a good teamwork effort when they developed this concept for functionality, we stay out of the clinician's way in the basement but yet we're still able to respond quickly and easily to wherever they need the material or the process. Support teams are smaller because of increased efficiencies of their location within the environment. People feel like they're directly next to the ED trauma, or the OR and they are really not. The helipad is right on the top of the vertical stack, so we have complete functionality. We can get equipment, people, and technicians, coming up and down the elevator, right to the source of trauma, because it's all in the team design.

Figure 23: Building Plans for MCR

MCR was built with expansion in mind with the design with the infrastructure for expansion. According to Participant #10, "We already have the infrastructure in place to support two more patient wings to come up completely on the north end and south ends, we will need them many years from now, but we've got it planned for today."

During the planning of MCR, the decision was made to build the office space for staff to have the same dimensions so everyone have the same amount of space and there are no signs of hierarchy within the environment. The offices which are all the same size for managers of the various units were placed within the environment nearest the unit of supervision.
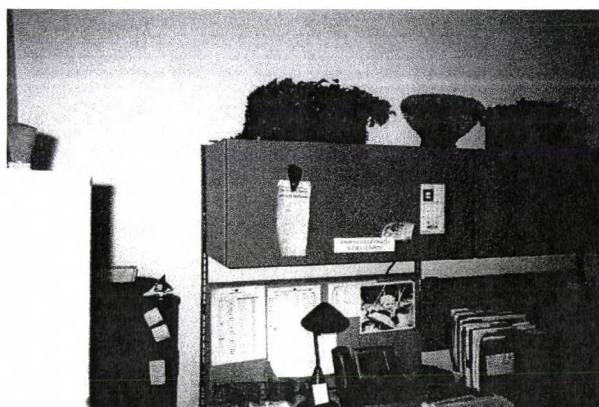
Figure 34: Office Space

According to Participant #12:

Another team effort thing that we did for equality was we made sure that we didn't have a lot of walls barricading people in rooms, so we decided to go with a furniture model that allowed people within the same room to just turn around and talk to each other. So instead of giving them separate offices all over the place causing dysfunction, we used little cubicles that are all the same. So the rest of the team can't be envious of a bigger desk or an office or anything else – they all are equal and they all can talk to each other in the same room. So that really enhances teamwork. So every desk in every room is the same size, so every director's room is exactly the same size and they've got exactly the same furniture so we can't say well that director (or team) has more importance than the other directors or teams. So that again fosters more teamwork.

Figure 35: Administration office from hallway in the SICU

According to Participant #6, "This picture of our administrator's office, I included it because it's nice having our administrator's and our educator's, essentially all the management are [accessible]. You don't have to go anywhere if you have a question they are right there next to the unit."

Summary

The themes that emerged from the photographs and interviews, including multi-agency teamwork, resuscitation room design, elevator and hallways, signage, patient rooms, equipment and supply rooms, communication, and roles and responsibilities, have shown that the physical environment has been deliberately built with teamwork as the main premise.

Multi-agency teams as described in the literature (Robinson & Cottrell, 2005; Saltman, et al.) surfaced as a theme from several of the participants showing an increase in productivity among the entire team. Team efficiency in the design of the elevators and hallways, signage, resuscitation and patient rooms, and equipment were themes that were identified by the participants, showing universal design elements. Communication, along with roles and responsibilities were also common themes as elements critical to the teamwork. This teamwork effort is seen in the photographs and comments as directly beneficial to the participants who use the facility daily.

CHAPTER 5

"Don't bury your thoughts, put your vision to reality," (Bob Marley, 1945-1981).

Conclusion

The research was conducted to identify how the physical environment shapes

teamwork with regards to communications and role assignments in a Trauma and

Surgical Intensive Care Unit (TSICU). Team members included in the study consisted of

personnel from facilities, emergency room staff, surgeons, nursing staff, trauma

coordinators, and administrators.

The data collection for this case study took place from February through April,

2010 with participants from the trauma unit at the Medical Center of the Rockies (MCR).

