High Touch, High Tech, High Flexibility

Reducing Obsolescence in Patient Care Environments

Mohinder S. Datta, AIA

Since the early 1970's, medical centers have been temples of medical technology and are often known for their disregard for the human needs of community and family. The computer age has begun to dispel this reverence for technology and replace it with a closer understanding of the linkages inherent in our state of wellness. The consumer (Patient) demand for greater participation in their treatment regimen now requires a paradigm shift in the design of hospitals.

The world of medicine is in the throes of phenomenally rapid change. The development of minimally invasive procedures, remote mo-nitoring devices, calibrated drug infusion pumps and new drug therapies are among the new elements of technology which are giving medicine a friendlier face. Digital technologies, and information systems are among the forces which now permit a reconfiguration of the patient care environment within hospitals.

The rapid change in the healthcare economy and simultaneous evolution of new hospital operating methodologies, have coupled with competing capital demands to bring new focus on the obsolescence of hospitals. Even as institutions identify new needs, the risks inherent in investment in flexible fixed assets cause reconsideration and appear to demand the development of other vehicles for the delivery of healthcare.

Faced with the above challenges in the design of a new heart center for a major health system, we analyzed the high-tech interstitial building system and the low-tech disposable hospital approach developed in the seventies. Even though these were designed to accommodate change in different ways, the time frames were considered too long and costs of adaptation too high in modern terms to be acceptable in this exponentially changing environment.

This began our search for a cogent framework for the design of nursing environments. Our research into recent writings kept taking us to a "Universal Room" concept but we had serious misgivings about an approach where the design presumed that people today could precisely foretell the future. We had recognized that our primary search was for systems which reduced obsolescence. The examination of trends in the products that served hospitals actually provided the key to the design of the *universal* nursing unit.

Trendlines

The design of the nursing unit of the future began with detailed research and analysis of the trends in the evolution of the key participants

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in the use of nursing units. To step back in time and view the social framework, the evolution of technology and the economics was a first step to understanding the trends of the nursing unit of the future. The Patients, Physicians and The Nurses, and the Patient's Family were the key players we considered.

The building's obsolescence was caused by the evolution of the key participants. The building's flexibility/inflexibility was designed by people who either succeeded, or failed to understand both the pace and actual changes in healthcare. Understanding the necessary areas of flexibility and the infrastructure of hospitals was an important aspect of this study, and led to our conclusions.

The Patient

The first hospital was really a Hospice. Here patients received basic humane care. Serious illness or injury normally led to death. Most medical problems tended to be contagious and patients were often hospitalized to isolate them from the population. In the case of minor surgical interventions and amputations outcomes were very poor at best. Patient mortality was commonplace. As rudimentary healthcare evolved with increased knowledge, patients were grouped by disease and by sex, but acuity still did not play a big part in the care of patients.

As medical practice matured, outcomes improved, patients began to live longer and mortality rates dropped. The hospice now became a hospital and treatment areas were added to the nursing units. This led to the categorization of patients as sick or very sick. Patient's acuity began to be defined and so did the nature and extent of nursing units. As the patients began to live longer we began to define their complications. These complications led to the development of different medical interventions.The complexity of the nursing care and the lengths of the patient stay increased. Nursing units began to be categorized by acuity levels.

The advent of major trauma care and serious surgical intervention decreased the rate of mortality. The patient stays in hospitals had been shortening – with this development, the hospital stay increased. Multi-disciplinary medical and surgical interventions brought new devices. Equipment and staff required for the new treatments created a dehumanizing environment. Reactions to this change heightened the sensitivity to environment, and to the role of the emotional connects necessary for the patient's sense of well being.

The Physician

Beginning with basic herbal remedies and potions, doctors, shamans, etc. were either self-taught or trained within guilds. Physicians made house calls or the patient came to his house. The patient's home was the sick room or the hospital. The physician diagnosed through observation. The touch, the contact between physician and patient, gave confidence. The bond was part of the treatment. The guilds established standards. They set up schools. Schools standardized the training, and the knowledge base increased. In rapid order; research led to the development of medical specialties and new technologies. Physician/patient contact decreased. The diagnostic tools of imaging and testing took over the care system. The search into the working of the mind took the profession back to the "alternative" medicines developed over the previous thousands of years. The patient access to information led to an informed partnership between patient and physician. The bond was reestablished.

The Nurse

Untrained, dedicated members of religious orders began the nursing profession as they took care of patients that the family and community had abandoned or were not able to provide for. The nurturing focus began the credo of the care given while physicians retained the responsibility for diagnosis. In hospitals the primary contact of the patient has been with the nurses. The nursing unit has remained the territory of the nurse whose training has become very sophis-

ticated, with knowledge of not only medicine but also of devices and pharmaceuticals. Most importantly the patient often sees the hospital through the nurse. As cost reduction efforts have evolved, there has been ever increasing pressure to reduce the level of nursing care and even to use telemedicine to utilize scarce skills from a remote location.

