INSTRUCTIONAL DESIGN AND ASSESSMENT

Reinforcing the Relevance of Chemistry to the Practice of Pharmacy Through the Who Wants to Be a Med Chem Millionaire? Learning Game

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Objectives. To reinforce the relevance of chemistry to therapeutic decision-making.

Design. A team-based game entitled, Who Wants To Be A Med Chem Millionaire? was devised for P3 students using clinical cases from Pharmacotherapeutics courses. Questions were developed to demonstrate the value of applying chemistry to meet patient care goals. Teams of 6 students played for health-related charities, and correct answers to questions earned Med Chem Moolah. Faculty members donated to the charities of 3 winning teams.

Assessment. Students actively participated in the game. Accurate responses to game questions indicated that students had reviewed the materials and/or recalled previously learned concepts. Students’ willingness to reason publicly demonstrated growth in professional maturity. P2 students also reacted positively to the game.

Conclusion. Students viewed the session as a positive learning experience, and faculty members gained insight about which elements of the game were effective.

Keywords: medicinal chemistry, active learning, learning game, knowledge retention, integrated education

INTRODUCTION

The 2-semester medicinal chemistry course sequence required in the second-professional year of the pharmacy program at Creighton University, entitled, The Chemical Basis of Drug Action I and II, has always emphasized the importance of a thorough analysis of drug structure as an integral part of rational therapeutic decision-making. The instructors have routinely attempted to reinforce the professional relevance of drug chemistry by employing learning tools such as the medicinal chemistry case study (both paper-based and computerized) and the structurally-based therapeutic evaluation (SBTE). There has also been a conscious effort to honor the School’s ability-based outcomes on (1) drug therapy evaluation, (2) pharmacotherapeutic decision-making, (3) taking personal responsibility for learning, and (4) critical thinking by demanding a demonstrated ability to apply knowledge of drug chemistry and structure-activity relationships (SAR) to patient care, and through the integration of course content with material previously learned and yet to be learned.

Course evaluation data gathered over the past several years has provided evidence that the active-learning strategies employed in the Chemical Basis courses enhance both learning and an appreciation of the practical relevance of our discipline’s concepts. However, the instructors remained concerned about students’ long-term retention and utilization of medicinal chemistry principles in practice without reinforcement in subsequent years of the curriculum. When invited to coordinate a session in the third-year (spring 2003) Early Pharmacy Practice Experience (EPPE) course, we readily accepted.

At the time of our participation, the EPPE course sequence was woven throughout the full 6 semesters of didactic coursework. First-year students received an introduction to the most common practice environments (eg, hospital pharmacy, community pharmacy), while those in the second-professional year explored alternative career options and gained insight on physical assessment and issues related to patient-specific pharmaceutical care. The third-year EPPE courses were designed to be a preparation for major life events, clinical practice, and the impending transition to the clerkship year. A component of these 2 courses was dedicated to a review of previous coursework so that students could better integrate the major concepts with the experiences and professional insight they had gained from working in pharmacies and their formal study of clinically-focused coursework (therapeutics, pharmacokinetics).
As we set about identifying a mechanism for engaging the students in a review of how the application of chemical principles to pharmaceutical care decisions honors their responsibility to be scientifically grounded practitioners, the concept of the case-based learning game, *Who Wants To Be A Med Chem Millionaire?* was born.

**Design**

**Student Team Assignment**

In keeping with our interest in team-facilitated learning, we devised a game that would allow students to share insight and work collaboratively on the questions posed during the session. We knew from experience that students uncertain of their knowledge hesitate to volunteer an opinion in response to an instructor’s question, but are usually willing to pose questions or offer answers in the company of friends. Therefore, we allowed the students to organize their own teams of 6 players. The 3-hour class session was divided into three 1-hour blocks, and 6 different teams competed during each hour of play. Those students not actively playing were encouraged to remain in the audience, both to support the current players and to advance their own learning. Prior to the *EPPE* session, each team was asked to select a health-related charity to which a faculty member would contribute if that team won the game.

**Game Construction**

Students enrolled in the *EPPE* course had completed 1 full semester of pharmacotherapeutics coursework at the time of our session, and had covered the disease states of rheumatoid arthritis, infectious disease, and asthma/chronic obstructive pulmonary disease (COPD). The *Pharmacotherapeutics* course reserves 1 afternoon each week for case study discussion and problem solving, and the clinical faculty members had previously presented 4 cases on these 3 topics. The faculty members teaching the *Chemical Basis* course chose these topics and their associated cases as the clinical springboard to our session because the students had completed detailed lessons on the drug classes important to treating these diseases in the *Chemical Basis* courses they took in the previous academic year (nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroids, β-lactam antibiotics, fluoroquinolones, and adrenoceptor agonists). As the students had solved the pharmacotherapeutic cases in the previous fall semester without an explicit mandate to include a structural analysis, our intent was to show them how a critical assessment of the chemistry of each drug structure in the case could allow them to predict important information about drug action that would have a direct bearing on therapeutic decision-making, drug product selection, and patient care.

