Re-Strategizing Healthcare Facility Design:  
The Comprehensive Outpatient Center

by
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Bachelor of Arts, Colgate University
Hamilton, New York, 1997

Submitted to the Department of Architecture in partial fulfillment of the requirements for the degree Master of Architecture at the Massachusetts Institute of Technology
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Abstract

During the past decade, medical facility design has gone through enormous change not only because of new health care management system but exploding technological advances in diagnostic equipments and fast communication system. New imaging equipment is now, better, smaller, less noisy. And digitized image results can be transmitted through the high-speed cable to multiple locations. In addition, robotics is changing the surgery suite organization. On the management side, hospitals are pressured to cut down their cost as much as possible in order to maintain the market share in today's ever changing health care environment. My thesis, in the first phase, focuses on identifying some of the important factors that are affecting the current hospital organization: “Computerization, telemedicine, digital imaging MRIs, CT and PET scanners, ultrasound, and lab and surgical equipment will make existing technology obsolete.” (Health facilities Management Feb. 1997, 18-22). These changes have already prompted many reactions in how to reorganize or renovate the existing facility so that hospitals not only can accommodate the current changes but also possible changes in the future; the issue of flexibility, changeability is the key underlying concept. Next phase of my thesis focuses on arriving at organizational strategy recommendations and its models. Some of the important strategy concerns are; rationalization of circulation which brings design that requires less staff (efficiency), emphasis on integration of similar functions that are caused by the new technology, issue of providing the maximum flexibility and changeability to the new organization, new relationship between the departments, offices, labs etc. Information Technology with digitized information such as imaging results, patients' access to their comprehensive medical files in their room or any place in the hospital, and other aspects of telemedicine is an important changing force in the future of hospital organization that will be examined. With all the research, my thesis will recommend the organizational strategy and exemplary design of comprehensive outpatient care facility.

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I would like to dedicate this thesis to my father and mother for all of their strength, support, and love. I also would like to express my sincere gratitude to Professor Ann Pendelton Jullian, Professor Andrew Scott, and Dr. Mitchell Rabkin for their guidance throughout the project.
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Comprehensive outpatient center
1 Research

Throughout the first phase of the thesis, future trends in health care delivery from the physicians, nurses, HMO's, administrators, architects, and finally the patients' viewpoints were gathered in order to determine the program and strategy development. From the very basic departmental relationship information to the newest medical technology, there are vast amounts of information that must be researched for what medical facility should become in the future.

Current medical facilities, especially, medium to large sized ones, do not adequately address the need of change in designing and organizing spaces. They are too rigidly designed and set. Only the big renovation projects are going to be done or in many cases, they opt to have a complete replacement projects (Pearson). Today, architects not only try to listen to physicians but also, pay more attention to the patients who are becoming clients and has many options. To attract them, much of design priorities are given to the design of waiting areas, appearances, and other attraction points. Indeed, they are very important part of the design but in so doing, true internal changes that can bring the fundamental change in delivery of care and the alteration of total experience has lost support. Still, hospitals follow vertically separated departmental model (figure 1) or often chooses to have horizontal organization (figure 2).

Fig. 1 The Homer Fudelsky Building University of Maryland Medical System
Both models have limits when changes are required. True vertical and horizontal integration of space for responding to future change is lacking. Patients who experience the healthcare facility must feel comfortable starting from the entrance to waiting, preparation-procedure-recovery, and finally discharge. For fast, reliable, comfortable, and caring environment, rethinking of how well those actual procedural rooms and their relationship to other services and functions are designed and coordinated should be the priority. Some of the important organizing issues for the future healthcare facility design are shown in the figure 3. The most outstanding concern has been the flexibility. It always has been the case that hospitals are one of the most sophisticated and complicated building types so that once the spatial arrangement and program design is done it becomes almost impossible to alter or adjust in the future without major reorganizing construction (Pearson). With the introduction of the interstitial floors which provides 6-8 feet of space for the long span structure and completely flexible mechanical system, hospital design somewhat achieved the column free, flexible space (Kobus). However, more profound level of flexibility that encourages and accommodate increasing interdepartmental collaboration has not been achieved. New medical technologies such as tele-medicine, robotics, advanced diagnostic equipments, mobile point of care diagnostic or treatment devices; all requires a different approaches to achieving flexibility. Developing trend of departmental relationship with
possible collaboration, consolidation, or even complete change of the nature of the department will come about in the foreseeable future. Since, there are enormous amount of information on changes in the healthcare service area, it is quite necessary to focus on the most important and urgent issues from this research to develop an organizing strategy for the medical facility. Thus, detailed new trend of change will be discussed as needed in the strategy development section of the paper. However, a basic question of what is the program that best meets the future care trend must be answered before any strategy can be developed. Research about each existing department provides insight for program determination of what are essential, what services are used the most, proximity requirements, what departments are going to be absorbed by the other or become obsolete is an important and basic area of investigation; Simplified departmental description and proximity chart is show in the figure 4(Kobus).

