

Health Care Planning, Design and Delivery Series Guide 1: Service Area Analysis and Master Planning ¹

Service Area Planning - Tsunami of Data! Master Planning - Not Just Buildings!

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Introduction

This series of healthcare/hospital related guides are intended to be of assistance to healthcare planners, architects and PMs in service area planning, master planning, and design process. Some of this material is well worn in that it is traditional and by nature not amenable to many new wrinkles. However some of the process can be facilitated by the use of AI, but still requires planner interpretation for future implications. I have personally been involved in the planning, design and delivery of hospitals for over 40 years. Therefore I am more apt to be more subjective on some aspects in which I have had repetitious involvement. This does not imply however that what I present are universal truths but rather that they worked for me in the circumstances in which I was operating.

Some of the planning approaches and border on archaic but kindly remember when I started with “manual” data collection and analysis with a three foot long Compag computer with the small green screen and very few sophisticated applications. Obviously over time desk tops computers and associated apps became a means of more expedited data entry and analysis. I was therefore thrust into the tide of changing technology, of which I learned in support of what I was doing; no venturing out for fun. This all served to quicken the pace and, in some cases, accuracy of analysis (with the caveat garbage in garbage out). However more importantly, it is imperative that the practitioners know what the data means and how it is utilized in the prediction of utilization and associated facility needs.

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These guides are detailed to accomplish the interaction that occurs in a sequential process. Each step presented builds upon previous information. I do not pretend to know everything but what I do not know I probably forgot. As such my bias can be questioned by better minds than mine. I have attempted to be as comprehensive and thorough as possible so there are no major gaps in the entire process.

The guides are as follows: Guide one addresses service area analysis and Master Planning while Guide two presents the design process and Guide three will provide projects examples for Master Planning and Design process.

Healthcare Services Planning

Hospitals Overview

Generally more people know vaguely what a hospital is and the purpose that it serves, but those who actually plan, design and build hospitals know that the various types of hospitals have varying degrees of complexity.

Healthcare facilities range from 24 hour/emergent, usually smaller rural facilities, to massive multi building academic medical centers. The general tenet for all size facilities is diagnosing and saving lives with the differentiating factor being number and types of specialty areas. Generally more complex specialty services (e.g.: neurosurgery, orthopedics surgery and a myriad of other body parts), are either in dedicated facilities or part of a larger medical center. With that being said most of us are more familiar with the mid-size local community hospitals that offer a fairly comprehensive array of diagnostic and treatment services along with a commitment to preventive programs also.

The typical hospital (200 beds or less) usually offer the following:

- Inpatient medical and surgical beds with 20% or more of the total beds dedicated to intensive care and step down needs.
- Outpatient services could include primary care, a lower classification of emergency care, and some specialty clinics depending upon the availability of MD specialist, although some smaller towns have a “jack of all trades” MD out of necessity.
- Inpatient and outpatient surgery services with a less complex emphasis.
- Diagnostic imaging including conventional x-ray, ultrasound, CT scanning and in some cases MRI.
- Laboratory services with access to larger reference labs for more sophisticated testing.

- Inpatient and outpatient pharmacy services.
- Home healthcare follow with durable medical equipment for either rental or purchase.
- Non-invasive (e.g.: heart diagnostics) services and invasive (endoscopy).
- Physical therapy at a minimum and some with OT and finer skill therapies.
- Typical array of support services including IT, Engineering, infection control, nursing administration, hospital operations, finance, ambulance service, dietary, housekeeping and all required quality and record keeping as well as maintenance services. This is not an inclusive list.

Regardless of size these are core essentials common to all facilities for effective health service provision.

