
Developing a Perfusion Technology Curriculum Using the DACUM Process

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Abstract

The DACUM process was used to develop a curriculum for a Perfusion Technology Bachelor of Science Program at Indiana University School of Medicine, Division of Allied Health Sciences.

DACUM, an acronym for developing a curriculum, is a brainstorming process for defining a job in terms of the skills necessary to perform it daily. As a result of the DACUM process, general areas of competence are identified and subdivided into specific skills. Once the necessary skills are identified, courses are designed to teach the skills.

Introduction

In 1979, two staff perfusionist positions were created at Indiana University Medical Center. During the recruiting process to fill these positions, Nursing Administration recognized an imbalance in the supply and demand for qualified perfusionists in the state of Indiana. The decision was made, therefore, to investigate the feasibility of creating a perfusion training program at Indiana University School of Medicine in Indianapolis, Indiana. A needs analysis was done and curriculum development began under the direction of the Di-

vision of Allied Health Sciences, Indiana University School of Medicine.

Methods

A version of the DACUM occupational analysis was used to develop the perfusion curriculum. DACUM, an acronym for developing a curriculum, is a process developed initially by the Experimental Projects Branch of the Canadian Department of Manpower and Immigration and the General Learning Corporation of New York.¹ It has been used extensively in Canada by Nova Scotia Newstart, Inc. and by Holland College, a two year community college on Prince Edward Island. Holland College has used the DACUM process to develop all its curricula and inservice faculty development programs. Staff at The National Center for Research in Vocational Education at Ohio State University have also used it.²

To initiate the DACUM process, a panel of persons actively working as perfusionists met for two days. During this time, the panel assembled a chart of skills that a person needs to work as a perfusionist. Each skill the panel identified had to yield a true statement when preceded by the phrase "On the job, on a regular basis, the individual must be able to . . ." Because the statement had to be true for all members of the panel, much individual bias was eliminated. After the panel listed all the skills and competencies necessary for a reasonably com-

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TABLE I
DACUM RESULTS: Cardiovascular Perfusion Technologist

A. Apply Knowledge	Principles of Anatomy	Principles of Physiology	Principles of Embryology	Principles of Physics	Principles of Mathematics
	Principles of Extracorporeal Technology	Principles of Patient Monitoring Systems	Principles of Product Design & Function	Principles of Communication	
B. Maintain Personal Competence	Perform under Stress	Maintain Emotional Stability	Maintain a Positive Professional Image	Review Current Extracorporeal literature	Participate in Cont. Ed.
C. Prepare for Clinical Procedures	Perform Patient Assessment	Collect Pertinent Data	Interpret Data	Perform calculations	Make appropriate Decisions Relative to Procedure
D. Execute Clinical Procedures	Initiate Procedure	Continuously Scan the Equipment and Environment	Maintain a High Level of Attentiveness	Establish and Maintain acceptable Extracorporeal Physiology	Communicate with Medical Team
E. Perform Extracorporeal Procedures	Perform Cardiopulmonary Bypass	Perform Left Heart Bypass	Perform Right Heart Bypass	Perform isolated Limb Perfusion	Perform Extracorporeal Membrane Oxygenation
F. Perform Mechanical Heart Assist Procedures	Operate the Intra-Aortic Balloon Pump	Insure Proper Balloon Insertion and Placement	Insure and Maintain Proper Operation	Participate in the Patient Weaning Assessment	Perform Left Heart Assist
G. Perform Related Procedures	Operate Blood Salvage Systems	Perform Autotransfusion	Perform Blood Flow Studies	Perform Product Evaluations	
H. Perform Administrative Duties	Manage Personnel	Conduct Inservice Programs	Maintain Inventory	Interrelate with Other Departments	Maintain Department Records

petent perfusionist, it grouped similar skills and created a general phrase to describe each group.

Upon completion of the DACUM process, the results were analyzed and each skill or competency was separated into one of two categories: those that could be taught by existing courses and those for which new courses would need to be developed.

Results

The results of the DACUM process are shown in Table 1. In the left column the eight general areas of competence (GAC's) are listed. The first two rows of GAC's identify skills that are primarily cognitive in nature. The remaining six rows identify psychomotor and affective skills. Apply

TABLE I
DACUM RESULTS: Cardiovascular Perfusion Technologist

Principles of Basic Electronics	Principles of Chemistry	Principles of Pharmacology	Principles of Aseptic Technique	Principles of Pathology	Laboratory Procedures	Medical Terminology
Perform Cardiopulmonary Resuscitation						
Select Appropriate Equipment and Supplies	Assemble Equipment and Supplies	Insure Equipment Operation				
Maintain Procedure Records	Collect, interpret and Respond Appropriately to Lab Data	Collect and Interpret Hemodynamic Data	Maintain Proper Hemodynamic Balance	Respond Appropriately to an Emergency Situation	Terminate Procedure Properly	Continuously Assess Patient
Perform Right Heart Assist						
Prepare Budget	Participate in Preventative Maintenance Programs	Interrelate with the Hospital Organizational Structure				

Knowledge, the first major area of competence, includes a list of the physical and biological sciences that form the foundation for other courses. The perfusionist must be educated in these basic sciences to understand and make decisions about perfusion techniques. The second major area, Maintain Personal Competence, includes the personal characteristics and responsibilities expected of a perfusionist.

The third GAC row, Prepare for Clinical Procedures, lists individual tasks that the perfusionist performs to prepare for procedures listed in the fifth row. The fourth row, Execute Clinical Procedures, lists the multiple tasks performed during the execution of the procedures listed in the fifth row. The fifth row, Perform Extracorporeal Procedures, lists common procedures performed using the heart-lung machine. The sixth row, Perform Mechanical

Heart Assist Procedures, includes the skills necessary to operate the intraaortic balloon pump. The seventh and eighth rows, Perform Related Procedures and Perform Administrative Duties, respectively refer to additional skills needed for various other equipment (such as autotransfusion devices and flow probes) and skills and competencies considered administrative.

After these skills and competencies were analyzed it was agreed that the majority of those in the first and seventh rows could be taught in existing courses. Most of the skills in the remaining sections, however, required the development of new courses.

Discussion

The DACUM process identified the skills and competencies a perfusionist must have on the job on a daily basis. With this information, a curriculum was designed to ensure that the proper cognitive, psychomotor, and affective skills and competencies were taught.

DACUM results can be used to design a perfusion program of any length. Length would be determined by the time necessary to ensure that the graduate, upon completing the program, has all the skills and competencies identified by the DACUM process. Use of the DACUM process helps eliminate superfluous competencies and skills

in two ways. First, skills that are "nice to have" or "nice to know" are eliminated. They do not yield a true statement when preceded by the phrase "On the job, on a regular basis, the individual must be able to. . ." Second, skills peculiar to a hospital or perfusion group can be eliminated, because general agreement among panel members is required. Once superfluous competencies and skills are eliminated, more time is available to teach those that are essential.

Overall, the DACUM process is one means of identifying essential competencies and skills for perfusionists, so that an effective perfusion technology curriculum can be developed.

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References

1. Adams, R. E.: *DACUM Approach to Curriculum Learning and Evaluation in Occupational Training*, Canada Newstart Program, Department of Regional Economic Expansion, Ottawa, Canada, 1975.
2. Hamilton, J. B.: *Preparation of Vocational Teachers to Serve Students with Exceptional/Special Needs*, Project Report, The National Center for Research in Vocational and Technical Education, The Ohio State University, 1981.