PORTLAND COMMUNITY COLLEGE
RADIOGRAPHY PROGRAM REVIEW
1999-2000
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1. Reflect upon and examine teaching methodologies, learning outcomes, and curriculum in order to improve the quality of teaching and learning  

A. Evaluate the curriculum using national and/or professional program guidelines.  

The program has a master plan of education which follows the accepted curriculum for the profession and contains the following sections: mission and goals, curriculum sequence (with rationale), course descriptions, Course Content Outcome Guides (CCOGs) with process skills, textbook list, Student Handbook with clinical education plan and objectives and all program policies, graduation competencies, student evaluation strategies, and the program assessment plan. The following is a list of national requirements for curriculum in Radiography and a summary of how our program meets the requirements.  

RADIOGRAPHY PROGRAM CURRICULUM CONTENT  

Oral and written communication  
Specific: prerequisites of English Composition & Medical Terminology, RAD 100  
Indirectly: All other RAD courses  

Anatomy and physiology  
Specific: prerequisites of BI 231, 232, 233, RAD 101, 102, 103, 209, 205  
Indirectly: RAD 206, All clinical courses  

Pathology  
Specific: RAD 101, 102, 103, 205, 206  
Indirectly: All clinical courses  

Pharmacology  
Specific: RAD 105, 209, 210  
Indirectly: RAD 102, 120, 140, 220, 230, 240  

Patient Care  
Specific: RAD 100, 105, All positioning & clinical courses  
Indirectly: All other RAD courses  

Radiation Physics  
Specific: RAD 106, 107  
Indirectly: All clinical courses  

Radiation biology and protection  
Specific: RAD 100, 132, All positioning & clinical courses  
Indirectly: RAD 107, 115, 215  

Medical ethics and legal issues  
Specific: RAD 100, 105, 20, All clinical courses  
Indirectly: All other RAD courses  

Medical Terminology  
Specific: prerequisite of medical terminology, RAD 100, 101, 105, 206  
Indirectly: All other RAD courses  

Instrumentation  
Specific: RAD 107, 115, 120, 130, 132, 210, 211, 215  
Indirectly: All positioning & clinical courses
Application of radiologic theory and techniques
Specific: RAD 115, 120, 132, 215, 230, 240
Indirectly: All clinical courses

Quality assessment
Specific: 107, 115, 130, 132, 210, 215, 230
Indirectly: All other RAD courses

Computer applications
Specific: prerequisite computer literacy, 107, 130, 132, 211, 220
Indirectly: All clinical courses

Competency-based clinical education
Specific: All clinical courses
Indirectly: All other RAD courses

B. Review/revise, where necessary, learning outcomes for the program and/or any sequence of courses within the program.

The curriculum and specific courses are continuously discussed and evaluated in response to assessment of outcomes and changes in the profession. The process of converting each course CCG to a CCOG with learning outcomes, assessment strategies, and the delineation of process skills, themes, concepts, and issues is 70% completed as of November, 1999 (all but 6 courses as of May, 2000). Our target is to have all of them completed by the end of the 1999-2000 year.

Course modifications occur nearly continually and sequence alterations less frequently. Modification to the curriculum sequence was recently completed with a rearrangement which lightens the 2nd term course load and adds a course to the 7th term. We will monitor student progress with this new arrangement. An example of course modification occurred as a result of a self-assessment students turned in at the end of their first year. Students were asked to give us feedback on their comfort level in performing various clinical exams and activities. One weak area which surfaced was that there were a number of students who felt uncomfortable with handling processor problems. This was discussed in the SACC meeting and again at the Advisory Committee Meeting. An objective for the RAD 140 clinical course now requires students to problem solve processor problems. Self-assessments this year indicated this assignment has been successful in raising the comfort level of students to handle this type of problem.

The master clinical rotation schedule and competency log is discussed every year with modifications made to ensure student rotations create experiences which mirror what will be expected of them in the workplace. The program follows a plan of education which integrates progressive academic coursework with clinical education assignments and objectives. Each instructor for each course, academic and clinical, provides the student with a syllabus containing objectives, outcomes, and evaluation criteria. Each term's clinical course contains objectives which require students in a clinical setting to gain experience which is correlated with what is being studied in the academic realm.