This qualitative study collected participants' descriptions of their perspectives utilizing

the photographs each individual took of their work environment. These photographs were

the catalyst for interviews to answer the research questions. The themes that emerged

from this photo elicitation were rich descriptions of physical elements identifying

positive environmental effects on teamwork within the trauma team. This methodology

allowed the themes to emerge utilizing multiple sources of data from the photographs and

interviews (Creswell, 1998; Shank, 2002).

Qualitative case study was chosen because of the flexibility to develop a

systematic approach to data collection (Banks, 2001; Branch, 2001; Creswell, 1998;

Emmison & Smith, 2000). This included the flexibility to select the site and participants

through staff meetings and personal invitation. The site was selected due to my personal

experience with the trauma team and the environment of MCR. The trauma team

members selected as participants were from a variety of disciplines to assure the data collected presented different areas of expertise to identify the influences of the physical settings on the communication, and team efficiencies.

The study utilized the stages of photo-elicitation as outlined by Rose (2007) which increased the credibility of the research by giving structure and guidelines which can be replicated for other studies. Having clearly defined instructions for the participants allowed freedom for the team members to photograph areas within their work environment that have enabled the team to function at an extremely high level. Interviews utilizing the participants' photographs in this visual elicitation brought deeper perspectives as each participant was able to share their stories of the environment rather than having a set of prearranged photographs. The feeling from the participants was that they are pleased to be part of this trauma team and work in this environment which is conducive to teamwork.

Potential Limitations of the Study

The research attempts to create transferability by including clear images with rich descriptions and in-depth portraits of the study's context so that comparisons can be made and the reader will be able to determine the applicability of the study (Merriam & Associates, 2002; Patton, 1990). The methodology utilized for this research project may be replicated and utilized by other health care organizations to conduct a case study. However, because of the specific selection of the site and participants, this research may not be generalizable to other healthcare teams. Other limitations to the research may include regulations, limited resources, and time constraints.

Major Themes

All of the participants commented on being valued members of the team at MCR and having clear roles and responsibilities which enables team member to each play their part in the team. The participants all take pride in their roles within the team and are open to communication from any other area including multi-agency participation, and the team members are accountable to each other.

Each interviewee had comments like from Participant #9: "Everyone who walks through that door is either a patient, a family member, co-worker, nurses, doctors, and they are all equal, we try to provide a safe and comfortable environment for everyone." Participant #4 said, "The patient bed is the central piece in the room where there's room around it for all the different team members to move around the bed... Shows that the patient is the essential of all the care that you do."

Accessibility of patient rooms, hallways, and equipment was another major theme that emerged from the data for each of the team members. MCR is a Gold LEED certified facility which implements all areas of universal design, behavioral design elements, and post-occupancy evaluation outlined in the literature (Balaram, 2001; Corry, 2001; Federal Facilities, 2001; Lawton, 2001; Osteroff, 2001; Preiser, 2001b; Sara-Serrano & Mathiason 2001; Story, 2001; U.S. Green Building Council, 2008; et al.). MCR has effectively brought together multiple stakeholders by including architectural designers, building owners, engineers, construction companies, administration, and staff to plan and build an accessible building according to Universal Design and LEED standards. Prior to the construction of the facility a steering committee was implemented

to ensure the teams utilizing the environment were included in the planning process to address teams' accessibility. Accessibility features were seen in the photographs and interview comments regarding entrances, hallways, resuscitation/patient rooms, elevators, communication systems, signage, storage, and office areas. Universal design elements were also identified in the photographs of building plans for current and future use, which refers to the units stacked to facilitate ease of transfer of equipment, teams, and patients for team efficiencies and patient care.