Types of hospitals include:

- Recently initiated 24 hour emergency facilities as well as micro-hospitals located in areas with limited access to healthcare resources. Micro-hospitals are also in urban areas built by hospital systems to protect market share by providing better ease of access to the population in their serve area. Both types of facilities are generally owned by larger hospital systems and used as emergent/primary care facilities and some have inpatient beds with the intent of use for recovery after minor procedures or as a patient stabilizing facility for transfer of patients to a larger hospital facility via either helicopter or ambulance depending on distance. Presently the development of micro hospitals is on the upswing in that they the can be developed quickly at a reasonable capital expense.
- Mid-size city/county hospitals in the 150-300 bed range with more sophisticated diagnostic and treatment capabilities. They can accommodate more types of walk in and emergent conditions. All have FT MD staff with specialty staff on call as required. These can be free standing hospitals or part of a larger regional system with a large hospital as a referral intake for complex cases.
- Regional or county medical centers can range from 400-1000 inpatient beds depending on complexity of services provided and size of service area. Large metropolitan areas might have multiple centers depending on the size of the city or county, access and population density. These are generally full service hospitals in terms of array with few exceptions (some hospitals are condition specific and handle the most complex cases). Usually these hospitals are networked with hospitals in their system or have alliances with independent hospitals or smaller networks. Mega systems are all over the United States now in a competitive environment. Larger programs could include cardiology (invasive and non-invasive), neurosurgery, cancer treatment (all modalities) pediatric care and more complex orthopedic conditions.

- **Academic Medical Center:** only 100 or so of these exist in the United States and I was fortunate to work at 2 of them for a combined 17 years. They vary in primary research aspects rather than service array with a few exceptions; generally with a robust teaching mission and with grants and philanthropic monies for research components. The areas of specialization could include: genomics, medical animal research, diabetes, trauma, neuro sciences, etc. They are normally innovative for diagnostics and treatment of most all major maladies including chronic conditions. The presence of medical students impacts facility size and faculty requirements and students are sometimes mentored in nearby hospitals which could be public or private. Many are very dependent of grant monies to foster research using grant dependent faculty as well as FT paid physicians. These center are challenging in terms of planning for efficient use of space while staying abreast or ahead of leading edge of technology.
- **Specialty Hospitals:** Generally one specialty area facilities including: oncology, orthopedics cardiology, neurology, psychiatry, and women and children's, etc. These facilities are normally found in larger metropolitan areas due to the need for a large service area for sustainability although some take international patients also. These facilities could also be on the same campus of academic teaching hospitals.

Service Area Planning

This term is used is generally used in conjunction with what is referred to as “market share analysis” (I.e.: how many inpatients and outpatients come from specific areas surrounding the hospital and for what services). The term used for the identified action for where patients come from is called patient origin and is identified through the use of zip codes associated with where patient live. Hospitals can determine their patient share through a variety of sources including state or local health departments, who collect and collate data provided by hospitals annually, and can assist in market share as well as service volumes. Originally the determination of the service area was a tedious manual process that took weeks to collect data, analyze and draw present situation conclusions. Now with the use of AI (if you ask the proper questions) and companies that keep healthcare statistics service area data are processed quickly. With these data you can not only determine origin but can also provide competitive data for competing facilities. Data could include inpatient and outpatient data by diagnosis, length of stay and patient origin. These are the key elements for reviewing internal utilization trends as well as competitive trends. From these data you can determine a rough market share.

Utilization could be increased by targeted marketing efforts though service enhancements, MD recruitment, and new service additions which could include the development of surgicenters or micro hospitals to protect a service area. All the data should be the basis for a marketing plan. The marketing plan can be used to review present service offerings relative to additional equipment,

staff and perhaps the need to expand spaces. While these data can indicate renovations or new facilities it is prudent to prepare a Master Plan for immediate and phased growth.

It is important to be cognizant that other hospitals in the same geographic area are performing similar statistical analysis and planning activities and caution must be taken to minimize duplication of costly equipment and staffing. There obviously are some risk involved and those hospitals that move the quickest could receive a marketing advantage. It is prudent however to attempt to stick with your service strengths and, if possible, engage with competitors to perhaps dole out who will offer what to minimize costly duplications. I have personally seen this approach work in the area of obstetrics and radiation therapy.

