

Therefore, the US experience may be very valuable to Taiwan. Using examples from the US, we discuss current trends and future developments in healthcare facilities design.

ADVANCING TECHNOLOGY

Several factors are proving to be driving forces behind the accelerating changes and evolution of the design of healthcare facilities. Advancing (high-tech) medical technology is perhaps the most readily apparent force for change due to its tangibility and increasing costs. The newest generation of medical diagnostic equipment, including magnetic resonance imaging (MRI) machines, CAT scanners, ultrasound, PET scanners, and numerous examples of laboratory and surgical equipment, such as gamma knife, have ushered in remarkable new advances in the treatment and understanding of deadly illnesses. In this section, the design of a gamma knife center is discussed as an example of advancing technology.⁸

A gamma knife is a stereotactic radiosurgical device used in the treatment of brain tumors, and to relieve pain associated with trigeminal neuralgia. If a brain tumor is thought to be inoperable, the gamma knife is almost the only tool which neurosurgeons can use to battle the cancer tumor. The entire process may take as little as 5 or 6 hours. A typical patient treatment process begins with the patient arriving and having the frame applied to his or her head. Once the frame is attached, the patient is sent to the radiology department for imaging. The target is then localized and its x , y , and z coordinates determined relative to the frame. An MRI, CT scan, or angiography may be administered depending on the illness. The images are transferred directly to dosimetry, where the patient's treatment is planned. Once the treatment is planned, the patient is laid on the couch of the gamma knife unit. The duration of treatment varies from 15 min to several hours depending on the complexity of the treatment plan and the number of doses required. After finishing the treatment, the frame is removed, and the patient is discharged.

There are various kinds of functional spaces which

should be included in a gamma knife center, such as a preparation area, a planning area, and a treatment room. The patient preparation area is where the frame is fixed to the head of the patient prior to imaging and treatment and where the patient will be stabilized after treatment. Therefore, this space should be close to the treatment room and with as much separation from the planning area as possible. The radiosurgical procedure occurs in the treatment room. This is where the gamma knife unit and helmet table are located. The gamma knife utilizes several differently configured 500-lb helmets to provide accurate targeting. These helmets are stored on a helmet table inside the treatment space when they are not in use. There are 2 special considerations in the arrangement of the treatment room. One is the need for direct access to the control room. Another is the location of the doors to the room outside the radiation cone of the unit. The control area contains all the instrument controls and alarms, the emergency shut-off, and audiovisual communication with the patient in the treatment room. The radiosurgical procedure is carried out and supervised from the gamma knife control panel located in this area. Dosimetry is the space where the radiosurgical procedure is planned. The digital images made by MRI, CT scan, or angiography are sent directly to the gamma knife planning stations in this space. It is here that the physicist and neurosurgeon carry out 3-dimensional planning of the doses, the dose rate, and the lesion configuration.

Other space requirements include a nurse station, soiled utility room, clean supply, toilets, dressing areas, offices, and a waiting area. Additional space may be required for a family waiting area. The floor plan of a gamma knife center is presented in Fig. 1.⁸

There are many considerations in planning a gamma knife center. First of all, there are intra-departmental considerations that need to be addressed. Since the treatment involves many staff from the radiation oncology department, including a radiation oncologist, a medical physicist, and a radiation therapist, the gamma knife center had better be located near the radiation oncology department. Another advantage of being located with other cancer treatment pro-