The literature emphasizes the importance of communication in establishing and maintaining a cohesive team (Bolman & Deal, 2003; Forrester & Drexler, 1999; Gilley & Maycunich, 2000; Hearn & Higginson, 1998; Lee, 2004; et al.). This significance of communication within the environment that utilizes multi-agency support was a major theme identified by all 10 participants in the study. A high level of communication has been designed and built into the environment as was seen in the photographs of the Emergency Entrances, patient resuscitation rooms, computer systems, bulletin boards, signage, and phones. The findings from the photographs and interviews show that team communication is affected by the physical environment. This is positively seen in the participant comments on the environment and how it has enhanced the teams' ability to communicate effectively and efficiently. Organizational development theories have included administrative support, communication feedback loops, teamwork, and organizational structure inclusive of all personnel for team efficiencies. Each of these elements have been implemented at MCR.

Szekendi (2007) contends the culture of the organization and clearly defined roles and responsibilities are influential in shaping the level of communication within multi-

agency and multi-disciplinary teams. Over half of the participants identified a shared mission, built on trust and communication, along with clearly established roles as major themes that emerged from the data. The photographs depicting these themes included the resuscitation and patient rooms, the use of uniforms, various carts, communication tools (computers, bulletin boards, etc.), and storage areas within MCR. The literature also expresses the importance of support from senior management and the overall administration (Miller, Charles-Jones, Barry & Saunders, 2005; Robinson & Cottrell, 2005; Rodriguez, 2007; Saltman, et al., 2006). There was no apparent difference in the pictures or interview responses from the four participants who hold administrative or leadership positions which shows the high level of support for teamwork from the entire organization.

Wearing different colors to identify areas of specialization has increased the efficiency of the trauma team. Support from the administration and the purposeful planning of the environment has also helped with teamwork efficiencies as there are no differences made for position within the organization (supervisor, manager, etc.) as seen with Participant #12's comments:

Another team effort that we did for equality was we made sure that we didn't … barricade people in rooms, ... So instead of … separate offices all over the place causing dysfunction, we used little cubicles that are all the same. So the rest of the team can't be envious of a bigger desk or an office or anything else, which really enhances teamwork. Every desk in every room is the same size, so every director's room is exactly the same size and they've got exactly the same furniture so we can't say well that director (or team) has more importance than the other

directors or teams. So that again fosters more teamwork. The design of teams which is the first step to any well functioning team, is key for making the hospital efficient. That's what PVHS does the best – work on teams. (personal communication, March 4, 2010).

Every response from each participant was music to my ears. The shared mission, the active participation of all the team members, the communication, stakeholder involvement, all sounded like it was coming directly from the research and theories in the organizational development field. Participant #10 participated in the planning and building of MCR talked about the experience with these words, "…Let's take the processes that we need for efficiency and build it into the design. So, We [have] designed the whole hospital to [be] adaptable… We worked with an architectural firm that … didn't make any decisions without clinicians being involved."

With each interview, the responses sounded like Organizational Development theories from all of the literature had been utilized to build this award winning environment.

Surprises

It was during the review of the literature and just prior to collecting the data that the Poudre Valley Health Systems (PVHS), which includes the Medical Center of the Rockies, Poudre Valley Hospital, and other service throughout Northern Colorado, won the Malcolm Baldrige National Quality Award which was presented to the President and CEO, Rulon Stacey (PVHS News, retrieved May 29, 2010). According to another press release, "The Medical Center of the Rockies in Loveland has become the first Colorado hospital to earn gold certification through the U.S. Green Building Council's Leadership

in Energy and Environmental Design program" (PVHS News, retrieved May 29, 2010)

As the research continued, MCR also added these distinctions of being named one of the top 100 places to work by Modern Healthcare, and the Magnet Award for Nursing Excellence (pvhs.org; retrieved May 29, 2010).

MCR continues to have involvement from the staff, outside agencies, communities to ensure continuous process improvement and to maintain an inclusive level of care for patients in the community.

Implications for Action

As a result of this research, articles may be submitted to journals including *Frontiers of Health Services Management*, *Journal on Quality Improvement*, *Academy of Management Executive*, and others.