Projections

Prior to the advent of the "big red machine" (name some called computer models that projected various aspects such as future utilization and space programs) data analysis was manual and how that works helps to explain what the computer model actually does. It is important to understand the process and the underlying assumptions. Aside: I took a statistics class (Biometrics) in graduate school with about 60 others. As soon as the instructor showed the first couple of slides loaded with gibberish formulas half the class got up to leave, The professor (tenured) requested that they sit back down so he could explain. He stated that the formulas were for information so that students would be aware of the what the computer does easier and faster. He did make us do some problems long hand for greater appreciation. Lots of phone calls among students in that the problem involved squaring a 100 numbers totaled and we wanted a consensus. Moral: understand what provided data means and the underlying assumptions.

As part of the Master Planning process (to be presented in a subsequent section) a departmental survey is prepared and, once approved by administration, is sent to all departments for completion This information is used for projections and well as formulating the Master Plan. The survey should be on line and address the following questions:

- What services/activities are conducted by the department?
- What is the past and current utilization of these service (for trend analysis)
- What is the present room allocation along with sizes?
- What are the present spacial deficiencies being experienced by the department?
- What is the assessment of flow and departmental adjacencies?
- What functional adjacencies are essential?
- What are the primary types and number of fixed equipment with utilization and age?
- What new enhancements or services will be provided and what is impact on present space allocations?

- What are the departments managers estimate of future volumes? These volumes must be reviewed and approved by administration.
- What is the perception of department accessibility and ambience?
- Which MDs using the department should be interviewed?

Once all the surveys have been reviewed and approved by management, consultants or in house planning department need to interview department managers for any clarify cations or missed input. Through trend analysis and other assumptions future utilization projections can be estimated (this is useful information with or without a formal Master Planning process.)

There are alternative means of predicting some condition specific projections by using prevalence and incidence data (either national or state specific) as a means of projecting some patient volumes. Another method is to review past hospital specific data (the more history the better) and develop incidence rates and apply to hospital projected service are population. Finer estimates can be generated by splitting service area population by sex and age. As cited before some of this is tedious but AI and consulting firms have sophisticated data bases that can be used to refine more global data. This is particularly important in service and MD recruitment planning.

There are some intangibles that can skew projections when addressing the issue of access to a healthcare facility. In larger cities such as New York and Chicago with heavy hospital facility density some patients will pass numerous facilities seeking healthcare due to factors like: family always used a particular facility. children born there or a standing physician preference. This could entail some calibration of utilization projects but usually the impact is minimal.

It must be clarified that a Market Share Study with future utilization projections can be formulated without the cited surveys under the assumption that the service area identification along with a competitive analysis are a good starting point for administration to discuss more in general without departmental input at this juncture. The future projections could identify a number of course of actions: the comparison of future volumes relatives to existing excess capacity could show for some service offerings that no spatial changes are required; analysis for some other departments could show a need for expansion and could be examined for expansion in place or in another part of the hospitals setting. The latter would be more service specific and if renovations are required performed by local architects in tandem with a local architect and preferred small projects contractor.

If however the projections as related to existing capacity show a wide gap across many services then it might be time to consider soliciting proposals to develop a Master Plan to optimize existing space and identify new and/or reuse of space for the campus. The competitive analysis might show that a new service could be in the offering and might be able to be addressed by retrofitting existing

space or developing new space. If this is a multi-new service phenomena then it would certainly be prudent to develop a Master Plan to ensure correct sizing and good functional adjacencies. The next section explains some approaches for translating demand into facility requirements.

Translating Demand into Facility Requirements

As for service specific utilization projections, the translation of demand projection requirements has a number of approaches including computer templates in which various assumptions can be used and the results (e.g.: number of exams rooms for each type of clinics, diagnostic imaging equipment needs) are estimated and can be calibrated for sensitivity analysis. There are a vast number of factors that contribute to the estimating process: is it a teaching/research setting in which MDs do both and if so the target utilization would be lower. Do MDs travel between urban and rural settings?

