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Designing the ambulatory endoscopy center

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Before a discussion of the design of an ambulatory endoscopy center (AEC) can take place, something should be said about the nomenclature and philosophy of the design. The AEC is normally part of a bigger facility. To understand the relationship of elements in the bigger facility some nomenclature needs to be defined. This article uses the following definitions:

- Digestive Disease Center. A digestive disease center (DDC) is a facility that includes both office examination space and procedure space for the care of gastroenterology patients. These units work together to form an integral delivery system for patients who need gastroenterology care.
- Practice Area. The practice area (Practice) portion of the DDC is that portion of the building in which the patient is examined and the general business of the DDC is conducted.
- Ambulatory Endoscopy Center. The AEC portion of the DDC is the procedural area of the center.

In an ideal situation a DDC includes both Practice and AEC portions of the delivery system. This is the most frequently used format for total gastroenterology care. Sometimes the Practice is separate from the AEC. In some cases the AEC is part of a larger multispecialty ambulatory surgery center (ASC). In some situations the AEC is in a separate building. This separation is not recommended, but in cases where the AEC is used by separate nonrelated physicians it is necessary to separate the AEC from the Practice. Most discussion in this article concentrates on the AEC areas of the DDC. It is necessary to separate the AEC and the Practice because of State Departments of Health and Medicare requirements. The State Department of Health——Licensing Division in most states and Medicare require the AEC portions of the DDC to be licensed but do not require

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the Practice portions of the DDC to be licensed. For this reason the two parts of the DDC must be separated by special construction methods. The specifics of the separation are discussed later.

Patient comfort and staff efficiency are key elements of the design philosophy of the DDC. The easy flow of patients from introduction to the DDC delivery system until they leave the facility is key to the success of the DDC. Every effort should be made to make the patient's perception of the center comfortable. The environment of the entire DDC should be one in which the patient believes their treatment is coordinated. For the patient to move through the facility at maximum comfort and confidence the center must be able to respond to the "three too's" of every patient:

1. It took me too long to get an appointment
2. Once I arrived the staff and physician spent too little time with me
3. When I left I was charged too much

If the patient understands the DDC houses everything for their care and that the elements of the DDC are coordinated, they feel more comfortable with the care delivered within the DDC. It is best if the AEC is part of a bigger DDC facility that also includes Practice areas. If the AEC is a stand-alone procedure-only facility, some system modifications must take place to make the patient believe the AEC is a continuation of the Practice located in a different building. A delivery system that is coordinated starts with the first appointment telephone call and ends with the last follow-up visit. The design of the entire delivery system of the DDC must center on patient comfort, a comfort as perceived by the patient. In short, patients come to physicians with problems they expect the physician to correct. They expect the physician will coordinate all aspects of their care until their problem is resolved. If the patient moves from one part of the delivery system to the next in a seamless fashion, they believe that their expectations have been met and they are satisfied patients who spread the news about the patient care that they received to friends. On the other hand, if the care is disjointed, the best medical care possible is not able to overcome the patient's perception that the delivery system is unorganized and flawed.

Flow through the center

Flow of patient, physician, staff, and materials through the center is of most importance. A review of some of the systems follows.

Initial telephone contact

The initial telephone call to the center is very important. It represents the first contact the patient has with the DDC and the delivery system of the DDC. The person answering the telephone and making the first appointment contact must have sufficient time to express to the patient that the practice is a quiet peaceful

environment. Even though everyone agrees that the first contact with the patient is the most important contact, most practices do not give the telephone or appointment person enough time with the patient. Most people performing this task are expected to take too many calls too fast. In this case, the first contact the patient has with the office is a person who does not have time to care for the patient. The initial contact by the patient with the DDC should be a real person and not a telephone message tree. If the office volume is so great that the practice cannot afford a real person to answer the telephone, they should at least ensure that the initial message tree options are very short. Many practices have initial message answering trees that are so long that by the time the patient gets to the last option they have forgotten which option they heard that most closely meets their demands. At least calls for an appointment should get to a real person as fast as possible. The first person who talks to the patient about an appointment should have enough time to be relaxed and should have enough medical knowledge to determine the proper first visit needs of the patient. This task is easier if the first contact is directly through a referring physician's office. In this case all necessary information should be gathered so a call back to the patient to make the initial visit appointment can be handled in a most efficient manner. When discussing an initial visit with the patient, ensure that information beyond insurance information is discussed. A quick overview of all entities housed in the DDC should be presented up front. Marketing of the entire DDC system starts with the initial telephone call. Most well-trained appointment clerks know when and when not to discuss the AEC portion of the DDC. If the AEC portion of the DDC is outside of the physical facility of the center, time should be taken to introduce the patient to the total patient care delivery system. This should be done to make patients feel comfortable that their total care is being taken care of by the physician. Patents do not come to centers because of the center; patients come to centers because of the physicians and systems within the center. Because the initial telephone contact with the patient is so important, care should be taken to ensure that the telephone receptionist is a well-paid, knowledgeable employee.

Information packet

If time allows, an information packet sent to the patient should precede the first visit to the DDC. The information packet should have a brief biography of physicians in the practice and an explanation of the delivery systems of the DDC. A simple floor plan of the facility and a small map showing directions to the facility should be included.

Patient representative

A patient representative should be part of every DDC. A patient representative is a staff member who talks to every new patient as they enter the practice. The patient representative should be housed in a small, enclosed space very close to the

reception desk. The patient should be invited to sit with the patient representative and review the systems of the DDC before the physician contact takes place. The patient should be told about the practice; the way their care will be handled; and the responsibilities that they have as a patient (including financial obligations). Five to ten minutes with each new patient before they begin the process of moving through the DDC makes them an educated patient. Educated patients are better patients than those who do not know what to expect. A few minutes with the patient at the initial visit saves hours later as the patient moves through the practice.

