INSTRUCTIONAL DESIGN AND ASSESSMENT

An Innovative Introductory Pharmacy Practice Experience Model

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Objectives. The implementation of a required third-year introductory pharmacy practice experience (IPPE) in the University of Georgia College of Pharmacy’s professional curriculum is described, and outcomes associated with the experience are evaluated. The IPPE involved fourth-year advanced pharmacy practice experience students facilitating the patient-student interactions for their third-year colleagues.

Methods. Third-year students interviewed patients in 10 different clinical areas, evaluated drug therapies, and presented the patients’ pharmaceutical assessment and care plans to a group of 7 students and 1 faculty member. Students completed a pre- and post-survey consisting of 21 competency-based skills that the IPPE course was designed to address. Faculty members were asked to log the time they spent conducting the IPPE.

Results. Students (N=21) indicated that they could better perform the IPPE’s competencies after the course ($P < 0.002$). Also, students indicated that the course increased their knowledge of patient care, and that they enjoyed the course.

Conclusions. This IPPE resulted in a significant reduction of faculty members’ time (requiring less than 80 hours of total faculty time to conduct the course) compared with the greater than 300 hours of faculty member time required to conduct the course that this IPPE replaced.

Keywords: pharmacy practice, introductory pharmacy experience, doctor of pharmacy, practice model

INTRODUCTION

The American Council of Pharmaceutical Education (ACPE) Standards 2000 introduced the requirement for Introductory Pharmacy Practice Experiences (IPPEs), defined as practice experiences offered in various practice environments during the early sequencing of the pharmacy curriculum for the purposes of providing transitional experiential activities and active learning.1 IPPEs should instill the philosophy of pharmaceutical care, facilitate and enhance student professionalism, increase student motivation for learning in the didactic curriculum, and promote the self-learning process.2-5 Students should have these experiences throughout the pharmacy curriculum in a variety of practice settings and as a continuum, progressing from IPPEs to Advanced Pharmacy Practice Experiences (APPEs).

Many creative and interesting experiential programs have been developed over the last few years. Examples of IPPEs that give students exposure to different pharmacy practice environments and patients include “shadowing” experiences, student visits to patient homes, and having actual patients in the classroom.6-9 Shadowing programs typically involve first-, second-, or third-professional-year students accompanying a pharmacy practitioner or an APPE student in a pharmacy practice site. Although the introductory student mostly observes, shadowing can provide a perspective on what it is like to practice in a particular pharmacy environment. In contrast to shadowing, patients have been brought to the classroom or students have gone to patient residential settings to facilitate student-patient interaction skills and to develop a student understanding of the patient perspective.8,9 These experiences are useful for introducing students to patients, facilitating communication skills, and instilling recognition of the need for pharmaceutical care.8,9 Although shadowing and patient visitations are beneficial, they also have proven to be time consuming for faculty and pharmacy practitioners to implement and
do not generally focus on the process of developing a pharmaceutical care plan. While high quality IPPEs are an important part of the professional curriculum, they pose the risk of over-extending faculty time that is also needed for academic responsibilities in other areas (e.g., didactic instruction, experiential instruction, scholarly activities, clinical service, and administrative duties). An important question is: How can colleges of pharmacy provide high quality IPPEs that expose students to a variety of patients and develop pharmaceutical care skills in a manner that does not exhaust manpower resources?

The purpose of this manuscript is to describe the implementation of a required IPPE course in the University of Georgia College of Pharmacy’s professional curriculum, and to evaluate outcomes associated with the experience. Specific objectives were to: (1) determine students’ perceptions of the value of the IPPE; (2) ascertain whether students believed that they could better perform the competency-based skills of the experience after the IPPE compared with before the IPPE; and (3) provide a quality IPPE that does not exhaust faculty manpower resources.