Design/Organizing Issues

Proximity
Flexibility
Efficiency
Distinguishing Caregiver, in/out patient
Public vs. Service traffic
New method of zoning
Interdepartmental collaboration
Reducing travel distances
Basic efficient circulation
New space requirements
Energy/environmental issues
Essential vs. non-essential
Change in medical technology
Convenience
Automation(lab testing, drug)
Digitized information access/share

Fig. 3 Key design issues
Fig. 4 Departments and their relationships

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Close Proximity

Medium Proximity
Current departmental relationships in combination with information about forthcoming changes in medical practice, provides future program and the spatial organizing strategy. Research showed that certain departmental functions are going to be combined in order to provide more comprehensive diagnostic service with less patient transportation. For instance, surgery and imaging departments are in close relationship and in the future, higher level of collaboration will occur with the aid of digitized medical information(Kobus). Some functions such as x-ray diagnostics are becoming obsolete and will be replaced with more sophisticated ones such as derivative of current CT scanner and other portable units(Symposium). Also standardization of procedure rooms, preparation/recovery, and treatment rooms so they can be used by all staff and physicians for the full range of treatment is another important trend in healthcare delivery facility design(Kobus). Operation protocol of pharmacy and Laboratory is starting to change as well. Some of the lab testing can now be done at the site of care such as blood analysis with advanced technology. Also using pneumatic tube systems, lab samples can be sent at the point of care to laboratory without patient transportation. Same system will be used in pharmacy operations. Drugs can be ordered by caregivers at any locations and it will be sent to patient's bedside(Hagland).

With the direction of delivering the healthcare in more unified and harmonious way, considering the forthcoming technological and operational changes described above, reinvention of the facility and program that satisfies the need of all the participants of the healthcare including patients is necessary. In the past and even now, there are countless expansion of small specialty clinics and large medical centers. Both types of facilities have pros and cons. Instead of expanding the trend of small specialty clinics which are certainly necessary, but the need of more comprehensive outpatient service are going to increase dramatically since most of the procedures requires some form of collaboration with other departments or services(Guinn). The ability to deliver a fast and accurate and well-integrated care is the key to most of the hospitals that are under a enormous amount of pressure to survive in the very turbulent environment for the healthcare service industry. A place where patient and their friends and family member feel comfortable and enjoy the full range of service such as education and entertainment besides the treatment is also a serious consideration for the program determination. Thus a comprehensive outpatient center with innovative approach in spatial arrangements seem to be the best program to address the current and future needs healthcare delivery. The detailed facility programs are shown in the figure 5. Some of the key descriptions of departmental relationship and changes are described in the figure 6.
Re-Strategizing Healthcare Facility Design:

Program

1. Emergency/Express general care
   Most of the visits are through appointments. Emergency-redefined as extensive primary care unit that can redistributed/converted if necessary.

2. Small Specialty
   Privatized care. Consultation rooms equipped with general care plus.

3. Therapy/Wellness
   Fitness, education, counseling

4. Short stay
   Larger patient rooms - to accommodate, point of service(care) modalities and telemedicine.

5. Surgery
   Class B and C type surgery restricted/semi/non.

6. Imaging

7. Special Diagnostics/Radiology


9. Endoscopy

10. Preparation/Recovery
    Centralized. Flexibility of converting into private rooms. monitoring through cross trained care team.

11. Cardiac Catheterization Lab

Fig.5 Program Details
The Comprehensive Outpatient Center

Special Diagnostic Department

Clinical Laboratory - Increased bedside testing

Diagnostic Imaging

Ambulatory Procedure Unit/Surgery
One-way flow for patients. Two distinctive areas - peri/post operative areas.

Cardiac Catheterization Lab
Majority are outpatient basis. High risk. Access to pre/recovery area. Shifting towards outpatient care.