The Family

The family was the first and primary caregiver for the patient. The first hospitals isolated patients with contagious and infectious diseases reducing family contact. The increased use of technology and invasive treatment further distanced families from patients.

The search for tools to improve outcomes and reduce costs is once again bringing the family into the care giving role. This has been coupled with medicine's recognition of the trauma and stress suffered by families when a member is in the hospital. The information age has helped by creating a more informed public better able to share in the role of caregiver. With the advent of cooperative care and the Planetree model, family members were given complete access to the patient and encouraged to participate in the care of the patient during their hospitalization. The need for family space in the nursing unit has created new pressures on the reserves needed for the development of hospitals.

Building Obsolescence

The rate of obsolescence has been increasing over the centuries. Today it is linked to the rate of information and knowledge development. At an ever increasing rate, communication of ideas forces a faster pace of obsolescence and the rate of building obsolescence has been doubling with each cycle. From a 100 year useful life for a space in the 18th century, today we can barely garner 5 years of use before the space needs renovation. Often in today's fast paced, high tech environment things are obsolete even before they are produced and distributed. Today one design is often obsolete before the space can be occupied. The chassis of the buildings we design today will still have a useful life span of 50 years plus. It is very likely though that the building will be in use 100 years later.

It is essential that we recognize the need to develop flexible tools to keep up with the need for constant and pressing change. It is not acceptable that the spaces be programmatically and functionally obsolete before they are occupied. The life span of the building, its infrastructure and interior systems must be made copasetic to optimize/maximize the value of the long-term capital investments.

We believe this can be achieved using concepts and ideas applied in the manufacture of computer hardware. It is essential that buildings, like computers be designed to accommodate change easily.

Building Configuration/Infrastructure

Hospitals at the turn of the century were designed with narrow, linear buildings that utilized natural ventilation and lighting. Gardens were incorporated to create a restful setting for people to de-stress.

The structures were usually designed with 3-storey exterior bearing walls and interior columns. By 1900, steel skeletal buildings, and the common use of the elevator brought about the creation of taller buildings and reduced the patient's and family's connection to nature and the outdoors. Air conditioning created fat buildings and soon people/patients lost the connectivity to light and air. The disenchantment with the oppressive larger medical center began to take hold.

Most patient treatments and therapies were accommodated on the nursing units with the exception of surgery. Adequate electrical lighting and mechanical ventilation made it possible to build thicker buildings. Advances in imaging technology, surgical practices and a new understanding and treatment of disease caused a metamorphosis in hospital design. The *"base block"*

was invented to house the diagnostic and treatment departments.

Open Wards

A curious and until now unnoticed element, the interior walls played a key part in the evolution of hospitals. The original, open nursing wards, had no partitions. The open spaces of the wards provided good visibility and flexibility. Minimal privacy was created using movable or ceiling hung curtains. See next figure.

While the first nursing units used the plan of churches as the model, modern nursing units evolved with the introduction of scientific medicine in the 1800s. The open ward, or Pavilion, was probably best characterized by Johns Hopkins Hospital at the turn of the century. These were designed with large windows and many vents to encourage ventilation and to remove contamination from the air. The Florence Nightingale influenced nursing units of the time emphasized cleanliness and focused on providing for bright and airy spaces.

Beds were typically lined up along a center isle with the head of the bed along the wall. This arrangement provided good observation and access and kept the travel distance for nurses at a minimum. There was, however, no patient privacy, and most of the patient's psychological needs were ignored. There was also very minimal support space, but the supplies were also minimal.

Segmented Wards

Segmented wards were designed with fixed walls for separation of people by gender and for infection control. The smaller groups of 6 to 8 patients had a little more privacy. Sound levels were lower and the tile and plaster walls which had only minimal electrical power, which was usually expanded outside the wall.

The first major evolutionary step after the open ward came with the design of Rigs Hospital in Denmark. Beds were turned sideways – parallel to the windows and placed in 2 to 4 bed open bays, separated by low partitions.

This arrangement did not reduce noise throughout the unit nor did it appreciably change infection rates among patients. It did decrease the travel distances for nursing staff, and gave patients a greater sense of privacy – both by what they could see around them and the overall activity level on the unit.