Generally one would need to know the following information regardless of the service under consideration:

- Historical data including utilization, turnaround times, average MD throughput (duration) and if there is a backlog and if so how many patients.
- Project data as calculated in the previous discussion along with number of MDs and assumed turnaround times (you can use historical data or assume greater efficiency to all for more patient volume).
- Related to the above a utilization percentage of particular service rooms with the understanding that 100% is usually not achievable (or desired) in that some days will be slower and some accounting for “unscheduled” times must be considered in room volume determination. For instance a private clinic might plan for 80% utilization while a teaching might assume 60% because of longer visits due to the use of interns and the actual time for mentoring/teaching during a patient encounter. It is not because teaching hospitals are not concerned with cash flow but rather a need to balance the research, teaching and care functions.

Example: Estimating Exam Room Requirement

Several productive models have been put forth and utilized for the estimation of exam room requirements. Each model has various input requirements that can be calibrated based upon the institutions utilization statistics experience. Typical models include:

- Daily operating hours
- Number of MDs
- Room turnaround times

- Projected daily patient volumes
- Utilization target

Once data is entered and the model run it will provide the estimated number of exam rooms and as stated the inputs can be modified based upon potential scenarios. Ultimately, the model is only as good as the inputs provided as is the case with many predictive models.

The same approach holds true for estimating surgical suite need but it is more complicated due to the diverse types of procedures performed. As such a weight average approach might be required to accommodate one type of procedure over another in terms of procedure and room turnaround times. Also it requires an assumed lower utilization to allow for cancellations and longer than predicted surgical procedures.

Upon review of some of the predictive models and associated white papers there is a need to use caution when using some modeling approaches in that some require some advanced statistical knowledge and probability. This is not to imply that the use of more complex models are incorrect but rather it is easy to get caught up in the process rather than the results. These are very expensive rooms and to the extent possible should be made as flexible as possible although certain surgical rooms require dedicated use (e.g.: Hybrid cardiology room with robotics).

Master Planning

Assuming that all (or most) demand projections have been reviewed and translated into a space program (either by consultant or architect firm having healthcare planning staff) the challenge is now how to take all this information and transform into a cohesive and functional campus facility solution. This could include renovating existing facilities as well as the development of new buildings. The best method of developing alternative campus solutions is to hire a facilities consulting firm or a hospital architectural firm to augment existing information and develop alternative design concepts to meet future needs. With the developed alternatives the pros and cons of each approach should be identified along with preliminary global costs. Phasing should also be developed so the Owner can review cash flow/reserves or borrowing requirements. Proformas will also be required to correlate anticipated cash flow relative to debt service prior to implementation of all or pieces of the Master Plan solution. The following questions should be considered:

- Can the desired plan be implemented logistically (I.e.: maintaining present operations and site access)
- Is it affordable (first determination to be made)

- Does sensitivity analysis show better operational efficiencies and short and/or long term cost savings?
- Is the solution flexible or does it limit future site changes that might be needed as service needs change in the future?

Obviously, the review and approval process is a daunting challenge and all assumptions used by the consultant/design team in support of the proposed solution require validation and viewed as practical rather than wishful.

Data Collection

In addition to the provision of any prepared space programs, traffic studies etc. to the design team it is necessary to provide all building condition reports, Life Safety issues and any other information deemed appropriate to performing existing building “physicals” along with all pertinent infrastructure conditions. Any deferred issues by the AHJ exempt until physical construction changes need to identified, assessed and addressed in the Master Plan.

If a detailed departmental surveys are not conducted during the marketing plan development, the design team will want to prepare and distribute a detailed on line questionnaire. A deadline should be agreed with administration to ensure that all results are submitted in a timely fashion. After review the design team should coordinate setting up follow up interviews with departmental managers to clarify points and to actually visit the existing departmental space. This allows for the determination of the existing department strengths and weaknesses and affords the opportunity to address patient and supply chain access.

This is all time consuming but a necessary pre-requisite prior to analyzing and developing departmental block layouts (total space not discrete rooms). During this time the design team engineers should be reviewing site infrastructure including IT which is essentially the backbone of all facilities.