Patient education

Education of the patient, especially if a procedure is necessary, is very important. It is important education takes place before the procedure. The environment of the AEC is very familiar to the staff and physicians, but very scary to patients. It is important to introduce the patient to the environment before they become a participant in a procedure. It is not necessary to present an actual procedure during the educational time. An audio-visual presentation is a good way to present the environment of the procedure area to a patient. A small audio-visual room with a 5- to 7-minute tape showing the process of a patient going through the AEC is very helpful. A simple presentation that shows the places the patient will be treated and the appearance of the surrounding environment makes the patient infinitely more comfortable as they proceed through the system. Specific design suggestions are presented later in this article. The concept of audio-visual patient education is even more important if the AEC is not housed in the same building as the Practice. Audio-visual presentations that visually take the patient from the Practice portion of the delivery system to the AEC in a different building and then back to the Practice for follow-up are important. It helps the patient believe there is coordinated care.

Patient anxiety

Once a patient is rolled into the procedure room and the sedation is administered, they no longer have the ability to maintain a high degree of anxiety. There is, however, a high degree of anxiety that remains in the AEC with the patient's escort. While the patient is in the procedure room with staff and physician, the patient's escort is somewhere in the building worried about their loved one. Somewhere in the AEC should be a place to educate the escort while the procedure is taking place. Although post-procedure care seems like a simple task to the medical staff, it is not a simple task to the escort who is required to participate in post-procedure nursing care. Using the short time of the procedure to educate the escort about the basics of post-procedure care is most efficient. It is suggested that the escort be allowed to participate in both pre-procedure and post-procedure care. It is recommended that the patient receive pre-procedure and post-procedure care in the same enclosed preparation-recovery room. It is also recommended that the escort remain in the preparation-recovery room while the procedure is taking place. Education of the escort can take place within this room while the patient is

in the procedure room. Placing the escort in the preparation-recovery room during the procedure kills two birds with one stone. It educates the escort and at the same time isolates the escort in a place convenient to the physician so that post-procedure conversation and instruction can take place as quickly as possible. If the systems presented in this article are followed, turnaround time of procedure rooms is so short that the governing time for speed within the AEC is not the number of procedure rooms, but rather the time it takes for the physician to complete dictation, talk to the patient and escort, get a quick refreshment, and get back into the procedure room for the next procedure. Some physicians are forgoing the face-to-face discussion post-procedure with the patient's escort to gain a little extra speed. This is false economy of time and bad physician–patient interaction. Some physicians actually transmit the image of the scope to the escort in the preparation-recovery room as the procedure is taking place. With this transmission the physician also talks directly to the escort while the images from the scope are transmitted to the preparation-recovery room. Although this is extremely efficient, it is not recommended. More discussion is presented later in this article about the preparation-recovery room.

Space efficiency

Before a discussion of specific design issues is undertaken, some time should be spent discussing space efficiency. It is the goal of every good AEC to be as fast as possible, while at the same time giving the patient the perception that the staff is paying appropriate attention to them. System speed usually comes from two major delivery systems: (1) the system that prepares and recovers the patient; and (2) the system in which the equipment is used, cleaned, and returned to the procedure room. If these two systems are designed properly the number of procedure rooms used by the physician is not as critical as the practice habits the physician uses to talk to the patient and patient's family, do any note preparation, and return to the procedure room. In an efficient AEC some of the physician's habits cultivated in the hospital endoscopy suite should be changed. In some hospitals the turnaround time of the procedure room is so long that the physician has time between cases to do other hospital tasks, such as visiting inpatients. This action on the part of the physician only makes a slow process slower. More discipline is necessary in an appropriately designed AEC because room turnover and equipment-cleaning time are so short. The most efficient AEC is not efficient if the physicians who practice in the center are not efficient. On the other hand, an efficient physician can be very fast in a well-designed AEC. It is not recommended to locate the physician's office portion in the Practice too close to the AEC. The additional efficiency in a well-designed AEC can be used to do more cases in the same amount of time and make more money, or do the same number of cases in less time and take more time off. The efficiency chosen has something to do with the number of procedures available to the gastroenterologist. More cases performed in the same time can lead to more revenue. The same number of

cases performed in less time can lead to more time availability in the office and more patients seen that can result in more procedures. Patient movement and equipment movement are discussed extensively later.

Building design governing bodies

In the initial paragraph of this article, the DDC was presented as a facility that includes both examination (Practice) and procedural areas (AEC). Although this is the way a good DDC functions, it is not the way the governing bodies dealing with building codes and design see the facility. There are three building design–governing bodies required by law to be involved with the AEC: (1) the State Department of Health — Licensing Division, (2) Medicare, and (3) the state fire marshal. In most situations the same person from the State Department of Health who surveys the facility for the state also conducts the Medicare survey. There are some possibilities that deemed status from Joint Commission for Ambulatory Health Organizations or Accreditation Association for Ambulatory Health Care can take the state's place for Medicare certification but not for state licensure. The State Department of Health inspector is interested in the flow of the facility and aseptic control within the procedure areas. The state fire marshal, on the other hand, is most concerned with exiting the building in case of fire. Building codes for the AEC can be found in the National Fire Protection Association codes. National Fire Protection Association Life Safety Code NFPA 101, chapter 12, section 12.6, for new centers and chapter 13, section 13.6, for centers built in existing buildings are the appropriate codes. Medicare requirements can be found by asking Medicare or the State Department of Health — Licensing Division for a Medicare survey form. The state should also be asked about their Certificate of Need requirements. Many states also follow the American Institute of Architects and US Department of Health Guidelines for Design and Construction of Hospital and Health Care Facilitates, chapter 9, section 9.5. Contact information for two of the important organizations mentioned previously appears in the box.