Recommendations for Further Research

Another outcome of this study could be further research at MCR and the Poudre Health Systems to answer questions such as:

- Is this level of teamwork and communication seen throughout the entire MCR organization as only one area was identified and researched in this study? So the question might be - How would other teams throughout MCR complete similar study/studies?

- How would the results be similar if another facility within the Poudre Valley Health System?

- How would the results from these studies compare in a meta analysis?

Concluding remarks

MCR is an award winning facility, having become a Gold LEED Certified building, receiving the Malcolm Baldrige National Quality Award, and being named by Modern Healthcare as one of the 100 best places to work in healthcare. It has been a pleasure to research this organizations' use of architectural design to enhance the efficiencies needed to build and maintain teamwork within the Trauma and Surgical Intensive Care Unit with process improvement and feedback loops for information to flow in every direction.

According to Lee (2004), "To succeed, an ensemble doesn't even need a leader as long as they all know the script or musical score. They may improvise and take turns starring in solo moments, but they never stray from the intentions of the script or score" (p. 191).

"Music can change the world." -- Ludwig Van Beethoven

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Appendix A

Permission Letters

June 26, 2009

Kevin Unger
Poudre Valley Hospital
1024 S. Lemay Avenue
Fort Collins, CO 80524

Dear Mr. Unger,

I am Debi Colbert. We met at the School of Education awards reception this spring when you were honored for the Malcolm Baldrige National Quality award. At that time we discovered that we were both in the OPC PhD program and at the dissertation stage of the journey. I am writing today to ask for your assistance.

When we met, I mentioned that I wanted to focus my dissertation research on the Medical Center of the Rockies (MCR) and the teamwork aspect of the Trauma/Surgery ICU (TSICU). I will be conducting a case study utilizing photographs taken by participants from across the trauma team (i.e., surgeons, physicians, trauma nurses, technicians, etc.). These work area (without people) photographs will be the basis for interviews with the participants. The interviews will then be coded and analyzed to determine the influences of the natural setting on teamwork. This will require letters cooperation and the permissions to conduct the study prior to going through the Human Subjects review from both MCR and TSICU. I have enclosed a draft of these letters and self-addressed stamped envelopes.

The timeline that I have identified for the case study is to have all permissions in place by mid-July; identify the participants and conduct the initial meeting to have the cameras in the participant's possession for a two week period by late July or early August. Cameras will be collected, photographs developed, and interviews scheduled with participants to be conducted the end of August. The fall semester will be spent transcribing interviews, checking transcription accuracy with participants, coding data, identifying themes, analyzing the materials, and completing the writing of the dissertation.

If you are not the person who can give me permission, please send me the appropriate person(s), contact information, or if it is better for them to contact me, please forward my information as you see fit. I would be happy to visit or give a presentation to MCR to explain my research interests and answer any questions. Thank you so much for your consideration.

Sincerely,

Debora Colbert, ABD
Colorado State University
Division of Continuing Education
(970) 491-2645
dcolbert@learn.colostate.edu

Enc.

Debora Colbert
Doctoral Student
School of Education
Colorado State University
Fort Collins, CO 80523

Dear Ms. Colbert:

The Medical Center of the Rockies grants you permission to conduct research for your dissertation titled *Environmental Effects on Teams: Case Study of a Trauma Surgical Intensive Care Unit.* You are welcome to study our facility with the participation of the Trauma/Surgical Intensive Care Unit.

I understand that the Trauma/Surgical Intensive Care Unit staff's individual participation in the research is voluntary and individuals may withdraw at any time. I am aware that the study follows guidelines established by the Human Research Committee at Colorado State University and participants' identity, names, or job titles will not be associated with their response.