### Development of the Third-Year Introductory Pharmacy Practice Experience

At the University of Georgia, IPPEs are included in each year of the pharmacy curriculum. The first-year IPPE involves students interviewing patients, visiting community and institutional pharmacy practice sites, and interacting with actual patients in the classroom to discuss their disease states. In second-year IPPEs, students visit a long-term care facility, observe drug administration, and perform patient counseling activities. Prior to 2002, the third-year IPPE involved students interacting with selected patients in patient care settings to collect information about their disease states and medications, and reviewing and evaluating “paper cases” with a specific focus of designing a pharmaceutical care plan. Although all of the IPPEs used in the curriculum are beneficial to student learning, they have drawbacks. The experience may be limited to include only a few patients with selected disease states (e.g., diabetes, asthma), which may limit learning due to a lack of patient variety. Also, many of the previous experiences did not facilitate direct student-patient interaction, which is a critical step in the development of a pharmaceutical care relationship. Another drawback of many IPPEs is the significant amount of faculty time required in preparing, arranging, and supervising the experience. The third-year IPPE (prior to 2002) involved 8 patient cases that required over 20 hours of faculty time each to develop (a total of 160 hours). In addition, 3 faculty members were needed to serve as facilitators for the 25 students. On average, each of the 3 facilitators reported that they had to spend at least 1 hour per week preparing for each of the weekly sessions and each session took about 3 hours to complete (4 hours per week/per faculty x 3 faculty x 12 weeks = 144 hours). Not only did this course require greater than 300 hours of faculty time (160 hours to develop cases + 144 hours to conduct the course = 304 hours), it was questionable whether it met the criteria to be considered an IPPE. Therefore, a decision was made to implement a new IPPE course. The new IPPE described in this manuscript replaced weekly sessions of simulated “patient cases” where students discussed patients in a problem-based learning format. The challenge was to design a new IPPE course that would build on the experiences the students already had and enhance student development in pharmaceutical care, while requiring less faculty time.

With the new third-year IPPE course, the goal was to accomplish 4 general objectives:

1) To better prepare students and ease their transition into APPEs;
2) To increase confidence in their therapeutic knowledge by having students present patient assessments and pharmaceutical care plans before an audience of instructors and peers;
3) To change the students’ mode of thinking from passive information gathering and observation to active problem and solution identification;
4) To create a learning environment that would use the experience of fourth-year pharmacy students concurrently in APPEs and use faculty most efficiently.

The specific instructional objectives (competency-based skills) for the course are given in Table 1. These include objectives at the levels of comprehension, analysis, synthesis, and evaluation from Bloom’s Taxonomy. This course was intended to prepare students to practice pharmaceutical care by having them spend time in several patient care settings and increase their level of confidence in these settings by performing patient interviews and collecting pertinent patient data, performing an assessment of drug treatments, identifying drug-related problems, and performing and describing elements of a pharmaceutical care plan.

The IPPE occurred in a tertiary-care health science center campus and the resources of the health care center.
Table 1. Outcome Objectives for the Third-Year Introductory Pharmacy Practice Experience

1. Determine the appropriateness of a drug order or prescription in relation to patient and disease specific factors.
2. Discuss patient and disease factors that influence drug selection (e.g., allergy, disease state, or medication history).
3. Formulate appropriate action when the use of a drug is contraindicated or questioned.
5. Discuss the risk of toxicity and manifestations of symptoms of toxicity of a drug or drug class in relation to disease and patient-specific information.
6. Formulate an appropriate action plan when a drug order or prescription presents a potential drug-related problem (e.g., drug interaction, side effect, toxic effect).
7. List patient characteristics that may influence the choice of alternative drug products.
8. Describe the types of information the pharmacist may need to make decisions on meeting a patient's health care needs.
10. Devise a plan for meeting the patient's health care needs related to the patient's presenting problem.
11. Describe health care needs that should be met by health care personnel other than pharmacists.
12. Integrate patient, disease, and drug data to determine desired therapeutic outcomes for a patient.
13. Identify information in a patient-specific database that is pertinent to a particular drug therapy decision.
15. Discuss factors to consider when determining therapeutic outcomes for a patient.
16. Formulate a pharmacotherapeutic regimen to achieve desired therapeutic outcomes.
17. Describe patient-specific factors that influence the selection of a drug, dose, dosage form, route, schedule, and duration of therapy.
18. Formulate a plan to monitor a pharmacotherapeutic regimen.
19. Determine those patient and laboratory parameters which measure the achievement of desired therapeutic outcomes.
20. Determine those patient and laboratory parameters which measure adverse drug reactions or interactions.
21. Describe the steps in a systematic approach to solving problems.

were used as much as possible. Considering the pre-established objectives in Table 1, the faculty members conducted needs and environmental assessments to explore the resources available that might be useful in conducting the IPPE. Immediately, it was identified that someone had to coordinate the assignment of the IPPE students with patients. An audience was also needed to provide the students a setting to discuss their patients.