Divided Wards

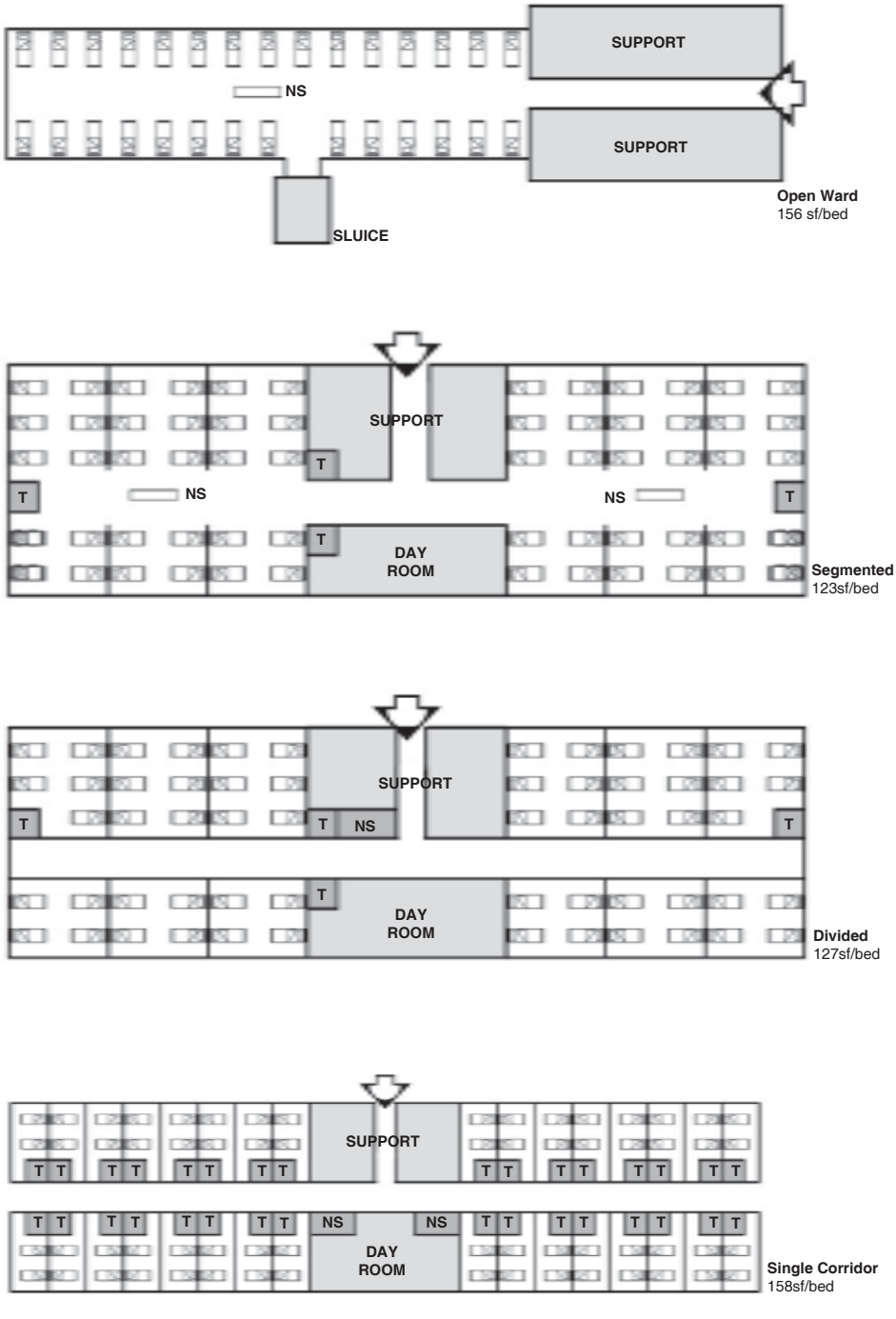
The next step in the evolution of nursing units came with the use of corridors to separate the 6 to 8 bed wards developed at rigs Hospital. At first this appeared to be a minor revision, but it actually created a major change. The addition of partitions and doors with a common corridor created more privacy, but more importantly it reduced cross infection. This initial revision to the Modified Ward was the first step in an even greater change.

Multi-patient bedrooms were designed with fixed walls for privacy, both personal and acoustical. Building services were still minimal. Electricity and water were the only utilities provided. Medical gas services (if available) were portable/movable. Tile block and plaster walls were used to establish the locations of the wash basin and toilets were provided centrally.

Double Room Units with Single Corridor

By the 1960's hospital design began to recognize the issues of patient separation and management not only by gender but by disease and between medical and surgical units. Surgery became the primary user of patient units in the 1970's. These realizations and the development of staff management systems began the centrally controlled single corridor design. The minimal support needed could easily be placed in the center of a long unit whose length was limited by the legal distance form the nursing station to the last bed.

The addition of the in-room toilet/shower was a great benefit for both patient and staff convenience. It provided improved convenience as well as improved sanitation/isolation, lessening the need for disease specific pavilions. The



The development of open wards to double room units.

drawback, of course, is yet another obstruction between the nursing staff and their patients.

Single/Double room Units with Racetrack Corridor

The introduction of the Racetrack corridor, was enabled by air-conditioning. It allowed nursing support spaces to be brought closer to the patients, reducing the travel distance to patient rooms from the nursing station. The Racetrack corridor concept also provided closer access to more support space, permitting inclusion of some treatment spaces. These had become very remote in the diagnostic base block. The issue of transport costs was recognized.