The powerhouse/central plant needs a capacity analysis to determine present usage and identification of any excess capacities for future development. In addition all major pieces of equipment, including gen sets, must be examined for age, output and maintenance. All of this is extremely important information in that proposed building solutions must be correlated with existing capacities to determine the magnitude of capacity expansion required to service any renovation and/or new construction. These upgrades would likely need to be implemented simultaneously with any new construction to ensure readiness for building opening.

Other information required are CAD drawings, drawings of past renovations and past new construction, site plans of utilities distribution along with zoning rules regarding building heights, setbacks, etc. Information on adjacent properties and ownership is helpful information in the event that property acquisition or rezoning is required. The design teams needs to know the size and location of off-site departments that might be under consideration for location back to the campus.

Project Organization

Getting the appropriate Master Planning oversight committee is especially important in that it should include hospitals administration (all VPs that have line authority of all patient care and support departments), select Board members, and representatives of MD staff. It is important to have broad representation to give the process more legitimacy and objectivity. This is not to infer that there will not be differences of opinion on a variety of topics and personal differences as well. Regardless an oversight Board with consistent consensus sends a signal that perhaps some other points of view are missing or complete indifference to the process. The design team should have de facto members to allow peer interaction and negate the “we-they” perception. Operating as a team with agreed goals and objectives (not opinions) is pertinent to achieving consensus on a timely basis.

This group should be interviewed as well as referring physicians (not hospital employees) in that they have a distinct perspectives from the outside looking in. Their involvement could be a mixed blessing on occasion in that they will be privy to some hospital future service development plans that could operationalize quicker than the hospital. It is rare but happens.

The design team must prepare a Master Plan development schedule with identified key tasks with estimated beginning and completion dates. It is understandable that they want the process to move rapidly but adequate time must be allocated for thoughtful analysis to ensure that all aspects/departments are considered in the formulations of master plan alternatives.

In my experience physicians are more vocal than most other participants; either because of genuine concern, vested interest, perceived status and unkept promises. Larger institutions, like academic medical centers could have planning or other higher ranking VPs that are more vocal and even aggressive when armed with data to support their assertions. At any level of hospital size politics are involved and the design team is dependent on those in upper administration to referee meetings and to the extent possible mitigate varying differences of opinion.

Master Plan Formulation

This activity is where things get complicated in that many variables require study and then synthesized for master plan alternatives. These include:

- Strategic goals and services development/expansion as developed from the Marketing/demand study and resultant space requirements (global at this juncture) needed to meet them.
- Code violations that have been put off pending the next major renovation or new construction project. This needs to be reviewed in tandem with previous building inspection reports along with some feel for costs to determine if reuse is less costly or less disruptive to present operations. Another consideration is if an older building is in the way of all Master Plan options.
- The impact of proposed growth on parking, access and infrastructure (particularly IT and central plant). Considerations include a capacity analysis of the present plant to determine the ability to serve more square footage in terms of heating, cooling and medical gases. In addition all central plant equipment needs examination to determine end of practical use. Decisions might include an all new plant or making some buildings freestanding for heating and cooling to make them self-sustaining. In lieu of dependence on a central plant. These are costs and connectivity decisions that require consideration with emphasis on campus disruption. In terms of parking surface lots might need to give way to a structured parking solution.
- Location of future and/or expanded structures and the associated phasing needs to be sensitive to capital costs and campus disruption. Utility relocations and road changes require a careful study to ensure a solution that does not include having to dig up streets more than once. Some projects for a utility loop fail to include a right of way for present or future IT right of ways. It is prudent to leave multiple conduits for future use.
- Ensuring practical placement for costly diagnostic equipment for outpatient and inpatient use to the extent possible to minimize duplication of costly equipment. It is understood however that for larger campuses with dedicated inpatient and outpatient buildings that some imaging duplication is required for patient access and faster turnaround times. In addition, if high level of trauma service is offered dedicated imaging equipment is a necessity.
- The zoning of adjacent properties and their current status (i.e.: rented, for sale or purchase) in that additional property for campus expansion might be required via lease or outright purchase.

