TITLE: An overview of the installation project of a SPECT/CT (Brightview XCT) and PET/CT (Tru flight) in Faridkot

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Abstract—SPECT/CT and PET/CT has revolutionized medical diagnosis by depicting the spatial distribution of metabolic or biochemical activity in the body which can be more precisely localized with anatomical structure obtained by CT scanning. Many diagnostic imaging procedures in oncology, surgical planning, radiation therapy and cancer staging have been changing rapidly under the influence of PET/CT availability, and centers have been gradually abandoning conventional PET devices and substituting them by PET/CTs. Although the combined/hybrid device is considerably more expensive, it has the advantage of providing both functions as stand-alone examinations, being, in fact, two devices in one. SPECT/CT or PET/CT installation and implementation are unique to each institution, and each practice will need to examine its facility, work flow, and processes to best adapt them for the new technology.

Key words: SPECT (Single-photon emission computed tomography), CT (computed tomography), PET (positron emission tomography)

I. INTRODUCTION

In the twentieth century, we are using a hybrid technology which combines two imaging modalities in a single system such as SPECT/CT (Single-photon emission computed tomography & computed tomography (CT) scanner) and PET/CT (positron emission tomography (PET) scanner & computed tomography (CT) scanner), so that the images acquired from both devices can be taken sequentially, in the same session, and combined into a single superposed (co-registered) image.[2-7] SPECT/CT and PET/CT has revolutionized medical diagnosis by depicting the spatial distribution of metabolic or biochemical activity in the body which can be more precisely localized with anatomical structure obtained by CT scanning.[8] For example, many diagnostic imaging procedures in oncology, surgical planning, radiation therapy and cancer staging have been changing rapidly under the influence of PET/CT availability, and centers have been gradually abandoning conventional PET devices and substituting them by PET/CTs.[9-11] Although the combined/hybrid device is considerably more expensive, it has the advantage of providing both functions as stand-alone examinations, being, in fact, two devices in one.

SPECT/CT is a nuclear medicine tomographic imaging modality which uses gamma rays emitted from administered radioisotope or radiopharmaceutical and aid in localization with the help of CT [12-13]. It is very similar to conventional nuclear medicine planar imaging using a gamma camera. However, it is able to provide true 3D information. This information is typically presented as cross-sectional slices through the patient, but can be freely reformatted or manipulated as required.

II. AIMS

The goal of this overview is to establish a pragmatic strategy for controlling, tracking, and monitoring a complex technical project that must deal with project complexity, project size and the degree of structural uncertainty in order to ensure that the end result is completed on time, within budget, and exhibits quality.

III. OBJECTIVES

Project duration was 150 days for building construction, installation and quality assurance of both SPECT-CT & PET-CT machines.

IV. METHODS

1) Project Scope was based on available space
2) Estimation was based on amount of budget dedicated to the project
3) Risks was based on accountability of the existing system to cover workload
4) Schedule was based on the increasing of examination request and the waiting list for the nuclear medicine examination.
5) Control strategy was based on the list of necessary activities and the establishment of a restriction list that sets the order of activity accomplishment.

V. DISCUSSION

Faridkot district is situated in the remote area of Punjab where such type of imaging facility is introduced for the first time. Several type of challenges were faced by the team involved in this project.

In the starting of this project place for construction was decided (which was inside the hospital premises next to...
Radiation- oncology department and radio-diagnosis department.

Then budget was decided for the construction of the building, furniture and machine procurement (SPECT/CT and PET/CT). One RSO level II and physician from the Nuclear medicine background were appointed. The basic layout plan for the building for the installation of both machines was prepared. Before the submission of the basic layout plan of the building a no objection certificate from Municipal Corporation, electricity department, water supply board was obtained. Soil testing was also performed to check the probability of damage with earthquake and load bearing capacity of the soil as well as soil composition was checked where construction of the building was planned.

After getting NOC’s from these agencies the Application for Approval of Site and Layout Plan for Nuclear Medicine Facility was applied by the RSO by filling the form available on the website of the AERB ( Atomic Energy Regulatory Board) with the original copies of layout plan and NOC’s.

Simultaneously the specification for the building construction and machines were made by expert team from nuclear medicine and related departments. The tender were called and Bright view XCT SPECT/CT and TRU Flight PET/CT of Phillips were found to be L1.

After that construction work was started. Different steps involved in the construction work were: the building was constructed as per the layout plan approved by AERB. Room size and shielding must be sufficient, shielding in radiopharmacy and scanning room must be RCC and thickness as per AERB rule and regulations. Shielding of the rooms was decided according to the patient burden and radioisotopes to be used.

Proper shielding can reduce the radiation exposure of the radiation workers subsequently. When construction work of the scanning rooms was partially completed installation of machines was started in their respective rooms. The shifting of the machine part in the scanning rooms was quite challenging due to the weight of the machines. After the installation, the quality assurance testing was started by Phillips engineers.

When all tests were performed successfully, then we applied for Commissioning & Operation of the facility by filling the form available at website of the AERB “Application for authorization for commissioning and operation of nuclear medicine facility” with the original copies of QA reports of the tests for SPECT/CT and PET/CT.

The one of the representative of the AERB came for the inspection of the construction of the building, proper shielding and proper working of the machines installed. After the inspection and checking the QA report, every measurement was found according to the NEMA, and AERB issued the licenses to take patients on SPECT/CT and PET/CT.

When we got the licenses to take patients on both the machine we applied the NOC’s to procure different radioisotopes which we are going to use for the patient scanning by filling the from available on the website of AERB “Application for Procurement of Radioisotopes for Nuclear Medicine Facilities”

### VI. RESULTS

Steps for the establishment of the nuclear medicine facility and installation of both SPECT/CT and PET/CT were followed in accordance to the guidelines provided by the national regulatory body AERB and machines were installed and approved by AERB for the patient use.

### VII. CONCLUSION

- During the establishment of nuclear medicine facility in remote area, such as Faridkot (Punjab) many challenges were faced such as:
  - Availability of raw material for construction of building due to difficult transportation as well as furniture.
  - Weather changes as construction was started in winters.
  - Additional cost incurred due to several factors such as:
    - Changes to the room layout were made in order to comply with the regulatory requirement where the review of radiation shielding conditions is necessary.
    - Date of machine delivery, calibration and T & C had to be extended due to the difficulty in procurement process.

### REFERENCES