The reduced 'nursing distance' allowed hospitals to add more beds, often up to 50 beds per unit. Patient rooms are basically unchanged, but a move toward providing a few single patient rooms began. Patient observation was improved by locating the Nursing Station in the core area between rooms.

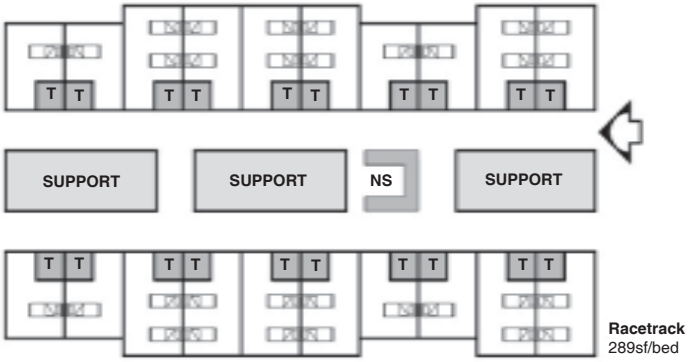
Two-patient bedrooms and Single patient bedrooms provided the fixed walls for acoustical, medical, separation and privacy needs. Walls were utilized as chases for medical gases and electrical power. Masonry and plaster walls were typical. Renovation took place every 10 to 15 years and was very expensive.

Contemporary/Universal Room Units

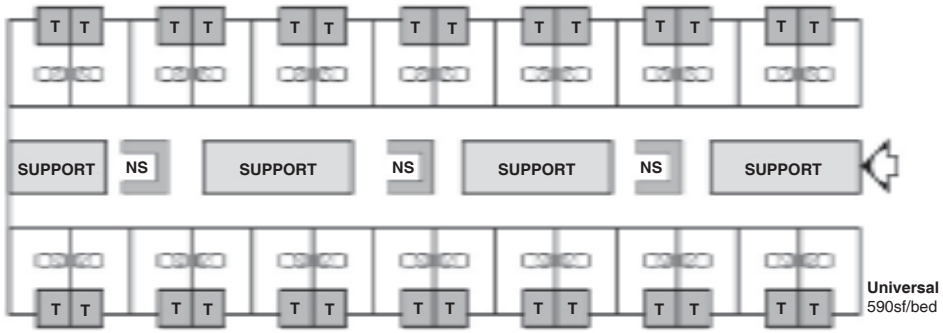
The trend toward *Universal* Rooms endeavored to solve a number of issues: a) Outboard toilets to bring back the visibility of patients. This had been lost with the introduction of individual toilets at the corridor wall. b) Single, *universal* concept rooms are arranged to provide zoning of patient rooms for family space, patient area and staff/service needs. c) Larger rooms provided flexibility for varying types of care and unknown future equipment needs. d) All single rooms eliminate scheduling conflicts, providing flexibility for facility operations. e) The increased unit size (due to larger rooms) leads to more and dispersed smaller Nursing stations. f) Personalized care in response to the need for earlier discharge of patients.

The move to all single and larger rooms has its drawbacks. Additional square feet equals increased building cost. Staff travel distance, especially during night hours when staffing levels are reduced creates access challenges and some increases in operating costs.

Contemporary Patient Rooms use walls for the distribution of power, gases, lighting, data, and sound systems. While ceiling spaces are used for primary distribution, walls are the final pathway for all support systems. They have generally become almost as fixed as the structure. Their removal is possible only at very significant



Single/Double room units with racetrack corridor.

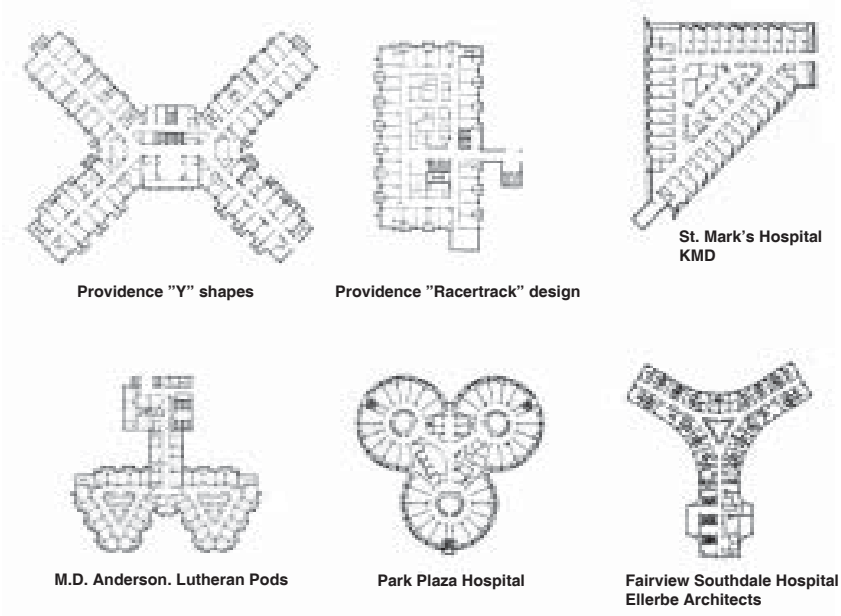


Contemporary/universal room units.

expense. The obsolescence of facilities is now, foremost, at the first lines of separation – the walls.