NFPA 101 – Life Safety Code
National Fire Protection Association
1 Batterymarch Park
PO Box 9101
Quincy, MA 02269-9101\1-303-832-2887
Guidelines for Design and Construction of Hospital and Health Care Facilities
The American Institute of Architects
1735 New York Avenue, NW
Washington, DC 20006
1-800-242-2837

The State Department of Health and Health Care Financing Administration are primarily interested in the AEC, and not the Practice areas. General city and state building codes have to be followed for the Practice areas. The AEC is governed by much more stringent regulations than the Practice. Design and licensing of the AEC is even more complicated in that most states do not recognize and entity called "an AEC." Most states do not have a license specifically for endoscopy centers, but rather license endoscopy centers under the jurisdiction of ASC regulations. One is not building an AEC, but rather building an ASC that is used to perform endoscopy procedures within. In the end, the AEC is state licensed and Medicare certified as an ASC. This is difficult for most gastroenterologists to understand because they know there are significant differences between surgery and endoscopy. It is known that the aseptic systems of an AEC and the aseptic systems of an ASC are different. One should not assume that the state building official knows the difference.

It is as important to educate the state building official as it is for him or her to educate the clinician. The first step is to contact the Department of Health — Licensing Division in the state and ask for a packet for the design and licensing of the AEC, which they refer to as an ASC. The clinician and their architect should become familiar with these documents. Selecting an architect who has experience in the design of AECs licensed in the state is very important. The design phase of an AEC is not the time to educate an architect. After receiving and reviewing the regulations, a meeting should be scheduled with a State Department of Health — Licensing Division official. This time should be used to listen to his or her words of wisdom, but more time should be spent educating him or her on the difference between an endoscopy suite and an ambulatory surgery center. Some of the illustrations in this article are helpful. At the same time the clinician should pick up a copy of NFPA Life Safety Code 101 and schedule a meeting with the state fire marshal. It may be that both these people are well aware of the differences between an ASC and AEC, but on the other hand one may find that they have no clue of the differences. The clinician and the architect need to be ready. A good way to do this is to engage an architect who has done an AEC in that state. If this is not possible, at least find an architect who has designed AECs in other states. Another option is to team the architect with a medical design consultant who specializes in AECs. Many times the state officials contact their counterpart in another state and have an inspector-to-inspector discussion about the facility. If the official in the other state is familiar with the architect it could be helpful. One should not try to end run the State Department of Health official. The clinician has to pass through him or her at some time; better to do so earlier rather than later.

The clinician should memo each meeting with the state officials. They do not usually write a letter recording what was said during the meeting. A memo to them can start out with the following words: "the following are my recollections of items discussed and decisions arrived at during our meeting. If your recollections are different please notify me at once." Although this is not a legal document, it is helpful if a disagreement comes up in the future. Once the rules are known and the state officials know what is being done, it is time to start designing the facility.

Because the State Department of Health inspector sees the AEC and an ASC, this does not mean that variances cannot be issued. Some state officials understand well the difference between an AEC and an ASC. These inspectors routinely issue variances to omit or modify certain portions of the ASC codes that do not apply to AECs. Educate the state official and try to get them to understand fully the types of procedures performed in the AEC and the type of environment needed in these areas. If there is an AEC in the state that one can access, invite the state official for a visit. It is even better if he or she witnesses a procedure and sees how the procedure is performed in an AEC. As a last resort he or she should visit with the hospital endoscopy suite to see how patients flow through the facility. If the official does not give in, then revert to creative labeling to make them think the AEC is an ASC.

Choosing a site

Before the interior design of the AEC is started, a piece of land must be found for the building. The size and location of the site is very important. Most AECs expand as they get older and more physicians join the practice. AECs make the physicians who practice within them more efficient. This efficiency brings more patients and the need for more space and sometimes more physicians. If the initial site selection is too small for expansion, one ends up abandoning the project and starting over from scratch in another location. This could be very expensive because new construction costs more and because there are not a lot of people interested in buying an old AEC. An easy estimate for preliminary land requirement is as follows:

Building floor area of first floor (from space program presented later in this article)
Parking (one stall per 150 sq ft of building @ 350 sq ft per stall)
SUBTOTAL
Green area (A + B) × 1.00
GRAND TOTAL (A + B + C)

Once the estimated amount of land is fixed, the location of the land can be determined. Most real estate agents suggest that the most important three factors in site selection are location, location, and location. This is not true for medical projects. The patient does not come to the AEC because of its location. The patient comes to the center because of the reputation of the physicians who practice in the center. Other elements of site selection are more important. A site on the major thoroughfare of the city may not be a good site. People coming to an AEC are sometimes older and most of the time have high anxiety levels. Dealing with the major traffic lanes of the city could be a detriment. The location of the site should decrease the anxiety of the patient as they move from the freeway, to the main street, to the side street, to the parking lot of the AEC. The site should be near but not on the major street of the town. Make it easy for the patient to turn into the parking lot and park. Make sure there is plenty of parking (see the previous formula) and that the

entrance to the building is under a covered canopy. Entering the AEC under cover of the weather is almost as important as leaving the facility under cover of the weather after a procedure. Ensure that patients park nearer the building entrance and the staff (including the physicians) parks farthest away or in an area that the patients cannot see. Patients do not like to park their cars at the farthest extent of the parking lot and walk past a new red Porsche with a vanity license plate as they walk in the rain to the building. Landscape the parking lot so that the environment presented to the patient is soothing to their nerves. Site the building on the land so that there is a separate entrance for patient entry and patient dismissal after a procedure. It is ideal to site the building so those patients walking into the AEC do not see patients leaving the AEC.