Six stages of photo-elicitation will be utilized in this case study to focus a rich description of the participant's team experience in the physical setting of MCR. These stages include:
1. An initial group session with participants to explain the study and focus on the research questions that will be addressed (approximately 30 minutes).
2. Participants are given cameras and a set of instructions to direct the types of photographs that are taken by the participants (over a two week period).
3. Photographs are developed and become the basis for interviews with each participant.
4. Interviews conducted with participants (45 minutes to 1 hour). Transcription of interview data with feedback from participants for revisions or additions to the data. (Transcripts to participants for 1 week – 7 days)
5. Data from the interviews and photographs are interpreted using content analysis to identify emerging themes.
6. Completed research is presented to participants.

MCR's staff would like to offer our support and cooperation for your study and look forward to have you collect the data between August and September 2009.

Sincerely,

Name
Title

Debora Colbert
Doctoral Student
School of Education
Colorado State University
Fort Collins, CO 80523

Dear Ms. Colbert:

The MRC Trauma/Surgical Intensive Care Unit (TSICU) grants you permission to conduct research for your dissertation titled *Environmental Effects on Teams: Case Study of a Trauma Surgical Intensive Care Unit.* You are welcome to study our facility with the participation of the Trauma/Surgical Intensive Care Unit.

I understand that the Trauma/Surgical Intensive Care Unit staff's individual participation in the research is voluntary and individuals may withdraw at any time. I am aware that the study follows guidelines established by the Human Research Committee at Colorado State University and participants' identity, names, or job titles will not be associated with their response.

Six stages of photo-elicitation will be utilized in this case study to focus a rich description of the participant's team experience, both individually and collectively, in the physical setting of MCR. These stages include:
1. An initial group session with participants to explain the study and focus on the research questions that will be addressed (approximately 30 minutes).
2. Participants are given cameras and a set of instructions to direct the types of photographs that are taken by the participants (over a two week period).
3. Photographs are developed and become the basis for interviews with each participant.
4. Interviews conducted with participants (45 minutes to 1 hour). Transcription of interview data with feedback from participants for revisions or additions to the data clarity.
5. Data from the interviews and photographs are interpreted using content analysis to identify emerging themes.
6. Completed research is presented to participants.

TSICU's staff would like to offer our support and cooperation for your study and look forward to have you collect the data between August and September 2009.

Sincerely,

Name
Title

Appendix B

Consent to Participate

Consent to Participate in a Research Study Colorado State University

TITLE OF STUDY: Environmental Effects on Teams: Case Study of a Trauma Surgical Intensive Care Unit

PRINCIPAL INVESTIGATOR:	Dr. Jerry Gilley Program Chair – Professor Organizational Performance & Change Colorado State University 246 Education Fort Collins, CO 80523-1588 (970) 491-2918 Jerry.Gilley@ColoState.EDU	CO-P.I.:	Debora A. Montgomery-Colbert Colorado State University CAMPUS DELIVERY 1040 Fort Collins, CO 80523-1040 (970) 491-2645 dcolbert@learn.colostate.edu

WHY AM I BEING INVITED TO TAKE PART IN THIS RESEARCH? You are being invited to participate in this research which examines: How is teamwork influenced by the physical environment in a Trauma/Surgical Intensive Care Unit (TSICU)? As a member of the TSICU team, your input is vital to the study.

WHO IS DOING THE STUDY? The case study will be conducted by Debi Colbert. Debi is a PhD Candidate in the Doctor of Philosophy Degree in Education and Human Resource Studies with a Specialization in Organizational Performance and Change. She has a Master's in Management and an interest in how teams are influenced by the physical environment.

WHAT IS THE PURPOSE OF THIS STUDY? In this case study, participants will take photos of the areas in the TSICU team environment. These photos will be the basis for an interview to explore the influences of the physical environment design on the TSICU team functions including team communications and role assignments. The study will also explore the influences of the surroundings on building and maintaining team efficiencies.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?
The Medical Center of the Rockies (MCR) TSICU was chosen for the site of this case study because of the personal experiences of the investigator with this team. The case study will take several months to complete with participants taking photographs of the physical environment, the investigator developing the photographs, the investigator integrating the photographs into an audio taped interview, transcription of data, analysis and concluding.

