PEP-SIG Task Force Chair Report: PharmD Clerkship Students as Resources

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BACKGROUND

As the profession of pharmacy adopts the PharmD as the entry-level degree and integrates more widely throughout the health care system to provide pharmaceutical care services, demand for experiential training of students has increased dramatically. In a majority of PharmD programs, students are required to complete approximately one year of clinical rotations. This has lead to a great demand for sites to provide this clinical training.

Competition among sites is intense, especially in the hospital. Hospitals provide the foundation for training in the health profession due to the controlled patients in a rich, multidisciplinary environment where the clinical skills learned can be transferred to other environments. Administrators have been forced to reduce staff, document the value of services, increase productivity, and maximize their resources in response to the downsizing of hospitals. This has increased the pressure to justify clinical teaching programs. Due to the high demand being placed on different clerkship sites, monetary reimbursement from schools is becoming a means of justifying the training of students and the student’s value to the site.

The AACP Professional Experiential Programs - Special Interest Group (PEP-SIG) Committee formed a task force to evaluate clerkship students as resources. The task force identified four key issues to address. The first issue was to evaluate the curricula to determine which elements provide students with skills that are an immediate value to an affiliated site. The curriculum may need to be modified (to prepare students with the basic skills) in order to make the students most desirable to the sites. Preceptors have certain expectations of student ability based on their didactic training. These skills obtained from didactic experience need to be uniform among students as well as perfected. This will allow students to concentrate on clerkship activities that cannot be learned through didactic work and to better contribute to the host environment.

The second issue to evaluate is the model for experiential training. The task force should focus on the “employee model” of training. In this model, both the preceptor and student produce output, which should be most contributory to the training site. The student produces output independent of the preceptor. Only if the student is fully trained will they have a positive effect on output. This model assumes that the student acts as an employee and if they are not present output will be decreased. It assumes that the student can provide services which the practitioner would provide if the student was not actively participating in these services while on their clinical rotations. In the “non-employee model” the student can have a positive impact on output, but not independent of the preceptor. The student only increases the preceptor’s output. The student cannot be considered an employee.

The third issue was to evaluate block training for students at experiential sites, including identification of the optimal length of training which provides return to the site. Many students are exposed to multiple practice sites that require orientation at each site. This increases training time and decreases productivity for host staff. If a student is trained at one site and continues to do rotations at that site, then training would only need to be performed once, and the potential contributions of the student might be greater.

The fourth issue involved evaluating the published literature to prepare a reference list which contains specific examples describing utilization of students within practice sites. Issue four is the focus of this report. The objective of this literature review was to determine how a pharmacy student could be an asset versus a liability to the clerkship site during experiential training.

METHODS

A MEDLINE search was performed that gathered published articles dealing with pharmacy clerkships. Each article was reviewed, and the content dealing with each of the Task Force issues was extracted from the literature. A table was formatted for guidance when reviewing the literature that included the following elements: evaluation of curriculum, evaluation of the application of the “employee model”, evaluation of block training, and evaluation of student contributions. The information was sorted in a useful, organized manner that could later be summarized.

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Am. J. Pharm. Educ., 64, 48S-52S(2000); received 10/31/00.
RESULTS

Overall, no specific conclusions could be drawn from review of the literature. The optimal length of a clerkship could not be determined. The length of various clerkships cited in the literature ranged from four weeks to fourteen weeks. Four weeks was the most common length of a clerkship experience. Forty-three percent of the rotations were four weeks in length. Nineteen percent were five weeks, 20 percent were six weeks, one percent were seven weeks, nine percent were eight weeks, and four percent were greater than eight weeks (See Figure 1). The rotations were all inpatient rotations completed by PharmD students. At two clerkship sites that involved four week long rotations, the preceptors expressed an interest in increasing the rotation to six weeks. One site determined it took four weeks for the student to perform at the specified level. Another required a minimum of 18 weeks at an institution, but all rotations were six weeks long. One site determined that the student’s contributions were greater in week five than week one of a five-week rotation.