Planning the building

Good planning should not stop at the AEC door. The interior flow of the building is much more important than the exterior of the building. Fig. 1 is a functional representation of an AEC. The functional relationship diagram is not a floor plan. The sizes of the boxes representing areas within the diagram are not

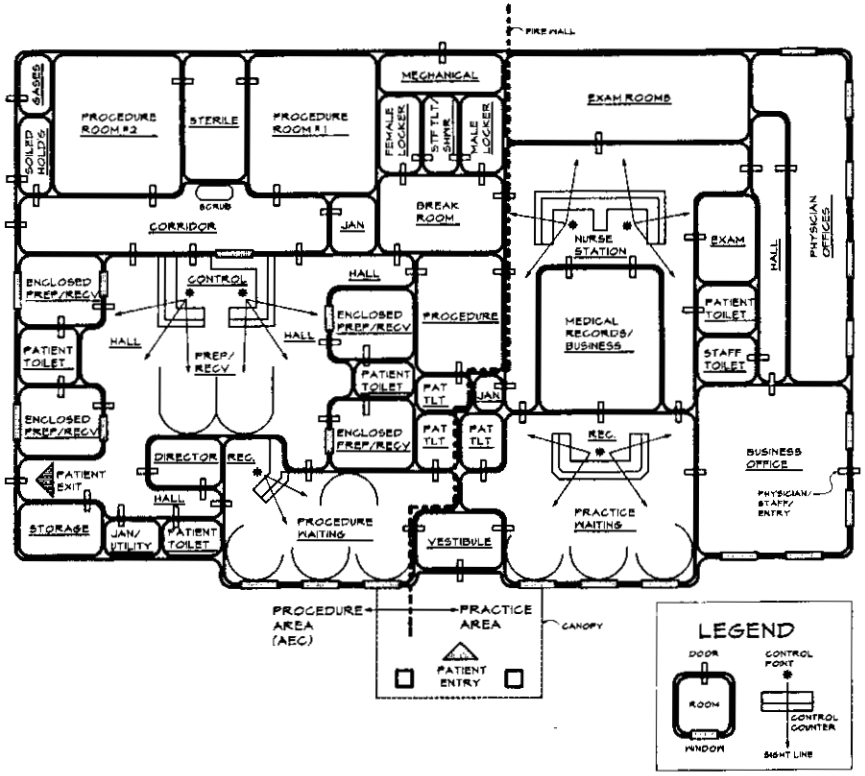

Fig. 1. Functional relationship of an ambulatory endoscopy center, not to be construed as a floor layout.

proportional to the actual relative size of the rooms they represent. The functional relationship diagram is a flow diagram showing the way that patients, staff, physicians, and goods move through the center. The diagram shows both the

	ROOM	DESCRIPTION		AREA
A.	Waiting Module			____ SF
1.	Seats	2.0 to 2.5 x # of patients in building at once @18 SF/Seat	____ SF	
2.	Nourishment/TV	1 @ 10 SF=	____ SF	
3.	Waiting Room Toilet	1 @ 55 SF=	____ SF	
4.	Family Room		____ SF	
B.	Business Reception Module			____ SF
1.	Reception Area	50 SF/Position	____ SF	
2.	Billing		____ SF	
3.	Transcription		____ SF	
4.	Director		____ SF	
5.	Files	# of patients/year x 3 years divided by 100 patients/lineal feet = lineal feet @ 1.75 lineal feet per square feet	____ SF	
C.	Control Module			____ SF
1.	Control Station	80 to 120 SF	____ SF	
2.	Storage	20 to 30 SF	____ SF	
3.	Dictation Area	20 to 30 SF	____ SF	
D.	Prep/Recovery Module			____ SF
1.	Enclosed Stations	2 per Procedure Room @ 100 SF =	____ SF	
		Glass Enclosed Procedure Room Side	____	
2.	Recovery Lounge	2 per Procedure Room @ 65 SF =	____ SF	
		Recliner	____	
3.	Toilet/Dressing	1 per 2 prep/recovery stations @ 65 SF		
E.	Operating Rooms (Procedure Room) Module			____ SF
1.	See Utilization Chart for number			
2.	Procedure Rooms	270 SF		
		Procedure Room could be as little as 180 SF - Discuss with State		
3	Scrub Area	See State Regulations		
		Could be inside room - if not then 10 SF		
F.	Utility Module			____ SF
1.	Sterilization	80 to 150 SF	____ SF	
		Discuss with State		
2.	Clean Storage	10 to 40 SF	____ SF	
3.	Dirty Storage	20 to 50 SF	____ SF	
4.	General Storage	80 to 180 SF	____ SF	
5.	Janitor's Closet	May need 2 - 15 to 20 SF	____ SF	
6.	Gas Storage	30 to 50 SF	____ SF	
7.	Uninterruptable Power Source	20 to 40 SF	____ SF	
G.	Staff Dressing Module			____ SF
1.	Check State to see if separate male and female dressing rooms are needed			
2.	Check State to see if separate toilet and/or shower is needed for male and female			
3.	Dressing (Male and/or Female)	10 SF per locker - minimum 60 SF	____ SF	
		55 SF per toilet	____ SF	
		70 SF for shower and toilet	____ SF	
4.	Break Room	Could be in Practice Area	____ SF	
		80 to 100 SF		
TOTAL NET AREA		**Sum of A through G**		**____ SF**
40% CIRCULATION		**40% of Total Net**		**____ SF**
TOTAL GROSS AREA		**Total Net + Circulation**		**____ SF**

Fig. 2. Sample architectural space program worksheet. SF = square feet.

Practice portion of the DDC and the AEC portion. Remember, the AEC is the portion of the DDC the State Department of Health official will probably refer to as an ASC. Some creative labeling can make the plan look like an ASC while at the same time functioning as an AEC. Fig. 2 provides a space program that helps determine the names and sizes of rooms that make up the AEC.