Sixteen senior fourth-year students, who were serving APPEs in 10 different patient care settings (pediatric hospital ward, intensive care service, emergency room service, oncology clinic, renal transplant clinic, family medicine service, internal medicine service, surgery
ward, neurology service, and gastroenterology clinic), participated as guides and facilitators, and they also arranged the patient-student interaction for their third-year colleagues. Three groups, each group consisting of 1 faculty member and 7 third-year pharmacy students, were formed for patient presentations and to provide discussion of the issues identified. The total experience spanned 12 weeks of the Spring semester and counted for 2 semester credit hours. Each group met once weekly for 2 hours, during which patients were presented and discussed. The small group sessions were preceded by 2 orientation sessions presented to the class as a whole. In the first orientation session, an instructor presented a patient case to demonstrate how an assessment was performed and how drug-related problems were identified. This was followed by a presentation of specific elements of a pharmaceutical care plan. The students were given a written patient description (case presentation) and asked to perform an assessment and identify drug-related problems for discussion at the second orientation session. A 1-page form was used to simplify patient data collection and encourage a structured thought process (Appendix 1). The fourth-year pharmacy students also met as a group for a 1-hour session to review the goals of the course and the expectations for their participation.

After completion of the 2 orientation sessions, a faculty member, who served as the course coordinator, assigned each third-year student to visit 3 different patient care areas over the semester. Each fourth-year pharmacy student served as a mentor for a third-year pharmacy student, and it was the responsibility of the fourth-year student who was assigned a patient care site to help the third-year student identify a patient who could be interviewed and had an accessible medical record. It was the responsibility of the third-year student to collect patient data, perform the patient interview, read about the disease state and treatment issues, and to present this patient to the group on the predetermined date. A schedule indicating the time and date each student was to present was distributed at the first orientation session at the beginning of the IPPE. Each patient presentation lasted approximately 15 minutes followed by 15-30 minutes of discussion. During the group sessions, students were encouraged to ask each other questions about the patient, disease state, medication therapy, and pharmaceutical care plan. A pharmacy practice faculty member attended each discussion session and served as facilitator rather than as a discussion leader. Attendance at each session was mandatory. The course grade was determined on a pass-fail basis. Formative assessment was provided by the instructor during each session and no written test or final exam was given. Students received a passing grade if they visited the patient care sites, adequately presented 3 patients in the small group sessions, and attended each of the weekly sessions.

**METHODS**

One week prior to the beginning of the IPPE (Spring Semester 2002), the syllabus for the course was reviewed with the students and they were asked to complete a survey (pre-survey). Students were asked to respond to each of the items, using a 5-point scale, ranging from 1 = “strongly disagree” to 5 = “strongly agree”. This survey consisted of the 21 pre-established competency-based skills that the third-year IPPE course was designed to address (Table 1). These competencies were developed by the curriculum committee over 2 years ago and are competencies that the curriculum committee believed that third-year pharmacy students should have prior to the fourth year of the curriculum. On the last day of the course, students were given the same 21-item survey (post-survey). As before, students were asked to respond to each of the 21-items by using a 5-point scale (ranging from 1 = “strongly disagree” to 5 = “strongly agree.” On the post-survey, students had 3 additional items to rate, using the 5-point scale, which addressed: (1) whether the course increased their knowledge of patient care; (2) whether they enjoyed the course; and (3) whether they “learned a lot” from the course. The pre- and post-surveys were marked for matching purposes. Student participation in the study was voluntary and the identity of the students was blinded to the investigators.

Faculty involved in the course were asked to keep a log of their time spent with course activities. At the end of the course, all faculty involved in the course met to discuss the course (eg, faculty impressions, suggestions for improvement). Also, the total amount of time each faculty spent conducting course activities was calculated.