Specialty Models

Over the years, the basic models, single corridor or racetrack have been modified to create special shapes. Each of these has been driven by two aspects: first the perimeter available has defined the total number of rooms and thus the number of beds on a floor. Secondly designs have focused on maximizing the number of staff that could be cared for by the highly trained nursing staff. The triangle, the circle, clustered pods and many others have been attempted.



Different shape of nursing units.

The basic limitations have remained. The search for the universal ideal solution continues.

Wall Systems

Traditional wall systems of masonry, plaster, and wallboard serve multiple functions, are durable, and since they are completely customized and site built can adapt to any configuration.

Their disadvantages however, center around their customized properties and construction methods. Long construction period, many trades, dusty conditions are each an anathema within the aseptic, clean environment of the hospital which changes everyday with advances in technology, drugs and new skills.

Modular wall systems have been used in hospitals for many years – but not in patient spaces. The challenges of cleaner walls which can take abuse, their use as a conduit for many utility systems and as a barrier to fire made the average "office partition" inappropriate to the patient care setting. But they have many advantages. They are modular, component systems – manufactured off-site, and have a very short installation period. They are demountable, relocatable, reusable and easy to reconfigure for future use. Finally, from an accounting perspective these systems can be depreciated as equipment on a 5 year cycle instead of the building's 30 year cycle.

The wall systems themselves have matured and their quality has improved. They now meet fire resistive standards and have many finishes, include windows that are ever easier to demount and reinstall.

The potentially higher first cost is offset by the ability to be reused. The single greatest difficulty lies in the slow pace of local building codes to define the framework for their base. Codes don't always change quickly enough to allow prompt application of new technologies.

The Modern Wall is like other modern products pre-manufactured to the customized fancies of the modern designer. It is available in a myriad of choices. Similar to other modern systems these walls are like "plug-ins". They can be reused, relocated, and reconfigured. Most importantly they support the idea of total flexibility.

Specialization Comes to the Hospital Building Industry

The world of customized modular systems is alive and well. New firms are entering the field with new products supporting the idea of easy change. The new furnishings of hospitals appear to be moving towards modular plug-in components. Patient bedrooms, medical gas, electrical power, and data systems all are available in plug-in modules.

New patient beds can be totally freestanding patient care support modules. The LSATT (life support and trauma transport) Bed includes all aspects of life support including medical gases, monitoring equipment, etc. Patient toilets are prefabricated and modularized. Staff Support Stations are often prefabricated, modular and or mobile. There are even companies that are single source providers of completely constructed, state-of-the-art modular patient rooms that are easily integrated into new hospital construction or renovation projects.

Nurse stations, nourishment stations, medication stations including Pyxis stations are prefabricated and modular. Staff lounge and locker areas and storage facilities can be too. It is also possible to have special protective closed environments, for patients, that are self sufficient and modular. Lounge/locker rooms, clean and soiled utility rooms and larger storage areas that are required to be enclosed in one hour construction can now be placed behind rated modular prefabricated walls.

The potential that these new "plug-in" technologies would be at least a partial answer to the challenge of rapid obsolescence is exciting.

Where we are today

An Analysis of the Traditional Nursing Units of the Recent Past

Driven by state sponsored financing systems, bureaucracies in each country have identified minimum standards. In most lands these have become the maximum standards. It is not until the fetters of "organized" thought are removed that we examine the total and final cost. When we do many constraining precepts are abandoned.

First cost/construction cost has been the major driver of nursing unit design in the USA. The desire to minimize the first costs led to buildings that were "optimally" (minimally) designed in terms of the infrastructure. The operational impacts were seldom understood. These nursing units were characterized by:

- Minimum floor to floor heights – often as little as eleven feet floor to floor.
- An optimized structural grid, usually twenty four feet by thirty feet square.
- A combination of centralized and fragmented vertical chases, placed hither and yon.
- The use of both toilets and shower rooms located on either the exterior or at the corridor wall, or between rooms.
- Fixed partition systems.
- Fire, smoke, and sound walls constantly redefining and dividing the space.
- Small windows, high sill low ceiling heights.
- An institutional environment typical of places of incarceration.

Recently as a reaction to the ills of the past, nursing units have become a study in "worst case" scenarios. This is characterized by the over allocation of space within a nursing unit with only a little regard to the financial pressure on first cost or to reduce staffing expenses. This is exemplified by the design of the patient rooms referred to as:

Universal Rooms or Acuity Adaptable Patient Bedrooms

The *Universal* Room is oversized for basic Medical/Surgical Acute Care Nursing Units. The potential benefits of the *Universal* Rooms; long-term flexibility and adaptability may never be actually realized in the near future.