The State Department of Health official and the Medicare official who review the plans (usually the same person) do not recognize that the Practice portion of the DDC is directly attached to the AEC portion of the DCC. The official is only interested in the AEC portion of the DDC. The AEC portion of the DDC is the area that he or she views as the ASC. The state, fire marshal, and Medicare inspectors insist that an AEC be separated from the Practice portion of the DDC by a 1-hour fire rated wall-door construction system. The development of a 1-hour fire rated wall-door system is not difficult. The construction is achieved by building a wall with two layers of fire-rated gypsum board on either side of the structural wall supports and having the wall go through the ceiling to the roof structure above. The system has to include doors that are of solid construction and have a door closure on them. Any competent architect knows how to detail such a wall. This type of wall construction only becomes expensive if it is built in the wrong location and after review from the state official it is determined that it must be moved. Relocating a fire wall after construction is very expensive. All the elements of a stand-alone AEC must be on the AEC site of the fire-rated wall. This means that the waiting room, business function, and so forth for the AEC have to be on the AEC side of the fire wall. These rooms can be small but they must be on the proper side of the fire-rated wall. If the architect fails to grasp this concept it will cost money when the inspection takes place.

Design module of the AEC

Waiting module

The design of the AEC waiting module starts outside of the building. The entry to the AEC should express an environment designed for comfort. The entry to the building should be covered with an all-weather canopy to keep weather elements from the patient. The door to the building should be an automatic opening door because many of the patients who enter the AEC are elderly and not be able to open a large manual door. The vestibule of this module should be a patient-friendly area and serve as the vestibule for both the Practice areas and the AEC areas of the DDC if both are housed in the same building. A bench within the vestibule to sit on while an escort brings an automobile to the front door for Practice patients is good idea. Wheelchair storage is needed in this area. The way the wheelchair is stored is important. The patient should not see a wheelchair when they first walk into the building. This leaves the patient with a feeling of sickness rather than a feeling of wellness. The vestibule should be designed with a planter under which a wheelchair can be rolled. The vestibule can also be a place to store

coats, but one should not allocate a lot of space for coat storage. Most patients do not hang up coats out of fear that if they do someone could walk off with their coat. The vestibule should be large enough to express to the patient that the DDC is a successful business but small enough to present the building as not too opulent. A separate vestibule should be part of the recovery module for exiting the AEC.

The level of finish in the waiting room is very important. To use the Practice waiting room as the AEC waiting room, a variance from the state is required. Because the AEC waiting room is required to be separated from the Practice waiting room, it is in a sense a subwaiting room for the AEC. This is not a bad concept. Separating the Practice waiting room from the AEC waiting room is good because the speed at which the patients move through these two areas is different. Patients in the AEC waiting room may be waiting for longer periods of time. The separation of the two waiting rooms makes it easier for both the Practice patient and the AEC patient.

The look of the waiting area is important. A too expensive look makes patients uncomfortable and a too plain look makes patients question the quality of the center. It is best to make the waiting room look like the living room of the common patient, not the living room of the physician. The waiting room should have comfortable individual seats in small groups. One group should be arranged around a television set that plays appropriate movies controlled by a video cassette recorder from the reception desk. Another group should be in a quiet area where patients and escorts can read and rest. A small round table with a puzzle on it or a writing area can add to the ambiance of the waiting room. An aquarium is also very relaxing for patients and escorts. The waiting room is the place on which to spend a few dollars.

The efficiency of the AEC should be of such a nature as to not give a lot of time for the patient and escort to be in the waiting room. A patient toilet should be located near but not directly off of the waiting room. Everyone is anxious when they come to an AEC and often need the use of a toilet. The toilet should be off a small anteroom that contains coat storage so patients are not walking directly out of the toilet and into view of people in the waiting room.

Control in the waiting room is important. State and Medicare regulations require a small business function in the AEC. This area is discussed in detail in the next section. The business-reception area should relate to the waiting room and serve as a control area for the patient and escorts in the waiting room. Checking into the AEC should be done at an interview desk between the business-reception area and the waiting room. Not a lot of space is necessary for the patient seating area at the interview desk because most of the check-in process should be taken care of before the patient enters the AEC. There should be a small nourishment station near the reception area for escorts. The station should be close to and controlled by the receptionist.

Business-reception module

The first thing patients should see as they enter the waiting room is the smiling face of the receptionist sitting behind a reception desk. The desk should look more

like the concierge desk at a good hotel than the reception counter found in most medical practices. Patients should sit at the desk, fill out forms, and receive their identification bracelet. Medicare requires that the AEC medical records be stored in the AEC portion of the building. The records can be limited to pre-procedure and post-procedure notes. They can be duplicated in the main record system of the Practice. The storage area for these records must be locked for security reasons. If the AEC is a part of a DDC, billing and other functions can be done in the Practice area. On the other hand, if the AEC is a freestanding unit, an area for business functions should be designed adjacent to the reception area. A nurse director office should bridge functionally between the reception area and the control area of the procedural area. This office is the abode of the leader of the AEC and should be located near both the business and procedural parts of the AEC. The business-reception module, like the waiting module, must be part of the procedure area of the AEC, if the AEC is to be licensed by Medicare. If the Practice areas and the AEC areas are part of the same DDC, they could share a common business-reception module, if the state building official allows a variance. If no variance is granted, then there must be a reception-business area within the AEC.

Control module

The stars of every AEC are the nurses. The preparation-recovery areas of the AEC should be under the constant visual control of the nursing staff. The control area should be placed between the preparation-recovery areas so that the nurses can observe both. Cleanup, charting, additional dictation, and other functions should be performed in this area. From the control area, the nursing staff should be able to see the head of every patient in the preparation-recovery areas and the recliner chair areas of the center. The control module is in essence a nurse station. It is a place where physicians and nurses interact. Included in the module are all the communication systems of the center and basic utility items, such as medication storage, computers, telephones, and so forth. The medical director of the facility should have a small office between the business-reception module and the control module.