**Statistics**

All pre- and post-survey data were entered in Microsoft Excel, Version 8, and then downloaded into SPSS (Version 11.08. Redmond, Wa: Microsoft Corporation; 1983) for analyses. Pre- and post-survey means and standard deviations for each of the survey items were calculated. Pairwise t-tests were used to detect any differences between students’ pre- and post-course scores for each of the 21-items on the survey. To reduce the probability of committing a Type I error, the signifi-
RESULTS

A total of 21 students completed both the pre- and post-surveys (91% response rate). The mean age of the students who completed the surveys was 25.4 years (SD=3.2), 86% were female, and 100% had some pharmacy work experience.

Refer to Table 2 for pre- and post-item mean scores and standard deviations. Students indicated that the course helped to increase their knowledge of patient care (4.86 ± 0.36), that they enjoyed the course (4.90 ± 0.30), and that they learned a lot from the course (4.48 ± 0.60). Although all mean scores increased on all the post-survey items, 15 of the 21 items improved significantly ($P \leq 0.002$).

Each of the 3 faculty indicated that the IPPE required approximately 24 hours to conduct. Thus, 72 hours (3 faculty x 24 hours each) of faculty time was required to conduct the IPPE in addition to the 6 hours of administrative time that was required to coordinate the course (e.g., arranging third and fourth student assignments). Overall, less than 80 hours of faculty time were spent conducting this course for the 21 students.

DISCUSSION

The goals of the IPPE were accomplished. Furthermore, the experience was beneficial to students by building thinking processes that will be useful in APPEs. Fourth-year students in their early APPEs often have problems presenting patients and collecting appropriate data to evaluate patients. The students in this IPPE commented that learning a structured process to collect, analyze, and assess patient data was beneficial. The standardized format (Appendix 1) to present and analyze patient data allowed others to easily follow the patient presentations. The evaluation of the IPPE course demonstrated student learning related to pre-established objectives. The IPPE instructors commented that third-year student performance approached that of fourth-year students by the end of the course. In fact, many of the fourth-year students commented that they wished that they could have participated in this course during their third year. Results also indicate that students not only learned from but enjoyed the IPPE. Furthermore, the experience was conducted with efficient use of faculty time.

Students not only learned by assessing and presenting their patients, but similar to the fourth-year APPE, they learned about a wide variety of other patients through the presentations of other students. Overall, students were exposed to 10 different areas of patient care. By the end of the 12-week period, each student presented 3 patients and participated in the discussion of over 20 patients. We estimated that a faculty-supervised experience of this magnitude could require greater than 150 hours per semester of faculty time. However, the course was accomplished with less than 80 hours per semester of faculty time.

Students involved in this experiential course believed that their patient care skills improved. This is supported by increased scores in approximately 71% of the predetermined objectives for the experience listed in Table 1. Although all mean scores increased, 6 of the objective scores did not increase significantly (Table 2). After careful examination of the 6 scores that did not significantly increase between the pre- and post-survey, reasons become apparent to explain the absence of change. The first is that we focused on enhancing certain skills more than others. It was very important for us to teach students how to create, evaluate, and present a pharmaceutical care plan; whereas, the role of other health care members (item number 11) was not thoroughly discussed. The second reason is that students indicated high pre-survey scores for some items (reflecting that they can perform that task) which may have created a “ceiling effect”, making it difficult to detect a difference between pre- and post-survey items. This is evident in items 14 and 17 where the students felt they were capable of creating a patient-specific problem list and identifying patient factors that affect drug choices even prior to this course (with average baseline scores well above 4). The third possibility is that a course, which centered on the patient interview, problem list, and pharmaceutical plan, such as this IPPE, may not need to expand its focus when other courses in the curriculum better address these other areas. For example, a discussion of the roles of other members of the health care team (item 11) may be better done in an APPE where collaboration on a team is realistic to achieve. Since our students usually spent less than 2 hours in the patient care area at one time, interaction with other health care professionals was limited.