Universal Rooms have a high first cost due to the increased area required, the additional equipment and furnishings provided, and the provision of extra mechanical, electrical and plumbing services.

The *Universal* Room with its increased area and longer staffing distances has the potential for higher initial/interim operational costs unless the full capability of the room is actualized.

Nursing Unit Design

Recently nursing unit design has been a reaction to the design of units of the past. Excess storage space is often planned as a reaction to the staff's perception that there never is enough storage space on the unit. Since materials often ended up stored in the corridors. This is often times not a result of lack of space but is in fact a materials management system problem. As materials delivery systems change every few years, there is a general lack of confidence in the ability to estimate the space needs. As a result, materials are often hoarded on the unit. As the needs of families and patients have been recognized, so has the need for a variety of additional staff. Regulatory reporting requirements have added to the staff needs on the nursing unit. Finally the past hoarding pattern in offices has suggested more and more space for this function.

On-line records should have reduced the chart storage space in the center of the unit, but lack of confidence in the paperless record have resulted in a duplication of space for the medical records and the computer system.

The result of this space explosion is: enormous nursing units. During the 1970's whole hospitals were built-using a 1000 sq. ft. per bed standard. Today the same area is applied to only the specialty Nursing Unit!

The universal nursing unit

The idea of a *universal* nursing unit presumes that one could design something where one size

fits all – without exception. The very idea would be preposterous. The term has been used here in response to the recent recommendation by some architects that hospitals use a *universal* room to meet all of their future needs. Not only is this idea of the universal room flawed but it is likely to do serious financial harm to many hospital builders. The universal nursing unit, we hope, is only a framework for a flexible "plug-in" system.

Organizing the Contact and Support System

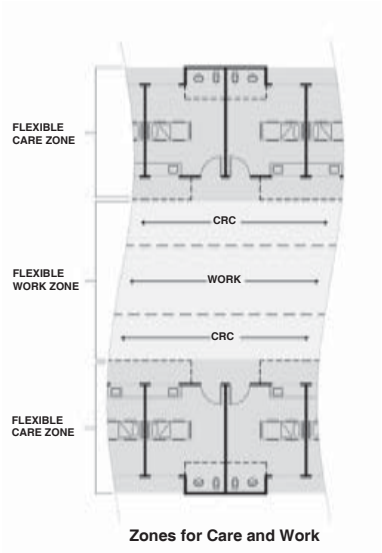
The *universal* nursing unit we developed has really borrowed from past concepts of 'loft' buildings, where users could plug-in their diverse needs. Few fixed rules existed for the individual design of the plug-ins – only that the plug-in had to be contained within the module. Key to the development of the "loft" is the dispersal of the "hard" elements to the perimeter keeping the middle free and flexible.

The Work Zone

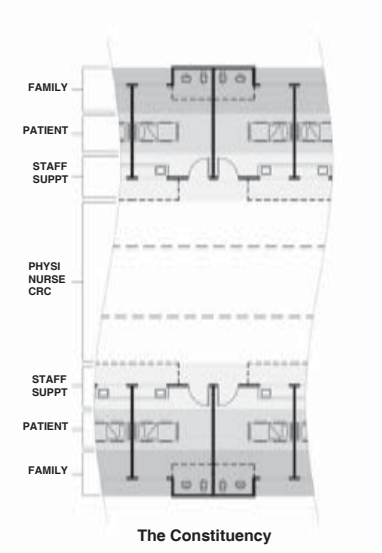
We placed the medical caregivers at the core. Creating an *open* 'live/work' room for the physicians nurses was a critical decision. Recently there has been a withdrawal of the caregivers into enclosed shells to complete the vast paperwork needed by various organizations. This has created a visual and contact barrier between patients and the caregivers. Searching for outcome drivers, we established that, after drugs and various treatments, physician and nursing contact gives patients the confidence to improve and go home sooner. Even though this may create a fish bowl effect – its benefits were primary to the goal of outcome improvement.

The Care Zone

Centered on the patient, the Care Zone recognized the participation of the nursing staff and the family as equally important. Placing the family to the "outside" and the nursing towards the inside, we enhanced the family patient contact with the outside world, the earth, sky and landscape. The staff support area, which could include nurse-servers, information/data stations, pharmaceutical and device storage centers was placed where it was central to the care zone and the work zone.



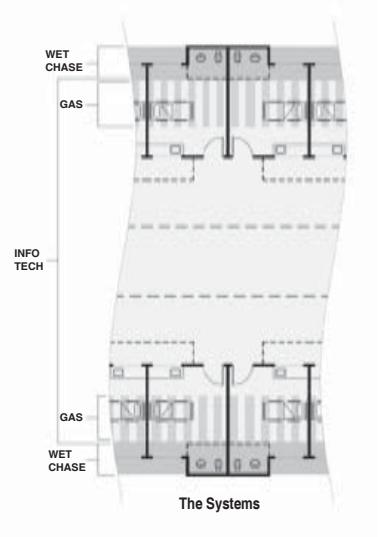
Zones for Care and Work



The Constituency

Organizing the Constituency
Reflecting the operational organization of the Nursing Unit, the space fields fell into defined worlds for each of the constituencies. Beginning from the outside, the Family, the Patient, the Staff. Finally the Physican and Nurse were placed at the center.