The majority of rotations had a one-to-one ratio of students to preceptors. The second most common ratio was two students per preceptor. Other documented ratios were three to four students per preceptor, and four students per three preceptors. Some of the sites with a one-to-one ratio expressed interest in the impact of more than one student at a teaching site.

The ideal model for activities during experiential training is the employee model. The employee model leads to overall productivity from the student and preceptor. It allows the student to work independently of the preceptor by working as an employee. Study documentation has shown that most recommendations were made independently, without immediate preceptor input. One article stated that employee models led to productivity. It was noted that hospital based students worked independently and then reported to the preceptor. Students may work independently but it may be necessary to supervise some activities. Carter et al, indicated that six of nine activities completed by clerkship students fit the non-employee relationship between student and preceptor(1). Non-employee activities involved answering complex drug information questions, in-depth topic research, report preparation, monitoring patient therapy and lab test results, presenting in-service programs to staff, attending rounds with medical or surgical team, and observing other departments. Some activities fit into the employee model, including collecting data for drug use evaluation and participating in the pharmacy team discussion.

When a student’s participation increases in a non-employee model, increased output will depend on the activities of the preceptor. If the preceptor decreases their normal output then there will be no increased output when the student is at the site. Thus, if clerkship sites have a cost associated with students, then when students are present there should be increased output. In order to have a positive effect on outcomes using the employee model, the student needs to be trained. If the student is not trained, using the employee model will have a negative effect on output. With the proper didactic and on-site training clerkship sites can and should implement the employee model for student training, encompassing as many activities as legally possible. Eliminating students from clerkship sites that effectively utilize the employee model would most likely increase the cost to the institution.

No cost savings assessment was performed

RESULTS

Fifty-nine recommendations were made by six students during week one while 54 recommendations were made by five students during week five. Overall, 78% of the student contributions to patient care were rated as either somewhat significant or significant.

Conclusion

• All preceptors and students agreed or strongly agreed that the student had contributed to the care of patients


Methods

Pharmacist preceptors were selected and trained in collaboration with Kaiser Permanente Northwest Region pharmacy management to assist in development of ambulatory clerkships in a managed care setting.

Results

Upon implementation, primary student activities included:

<table>
<thead>
<tr>
<th>Activities</th>
<th>Percentage of time spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatient dispensing</td>
<td>30.6</td>
</tr>
<tr>
<td>Patient counseling/teaching</td>
<td>24.2</td>
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<tr>
<td>Drug use Review/Target drug programs</td>
<td>10.1</td>
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<tr>
<td>Obtain Medication history</td>
<td>7.4</td>
</tr>
<tr>
<td>Problem solving</td>
<td>7.4</td>
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<tr>
<td>Interacting with physician and others</td>
<td>7.0</td>
</tr>
<tr>
<td>Preview patients and drug regimens</td>
<td>7.9</td>
</tr>
<tr>
<td>Other</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Conclusion

Eight ambulatory care clerkship sites were developed in an HMO. Preceptors were perceived as positive role models and students gained experience in a number of areas not routinely available in community-pharmacy based experiential sites.


Methods

• 39 students completing clerkships at Albany Veterans Affairs Medical Center
• Students were asked to complete a workup of drug therapy and document drug-related problems (DRP)
• 27 of the 39 students were assessed
• No cost savings assessment was performed

Results

• Students identified 582 DRP’s for 199 patients
• 286 (49.1%) of recommendations were accepted
• Nearly half of the DRPs were drug interactions or adverse drug


Methods

Six clerkship students were observed to determine student contributions to patient care during a five-week clerkship.