The lack of improvement in some competencies indicates areas for improvement in the IPPE course. This is especially noted in the competencies associated with alternative treatment (item 7) and achievement of therapeutic outcomes (items 15 and 19). We will redesign our orientation sessions and group meetings to focus on...
Table 2. Pre- and Post-Course Mean Scores by Pharmacy Students on Course Objectives for an Introductory Pharmacy Practice Experience

<table>
<thead>
<tr>
<th>Objective Description</th>
<th>Pre-score (n=21)</th>
<th>Post-score (n=21)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I can determine the appropriateness of a drug order or prescription in relation to patient and disease-specific factors.</td>
<td>3.71 (.784)</td>
<td>4.29 (.561)</td>
<td>0.002</td>
</tr>
<tr>
<td>2. I can discuss patient and disease factors that influence drug selection (e.g., allergy, disease state, or medication history).</td>
<td>3.62 (.590)</td>
<td>4.38 (.498)</td>
<td>0.001</td>
</tr>
<tr>
<td>3. I can formulate appropriate action when the use of a drug is contraindicated or questioned.</td>
<td>3.62 (.498)</td>
<td>4.24 (.625)</td>
<td>0.002</td>
</tr>
<tr>
<td>4. I can assess drug orders and prescription for potential drug-related problems.</td>
<td>3.38 (.740)</td>
<td>4.19 (.680)</td>
<td>0.001</td>
</tr>
<tr>
<td>5. I can discuss the risk of toxicity and manifestations of symptoms of toxicity of a drug or drug class in relation to disease and patient-specific information.</td>
<td>3.24 (.831)</td>
<td>4.10 (.539)</td>
<td>0.001</td>
</tr>
<tr>
<td>6. I can formulate an appropriate action plan when a drug order or prescription presents a potential drug-related problem (e.g., drug interaction, side effect, toxic effect).</td>
<td>3.57 (.507)</td>
<td>4.14 (.727)</td>
<td>0.001</td>
</tr>
<tr>
<td>7. I can list patient characteristics that may influence the choice of alternative drug products.</td>
<td>3.71 (.561)</td>
<td>4.10 (1.136)</td>
<td>0.176</td>
</tr>
<tr>
<td>8. I can describe the types of information the pharmacist may need to make decisions on meeting a patient's health care needs.</td>
<td>3.90 (.768)</td>
<td>4.62 (.498)</td>
<td>0.001</td>
</tr>
<tr>
<td>9. I can assess pertinent patient data to determine the patient's health care needs related to the patient's presenting problem.</td>
<td>3.81 (.602)</td>
<td>4.48 (.512)</td>
<td>0.001</td>
</tr>
<tr>
<td>10. I can devise a plan for meeting the patient's health care needs related to the patient's presenting problem.</td>
<td>3.62 (.669)</td>
<td>4.38 (.590)</td>
<td>0.001</td>
</tr>
<tr>
<td>11. I can describe health care needs that should be met by health care personnel other than pharmacists.</td>
<td>3.67 (.577)</td>
<td>3.90 (.700)</td>
<td>0.234</td>
</tr>
<tr>
<td>12. I can integrate patient, disease, and drug data to determine desired therapeutic outcomes for a patient.</td>
<td>3.62 (.590)</td>
<td>4.29 (.561)</td>
<td>0.001</td>
</tr>
<tr>
<td>13. I can identify information in a patient-specific database that is pertinent to a particular drug therapy decision.</td>
<td>3.48 (.602)</td>
<td>4.29 (.561)</td>
<td>0.001</td>
</tr>
<tr>
<td>14. I can generate a patient-specific problem list.</td>
<td>4.24 (.625)</td>
<td>4.62 (.498)</td>
<td>0.029</td>
</tr>
<tr>
<td>15. I can discuss factors to consider when determining therapeutic outcomes for a patient.</td>
<td>3.76 (.625)</td>
<td>4.10 (1.136)</td>
<td>0.201</td>
</tr>
<tr>
<td>16. I can formulate a pharmacotherapeutic regimen to achieve desired therapeutic outcomes.</td>
<td>3.38 (.590)</td>
<td>4.19 (.680)</td>
<td>0.001</td>
</tr>
<tr>
<td>17. I can describe patient-specific factors that influence the selection of a drug, dose, dosage form, route, schedule, and duration of therapy.</td>
<td>4.14 (.573)</td>
<td>4.29 (.717)</td>
<td>0.379</td>
</tr>
<tr>
<td>18. I can formulate a plan to monitor a pharmacotherapeutic regimen.</td>
<td>3.67 (.483)</td>
<td>4.24 (.625)</td>
<td>0.001</td>
</tr>
<tr>
<td>19. I can determine those patient and laboratory parameters which measure the achievement of desired therapeutic outcomes.</td>
<td>3.71 (.561)</td>
<td>4.19 (.602)</td>
<td>0.009</td>
</tr>
<tr>
<td>20. I can determine those patient and laboratory parameters which measure adverse drug reactions or interactions.</td>
<td>3.48 (.512)</td>
<td>4.14 (.573)</td>
<td>0.001</td>
</tr>
<tr>
<td>21. I can describe the steps in a systematic approach to solving problems.</td>
<td>3.62 (.590)</td>
<td>4.29 (.644)</td>
<td>0.001</td>
</tr>
</tbody>
</table>
these 2 competencies, because we feel that they are important in developing and monitoring therapies.