- A traffic study might be required by the AHJ to assess current and potential future impact regarding access/egress to the hospital site. It needs to review area regulations pertaining to on street parking as well as traffic counts. It is not unusual to have some friction between adjacent homeowners and hospital staff who might park on residential streets to save parking fees. City interaction and review of the Master Plan is necessary to determine if street or signal modifications are required. Any costs for changes might be incurred by the hospital. In conjunction with the traffic study the local health department should be notified of any potential increase in traffic volume for their assessment on air quality impacts.
- All utilities companies serving the hospital should be contacted and provided with pertinent data for proposed MP solutions so they can assess future capacities relative to what they are providing presently. If more is required the magnitude needs to be assessed along with potential cost sharing. In addition any utility upgrade schedule must be interfaced with Master Plan schedule to ensure connection timing. Utility plans need to be shared with the design engineers and meeting held as appropriate.
- If a helicopter service is either being relocated or a new development it will be necessary to coordinate and seek approvals regarding flight paths, fire regulations and other considerations. If refueling to be accomplished on site a number of fire and hazardous materials codes are activated. It would be prudent to have one or more public presentations of the proposed Master Plan solution in an urban area to assess feedback regarding pros and cons. Helicopter noise is a real issue with adjacent neighbors.
- The design team needs to check with local zoning authorities to check on regulations regarding building height, setbacks, parking requirements, landscaping, and in some instances limitations on building facades.

There could be more minor variables that might be unique to a specific hospital site (e.g.: donated trees, memorial gardens, historically valuable buildings, etc.) that might require addressing.

Armed with a vast array of information including marketing and utilization projections the design team and/or health planners (if Owner retained) need to begin the synthesis process. Each planning participant need to provide reports on topics mentioned earlier and the salient points require discussion to identify limitations or opportunities. Not mentioned previously is the need to discuss the fixed equipment to ascertain if recommending updated technology is required. In that regard the design team needs to discuss with the Owner any planned fixed equipment purchases so the space required for them is accounted for; particularly if it is additional to the existing inventory.

The designers will estimate initial draft space programs for the purposes of developing blocks of spaces for formulating draft floor plans. This is best accomplished by using AI (I ask for a space program for 10 rooms clinic and got it in 10 seconds). Obviously it needs some refinement but for MP purposes it is a good starting point. However you must ask the proper questions and provide sufficient information for AI to be more precise. It must be remembered that if additional bed units are included other support departments need to be reviewed to ascertain their capacity to service additional inpatient rooms. These could include laundry, kitchen, central stores, loading dock/compactors and as mentioned earlier central plan and IT.

Now that the designers are dealing with blocks of estimated size departments they must review present locations versus new locations and where. This work must be cognizant of patient flow, materials management support, and staff/visitor flow. Functional adjacencies are also essentials for departments that interact frequently. For example having diagnostic imaging with easy access from the emergency department with the understanding that STAT might require some duplication (e.g.: CT in the ED). Another challenge is trying to place imaging services between an inpatient wing and outpatient wing to maximize effective use of the equipment. For large hospitals or academic medical center redundant equipment cannot be helped due to sheer size and need for quick turnaround times.

Usually at this stage the design team generates multiple more global deliverables by developing building and departmental massing solutions under varying assumptions including: building reuse, adjacent land availability, departmental and building functional adjacencies, access/egress, etc. Also if a pre-construction firm is involved height level cost estimates can begin development (design team can also develop if no pre-construction team). These estimates allow hospital finance to begin to develop a pro forma to include debt service, rate of return, etc. This will help to identify the debt service that the hospital can take on. This preliminary analysis will assist in identifying if a phased implementation will be required.

Obviously with debt limitations there might be medical departments that might “lose” in terms of meeting physical service needs to higher revenue generating departments. In some instances the concept of “satisficing” might be used in which some departments get some of what they need (eg:: piece of new equipment).