Preparation-recovery module

When it is time for the patient to begin preparation for the procedure, a nurse should come to the waiting room and greet the patient and his or her escort. Both should be brought to an enclosed preparation-recovery room. Privacy is the major design element of the preparation-recovery room. Efficiency can be accommodated best if the patient prepares for the procedure and recovers from the procedure in the same place. An enclosed room for the patient and escort allows the patient a comfortable place to prepare for and recover from the procedure. A handicapped-accessible toilet attached to the preparation-recovery area (shared by two preparation-recovery rooms) should be used for changing. The toilet is required by Medicare to be handicapped accessible, which makes it large enough

for changing. A locked cabinet in the preparation-recovery room can store patient's clothes. The preparation-recovery rooms should have a home-like environment and include a glass sliding patio door with a recessed track to the control area so the nurse control area can control the area and patient gurneys can easily move in and out of the room. At some AECs patients are prepared on gurneys in the preparation-recovery room, which are rolled into the procedure room and used as a procedure table. This is very efficient because is allows patients to be moved from the preparation-recovery rooms to the procedure rooms and then back to the same preparation-recovery rooms very quickly. The patient is aware of the environment that they pass through on the way from the waiting room to the procedure room. This awareness is not as critical after the procedure is complete because of sedation of the patient.

The comfort level of the escort is as important as the comfort level of the patient. The patient's escort relays most of the information from the physician to the patient. Special attention should be taken to make the escort an integral part of the system. Although the procedure is common for the staff and physician it is scary for the patient and escort. It is important to educate both patient and escort and prepare the escort for post-procedural care of the patient. It is the escort who takes on nursing duties. The escort should be viewed as an important part of the team and given systems to let them be good nurse caregivers. While the patient is moved to the procedure room the escort should stay in the preparation-recovery room. The escort should view an audio-visual presentation on post-procedure care while they are waiting in the preparation-recovery room for the patient to return from the procedure. Placing the escort in the preparation-recovery room isolates the escort, so that they can be present when the patient returns from the procedure for recovery. This makes the patient and escort available for physician consultation after the procedure. The speed of the center is dependent on the physician. The number of procedure rooms is not the governing factor for center speed if the turnaround system is properly designed. It is important to have the patient's escort in a position to talk to the physician when the physician is ready. It might cost a bit more to provide enclosed preparation-recovery rooms, but this type of design makes for a more efficient environment for patient and escort. Two preparation-recovery rooms per procedure room are sufficient.

Patient recovery time is variable. Some patients may be ready to move from the preparation-recovery room but are not yet ready to move from the center. For this reason a few curtained, recliner chair areas should be included in the recovery area. One recovery lounge area per two preparation-recovery rooms is sufficient. The grouping of two preparation-recovery rooms (with gurney) per procedure room and one recovery lounge chair per two preparation-recovery rooms provides a very efficient recovery group. These areas should be very residential in design. They should have telephones available. Patients and escorts should be encouraged to call loved ones and report successful procedures. This is an amenity that patients do not expect and gives the center an advantage over other centers. A covered exit vestibule with automatic doors, separate from the main vestibule, should be part of the design.

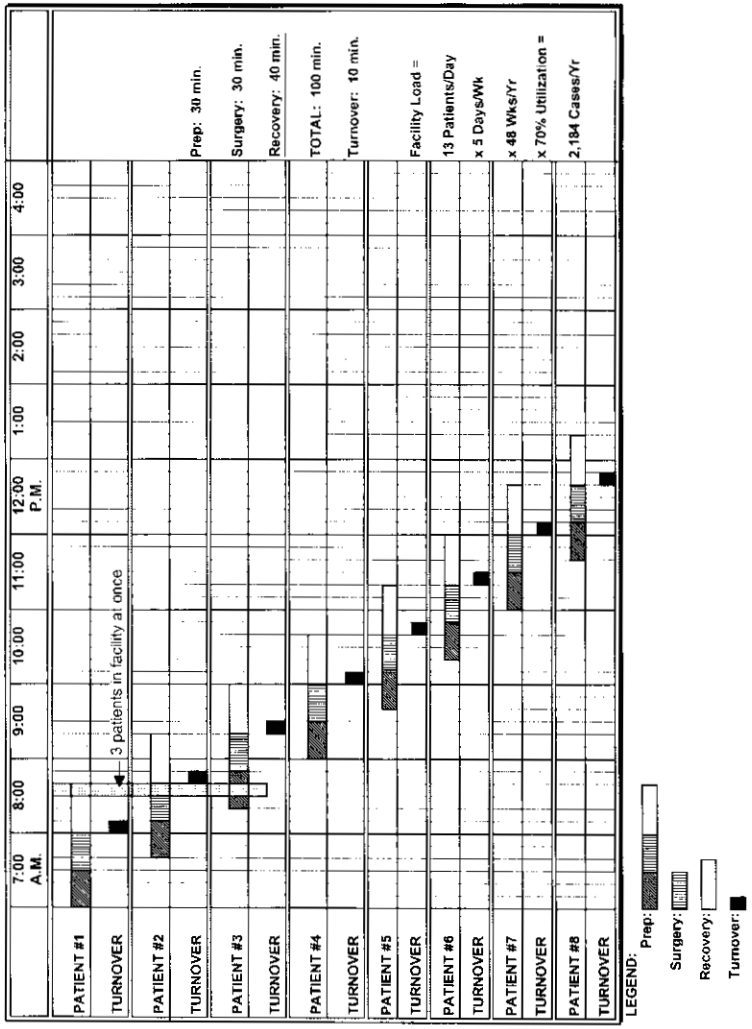

Fig. 3. Sample procedure room utilization analysis.