Organizing the Systems
Reflecting the current focus on information/ data and communication systems, a broad band



of this technology was spread across the nursing unit. Above it in the ceiling, is a presumed layer of air systems. A defined perimeter wet zone keeps "hard" waste systems at the perimeter of the nursing unit. The gas systems were organized around the patient. It was presumed that any treatment would occur in the patient zone only. Distribution systems for the data and gases were very important. As discussed earlier, the concept relies on the flexibility of the "dividing system" and expects the partition systems to be quickly demountable or easily folded away. Hence "pigtail" drops from the ceiling or "plug-in" gas/ power columns became the primary means of delivery these systems to the user. The result is a "high-tech" yet simple and flexible building chassis that is quickly adaptable to varying patient care environments.

Characteristics of the universal nursing unit include:

- *Floor to floor heights greater that typical nursing units of today.*

We are currently using a 15'–6" floor to floor dimension.This additional height assures adequate space so that changes can be made to the existing systems over time. It is not essential that a full interstitial floor be accommodated. Larger spatial volumes can be created with this height. We have observed that the ceiling variations encourage interest in the patient and reduce boredom and lethargy. The taller heights allow different patient care environments to be created, offer flexibility to accommodate different types of equipment and reduce the claustrophobic containment of stock 8'-0"ceilings.

- *Longer spans structural grids.*

The absence of columns in the interior space will allow for increased flexibility in the use of modular systems. It minimizes the costly customization required to work within a tight/ small grid system. Finally minimizing the number of columns provides the flexibility to organize the interior space without the constraint of long straight corridors.

- *Vertical chases located on the perimeter.*

It is essential that the floor to floor vertical penetrations and chases be located in the perimeter zones of the building. This is again to maximize the flexibility of the interior.

- *Combination of traditional fixed partition systems and modular partitioning systems*

We recognized the benefits of using traditional partition systems around the "hard" fixed elements. For the remainder we used modular systems for their greater flexibility in installation and relocation.

- *Plug-in ceiling distribution systems for Mechanical, Electrical and Plumbing components.*

These concepts have been described earlier. The diagram below describes the distribution system for the Heart Center at Palmetto Health.

The heights for the modular systems at the center were maintained at a standard 8' 0" but care and work zone volumes were varied to enhance the environment and to create discrete pockets for the system "pigtails".

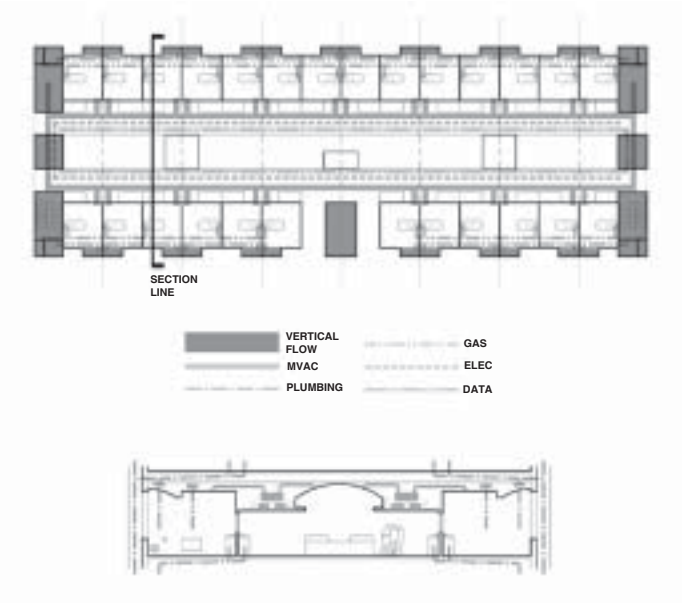
• *Richness in texture – it comes with modularity*

Space, color, texture, and light are used to define each of the zones. Careful analysis of the high-touch needs of the three populations (medical care-giver, family/community, and patient) led to varying ceiling heights and the surface treatments to provide a rich variety of spaces. The perimeter and the center (each of which are not expected to undergo major change) were designed with curved ceilings. In the rest of the area we utilized flat ceilings, though we varied the height. The modular systems could work well in the 8'0", 9'0" and 10'0" heights.