C. Give evidence that program learning outcomes are being met by students.

The Outcomes Assessment Plan uses specific criteria which directly correlate with the program's mission and goals, which are listed on page one of the plan. The Outcomes Assessment Plan identifies the cycle of assessment and which goals are addressed by each outcome. High quantitative criteria are meant to be an indication of high quality output.
The class of '97 was the first class for which complete outcomes data were tabulated. All outcomes met and surpassed the specified criteria except one. The area which did not meet criteria was a response to a graduate survey question. It was felt that the results were inconclusive because of a poor survey question, so the survey was redesigned to improve the quality of information gathered. The outcomes for the class of '98 and class of '99 were all met.

Attachment 1: Outcomes Assessment Plan
Attachment 2: Class of '98 & '99 Outcomes

D. Describe how the courses in this program address the College Core Outcomes.

The college core outcomes are under review by the EAC and are not available.

2. Maintain instructional quality consistent with the academic standards of the Northwest Association of Schools and Colleges.

A. Assess the success of the program in contributing to the College Mission.

The process of development of the program's mission statement began with review and discussion of the college's mission statement. The college's mission statement remained physically visible during the time the program's mission statement was developed. The program's statement includes the following concepts which coincide with the college's mission: quality education, realization of an individual's potential, attainment of goals, emphasis on the individual, and being the provider of education.

Here is a summary of statements from the PCC Mission statement and how the program measures its success in meeting each part of the PCC Mission:

1. "PCC provides quality education" - The program measures the quality of the education it provides by setting quantitative outcomes criteria at a high level. This is particularly true for the quantitative criteria we have set for outcomes 1-7 related to graduates' success on the national certification exam. We expect to have a pass rate and scores much higher than the national averages. A review of attachment 2 shows we have been very successful in meeting this part of our mission. Our success in providing a quality education is also confirmed by the exit survey responses to the question, "How would you rate the overall quality of the PCC Radiography program?". 100% of the 1999 graduates rated the program quality as exceptional or very good and 95% of the 1998 graduates gave the program an exceptional or very good rating. Results of employer surveys indicate a high satisfaction level with the program's graduates.

2. "... encourages the full realization of each individual's potential" - The program outcomes discussed above also demonstrate success with encouraging our students to reach their potential. Additionally, the program maintains attrition statistics which measure how many of the students who begin our program ultimately graduate from the program. The three year average attrition rate is 18% overall and 4.7% due to academic reasons. The average attrition rate for radiography programs nationwide has been reported to be around 30% overall, with no statistics available for the average attrition rate due to academic reasons. The data indicate that the majority of individuals within the PCC Radiography program are meeting their potential.

3. "The college offers students of all ages, races, cultures, economic levels, and previous educational experience opportunities ..." - The Radiography program utilizes a competitive admissions system which requires completion of prerequisite coursework. The admissions policy has been developed to give preference to those students who have the
qualitative and quantitative characteristics deemed to give the best indication of probable success in the program. The admissions policy is published and practiced without discrimination.

The program also maintains and analyzes demographic trends for each class admitted. Traditionally the program enrolls students within a wide range of ages and economic levels. The program diversity is weakest in the area of gender and race, although the three-year trend has shown slightly more diversity in these two areas.

Attachment 3: Demographic Charts

4. "offers students ... opportunities for personal growth and attainment of their goals." - Success in meeting this part of the mission is again seen with the outcomes discussed under #1 of this section. Results of graduate surveys also indicate the program’s success in this area. Question #1 of the graduate survey asks whether or not the graduate is employed in radiography. 100% of the last three year graduates are employed. Question #4 of the graduate survey asks the graduate to indicate whether they are continuing their education. The positive responses to this question have exceeded the program’s criteria over the last three years and this is an indication that our graduates value life-long learning and personal growth.

B. Report any changes the SACC has made to instructor qualifications and the reasons for the changes.

Instructor qualifications are specified by our accrediting organization. All of the program’s staff have the appropriate qualifications for their positions and current CVs are kept on file in the program director’s office.

C. Describe how the students in this program are using the library or other outside the classroom information resources.

Program courses include research papers, case studies, journal article summaries, lab reports, and completion of worksheets which require students to conduct investigations and interpret data. These assignments utilize resources within the department, PCC library, on the Internet, and within affiliate hospital departments.