Procedure (operating) room module

Before looking at the size of a procedure room, it is more important to determine the number of procedure rooms necessary to accommodate the caseload of the AEC. It is common to build too many procedure rooms in AECs. This occurs when the turnaround time of the facility is not properly calculated. In an acute care hospital equipment is cleaned in a central supply department, and there is normally not enough equipment to accommodate an efficient department. Because of slow turnaround time, most physicians insist on more procedure rooms than are necessary. To get an accurate view of the number of procedure rooms necessary,

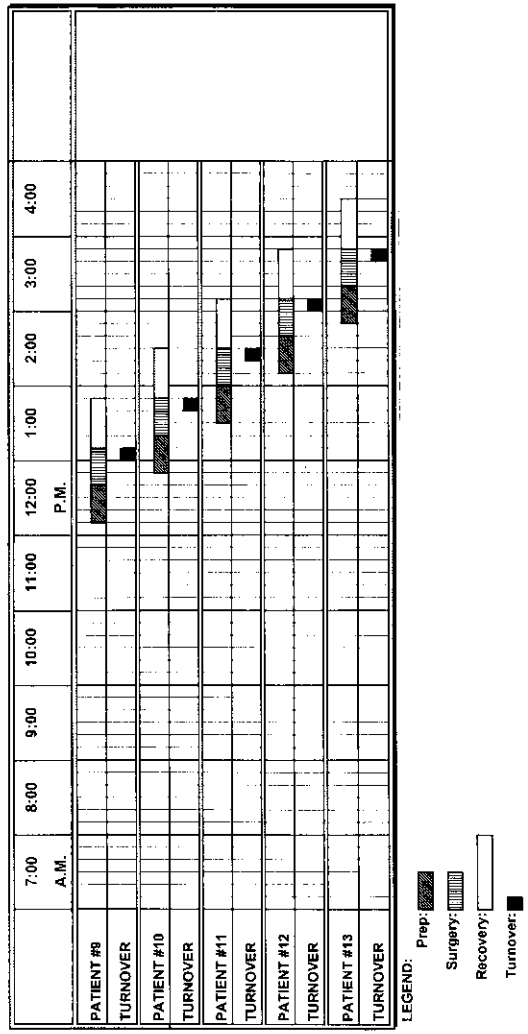

Fig. 3 (*continued*).

a utilization chart should be prepared. A sample chart is presented in Fig. 3. A utilization chart shows the flow of an AEC procedure room expressing the preparation, procedure, recovery, and turnover times for each patient. Fig. 3 is only an example. Each AEC should have its own set of parameters. Determine the speed of each of the segments of the AEC and develop a utilization chart. The chart helps determine the number of procedures that can be expected per procedure room. The chart can assist in determining the number of procedure rooms necessary to accommodate the patient load of the center. By determining the anticipated patient load 5 years after completion of construction and dividing the total load by the number of procedures per room per year, the number of

necessary procedure rooms can be determined. By looking vertically at the chart at the end of the first patient, one can determine the number of patients who will be in various stages of center utilization. This can help determine the number of seats in the waiting room, number of procedure rooms, preparation-recovery rooms, and recliner chairs.

Because the State Licensing Department and Medicare look at the AEC as an ASC, even though the procedure rooms are expressly for endoscopy procedures performed within them, the licensing people look at the rooms as operating rooms. Minimum requirements for operating rooms are 360 sq ft. This is too large for a procedure room. Approximately 300 sq ft is plenty for a procedure room. By presenting a narrative of the operation of the AEC, a variance might be secured by the State Licensing Department. If no variance is granted, the rooms have to be designed at the minimum size of an ASC operating room. Equipment suppliers should be consulted to determine the location of gases within the procedure room. Indirect lighting in lieu of florescent lighting should be part of the room design. It is important to keep the procedure room as nonthreatening as possible. The equipment necessary to perform a procedure is very threatening to a patient. Even though some pre-sedation is administered to a patient, the patient witnesses some awareness of the surroundings of the room. The last thing a patient wants to know is exactly how long a 100-cm scope is when he or she knows were it is going. It is best if the equipment is stored in cabinetry until the patient is sedated and unaware of the surroundings of the room. Designing procedure rooms in pairs with sterilization between two procedure rooms is very efficient.

Utility module

Maximum efficiency is obtained if equipment turnover time and the time for patient transportation from preparation-recovery to procedure and back is minimum. Equipment turnover time is the result of the amount of equipment available and the nearness of the sterilization areas to the procedure rooms. If efficient equipment turnover time is obtained, the speed of the center is determined by the speed of the physician between patients rather than the number of procedure rooms. Locating the sterilization area between two procedure rooms is an important design concept. Moving equipment the shortest distance from procedure to sterilization to procedure helps increase the efficiency of the center. Experience shows that it is always better to purchase additional equipment than to have physicians and staff waiting for equipment to be cleaned. The most expensive cost element of the AEC is the staff. Staff members, especially physicians, should never be waiting for equipment to be cleaned. Design one sterilization area between each pair of procedure rooms.

There are many utility areas needed in the AEC. General storage for supplies is necessary. General storage areas should be accessible to both the preparation-recovery areas and the procedure areas of the AEC. Space is necessary for storage of dirty items generated within the center. Dirty storage areas should be located near the exit of the facility to make for easy disposal from the building. There is a

need for the storage of gases within the center. Special care for ventilation of gases is important. The center also has to function when electrical power from normal sources fails. A simple uninteruptable power source is necessary. For small one-procedure room facilities the uninterruptable power source could come from a battery back-up system. If the center is larger the back-up system has to be powered by a generator. Design the center so that supplies and gases can be delivered to the center during the daytime hours when procedures are being performed.

Staff dressing module

The requirements for staff gowning in an AEC and an ASC are different. It is important to remember, however, that because the AEC is to be licensed as an ASC, the rules and regulations for an ASC have to be followed. It is worth the effort to meet with the State Department of Health—Licensing people to seek a waiver after explaining that the center will only be used for endoscopy procedures. Some states understand the differences between AEC and ASC and grant variances. The only way to know is to have a face-to-face meeting with the state staff. If strict compliance with state licensure and Medicare certification is adhered to, there is a need for male and female locker areas. In the strictest interpretation each dressing area requires a toilet and shower. In some states it is possible to share a toilet and shower and to have a single generic dressing-locker area. If the state interprets the regulations in the strictest way, it is important to have the necessary rooms but to design them as small as possible and still meet requirements. There is a requirement for a break room within the AEC. There is, however, no requirement for a break room within the Practice portion of the DDC. If the break room is located on the AEC side of the 1-hour wall and includes a door to the Practice area, it can serve both portions of the DDC.

