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 Division 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. 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.

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-
TABLE I
DACUM RESULTS: Cardiovascular Perfusion Technologist

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<tbody>
<tr>
<td>C. Prepare for Clinical Procedures</td>
<td>Perform Patient Assessment</td>
<td>Collect Pertinent Data</td>
<td>Interpret Data</td>
<td>Perform Calculations</td>
<td>Make appropriate Decisions Relative to Procedure</td>
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<tr>
<td>D. Execute Clinical Procedures</td>
<td>Initiate Procedure</td>
<td>Continuously Scan the Equipment and Environment</td>
<td>Maintain a High Level of Atteniveness</td>
<td>Establish and Maintain acceptable Extracorporeal Physiology</td>
<td>Communicate with Medical Team</td>
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<tr>
<td>E. Perform Extracorporeal Procedures</td>
<td>Perform Cardiopulmonary Bypass</td>
<td>Perform Left Heart Bypass</td>
<td>Perform Right Heart Bypass</td>
<td>Perform isolated Limb Perfusion</td>
<td>Perform Extracorporeal Membrane Oxygenation</td>
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<tr>
<td>F. Perform Mechanical Heart Assist Procedures</td>
<td>Operate the Intra-Aortic Balloon Pump</td>
<td>Insure Proper Balloon Insertion and Placement</td>
<td>Insure and Maintain Proper Operation</td>
<td>Participate in the Patient Weaning Assessment</td>
<td>Perform Left Heart Assist</td>
</tr>
<tr>
<td>H. Perform Administrative Duties</td>
<td>Manage Personnel</td>
<td>Conduct Inservice Programs</td>
<td>Maintain Inventory</td>
<td>Interrelate with Other Departments</td>
<td>Maintain Department Records</td>
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</table>

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 competent 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.
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.

**Acknowledgements**

The authors wish to thank Dr. Edward Pierce, Dean, Division of Allied Health Sciences; Indiana University School of Medicine, and Mr. Brad Winn, Chief Perfusionist, Indiana University Medical Center.

**References**