It is prudent for the design team to begin with master planning solutions using blocks of space that are massed floor by floor and augmented by a stacking diagram. Once multiple solutions are prepared the design team will develop the pros and cons of each alternative. Prior to sharing with departmental staff it is necessary to review with the Master Plan oversight committee to obtain tentative approval of one or more of the Master Plan recommendations. Once selected the options should be shared with all service VPs, managers, selected staff and MDs. All input should be

documented, analyzed by the design team and a report with recommendations provided to the Master Plan committee. Keep in mind this part of the project is still conceptual and more details need to be reviewed that expand on.

Along with the Master site plan development should be a report with estimated total costs (Buildings and infrastructure support) along with major pieces of fixed equipment for hospital and utility support. The phasing plan might change based upon financial resources and the hospital's service priorities. Lock step with that is a generic schedule with phased durations (under the assumptions that the entire MP cannot be afforded all at once). It should include the timing for any city/county utility or street upgrades to ensure that those events are timed with campus development. Once all the direct and extraneous factors have been woven into the plan final approval can be sought. The submittal should have site plan, building locations along with stacking diagrams and a detailed narrative of the recommended solution with a utility upgrades narrative. The client could instruct the design team to develop an animated presentation for Board, staff MD and public meetings. The client might further request a scale model and video suitable for fund raising (if required).

Although the approval of a Master Plan is a big achievement, a yearly update process should be implemented to monitor and record progress and changes. This can be done by in-house resources or out sourced annually to a firm that specializes in updating their clients plans.

Master Plan Spin off Studies

The approval and implementation of the MP could engender additional topic-specific studies that help to improve operational and/or campus changes. These include:

- **Staffing Studies:** increased departmental sizes and/or development of new services could necessitate a staffing study to determine staffing needs and priority recruiting emphasis ; this should include physician and non-physician staff. The recruitment process, to the extent possible, should be in tandem with the scheduled opening of the new or expanded service to ensure that new staff are included in the operational activities required prior to opening.
- **Materials Management Studies:** although the design team as part of the Master Plan process might have the Owner retain a Materials Management firm for the general planning of movement of people and materials; the actual design of projects emanating from the Master Plan might need a Materials Management firm for greater details. They not only review specific departments but also assist in quantifying the number of elevators, loading dock needs, etc. Their input is required especially on larger complex projects to reduce movement conflicts for people and materials.

- **Infrastructure/Power Plant Needs:** this type of study is conducted in the latter stages of Master Plan development after campus wide loads for a variety of services have been calculated and compared with existing capacities. The elements included should be: electrical (primary and life safety), chilled water, steam, medical gases and emergency generator requirements, It is mandatory that this type of assessment be conducted in that the modernization and/or expansions might have to occur in tandem with any proposed new construction.
- **Traffic Study:** while the Master Plan effort will include access and egress solutions and other traffic control recommendations, the actual detailed calculations of parking requirements and flow/control requirements is generally required; particularly if the institution is required to approach the local transportation department for road and/or control modifications. A traffic study from a qualified firm should include: traffic counts for various times of the day, MD parking, second shift parking, patient/visitor parking and suggestions for meeting parking needs including off-site parking with shuttle service if land scarcity for parking dictates.
- **Way-finding Studies:** way finding studies are integral to the efficient working of a medical campus. These studies involve not just signage but also require branding input for sign development. The development and implementation of a good way finding plan is instrumental to the patient experience in that ease of access helps to mitigate anxiety associated with a patient medical visit. Exterior way finding for parking and building location via street signs and strategically located way-finding location boards (some electronic) are extremely important. In terms of interior way-finding the intent is to reduce the number of staff/patient interactions for finding destinations Electronic signs and/or monitors with directional as well as other information features are extremely effective if planned and located properly. There is a hefty price tag for large healthcare campuses way finding studies but that in the long is countered by patient satisfaction scores by not having to wander. These studies are the backbone for patient visitor movement and should be conducted ion tandem with the building design program.
- **Medical Office Building Feasibility Studies:** These are type typically standalone studies in which hospital administration is contemplating an outpatient building (could be part of a MP recommendation) and do not want to absorb all the capital costs. Usually a healthcare consulting or perhaps a real estate firm are retained to gauge physicians interest in participation of such a venture through leasing or purchasing a suite. In my experience there are some on staff and referring physics and who are skeptical and tend to be very vocal at group meetings. Some are turned off by upfront capital required and proposed tenants requirements. Interest is determined to surveys and face to face interviews. All information is analyzed and through a predetermined threshold feasibility probability a reasonable prediction can be determined (this author never participated in a Medical Office Building study that was not feasible).

