A Case Study on NMT Training at Hillsborough Community College: A Summary

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Administrators concerned with implementing collaborative NMT training programs may benefit from an in-depth knowledge of the experience of other program coordinators. Technical Education Research Centers has recently completed a case study of the NMT associate degree program at Hillsborough Community College, Tampa, Florida, to provide insights and guidelines in program development.

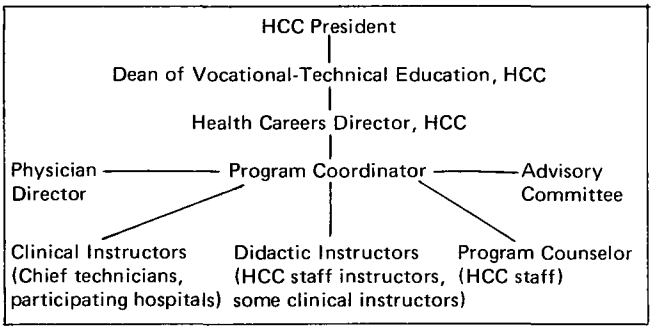
The Hillsborough program was chosen for a detailed case study because it has evolved since 1969 from a modest hospital-based program with three students to an expanded fifteen student collaborative program including HCC, Tampa General Hospital, and three other local hospitals. Furthermore, the program has been continuously reviewed by its staff members, resulting in extensive changes in curriculum design and scheduling and the addition of new courses, which were created particularly for both perceived and expressed needs of students.

The case study is based on intensive interviews with staff and students during the summer of 1972 and continuing communication with Huey Barnett, the Program Coordinator. Others extremely generous in providing information for preparing the case study were Gloria Phillips, Health Careers Counselor at Hillsborough, and Don Ward, now Technical and Administrative Director, Department of Nuclear Medicine, Tampa General Hospital.

Program Development

The first steps in establishing an NMT program at Hillsborough Community College were initiated in 1969 by Don Ward, then Chief NMT at Tampa General Hospital. With the help of an informal advisory committee, he arranged college-hospital affiliations, planned the curriculum, and obtained initial funding grants.

To administer the training program, an organizational scheme for the school and hospital collaboration was required. The organizational arrangement summarized in the box on this page was the outcome of joint efforts by the staff. Representing the Hillsborough Community College administration was the Dean of Vocational-Technical Education with the Director of Health Careers under his supervision. The focal role of Program Coordinator was originally conceptualized as a part-time position filled by Don Ward, who also held responsibility at Tampa General Hospital. As the program expanded, it became clear that a full-time



Coordinator was essential for program continuity, and in early 1972 Huey Barnett from the NMT program at Duke University was selected for the position.

A Physician Director was named to work with the Program Coordinator in the supervisory position required by the American Medical Association. Chief technicians from each of the participating hospitals were selected to serve as clinical instructors. Responsibility for teaching didactic subjects was assigned to staff members at HCC, as well as to the Program Coordinator and clinical instructors. Staff physicians in nuclear medicine

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from participating hospitals were involved in the program in an advisory capacity, as were other hospital administrators. Counseling services were made available to students through the Health Careers Counselors at Hillsborough Community College assigned to the NMT program.

Student Problems and Solutions

Faculty and clinical instructors encountered various student training and selection problems and found that some students were not performing in a professional manner in the clinical setting. Moreover, some of the students had had little or no prior contact with hospitals and were placed in a situation where they were expected to work with patients before they were really prepared to do so. As a result, administrators and counselors worked out two complementary courses, a seminar and a lab, to be offered to first-year students as an introduction to the hospital and its functions. The overall purpose was to provide students with a vocational orientation to the hospital and to provide an introduction to the concept of team care—the NMT as part of a total health care delivery system. A faculty member experienced in psychiatric nursing education was put in charge of team teaching these courses.

The seminar is a two-credit course with associated laboratory experiences entitled "Interpersonal Relationships in Health Care". It covers the medical, legal, and sociological implications of working with patients, and students can bring their problems, experiences, and feelings into open discussion.

The one-credit laboratory course entitled "Introduction to Patient Care" includes observation in various parts of the hospital on a rotating basis. This course serves to supplement the seminar and requires that the student spend three hours per week rotating through twelve specified departments including: nursing, EEC (electroencephalogram), dialysis, cardiopulmonary, clinical chemistry, inhalation therapy, surgery, physical therapy, intensive care, emergency room, radiology, and nuclear medicine. These departments were selected for two reasons: (A) they all relate directly to patient care and (B) they all relate directly or indirectly to the NMT patient. Not only does this give the students a chance to see whether they really enjoy the hospital environment, but also it provides them with added perspective on how the nuclear medicine department functions within the hospital as an integrated unit.