In the lab setting, instructors may use any of the same materials used in lecture and also a variety of laboratory instructional aids such as various types of radiography equipment, faxitrons, an extensive film library, and patient care supplies such as a venipuncture training arm, sterile trays, vital sign equipment, etc. Three computers are available for student use along with a number of software programs and CDs. Access to the Internet is available in the radiography lab as well as the LRC.

In the clinical setting, students may be scheduled for various types of in-service sessions utilizing the clinical facility’s resources.

For research purposes, the program maintains its own library and subscribes to several journals. The PCC library also has an extensive holding of radiography-related book titles and subscribes to several medical journals. The LRC also maintains a collection of videos and laserdiscs which may be used by instructors or students. The program faculty work with the LRC to recommend purchases of appropriate materials and to weed out older materials.
3. Describe how the program is responding to the changing needs of students.

A. List the professional development activities of the faculty over the last three years and describe any instructional or curricular changes made as a result of those activities.

Attachment 3: List of faculty development activities

B. Describe any significant shift in student demographics within your discipline and how that has impacted instruction.

We have a slight increase in the number of minority students and we have increased the percentage of male students within the program. Neither of these changes in demographics has impacted instruction. Overall, our program has had fewer applicants in recent years and this has led to students who are not as strong academically. In order to provide assistance to the weaker students, we have tried to identify those students with difficulties as early as possible in the program to connect them with appropriate help. Each instructor does this by having some sort of quiz or other feedback mechanism within the first three weeks of the fall term when students first come into the program.

Attachment 4: Student demographic graphs

C. Give examples of how feedback from students, business and industry, community groups or institutions our students transfer to, was used to make curriculum or instructional changes.

The program curriculum and specific courses are continuously discussed and evaluated in response to assessment outcomes and changes in the profession. Methods of evaluation include classroom evaluations, clinical instructor/site evaluations, and the average of student clinical evaluations. The method by which each of these is used varies and is identified on page six of the program’s Assessment Plan. Classroom evaluations and clinical instructor/site evaluations are used for discussion between the program director and instructor to target curriculum and/or instruction changes, as well as part of the faculty member's overall evaluation. The average of student clinical evaluations is part of the Outcomes Assessment plan with the criteria that it will be ≥ 3.0.

Communities of interest which become involved in various components of the program’s planning include the SACC, students, the Health and Family Studies Division, the Advisory Committee, the Health Admissions Office, and graduates, employers, and alumni.

An example of a course modification resulted from a self-assessment students turned in at the end of their first year. Students were asked to give us feedback on their comfort level in performing various clinical exams and activities. One weak area which surfaced was that there were a number of students who felt uncomfortable with handling processor problems. This was discussed in a SACC meeting and again at an Advisory Committee. An objective for the RAD 140 clinical course which requires students to problem-solve processor problems was implemented and subsequent evaluations showed improvement in this area.

Another course modification occurred when one of the clinical instructors from a hospital informed us that students seemed unprepared to perform a certain procedure. This was discussed during a SACC meeting to identify which courses should include additional material on this procedure, what outcomes would be expected, and what resources were needed. In
this situation, material of greater depth was included in a lecture class and additional lab objectives were developed. An anatomical model for lab was purchased to enhance instruction and development of the psychomotor skill involved.

Modification to the curriculum sequence was recently implemented which lightens the 2nd term course load and adds a course to the 7th term. The master rotation schedule and competency log is discussed every year with modifications made to ensure student rotations create experiences which mirror what will be expected of them in the workplace. Additionally, new material is added to the curriculum as new technology emerges. One recent example of this process is the emergence of digital radiographic imaging and our progressive inclusion of this topic into our curriculum. This particular technology will result in a name change for our Film & Processing class in the near future as this technology replaces film.

D. What strategies are used within the program to increase enrollment, improve student retention and student success.

The program has a marketing plan which includes an assessment of current student enrollment, enrollment factors, current marketing goals, and current and future initiatives. Tracking the number of applicants and accepted students to the program complements the monthly reports of information requests and advising appointments from the Health Admissions Office. Monitoring program enrollment statistics became a professional goal of the program director and increasing FTEs within the department became a Target Goal in the Strategic Plan.

Marketing strategies include utilizing marketing grants, annual update of promotional materials, letters to A&P students, high school science teachers/guidance counselors and community college advisors, program website development, cable TV advertisements, PCC video, attendance at career fairs, development of scholarship/loan information, and displays.