Endoscopy Suite
Trend towards having separate suite and outpatient base. Centralized prep/recovery area. Increased application.

Obstetrics
Toward ambulatory/acute mix. Isolated from busy networks. Consolidated women's health floor/section

Fig. 6 Key Departmental Descriptions
More detailed explanations on departmental change needs and particular trend will be provided in the strategy development part.

With the new program in mind, the three most important things to consider when developing a organizing strategy and implementing it into a skimatic design are, first, new technology's implication for space and planning. Second, recognizability by the users(patients/other visitors/workers) or ease of way-finding. Third, light and ventilation.

2 Strategy; Streamlining Care

This phase of the project is to develop a spatial organization strategy for the comprehensive outpatient center program that best reflects the advances and changes in medical technology and method of health care delivery that was researched in the research phase. The developed strategy's simple implementation with viable dimension is described in the next phase.

Focusing on the outpatient facility organizational strategy, the project tried to identify the factors that will generate a new paradigm of hospital planning. Main approach will be researching on areas of integrating departments for easier future collaboration, expansion, and consolidation. Integration applies to both vertical and horizontal that leads to an ultimate environment for facilitating an easy future modifications. Strategy should be the one that results in easy internal transformation, conversion as well as minimizing the interference from any renovation or reorganization. Also one of the main goals of generating the strategy is to bring a hospital experience from a fragmented one to well integrated one so that the minimization of patient transportation can achieved. With the streamlining of care through better design strategy, cross-trained, multidisciplinary care-giving teams can work efficiently as well as reducing the patients' anxiety. Recognizability or readability by users of the building from outside as well as inside is also an important consideration in generating strategy. Not intermixing sick vs. non-sick and care vs. non-care activities are significant factors in designing a well-balanced and healthy building with different levels of light and ventilation control.
2.1 Striation

One of the most important strategy of this thesis is striation (figure 7,8). The concept of patients gradually becoming better in physical as well as psychological well being in the process of care is the main idea in striation concept. Also readability of the facility by all users gives another important motive for this strategy.

![Layered/systematic care process](image)

**Fig.7** Layered/systematic care process

If more intensive intervention is needed, not sent to other large facility but able to treat-- patients goes further into the procedural treatment part (vertical move)

**Fig.8** Diffusing/relieving tension/anxiety
Both planner and sectional strategy of striation follows the concept of less general to more specific/serious care. Planner striation is shown in the figure 9. First layer(1) is non-sick zone with educational, gathering, shop spaces, and other non-specified activity that can be programmed as particular need rises. The next layer(2) consists of mainly next level of sickness; preparation, recovery, and nurse stations, acting as a buffer. The last layer(3) is care zone where the most serious procedure is done. With planner layering, work efficiency, flexibility, readability of the facility can be achieved. Simple, clear, yet efficient care can occur with the proposed striation model.
Patients' need of intermixing and crossing different departments and being psychologically affected in the process of experiencing the maze-like parts of the facility is eliminated. Striation provides clarity in organization, ease of finding places and thus, giving patients sense of control. Sectional striation is shown in the figure 10. From the general/express/small specialty care layer of first few levels, to special procedure layers and finally the top layer with short stay unit, the strategy promotes the idea of level of anxiety, tension, and sickness being diminished as one experiences building vertically as well as horizontally.
2.2 Dual departmental arrangement

What is the best departmental arrangement? As described earlier in the research section, many hospitals have separated departments by floor or some hospitals have horizontal arrangement (figures 1, 2). Current model of rather segregated departmental configuration must change into more flexible and collaborative model that reduces hard boundaries of each department. Based on the first phase research, with given program of comprehensive outpatient center, dual departmental arrangement seems to be the best solution (figure 11). Diagnostic imaging and surgery should be near proximity for the increasing collaboration (Kobus). Also, invasive imaging such as Cath Lab should be near the surgery (Kobus).

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**Fig. 11 Dual departmental arrangement diagram**
However, dual departmental planner strategy without vertical consideration will not work. For instance, Cath lab and surgery has to be close because, in case of an emergency, a surgeon should be able to reach Cath lab fast for emergency heart surgery when required (Symposium). It is not quite necessary for a patient to be transported to surgical suite unless it requires extraordinary equipments or environment. Cath Labs are becoming more generic with more efficient layout for various invasive heart procedures and with cart system in use, all the necessary equipments and supplies can be reached to any procedural rooms easily including emergency open-heart surgery (Symposium). Special diagnostic department that does non-invasive testing of cardiovascular or neurological performance, based on the relationship research, should be near by both Cath Lab and diagnostic imaging department. This resulted the dual departmental model with very important vertical collaborative practice implication for the future change and needs (figure 12). Therefore, as a whole, the four procedural departments operate in harmony as a coherent unit.