WHAT WILL I BE ASKED TO DO?
Attend a group session to receive an overview of study, instructions, and to sign consent form. Please take photographs of the physical work environment at MCR. I understand that I am to avoid taking photographs of people, as the study pertains to the physical setting at MCR. After 2 weeks the cameras will then be collected, photographs developed, and an interview time will be set up to discuss the photographs of areas photographed. Data collected will be transcribed and a time set to review the interview information. The data will then coded and analyzed to find any trends that may emerge. Results will be available upon request.

ARE THERE REASONS WHY I SHOULD NOT TAKE PART IN THIS STUDY?

If you have been at MCR's TSICU less than 6 months, you should not take part in this study.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There are no known risks associated with this research project.

It is not possible to identify all potential risks in research procedures, but the researcher(s) have taken reasonable safeguards to minimize any known and potential, but unknown, risks.

ARE THERE ANY BENEFITS FROM TAKING PART IN THIS STUDY?
There are no direct benefits to the participant.

DO I HAVE TO TAKE PART IN THE STUDY?
Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

Page __ of __ Participant's initials _____ Date _____

WHO WILL SEE THE INFORMATION THAT I GIVE?

At no time will the information be shared with your supervisor. Your name will only be used as a link to the photographs, schedule interviews, and to return your interview transcripts.

We will keep private all research records that identify you, to the extent allowed by law.

Your information will be combined with information from other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You will not be identified in these written materials. We may publish the results of this study; however, we will keep you name and other identifying information private.

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. For example, your name will be kept separate from your research records and these two things will be stored in different places under lock and key.

CAN MY TAKING PART IN THE STUDY END EARLY?

If you fail to take photographs and turn in your camera you may removed from the study.

WILL I RECEIVE ANY COMPENSATION FOR TAKING PART IN THIS STUDY?

Everyone who provides contact information with the completed questionnaire will be entered for a drawing for one of three $25.00 gift cards to a local restaurant as a token of appreciation for participation.

WHAT HAPPENS IF I AM INJURED BECAUSE OF THE RESEARCH? The Colorado Governmental Immunity Act determines and may limit Colorado State University's legal responsibility if an injury happens because of this study. Claims against the University must be filed within 180 days of the injury.

WHAT IF I HAVE QUESTIONS?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions about the study, you can contact the investigator, Debi Colbert at 970-491-2645. If you have any questions about your rights as a volunteer in this research, contact Janell Barker, Human Research Administrator at 970-491-1655. We will give you a copy of this consent form to take with you.

This consent form was approved by the CSU Institutional Review Board for the protection of human subjects in research on (Approval Date).

Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing pages.

_____   _____

Signature of person agreeing to take part in the study   Date

_____

Printed name of person agreeing to take part in the study

_____   _____

Name of person providing information to participant   Date

Page ___ of ___ Participant's initials _____ Date _____

Appendix C

Participant letter and instructions

January 27, 2010

Dear Participant,

Thank you for agreeing to take part in my research for my dissertation titled *Environmental Effects on Teams: Case Study of a Trauma Surgical Intensive Care Unit* at The Medical Center of the Rockies. Findings will provide feedback to MCR. This case study examines how teamwork is shaped/influenced by the physical environment in a Trauma/Surgical Intensive Care Unit (TSICU).

As a TSICU team member, your opinions are important to this study. Please take photographs of the physical work environment at MCR over a 2 week period. The cameras will then be collected, photographs developed, and an interview time will be set up to discuss the areas photographed.

Attached to the coded camera that you will receive at this meeting is a questionnaire which will take just a few minutes of your time to fill out. This questionnaire is an important research component. Completion and return of this questionnaire are voluntary and constitute your consent to participate in this study. Your responses will remain anonymous.

This research follows the guidelines established by the Human Research Committee at Colorado State University and the Poudre Valley Health System. It is not possible to identify all potential risks in research procedures, but I have taken reasonable safeguards to minimize any known, potential, or unknown, risks. If you have any questions about your rights as a volunteer in this research, contact Janell Barker, Senior Coordinator of Research, Integrity, and Compliance Review Office at Colorado State University at (970) 491-1655.