- Student assisted the clerkship instructor by completing tasks such as:
  • Checking medication carts
  • Performing discharge counseling
  • Made recommendations to physician pertaining to:
    Best dose
    Drug of choice
    Monitoring parameters
  • Activities:
    • Medication histories
    • Patient education
    • Educated members of the medical team
  • Summary of pharmacokinetic dosing of cardiac drugs (serve as a reference for pharmacist)
reactions

Therapeutic Classes:
- Antibiotics
- Digoxin
- Cimetidine
- Diuretics
- ASA, APAP, NSAID

Recommendations Involved:
- 24.5% drug-drug, drug-disease, and/or drug-lab interactions
- 23.4% a medical condition resulting from an adverse drug reaction
- 16.8% drugs being given without an indication
- 12.2% untreated indications
- 7% drug overdoses
- 7% drugs that were underdosed for patients
- 6.6% inappropriate drug selection for patient and/or disorder
- 2.4% failure to receive drugs ordered

Conclusion
The student-based work-up of drug therapy assisted development in identifying and solving DRPs. Many identified potential problems had a low likelihood of incidence resulting in a reduced rate of acceptance of student recommendations.

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Methods
- Four students suggested a total of 231 interventions

Results
- Acceptance:
  - 219 (94.8%) of recommendations were fully or partially accepted by the preceptor
  - 90% were accepted by interns, residents, or fellows
  - 10% attending physician
- Cost information:
  - Of the 219, 111(50.7%) resulted in cost savings
  - 23.7% increased costs
  - 25.6% would not have effects on cost
- Recommendations involved:
  - 31.5% drugs that were underdosed
  - 17.4% drugs that were overdosed
  - 14.1% untreated indications
  - 13.7% drug being given without an indication
  - 18.1% inappropriate drug selection for patient and/or disorder, failure to receive drugs ordered, and adverse drug reactions

Conclusion
- Average cost savings per intervention $30-35.00
- Students documented patient outcomes in 129 (58.9%) of the cases, the goals of the intervention were achieved, indicating a positive effect on patient care

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Methods
- Setting: Adult and pediatric hospital offering rotations for traditional PharmD students and post-B.S. PharmD students (10-month col-
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Methods
• Setting: general medicine or family services (September 1994 - March 1997)
• Students were responsible for preventing or resolving patient medication-related problems, providing drug therapy recommendations, and making appropriate pharmacotherapy recommendations

Results
• 88% of the recommendations were accepted by medicine teams
  Recommendations involved the following:
  25% improper medication selection
  21.6% untreated indication
  17.7% overdosage
  • Most commonly accepted interventions involved:
    33.2% anti-infectives
    17% cardiovascular
  • Significance of interventions:
    56.3% significant [Used Hatoum’s criteria]
    11.6% very significant
    1.3% extremely significant

Conclusion
Students made appropriate recommendations with potential significance, the majority of which were implemented by the medical team.

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Methods
Interventions made by fourth-year PharmD students were documented and assessed during their first, third, and fifth week of a six-week inpatient rotation.

Results
Twenty-seven students performed 349 interventions over the 15-day study period. The number of interventions per student per week increased over time. Primary outcomes of interventions in order of frequency included optimized drug therapy, minimized ADR/toxicity, increased patient satisfaction, and increased reimbursement. Seventy-four percent of interventions in the top two categories were judged to have a moderate to high impact. The annualized drug cost savings per student per year was $521.81.

Conclusion
The data confirmed the hypothesis that students perform a valuable service to patients through their interventions.

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Kale-Pradham, P.B. and Buckler, V.G., Assessment and Significance of Clinical Interventions by Doctor of Pharmacy Students in a Surgical Intensive Care Unit, Pharmacotherapy, 17, 1127(1997)

Methods
• Setting: students were in a surgical intensive care unit
• Interventions were documented by CliniTrend® or standardized forms noting date, intervention, and acceptance or rejection by the physician
• Data analysis included identification of therapeutic class, drug-related problem/activity (DRPA), and significance of intervention

Results
1023 interventions were made by ten students (September 1995 to April 1997).
• Therapeutic Class
  45.5% anti-infective
  10.8% gastrointestinal
  10.4% pain management
  5.9% cardiovascular
  Remaining: electrolyte, neurology, sedation, nutrition, respiratory, endocrine, and other
• DRPAs were divided into 14 categories
  44.6% therapeutic drug monitoring
  19.4% untreated indications, optimization of therapy and drug information
  15.5% incidences of drug use without indication
  9.0% improper dosing
  3.8% change appropriate dosage form
  2.8% drug duplication
  2.2% adverse drug reactions
  2.8% improper drug selection, order clarification, drug interactions or failure to receive drug