![collaboration(flexi-) zone](image)

Fig.12 Contiguity; collaborative sectional strategy

Also the necessity of having emergency department and general/express care department on the first floor is another aspect in resulting dual departmental model. Most of the emergency cases are not really a true emergency cases: “the recent crisis of growth in emergency room service is due largely to the fact that more appropriate outpatient service is not available after-hours... Many emergency room visits are significant enough that the patient needs to be observed for eight to 23 hours (Guinn)”.

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With the dual departmental model of emergency and general/express care, the tension can be reduced by making an elastic boundary. General care can receive patients by appointments, walk-in's, or minor emergency patients who needs simple care or short observation. By locating the two departments side by side, general care can reduce the overcrowdedness of emergency department. A flexible buffer zone between the two departments should be provided when the strategy is implemented.

2.3 Centralized preparation and recovery

Consolidating the preparation and recovery area have been discussed in the medical community as the most efficient model, but there has not been a realization of the concept. This thesis tries to engage the concept of centralized prep/recovery that can only be achieved through the careful departmental arrangements which is explained in the dual departmental organization. Since each departments has its own procedural and recovery routine, it is necessary to have separate prep/recovery areas for the each department. However, both pre/recovery areas should be nearby for the efficiency as well as controlling and separating the environment from the procedure area. In most of the current models, each procedure has its own little prep/recovery settings with different room sizes and arrangement which creates confusion about the readability, clarity from the users' point of view and diminishes flexibility of facility when the change of care pattern or procedure comes about. For the cross trained care givers to be efficiently working and patients to feel more comfortable, the prep/recovery environment should not be in the small isolated areas.
2.4 Interventional Floor

Equally important organizing strategy for the outpatient center is the concept of interventional floor. Hospital of Venice project by Le Corbusier in 1965, introduces the idea of intermediate service floor (figure 13) for staff preparation and staging. Intermediate floor is segregated departmentally between the procedure/exam rooms below and bed units above.

Re-inventing this concept by Le Corbusier, adjusting and fitting into a new medical practice patterns in the future, situating the interventional floor as a backstage making sure all the functions of hospital operates smoothly is vital to this project. Conventional practice places all of the service and support departments such as central sterile processing, medical records processing, pharmacy, materials and management into different floor as needed. Although some of those departments are coupled together, they are put in the basement of the facility. With all the support services in one floors, operational management becomes more efficient and simple. Strategic placement of vertical transportation method for both supply and for caregivers is an important consideration. This floor also has potential to be used as patient transportation when needed. Also, materials management can use more room for transportation of larger equipments for the future. More and more medical equipments are in carts becoming mobile thus making each procedural department to be flexible in accommodating the different procedural need is essential. In addition, new
need for the information technology management space is emerging. For the uncertainty of the expansion, reduction, elimination, or collaboration of the support and service departments mentioned, the idea of having an interventional floor that has all the support functions making possible of the easy future adjustment is essential in operating efficiency as well as being flexible for the future change without interfering any other departmental functions of the facility.

There is a social aspect of having an interventional floor accommodating all the various support and service departments. Workers can get to know and interact with each other on everyday basis than being rather separated into different floors and segregated departments in the current paradigm. Also, the working environment of the staff at the facility can be improved by locating the support departments above ground and group them into one or two levels.

![Interventional floor diagram; serving floors above and below](image)

### 2.5 Information/telemedicine zone

It is important that the entire facility should be wired and prepared for the advanced communication and telemedicine system. But I wanted to create a zone that is specifically dedicated for the digital information access and telemedicine practice for both patients and physicians (figure 15). Patients/other visitors can acquire their healthcare information as well as education or even an entertainment while waiting. Patients will be educated about their procedure in the special information zone or prep area. Color coded work flow indicators will let workers know to either slow down the admissions etc. Billing and drug dispensing done within the self health check points. Caregivers can come to this zone for the remote tele-consulting of patients or communicating with other physicians in the different departments as needed instead of going to their own offices. By creating a special zone for this use, it can naturally act as a vertical boun-
ary between procedural(care) zone and malleable free activity zone(Figure 11). In addition, in terms of infrastructure, it will be easier to have a special zone feeding entire floor for the maintenance/management purposes.