Student retention and success is assessed continually. Although our measures for retention and success indicate we are operating within acceptable limits, we do employ improvement strategies such as mid-term advising at the college and at clinical and early quiz/test/homework feedback during the first fall term. This last strategy was first implemented fall, 1999. Within each class the instructors have some form of student evaluation with results reported back to the students and program director. Potential problems are identified early enough for the student to receive the proper assistance. Faculty within the program readily refer students to the appropriate college resource such as the Office for Students with Disabilities, counseling center, job placement office, multimedia center, etc. Faculty are also responsive in making available alternative learning strategies such as WebCT, CDs, software, etc. At times individual tutoring has been set up as well.

E. Report any changes made in the last three years to increase student access and diversity.

Student access to courses involving advanced modalities has increased through the offering and careful scheduling of "graduate" level courses within the program. These courses are designed to meet the needs of senior radiography students or graduates to learn advanced imaging equipment and procedures. Some of these courses are offered through the WWW and others are carefully scheduled to meet the needs of both students and working technologists.
Students have access to some traditional course material over the Internet through WebCT and now have on-line computerized practice tests for some courses. Additionally, students are allowed access to the lab facilities through the public safety office during any hours the college is open.

On an individualized basis, the Program Director and Clinical Coordinator have arranged advising appointments in other locations which are convenient for students who do not live in the Portland area. We have also worked with technologists from other countries and/or technologists wanting to update their skills for reentering the workforce to enroll in specific classes, including clinical education.

F. Identify any operational issues faced by the SACC that impact student learning in your area.

None identified.

4. Assess that this professional technical program is adequately preparing student to enter into a career field.

A. Evaluate the impact the advisory committee has on curriculum and instructional methods.

The program's Advisory Committee meets approximately once per month and meetings are regularly attended by the ClIICs who freely provide input to the program. Faculty and students participate in these meetings in addition to clinical personnel. Most Advisory Committee meetings include review of proposed program changes ranging from curriculum to the policies and procedures. Outcomes are reported to the committee as well.

On a needs basis, the agenda for a specific advisory committee meeting will be centered on broader issues of interest and the meeting attendees will include department managers and other technologists who have agreed to serve on the committee. Larger meetings such as this are generally held once per year.

Examples of how Advisory Committee input was used to impact curriculum are described under part 3C of this review. In this section there is a description of a modification related to processor problem-solving and another related to preparing students to perform a certain procedure. An additional example arose when there were inadequate numbers of certain types of procedures being performed at a student's assigned hospital and the Advisory Committee recommended rotations elsewhere. Since the implementation of this recommendation, students regularly rotate to other facilities to enrich their clinical experience. The program has added outside clinical sites for this purpose such as Portland Clinic, Shriner's Children's Hospital, Willamette Falls Hospital, and Doernbecher's Children's Hospital.

B. Review job placement statistics of students in your program over the last three years, including salary information where available.

Job placement statistics for graduates of our program over the last three years are:
- Class of 97 - 90% employed in radiography
- Class of 98 - 100% employed in radiography
- Class of 99 - 100% employed in radiography
Going by word of mouth in the Portland area, starting salaries have increased from an average of $13/hour to $14.50/hour over the past three years. According to official labor statistics:

- Oregon average annual salary (1997) = $32,800
- Federal average annual salary (1996) = $32,888

C. Analyze the program learning outcomes, competencies, and skills as compared to the business and industry needs today and in the immediate future.

The program does have a master plan of education which follows the accepted curriculum for the profession. Areas of the curriculum include current and emerging technology. The program's curriculum is an integrated competency-based curriculum as required. Each course has specific objectives or instructional goals, required student competencies, and general learning outcomes. The program's Outcomes Assessment plan identifies the learning strategies utilized by the program and which of the program's goals each learning strategy is used for. The Outcomes Assessment plan goes on to identify the particular outcomes the program uses to document success in achieving its goals and the suggested action plan to be utilized when outcomes are not met.