What are some of the critical steps that made this experiential training a success? Above all, we believe that it was the combination of using real patients in patient care settings (opposed to using simulated patients) and the teaming of the third-year and fourth-year students. Both third-year and fourth-year pharmacy students accepted their responsibilities and they fulfilled their tasks. Fourth-year students not only served as a bridge between the student and the patient, but they served as a mentor/teacher for the third-year students. Third-year students related that they enjoyed the chance to interact with fourth-year students, and fourth-year students appeared to be very interested in participating in the course and voiced no opposition to serving as facilitators. In fact, this peer mentorship was an important element of the IPPE.

The IPPE described here is a hybrid, containing elements of both shadowing and advanced pharmacy practice experiences. However, it is different from a shadowing experience in that the third-year student assignment was to interview, evaluate, and present the patient. Thus, the student’s role was more active in the IPPE course than in the shadowing program, in which student involvement is limited to an observational role. This IPPE built upon what was learned in previous IPPEs, and helped to lessen the gap between didactic and pharmacy practice.

Although the results generated from this investigation are limited to the study population and institution, it suggests that an active experiential course such as this one can enhance learning in pharmaceutical care skills. There are some limitations to our evaluation of the IPPE that are worthy of discussion. One limitation of the student survey is the subjective use of the words “a lot” to ascertain and quantify how much students believed they learned in the IPPE. Another limitation to the study is that it is impossible to tell if this IPPE directly caused the students to score higher on the post-test on course objectives since these students were taking other didactic pharmacy courses at the same time. However, it is likely that the increased scores were at least influenced by the IPPE since these objectives were identified for this experience prior to its implementation and the IPPE was designed with the goal of achieving these competencies. In areas in which the scores did not increase, we are examining whether other strategies should be attempted to address these competencies. It is possible that other courses may be more suitable to achieve competencies outside of the pharmacotherapy work-up, problem list, and plan.

CONCLUSIONS

Overall, this introductory pharmacy practice experience for third-year pharmacy students was enjoyable to students and resulted in learning. By providing a variety of patients and using senior fourth-year pharmacy students as mentors, a beneficial introductory pharmacy practice experience was conducted that maximized faculty resources. In providing pharmacy practice experiences, every effort should be made to identify efficient ways of providing high-quality practice experiences in which close attention is given to achieving predetermined competencies.

REFERENCES

Appendix 1. Standardized patient form used by pharmacy students enrolled in the Introductory Practice Experience.

<table>
<thead>
<tr>
<th>Patient age, race, gender</th>
<th>Assessments / Problems</th>
<th>Pharmaceutical Care Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMH</td>
<td>Disease status</td>
<td></td>
</tr>
<tr>
<td>Diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allergies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drugs</td>
<td>Indication, dose, DIs, ADRs, monitoring, patient knowledge, compliance</td>
<td></td>
</tr>
<tr>
<td>Pertinent PE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pertinent labs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Events, procedures, current status</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CC=Chief compliant; HPI=History of present illness; PMH=Past medical history; PE=Physical exam; DIs=Drug interactions; ADRs=Adverse drug reactions