The two courses were introduced during the 1972-73 school year and have been very well received by students; moreover, instructors in all participating hospitals have been impressed by student preparation for the hospital role. Because of the success of these courses the Hillsborough staff is currently planning to publish a report on their experience in development and presentation.

Student selection and attrition posed critical problems during the first year. Since the planning for the NMT program did not become final until four months before the training was to actually start (fall 1970), there was little time to recruit and evaluate students. Of the fifteen selected for admission into the first class, seven dropped out during the first year. Program staff offered the following reasons for the high attrition rate: several of the students had such poor mathematical skills that they could not function in the lab, or they were general academic failures. Some "just didn't like" the program, while others dropped out because they had unrealistic expectations about working full or part-time to support a family while going to school. Among the students who stayed, several had problems adjusting to the hospital setting and patient care. The staff invested much extra time trying to help such students fit into the program.

In reviewing the problems they encountered with the first classes, the staff members responsible for recruitment have changed acceptance requirements: They will accept only those students on an appropriate academic level and who can easily develop acceptable attitudes toward patients and patient care. The staff is developing a psychology test to assess interests and attitudes and a mathematics test to assess those skills actually needed in nuclear medicine technology; these tests will be administered to all applicants.

The original two-year program was structured so that the didactic courses would parallel the clinical experience during the training period. The didactic classes, held in the evenings, included Associate of Science general degree courses specially designed by the faculty for the nuclear medicine technology student. During the day the students rotated through two hospitals on a 16-hour-per-week schedule. The available clinical schedules were:

A Schedule—Monday through Thursday: mornings in laboratory

B Schedule—Monday through Thursday: afternoons in laboratory

C Schedule—Friday and Saturday: all day in laboratory

As the program evolved, scheduling difficulties became increasingly apparent: during a routine day in the laboratory, morning work (A Schedule) is extremely heavy, while the afternoon load (B Schedule) is much lighter. Consequently, students who worked in the laboratory in the afternoon were "shortchanged" in their exposure to the requirements of the job and were expected to correct

mistakes made by the morning students, while the morning students could not carry through their procedures to completion or see the results of their efforts. Within their first two terms in the program, students operating on the B Schedule were much further behind clinically than those working on the A Schedule. Students working on the C Schedule were only supervised fully on Fridays, because instructors usually worked only part time on Saturdays. Moreover, these students were in the laboratory only two days per week and were unable to establish a meaningful continuity in their work.

If each student had been able to rotate among the A, B, and C schedules, these problems could have been somewhat alleviated. However, the schedule was originally designed to permit students to hold part-time jobs, yet securing such employment restricted a student's available time so that clinical schedules could not be shifted.

A secondary scheduling problem proved to be the continuous series of evening classes which the students were required to attend. During most of the school year, the students at least tolerated these classes, but during the summer they seemed to reach a saturation point. Even the instructors found their effectiveness decreasing during the evening and considered these classes a burden.

Another major problem with the program was that the students were entering the clinical setting totally unprepared to participate in the functions of the hospital. The rationale for early laboratory contact had been that clinical training should coincide with or closely parallel didactic training. The idea proved generally sound, however, time seemed to be wasted when the student first entered the laboratory. Also the parallel training schedule was sometimes uneven, and students were required to learn clinical procedures without the necessary didactic background information.

To overcome these difficulties, the full-time Coordinator decided to drastically change the whole teaching approach for the class entering in the fall of 1972. With the help of his staff, he decided that the students not only should be exposed to a certain amount of ethics, theory, and psychology before entering the laboratory, but also that they should have all their didactic training completed before they are expected to perform knowledgeably in the NMT laboratory. The courses included in the revised two-year curriculum are shown in Table 1.