Like the didactic courses, the clinical courses have stated objectives, competencies, and outcomes for each term which are related to the didactic coursework. Each student also maintains a competency log of radiographic exams in which he or she has achieved competency. The program requires a minimum number of competencies to be performed each term and each graduate will have documentation of at least 110 competencies in order to graduate. Exams are broken down by body part and students must have a minimum number of competencies in each of the body part areas. The number of competencies required is such that students will have competencies for trauma and pediatric exams. The achievement of a competency is used to determine the level of supervision; the student may be indirectly supervised when performing an exam he or she has been deemed competent for, unless the student needs to repeat an exposure. Additionally, competency achievement in each course is required before the student can progress to the next sequence of courses. The competencies required in our program include and exceed those required by our national certifying organization, the ARRT.

Our accrediting organization requires us to have strategies which address the cognitive, psychomotor, and affective domains. Evaluation occurs individually in each course and is matched to the skill being evaluated. Traditionally the cognitive domain is evaluated by written exams, however instructors will frequently utilize other methods such as written papers, group projects, or case studies as a form of evaluation. Psychomotor competencies are most frequently evaluated by practical exams followed by clinical competency. Skills in the affective domain are assessed during lab practicals (when "patients" are brought in from the general public for simulated exams) as well as through Rotation and End of the Term evaluations in clinical. The clinical assessments include areas such as attitude, dependability, professional and ethical judgment, and team participation. Within each of these broad areas specific behaviors are evaluated.

Other areas of particular concern are to be sure we graduate students with high ethical standards and who will value the pursuit of lifelong learning. One of the program's goals is to produce graduates who "...exhibit professional ethical behaviors in the workplace and continued growth within the field of radiography". The program integrates development of professional values by teaching the students within specific courses, modeling professional behavior, providing course objectives emphasizing professional values, and providing
dedicated exercises and evaluations. Modeling of professional behavior has the Radiography Program Values as its foundation. All members of the program were part of the formation of these values and are expected to demonstrate these values to everyone, including students. The clinical faculty and staff also support professionalism and continuing education through example and including students during in-service training sessions. Additionally, the program demonstrates the value of life-long learning by offering several graduate courses in radiography which provide current students and graduate technologists the opportunity to enhance and continue their education. Specific assignments for the students to investigate professional organizations and the value of continuing education are included in the RAD 230 objectives. Students are given clinical time and, sometimes, extra credit for attending professional meetings outside of school.

Program outcomes assessment, including graduate/employer surveys and credentialing statistics indicate that the curriculum is preparing students to practice in the professional discipline. Outcomes assessment with numerical data has been formalized since 1997 and demonstrates that the program is accomplishing its goals.

D. Forecast future employment opportunities for students in your program.

State of Oregon statistics:
Number employed in 1998 = 1,958; Projected need in 2008 = 2,610; Growth 1996-2008 = 33.3%; Number of annual openings 1996 - 2008 = 96

Federal statistics:
Number employed in 1998 =162,000; Projected growth 1998 -2008 = 10 - 20%

E. Analyze any barriers to degree or certificate completion that your students face and describe the main reasons students leave your program before program completion.

Over the past three years the program has experienced an average attrition rate of 18%. This attrition rate is well below the national average for radiography programs, reported to be 33% - 50%. Approximately 25% of our students have left the program for academic reasons and 75% due to personal reasons.

In terms of academic barriers, the program strives to maintain an appropriate level of prerequisite coursework to assure proper preparation. Admittance is competitively based on overall and prerequisite GPAs. When we have fewer applicants, we also have students in the program with weaker grades in the prerequisite courses. Other academic barriers include the limited time and personnel to offer tutoring outside of classes. We have explored having second year students tutor first years students utilizing work-study funding, but without success. Early recognition and intervention of academic difficulties has also been a barrier which we have succeeded in lessening. As mentioned previously, we have developed early feedback mechanisms for the first fall term in particular. This allows us to counsel and provide help to students prior to mid-term exams.

Students who leave the program for personal reasons sometimes leave due to financial difficulties. We are exploring additional avenues of financial assistance to help these students. The most common personal reason for students leaving the program is a change in desire to pursue this profession. We have students visit and observe at seven hospitals prior to entering the program as part of an effort to help them be fully knowledgeable about the profession and the work environment. Our program also offers clinical education beginning the first term. We will sometimes have a student rotate to a second clinical site if they are trying to decide whether radiography is the right choice for them. When students leave
because they feel this is not the right career for them, they do so having significant experience. In other words, the students make a well-informed decision.