Conclusion
• 80% of recommendations were considered significant to extremely significant
• 97.9% of recommendations were accepted by physicians
• $58,556.04 potential cost savings

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Methods
• Setting: PharmD clerkship students in a teaching hospital (3 month period)
• Total of 283 drug therapy interventions

Results
88.8% were implemented by health care providers
Decreased drug cost by $1661.99 and decreased actual patient charges by $5938.37
The average drug-cost decrease for implementing an intervention was $6.73 and a patient cost of $24.04
A total of $6028.27 of revenue was generated for the pharmacy department by educational personnel providing pharmacokinetic consults on drugs

Conclusion
PharmD students are considered to be an asset to the host site. This is based on their contribution to pharmacotherapy and cost-effectiveness/cost reduction.

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Methods
• 21 required and 6 elective inpatient rotations (September 1995-April 1996)
• 11 PharmD Students
• 11 students reported 3,466 clinical events
Results
• Students were responsible for:
  42.5% initial patient work-ups
  34.0% patient information and education episodes
  24.6% in-service programs for physicians
• Activities:
  Drug therapy monitoring, focused patient monitoring
  Pharmacokinetic evaluation
  Rounds with physicians
  Drug evaluation for P&T
  Participated in administrative and continuous quality improvement projects for the department
  Medication order modification
  Target-drug monitoring
  Selective monitoring of patients with renal disease
  Provision of drug information to patient and patient education
  Provision of drug information to nurse
  Restricted – drug evaluation
  Adverse drug reaction identification and reporting
  Total parenteral nutrition work-up

Conclusion
• PharmD clerkship students contributed to pharmacy department’s workload productivity data at an affiliated teaching hospital
• Documentation of student contribution led to an increase in the number of clerkship students assigned and an expansion of the program, a benefit to both the school and the host institution

Results
A total of 951 events reported
612 interventions (primarily involving drug therapy)
335 information events

Activities:
Student was asked for information by physician, nurse, or patient or engaged in counseling session with a patient about a medication
Added or discontinued a drug from existing regimen, making a change in existing regimen, increase or decrease the dose, identify potential or real adverse reactions
Conducted medication histories
• Areas: cardiovascular, infectious disease, neurological, pulmonary, endocrinology, GI
• Acceptance rate was 78.8%

Conclusion
• Peer review scores tended to show a positive impact (physician scoring higher than pharmacy faculty scoring)
• Estimated-related savings of $3891 per year
• This study demonstrates students on clinical rotation do have an impact in terms of both drug information provided and recommendations made concerning pharmacotherapy

Pharmacy school curricula should provide strong fundamental skills to adequately prepare students for experiential training. Required skills include: listening, writing, problem identification, problem solving, therapeutic drug monitoring, evaluation of orders, identification and assessment of treatment outcomes, interpretation of scientific literature, selection of drug products, knowledge of pharmacy law, interpretation of lab data, computer literacy, communication, presentation, case work-up, thinking, reasoning process, etiology, pathophysiology, diagnosis, and treatment of various disease states.

CONCLUSION
Preparing students with the required skills, implementing the employee model into the training site, and identifying the optimal length of a clerkship will support the incorporation of students into training sites.

FUTURE PLANS
This review did not fully answer a number of key questions regarding experiential training and the initial charges to the PEP-SIG Task Force. The Task Force remains active in addressing the balance of outstanding issues. Their focus includes evaluation of the evidence (including method) of documentation to determine the ideal length of a clerkship, activities students are allowed to conduct using an “employee model,” and the ideal ratio of students to preceptors in order to maximize the preceptor’s time and efforts. Additional areas of focus will include curricular specifics which prepare students for experiential training as well as other methods being utilized to justify incorporation of students into various training sites without reimbursement.

References