Shared space module

Depending on the Department of Health plan checker, rooms like break rooms and special procedure rooms can be shared with Practice and AEC portions of the DDC. Sharing these spaces allows them to be productive parts of both the Practice and AEC sides of the DDC. Savings can be obtained by not duplicating the areas. Proper location of the special procedure room can give the AEC an added procedure room. One should ensure the state officials deem this allowable.

The development of an AEC is as much an economic problem as it is a design problem. It is important to have enough space to accommodate an efficient AEC, whereas at the same time not over-build the facility. To control the design process three aides are included in this article: (1) functional relationship diagram (see Fig. 1); (2) architectural space program (see Fig. 2); and (3) procedure room utilization chart (see Fig. 3).

The attached functional relationship diagram (see Fig. 1) is not intended to be a floor plan. It is intended to show the flow of patients through the AEC. The diagram shows the relationship of one room to another. If this functional relation-

ship is maintained the AEC reaches maximum efficiency. Remember, the single most expensive operational element of the AEC is staff. It is not wise to develop a plan that is too small or large for the staff to perform at its maximum efficiency. Take note of not only the relationships within the AEC but also the relationships between the Practice area and the AEC. Special attention should also be paid to the location of the 1-hour fire wall. Building a fire wall within the initial construction is not expensive. Building the fire wall after construction is completed because the state or Medicare inspector determined that not all the required elements of the AEC are within the fire-rated construction is very expensive.

The space program (see Fig. 2) is simply a tabulation of the areas necessary for the development of the AEC. Fig. 2 is the shell of a space program. Included in the space program document is a listing of all of the spaces needed in the AEC. The space program can vary significantly depending on the number of patients to be treated and the ability to be granted variances from the state. The architectural space program should help determine the size of the facility. Not all the rooms listed in the space program are necessary in every AEC. If the AEC is a stand-alone facility, then all the rooms are probably needed. If the AEC is part of a bigger DDC, then some of the functions may not be necessary. If the State Department of Health—Licensing official or the Medicare surveyor can achieve variances, then some of the spaces shown in the space program may be in the Practice instead of the AEC. The only entry that cannot be modified is the 40% circulation element at the end of the space program. The circulation factor accounts for wall thickness, corridors, and so forth. This space requirement is 40% of the net area of the AEC. Reducing this number arbitrarily to make the facility smaller only prolongs the inevitable until the facility is actually designed.

The procedure room utilization chart (see Fig. 3) is necessary to help determine the number of procedure rooms and other ancillary areas necessary to service the patient caseload. By determining the speed at which one can prepare a patient, perform the procedure, recover a patient, and turnover the room, the number of procedure rooms necessary to accommodate the caseload that is anticipated in the center can be calculated. This process starts by actually counting the number of procedures that were done in the practice last year. It is appropriate to discount the cases because some cases that could be done outpatient are not done in the AEC. Patients may have their procedures done outside the AEC because of managed care contracts, patient health, and patient preference. Once the number of previous year procedures done within the practice is determined by analysis of the CPT codes in last year's records, it is suggested that the caseload be discounted by 15% to 25% because of items previously mentioned. Determine the discount rate based on the specifics of the practice. This mathematical calculation should help determine the number of cases that could have been done in an AEC if the facility was in operation last year. Because caseload usually grows once the AEC is completed, it is important to project caseload into the future before it is determined how many procedure rooms will be included in the AEC. Projecting the caseload 6 years into the future is appropriate (1 year for the development of the AEC and 5 years of patient growth) so that the facility is not initially built too small.

Caseload increases once the facility is built and patients perceive the DDC is a full-service delivery system. A yearly caseload increase of 10% to 15% is in order. This increase should be based on the specifics of the practice. To determine the caseload that is used to design the facility, it is recommended to gather the previous years caseload, discount the number by 15% to 25%, and then increase the caseload 10% to 15% per year compounded for the next 6 years. Some will want to be more conservative in projecting caseload. One can use any amount of discounting and inflating to determine the number of cases that will come to the AEC. Do not be so conservative that the facility is underbuilt to the point that additions are required 1 or 2 years after the initial opening of the facility. On the other hand do not project the caseload in such a liberal manner that the resultant facility is overbuilt and the rental cost of the facility is detrimental to the DDC. One way to resolve this issue is to be conservative about the caseload projection and then purchase enough land that an addition to the AEC is easy once the caseload materializes. The utilization chart is an aide to determining the number of procedures per procedure room per year. Once the anticipated 6-year projected caseload is determined, the calculation to decide on the number of procedure rooms in the center is as follows:

Total caseload at year 6/number of procedures per room from Utilization

= number of procedure rooms

The utilization chart has other uses. An analysis of the location of patients in the center at the time that the first patient is completely recovered and ready to leave the facility helps determine a number of things, such as the number of seats necessary in the waiting room, the number of preparation-recovery stations required, and the number of procedure rooms needed. Simply draw a vertical line at the end of the first patient's recovery time and use the chart to determine the number of the various rooms or room elements necessary for an efficient center.

In conclusion, the addition of an AEC as part of a total gastroenterology delivery system is a win-win scenario. As professional fees go down, physicians have to look for ways to protect their incomes. One of the very best ways is to gain the revenue available from the facility fee of the AEC. Not only does an AEC added to the practice give additional revenue from an added facility fee, it also gives added revenue through a significant increase of efficiency. All this at the same time giving to the patient a comfortable, coordinated, and efficient delivery system not only for the examination portion of the patient encounter but for the entire experience of good, quality, efficient gastroenterology care. Empowering physicians to control the medical delivery system should be the goal. Developing a full-service DDC allows the physician to take control of part of the system. Controlling the system not only allows the physician to generate more revenue but also provides a better place for the patient to interact with his or her physician.