Fig.15 Information/tele-medicine/self learning zone(blue green)

2.6 Other important strategy factors

2.6.1 Integrating self health check points
Supporting self-care environment where patient feel they are in control and systematic support is provided throughout the facility. Patient can access the self-health check modules on every floor to have any information they need relating to their care or operation update of hospital care flow. Patient, family and friend learning and activity spaces can be designed and arranged in the malleable free activity zone.

2.6.2 Generic care/procedure rooms that can accommodate different types of care including emergency, fast track and access of point of care devices- cast, Gyn, EKG, anesthetic, crash, and other diagnostic or treatment devices should be designed.
2.6.3 Soft space for future expansion
Increasing the storage space outside of the procedure or patient rooms are becoming an important issue (Symposium). Future trend is to have mobile medical equipments located on each floor in the common storage, so that it can be transported where needed and thus, less travel for the patients as well as flexibility in procedures. Soft space also applies to the un-programmed, malleable free activity zone for the patients/visitors/caregivers for the wide variety of new spatial needs. Different types of activities such as education resource areas with interactive media for parents, families, conference, library, entertainment, chapel, day-care, fitness, retail, dining etc. will need more and more space because of the necessity of the facility to be the best position to attract the patients who are more and more becoming like clients who wants better system of service. In this project's strategy, malleable free activity zone (figure 16,17) is created for this soft space purposes.

2.6.4 Expansion
Possible expansion in the future can occur as shown in the figure 16. The design has almost modular like program arrangement. Therefore, expansion can be achieved by adding another care procedural unit to the either direction. As mentioned earlier, minimizing the interference from any types change is made possible by the departmental arrangements with buffer zone in the middle so that one side's physical adjustment has minimal affect to the other.

![Future expansion path](image)

Fig. 16 Future expansion path
Further explanation of the strategy is provided in the next (Implementation) phase.

1  Malleable free activity zone
2  Information/tele-medicine zone
3  Prep/recovery zone
4  Circulation
5  Care zone
6  Interventional floor

Fig. 17  Concept model
Re-Strategizing Healthcare Facility Design:

3 Implementation; introverted design concerns promoting collaboration, flexibility, recognizability.

This part of the project tries to apply the developed strategy to a schematic design with a real space dimensions. Total dimension of the facility is solely based on the basic internal space arrangements and requirements without any site implications. If a facility requires more procedural rooms, then the increase of the room numbers, thus total depth of the building will increase and visa versa. For the strategy implementation, I have took the total departmental sizes and number of procedural rooms from the book Building Type Basics For Healthcare Facilities and modified them with an additional information. Based on the number of procedural rooms, number of preparation and recovery rooms are decided. Optimizing the flexibility and collaborative environment requires larger procedural, preparation/recovery, and storage room sizes in general(Symposium, Kobus). Procedural room sizes are based on the book, symposium attended, and consulting with physicians and administrators with careful consideration of future change. It is true that in reality, patient market investigation should be done before deciding on the size of the hospital. However, in order to schematically implement the organizing strategy developed in the second phase of the project, the design does not depend upon the population size or the site condition. How the developed strategy makes collaboration and flexibility possible through spatial orientation, relationship to others is the key idea in this final phase of the project.
Fig. 18  Final model: front
Re-Strategizing Healthcare Facility Design:

First Floor
Lobby/Express Care/Emergency Care

Express care/general care; observation beds unit

Primary care unit that has urgent care capability and if necessary, can serve as an emergency and intensive care room (privatized exam rooms and patient rooms since it has urgent care capability.) Privatized rooms have necessary equipments and connections to central units (telemonitoring, point of care devices.)
Patient Scenario

Patients enters and stops at self check in/health check up places right off the entrance near the admissions booth. Each patient is given a personal ID card which can be used to access computers around the hospital with all the personal health information included.

Registration/checkin-- All the records are ready, all scheduled activities, financial issues, future visit can be accessed by using ID card. If the patient requires a primary care visit, he proceeds to a selection of primary care modules that include general and pediatrics units. If one needs specialty referral, the patient is scheduled for this at his primary care point of service. Specialists' office are positioned above to foster accessibility.