Generally if it appears viable the hospital might need to agree to some diagnostic services in the building. Care, however, must be taken to not provide too much information in that some entrepreneurial physicians might develop their own plans to fill service gaps and the usually can muster planning and construction resources faster than a healthcare organization.

- **Site Surveys:** over the years some larger hospitals campus implement many underground changes and unfortunately over the years documentation is not updated and/or lost in the planning room. The result is that when renovations or new construction occurs on the existing site undocumented unknowns are discovered during construction resulting in plan redesign which in turn could result in delays and increased costs for a variety of reasons. While site surveys may not appear a high priority in the scheme of things they (if updated concurrent with past projects) are useful in identifying all types of pipes, electrical lines, IT cable, landscaping pipes, etc. that are not in use or worse in use but route not documented properly. Site survey should be conducted in tandem with the existing building analysis to ensure that any corrections required are included in the site changes for Master Plan projects.
- **Off Site Care Facilities:** The health services plan or Master Plan might show a need to develop some off site facilities to improve service area patient access and/or protect market share. These facilities could include: micro hospitals, surgicenters, surgicenters PT/OT facilities and hemo-dialysis. Typically a consultant firm is retained to assist with demand projections and location analysis. Care must be taken by the client when reviewing recommendations in that on occasion some recommended locations do not live up to expectations and the consultant has no real liability in that regard. It is fair to point out however that they are right more than wrong but seek due diligence anyway.

Recap

The following points should be kept in mind for the health services analysis and Master Planning:

- The amount of healthcare data collected or provided by consultant can be overwhelming and it is imperative that the Owner have the consultant provide analysis that assist in the interpretation and service implications of the data.
- Population aging should be reviewed for trending with emphasis on pediatrics, child bearing age, and folks over 65. All three have service implications. Cause of death in the service area also needs scrutiny to determine leading incidence and prevalence. Again health prevention and direct care have a role to play in addressing them.
- Master Planning is a complex process if done correctly. It has many other aspects than just buildings and increased departmental sizes. As discussed some off main campus satellite facilities might be required.

- For the additional studies in support of the Master Plan process the Owner and design team need to determine who should actually engage the required firms. While under the design umbrella assist in coordination and timely input for analysis there will be a markup cost for their coordination of the consultant's work.
- City, county and public hearing input to the selected Master Plan should not be overlooked to avoid issues downstream.
- It is important to incorporate the Life Safety corrections that have been deferred by AHJ. The magnitude is somewhat contingent on which buildings will have renovations or new construction.

The next Guide will address how space programming is conducted and how the program goes through the complete design process. The design process necessitates many user group meetings and controlling these meetings is very important. Any questions should be directed to Bill Jackson at bjcamel2012@gmail.com.

About the Author



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William C Jackson, MS, MA Fellow HFI. has been involved with healthcare facilities planning, programming, design oversight and project delivery for over 40 years. He has consulted or worked directly for 60 hospitals in national and international settings. He has been associated with 9.0 million square feet of hospital projects put in place; He has worked for design firms (Ellerbe, HDR and Heery), consulting firms, PM firms and academic medical centers (17 years) including Bowman Gray School of Medical at Wake Forest and the Miller School of Medicine at the University of Miami. International work includes seven years of varying roles in the United Arab Emirates working on two 3,0 million square foot hospitals, Turkey, Haiti and Nassau. He is presently semi-retired, living in Medellin, Colombia, and can be reached at bjcamel2012@gmail.com.