To structure the program in this way, the staff concluded that the fall, winter, and spring semesters of the first year—of eleven to twelve weeks each—should be almost wholly devoted to didactics. Starting in the first of two six-week summer sessions after the first year, the clinical schedule

Table 1. Courses Given During Two-Year Program

Course number	Subject	Credit hours
	First Year	
PHS 104	Physical Science IV	3
NMT 161	Intro to Nuclear Medicine	2
NMT 162	Interpersonal Relationships in Health Care	2
NMT 170	Introduction to Patient Care	1
APC 120	Career Communication I	3
APM 125	Applied Mathematics	3
NMT 165	Nuclear Physics	3
NMT 167	Nuclear Instrumentation	3
NMT 168	Radiation Safety & Health Physics	2
ANA 115	Human Anatomy & Physiology	4
NMT 181	Nuclear Medicine Methodology I	2
NMT 171	Nuclear Medicine Practicum I	3
NMT 182	Nuclear Medicine Methodology II	2
NMT 172	Nuclear Medicine Practicum II	3
	Second Year	
NMT 281	Nuclear Medicine Methodology III	3
NMT 271	Nuclear Medicine Practicum III	5
NMT 282	Nuclear Medicine Methodology IV	3
NMT 272	Nuclear Medicine Practicum IV	5
NMT 285	Radiation Biology	3
NMT 273	Nuclear Medicine Practicum V	5
	Total credit hours	60

was revised so that now students work with patients in the NMT hospital laboratory Monday through Friday, 40 hours per week. In the two summer terms and during each of the subsequent semesters of the second year, the student attends one three-hour evening seminar each week in addition to his clinical work. During the summer, fall, and winter semesters, this seminar is a required course entitled *Methodology I through IV*, the purpose of which is to tie in the theoretical aspects of NMT with the clinical aspects of NMT, and to make the two sections relevant to each other by teaching, explaining, and discussing clinical diagnostic procedures. Methodology IV is set up like a graduate seminar in which the students explore one aspect of the field in depth, and present this information to the class. The purpose of this approach is to give the student experience in research, writing, and public speaking.

During the final spring semester of the two-year program the three-hour evening course is Radiation Biology. Although the students do not need this subject to become practicing nuclear medicine technicians, the Program Coordinator and staff consider the course important in rounding out the student's education.

The second-year seminars overcome two major problems perceived by students and faculty in the original two-year program: (A) the students attend classes only one evening per week compared with several evenings per week; (B) student interest does not lag during the final spring semester

because students are involved in new subjects instead of merely reviewing past subjects.

Another problem encountered and resolved by the Program Coordinator is that the specialized student such as the NMT is expected to take regular college courses to meet AS degree requirements as specified by the State of Florida. For example, Anatomy and Physiology is included in the general college curriculum and is taught through the "organ system" approach, which the Coordinator felt does not really help the student relate the subject to a particular field such as nuclear medicine technology. To alleviate this problem, the Program Coordinator devised the following plan: since the Anatomy and Physiology course is taught in four class periods each week at HCC, the NMT students meet with the regular class three out of four times per week; during the fourth class, students in the various participating disciplines (NMT, nursing, etc.) meet in small conference groups. These homogeneous discussion groups give the student a chance to ask why "I as NMT (or nurse) am studying (for example) the liver." The course is divided into learning modules, some of which—applicable to health careers students generally—are presented to the group as a whole, and other more specific modules are discussed only within the smaller groups. The staff also worked out ways of adapting courses like mathematics and English to NMT subject matter so that these courses are more relevant to the students.

A series of behavioral objectives was established for student evaluation. Each student's progress is kept in a single record and is passed on from one instructor to the next. To strengthen the coordination between clinical instructors and didactic instructors, the Program Coordinator makes weekly visits to the hospitals and conducts regular joint staff meetings at the Hillsborough campus.

Student reaction to the program, as assessed through personal interviews by TERC staff, is highly favorable. The program is small and flexible, so that informal interaction can serve an important function. Administrators, instructors, and counselors work closely with students and each other, and communication among all is considered quite effective.

Acknowledgment

This summary is based on TERC's extensive case study entitled *Hillsborough Community College: An Evolving Program in Nuclear Medicine Technology* (1973) 46 pp. Copies of the case study are available from Joseph L. Hozid, NMT Project Director, Technical Education Research Centers, 44 Brattle St., Cambridge, Mass. 02138. Development of the Hillsborough Community Case Study was made possible by U.S. Office of Education Grant # OEG-O-80070313-1602.

Errata

The answer to Question 1 in the most recent "Test Your Knowledge" column (*J Nucl Med Tech* 1: No. 2, 7, 1973) should be choice b.: "Reduction of atomic number by two."

In the article "Radioimmunoassay: Generally and of Digoxin Specifically" (*J Nucl Med Tech* 1: No. 2, 18-25, 1973) the following corrections should be noted: In Table 1 the last two values in column two should read; "1,000 ng/ml" and "10 ng/ml." In Table 2 the first line should be corrected to read "Dose 0.5 mg = 500 μg."