Procedure visit-- Patients are immediately directed to appropriate area using lobby elevator. Department is immediately notified and expects them(color coded.) Computer plans out the care pattern, scheduling, estimated care time and if there is any wait, option of classes is offered. In the waiting area at the self check in points and educational class, the procedure which patients are going under will be reviewed. From the prep-procedure-recovery, all are done in one big loop in care sequence as well as accrual spatial experience that is easily recognizable, non-threatening, and comfortable
Re-Strategizing Healthcare Facility Design:

Position 01
view from the entrance towards cafe and shop area. self check-in points/admissions/elevators/stairs/waiting are all in patient's view

Position 02
view to the direct emergency access. from the main entrance. view of administration/admissions/self check-in/admission.
Position 03
view to the atrium space/general care/waiting space from the first floor elevator

Position 04
view from the general care waiting area towards entrance/admission/pharmacy
Second Floor
Physical therapy/Personalized Care/Preventative medicine

Personalized Care/ Preventative medicine department

Primary/specialty care offices such as Dermatology, Allergy, eye/ear/nose..etc is located on the second floor. Also, the department deals with personal genetic information with preventative medicine counseling service. privatized care rooms are important with special procedure capabilities. Near by are Physical Therapy and express care below, and other public functions for easy access from the lobby level.

Malleable free activity zone

Educational resource areas with interactive media for patients, families, and seminars for all. Library, conference, chapel, dining, lobby and waiting area, day-care, fitness, can be incorporated.
Position 05
view from the second floor waiting. first and second floor self health check points/admission/pharmacy/administration are in view.

Position 06
view from the second floor cafeteria. self check-in points/shops/entrance are in view.
Re-Strategizing Healthcare Facility Design:

**Interventional Floor**
Pharmacy, Central Sterile Processing, Staff office/Lounge,
IT/imaging/record, Small Lab, Materials Management

This floor redistributes staff, equipments, patients serving as a backstage for streamlining the care process. With fast vertical circulation methods and large storage and unprogrammed mobile zone, interventional floor will bring more efficiency and flexibility. Accommodating future technical zone that is close to other functions of the complex.
Staff Scenario

Physicians and other staff have direct access from the parking to the interventional floor—similar experience as patients within the same building. Comes in and goes to their offices/lockers/lounges for the information download and overview of the department and patient numbers and flow. When needed from other departments, fast access through the designated stairs or elevators are provided. All physicians and nurses, for example, will carry palm tops that will not only allow for instant access to electronic medical record information but will enable nurses to use their palm tops as universal controller remotes to operate medical and other equipment in patient rooms. Nurses can order electronic drug-dispensing units to dispense medications, then, pick them up, ready to administer, while they are on their way to the patient rooms, saving time and increasing efficiency and care effectiveness. You punch in a patient's social security number, for example, and there's a computer within that unit that calls up the order and gives you the proper dosage and medication.
Re-Strategizing Healthcare Facility Design:

Fig. 21 Interventional Floor (orange) stemming from the receiving dock redistributes
Fig. 22  Final model: Interventional floor serving all the procedural floors above and below with multiple vertical transportation devices
Re-Strategizing Healthcare Facility Design:

Procedural Floor 01
Surgery + Endoscopy, Diagnostic Imaging

Diagnostic imaging department

While it is true that, in general, electric devices are getting smaller, advances in diagnostic imaging will likely result in larger, more complex equipment, particularly in the case of equipment for whole-body imaging. Merging of high tech imaging and surgery capabilities to the special procedure center - Surge-Im center - possibility of endoscopy unit combined.
Similar procedure room sizes

Every room should be multifunctional and standardized. Operating, endoscopy, and advanced oncology all requires similar process with robotics and MIP(minimally invasive procedure). Interchangeability of rooms will affect the size and relationship between departments.