Everyone who provides contact information with the completed questionnaire will be entered for a drawing for one of three $25.00 gift cards to a local restaurant as a token of appreciation for participation. Your personal information will not be associated with the questions, and will not be used for any other purpose.

If you have any questions, please contact me via email (d.colbert@learn.colostate.edu) or call (970) 491-2645. I would be happy to answer.

Sincerely,

Debora Colbert   Dr. Jerry Gilley
PhD Candidate   Program Chair/Professor

Instructions

1. Please fill out the questionnaire attached to your coded camera. Both the camera and the questionnaire have been coded for tracking purposes. Please do not exchange cameras with your co-workers.

2. Please take pictures over the next 2 weeks of the MCR work environment, including all areas in which you interact with the team, which either enhance or detract from teamwork (Takes approximately 45 minutes to 1 hour). Please take pictures after working hours. If a situation arises during your shift, take a mental note and return for the photo later. Please NO PICTURES OF PEOPLE. Pictures of people will not be included in the study.

3. A drop box will be set up in the TSICU to gather the cameras and pictures will be developed. The pictures become the property of the research.

4. A 30-45 minute interview will be scheduled with you to discuss the photos over the next several weeks.

5. Data collected will be transcribed and a time set to review the interview information.

6. The interviews will then be coded and analyzed to find any trends that may emerge from the data.

7. Results will be available upon request.

Questionnaire

Please provide some information about yourself and your connection to this facility. Information in this section will be used to assist in assuring all members of the TSICU Team are represented.

Your role in this facility (check the best one) I am a/an:

_____	Surgeon
_____	Physician
_____	Physicians Assistant.
_____	Trauma Nurse/Emergency Room Nurse
_____	Operating Room Technician/Assistant
_____	Pharmacist
_____	Pharmacist Assistant
_____	Lab Technician
_____	EMT
_____	Respiratory Technician
_____	Therapist _____ Respiratory _____ Physical _____ Occupational _____ Other
_____	X-ray Technician
_____	Phlebotomist
_____	Building Maintenance
_____	Administrator within this facility
_____	Other (please explain) _____

Camera Number: _____

Contact Info: Name: _____Phone: _____

E-mail address: _____

What times during the week of February/March _____would you be available for an interview?

_____

* Consent to Enter Name in Gift Card Drawing *

&

* To Receive Summary of Results *

- Please enter my name in the gift card drawing (Circle *yes* or *no*)

  Yes   No

- Preferred method to contact for the gift card drawing (Circle one)

  Email   Phone

- I would like to receive the summary of results (Circle *yes* or *No*)

  Yes   No

- Preferred method to receive the summary (Circle one)

  Email   U.S. post

----

* Contact Information *

Fill if you selected *yes* to enter in the gift card drawing or to receive summary of results

Name_____

Address _____

_____

Phone#_____

Email _____

Appendix D

Possible Interview Questions

Possible Interview Questions and areas to explore:

- Please tell me about this picture and how it relates to teamwork here at TSICU? (picture number or brief description for later identification).

- What are the aspects in this picture that promote or detract from teamwork?

- (If the picture is of a barrier) Are there possible solutions to these barriers:

- How does this space pictured here influence the teams role assignments (clear & effective, goals & objectives in common, supported by senior management, uniting to the team, inclusive, encouraging to communication, increases commitment to high quality patient care)?

- How does the physical environment influence the team's communication:
  - Is it a place where differing points of view can be aired?
  - Is communication clear and effective?
  - Does the communication provide feedback for team members?
  - Does it make you feel included in the team decision making?
  - Is it conducive for sharing trusted information?

- (If pictured) How does the computerized medical records and electronic communications (email, IM, calendar, phone pager, etc.) effect the team?

- Is the facility flexible enough to meet the changing needs/demands of the team?