5. Develop recommendations for improvement in the program.

A. Assess the strengths and areas in need of improvement in the program.

The strengths of the PCC Radiography program include:
- A well-planned and integrated curriculum
- An active Advisory Committee which recommends and helps in implementing changes
- A dynamic outcomes assessment plan which provides continuous improvement of the program in conjunction with both college requirements and outside accrediting agency requirements.
- Quantitative evidence of high quality outcomes. For example, high national certifying exam pass rate, high scores on the national exam, and high job placement rate.
- An up-to-date curriculum which includes emerging technologies.
- Ongoing strategic planning.
- Quality faculty and staff who work well as a team, are actively involved with the students, and engage in professional development.
- Supportive clinical sites which are integral to the program and offer students a wide variety/volume of exams and equipment.
- The majority of registered technologists who work at the program’s clinical affiliates take the time to teach students and model professional characteristics.
- Accredited by the JRCERT.
- Support of the LRC in keeping resource materials current.

Areas in need of improvement:
- Energized radiographic equipment update for the lab.
- Increased lab space. (Especially if Sonography program begins.)
- Overview of the program application process with special attention given to use of the supplemental questions and the assessment of points.
- Increased student diversity within the program, particularly a larger number of students with lower income and students of color.
- Marketing with the goal of increasing the number of applicants.
- Professional development funding for faculty and staff.
- Improving the ability of students to adapt to unusual situations within the clinical environment.
B. Given the above analysis and other findings of the SACC in this review process, prepare a set of recommendations that cover areas such as curriculum and professional development, recruitment and retention of students, obtaining needed resources, and being responsive to community needs.

It is recommended that the areas of need identified above be addressed as follows:

- Energized radiographic equipment update for the lab.

Since this represents a large investment of funds which could not be covered with the usual program budget, alternative funding must be found. It is recommended that a radiography equipment account be started with the PCC Foundation to which contributions could be made. Additionally, other sources of grants and/or donations should be pursued.

- Increased lab space. (Especially if Sonography program begins.)

Once the PCC Bond measure passes, the Radiography lab area should have additional lab area added which would serve the needs of the program. It is recommended that the program support the passing of the Bond.

- Overview of the program application process with special attention given to use of the supplemental questions and the assessment of points.

An ad hoc committee should be formed to evaluate the entire application and acceptance process of the program. The committee should include members of the department, program Advisory Committee, and the Health Admissions office.

- Increased student diversity within the program, particularly a larger number of students with lower income and students of color.

Increased marketing efforts, in general, are recommended to widen the applicant pool (see next recommendation). Additionally, the program should identify sources of financial assistance for students with lower incomes by developing a list of scholarship/grant sources and by working with health facilities to develop new scholarship/grant programs. Financial aid sources for students of color should, in particular, be identified. A priority should be made to provide information about our program to schools with diverse populations and other diverse audiences.

- Marketing with the goal of increasing the number of applicants.

The program should continue to follow an annual marketing plan which includes letters to A & P students each term, friendly customer service to all inquiries, opportunities for job shadows, talks about our profession at high schools, career fairs, and other colleges, setting up displays at health fairs, holding an annual open-house, and maintaining an effective website. Additional activities should be continued development of contacts with faculty and advisors at other colleges, increase visibility of our program within health care organizations, and including students and graduates in marketing efforts.
• Professional development funding for faculty and staff.

The program should work towards incorporating a higher amount of professional development funding into the annual budget. All members of the department should be assertive in pursuing alternative methods of funding by applying for one-time funds and grants as they become available, such as Instructional Improvement funds, Conference lotteries, and funds which are used for specific purposes (i.e., Program Review funds). Time-shifting of responsibilities and the use of tuition waivers should be encouraged when professional development opportunities arise within the college.

• Improving the ability of students to adapt to unusual situations within the clinical environment.

The program should investigate holding an afternoon seminar 1-2 times per term with both classes of students. The seminar could have varied topics and activities such as senior students modeling as patients who require the use of adaptive imaging techniques or bringing in people from the general public who would require adaptive techniques and be willing to talk with the students about how radiographers could best assist them. Additionally, the program will encourage more rotation of students between facilities with a special emphasis on rotating all students through one of the trauma hospitals. These rotations are to provide students skills in orientating to a new facility and, in the case of rotations at trauma centers, provide additional contact with patients who require the use of adaptive techniques.