Surgery Recovery

Phase I recovery within the procedural suite and phase II recovery at the centralized pre/recovery area

Surgical suite

Developing trend is to combine surgery with endoscopy and magnetic resonance imaging(MRI). Integration of invasive imaging(cath lab) with surgical suite will increase. In this design, Cath Lab is located directly above the surgery with vertical transportation(stairs/elevators) within the suite.
Re-Strategizing Healthcare Facility Design:

Elastic within
Possible carezone configurations

Fig. 24 Middle collaborative(flexi-) zone can be used by both departments at the same time or used by either one of the departments

Collaborative design/organization (Flexi-Zone)

Previously each department had its own traffic pattern and design which is important. However, it is changing into more flexible design for future collaboration. Larger, more sophisticated machines, robotics will have to be accommodated and adapting to changing care pattern. Currently, there are almost no physical signs of collaboration, only just through proximity with very different arrangements (no recognizability). Future care will require more integrated design for sharing of space or transforming into different procedure with ease through standardized procedure room sizes as well as collaborative configurations so that they can be used by all staff and physicians for the full range of treatment.
Care-zone (Surgery/Imaging/Cath lab/Special Diagnostics)

The lines between the needs of surgery and a variety of other interventional procedures are blurring. Increasingly, these procedures are requiring sterile environments, patient prep areas, anesthesia, and monitored recovery. This trend suggests that these prep and recovery activities should be consolidated into a shared pre- and post procedure zone. Surgery and Imaging can function as one special procedure unit with the proposed design. Horizontal and vertical collaboration and care providing efficiency is achieved.
The ability to rapidly move patients from critical care units and unscheduled patients from the emergency department to the cath lab is of the highest priority.
Centralized preparation/recovery area

With assistance of telemonitoring/remote monitoring, care by cross trained medical staff, minimally invasive procedures, faster, accurate, integrated recovery can be done.

Interventional and diagnostic Cath lab:

Use of mobile carts with catheters will increase. Also, Cath Lab procedural room sizes are open heart procedure capable with efficient transportation system of supply and workers within. In order to add efficiency, in-room storages are moved into the flexi zone or designated storage on each floor or the interventional floor.

Flexible/decentralized care

The patient focused care theory proposes a structural reordering of the inpatient system so that the departmental services are decentralized and refocused at the patients' bedside. Standardized and generous procedural room sizes with arrangements that can absorb different types of changes makes efficient care giving environment. Decentralized, mobile equipments can become a catalyst for the furthering the limits of the care pattern.
High risk side

Whole floor is dedicated to obstetrics unlike dual department arrangement for the other procedural zones. Spaces for family member activity while waiting is important. Surrounding the courtyard, the department is divided into high risk and normal side for the work efficiency. High risk side has smaller recovery rooms as well as conventional LDR (Labor/Delivery/Recovery).
Striated Design A

Sickness/treatment vs. wellness
not interacting and crossing the sick side and the other side

Incremental experience as needed

The design eliminates confusion and intertwined organization for work efficiency. Simple striated model filters between sick vs. non-sick, patient vs. visitor. By differentiating zones with different levels of sickness, healthier environment is accomplished. Striated model also helps the recognizability of the design by the visitors to the center.
Re-Strategizing Healthcare Facility Design:

**Short Stay/Conference/Garden Floor**

**Short stay rooms**
Each short stay rooms are privatized hotel like environment. Fast access to the large elevators are available for the emergency patient transportation to any procedural floor if necessary.

Top floor is divided into short stay unit for the last phase recovery patients who need overnight stay and the other zone with public activities like garden cafe and conference for the staff or patient education. At the top floor, patients are well enough to enjoy the courtyard/garden environment. Preventative care and wellness education is provided within the short stay unit. Also workers can enjoy the environment for their conferences. Finally, as demonstrated form the other floor plans, 35-40% of the spaces are not specifically programed rooms or areas for the flexible use with only proposed zoning directing the general function.
Striated Design B

Environmental striation strategy

Zone A
Heavily controlled ventilation and light for the different types of procedures

Zone B
Varied control of light/ventilation

Zone C
Limited/possible natural ventilation and relaying the light to the inner parts of the building

Light/Ventilation; Integrated striation

Three zones of control; heavy control of mechanical ventilation for the care zone, varied control for the middle idiosyncratic/prep/recovery zone, and limited/possible natural ventilation for the malleable free activity zone (Zone C).
Fig. 27  Final model: top
Fig. 28  Final model: aerial view 01
Re-Strategizing Healthcare Facility Design:

Fig. 29 Final model: obstetrics
Fig.30 Final model: short stay/roof garden
Re-Strategizing Healthcare Facility Design:

Fig. 31  Final model: perspective
Fig. 32  Final model: aerial view 02
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Illustration Credits

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Figure 13 Guillermo Jullian De La Fuente, "The Venice Hospital Project of Le Corbusier", Architecture at Rice 23, 1968.

All other illustrations are created by the author