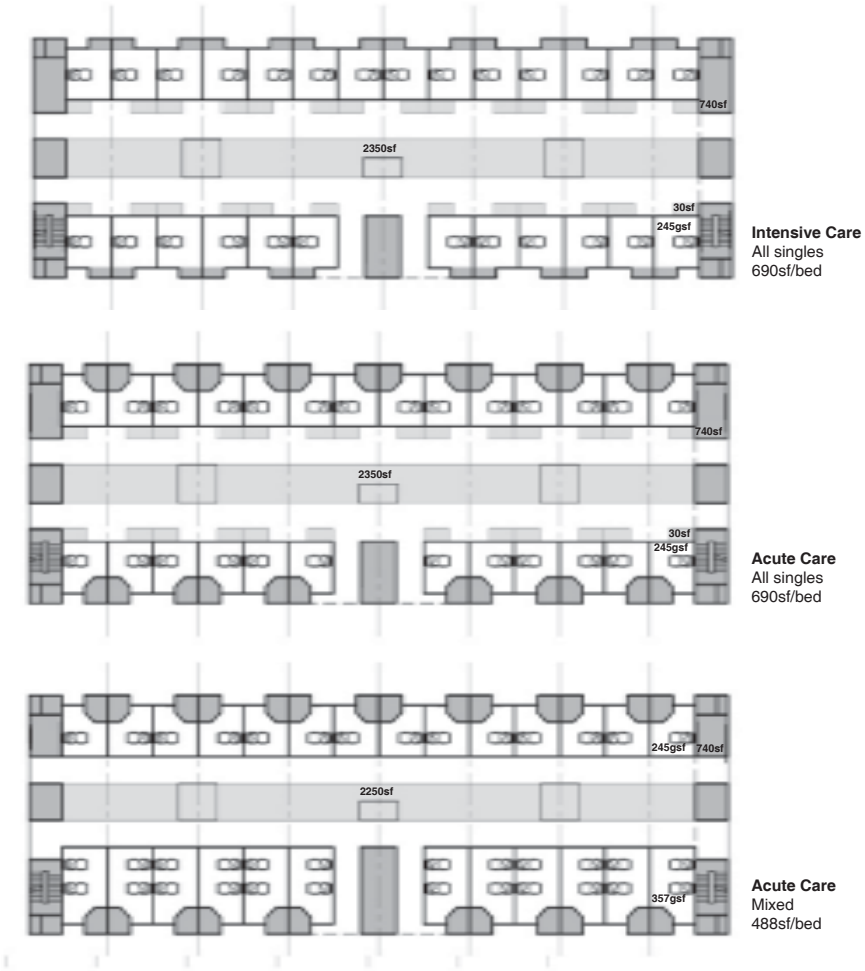
The approach was carefully tested to assure lowest operational cost. It is equally applicable in critical care and acute care environments, and relies on very broad universal needs of in-patients and avoids the pitfalls of special customization. The concept has been examined for a full range of hospitals, medical centers, community hospitals and rural hospitals. We established that the desired rates of change were no less in all three though the ability to finance this change varied very significantly. Thus the modular/universal unit was even more important at the rural facility.

The following diagrams illustrate the adaptability of this approach to three varying types of nursing units: Intensive Care, Acute Care in all single rooms, and Acute care with mixed singles and doubles. All three units are based on the same flexible building chassis. The key lies in setting up the service point, and therefore the fixed areas of the plan, and then allowing the remainder of the floor to flex with the nursing units needs.

In all cases, the patient toilets are located in fixed positions along the wet chase zone of the perimeter. This fixes the locations of the dividing walls between the patient bedrooms. The depth of the patient room can flex, depending on the location of the corridor-side wall, and the services to be provided with the patient toilet.



Vertical chases located on the primeter.



Design for ICU or acute care.

The intensive care room does not need a shower, so the toilet space is shallow, providing a larger 13'–6"x15'–6" patient room area. The all-singles acute care bedroom flexes down to provide a shower in the toilet and a 10'–6" clear headwall space. The corridor wall is relocated again in the acute care mixed singles and doubles unit in order to provide additional space for 2-bed rooms. The design square feet per bed varies in these diagrams from 26 ICU or Acute beds at 638sf/bed to 38 Acute mixed beds at 437sf/bed.

The entire central area of the units remains flexible, with the use of modular furniture systems. The physician / nurse work zone is kept at a constant 12 ft, which is more than adequate for the many different uses.

Conclusion

The goal of this approach is a truly flexible

chassis, which promotes and encourages primary interaction of patients with families, and with physicians, and with their nurses and caregivers. The *Universal* Nursing Unit has demonstrated that it provides a flexible building chassis and an organizational system to achieve operational savings and to minimize first cost.

The Universal Unit Goals

- Enhance the flexibility of the infrastructure.
- Permit immediate change to allow new organizational and management patterns.
- Improve the patient outcomes through the enhancement of the medical team's ability to assess the patient's condition and situation.
- Maximize the relationship and contact between physician and patient.
- Create a convenient environment for the family members to care for the patient.
- Provide immediate resources for staff to support the patient.
- Support an interactive setting for the medical