Each faculty member took responsibility for 1 of the 3 disease states and hosted 1 hour of play during the *EPPE* session. The students were provided with a summarized version of the pharmacotherapeutics cases they had solved the previous semester (Appendix 1) and were encouraged to review the complete version of the cases and their therapeutics-based solutions on the *Pharmacotherapeutics* course web page. The clinical faculty members who originally authored the cases were given credit for their work. The faculty members also constructed SAR overview documents for the classes of drugs addressed in each case. The cases and SAR overview documents were provided to the students 1 week prior to the *EPPE* session to facilitate their preparation for the game.

Next, the faculty members constructed chemistry- and SAR-related questions to be used during the game. The questions were written to serve 2 major purposes: (1) to provide a review of basic chemical concepts important to understanding drug action, and (2) to engage students in using their knowledge of chemistry and drug structure in therapeutic decision-making. Many of these questions were of the multiple-choice type, but several open-ended questions requiring a chemically or structurally based verbal explanation were also included. These questions were incorporated into vivid “cash-green” *PowerPoint* slides decorated with money-related graphics in keeping with the game’s theme (Appendix 2).

**Game Logistics**

One week prior to the *EPPE* session, students were provided with the *Pharmacotherapeutics* case summaries, SAR overviews, and a set of rules for *Med Chem Millionaire* (Appendix 3). Each team was assigned to a particular session of play and encouraged to review the *Chemical Basis* course content related to their assigned drug classes in preparation for the game. The rheumatoid arthritis session involved NSAIDs and corticosteroids, the infectious disease period covered β-lactam antibiotics and fluoroquinolones, and the asthma/COPD segment addressed adrenoceptor agonists and further reviewed corticosteroids.

The 6 teams competing each hour were seated in the front of the classroom. Those students not playing were encouraged to remain in the classroom as the “studio audience.” Teams were allowed free access to the SAR overviews constructed by the faculty members, as well
as to course notes, texts, and/or any other resources they felt could assist them in the game. Each team was given a bellstand bell and instructed to ring in to signify their intent to answer a question. The 2 Chemical Basis faculty members not hosting the session were stationed on each side of the room to identify the first team to ring in. The game questions were projected on screens visible from both sides of the classroom. After a multiple-choice question was projected and read aloud by the host, the teams were given 10 seconds to confer and ring in to answer before time was called. The time to confer and answer was extended to 30 seconds on questions requiring a chemically based explanation.

The student teams played for Med Chem Moolah, play money decorated with pictures of the 3 faculty members and emblazoned with our game motto: “In Structures We Trust.” Correctly answered multiple-choice questions were worth $50 in “Moolah” on the first attempt and $20 on a second attempt. The open-ended questions, which followed some of the multiple-choice questions, were also worth $50, and allowed the answering team to double their winnings by providing an accurate, chemically based explanation for their correct answer. If the team was unable to provide a correct chemically based explanation for their answer on the first try, a competing team could steal their winnings by ringing in with a complete, accurate explanation.

Play continued for 45 minutes, at which time the teams were instructed to count their winnings. The members of the team with the most Med Chem Moolah at the end of their session were proclaimed Med Chem Millionaires. The faculty host then wrote a $50 check to the charity selected by the winning team. At the end of the third session, the faculty members donated an additional $50 to the charity of the team that won the most Med Chem Moolah overall.

**ASSESSMENT**

At the end of the term, students were asked to evaluate the effectiveness of all EPPE sessions in advancing learning. Standard questions were used in the evaluation of all course sessions. The quantitative responses of students to the evaluation questions applied to the Who Wants to be a Med Chem Millionaire? game are provided in Table 1. Fifty-five percent to 77% of the students thought the exercise was well organized, pertinent, and of value to both their learning and their development as pharmacy professionals.

While Table 1 documents the positive responses elicited from most of the class on the value of the Med Chem Millionaire game, there were some who were not convinced that the session was well constructed or accomplished its goals. The proportion of students who disagreed or strongly disagreed with the evaluation statement was usually less than 20%, but approximately one fourth of the class disagreed with the statement that we successfully accomplished our main objective of documenting the relevance of chemistry to the practice of pharmacy. The areas that received the least amount of disagreement related to group effectiveness and the enjoyment received from interacting with faculty members.

The 62 narrative responses received to an open-ended evaluation question inviting comments on the value of the session were categorized into 5 commonly cited strengths. The percent of responding students who made comments related to the strength of each session is provided in Table 2. The comments received reinforced the findings from the quantitative course evaluation.

**DISCUSSION**

**Observations During Play**

Faculty members made several positive observations during the EPPE session. Students had obviously prepared for the game, as all teams were surrounded by
Table 2. Percentage of Students Identifying Categorized Strengths of the Who Wants To Be A Med Chem Millionaire? Game in Narrative Comments on the Value of the EPPE Session (N=62)

<table>
<thead>
<tr>
<th>Strengths of the Who Wants To Be A Med Chem Millionaire? Game</th>
<th>Students Identifying Strength, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session helped students recall specific SAR of interest</td>
<td>45</td>
</tr>
<tr>
<td>Session provided a good review of medicinal chemistry</td>
<td>27</td>
</tr>
<tr>
<td>Students had fun with the exercise</td>
<td>16</td>
</tr>
<tr>
<td>Students saw the relevance of chemistry to therapeutics and pharmacy practice</td>
<td>11</td>
</tr>
<tr>
<td>Student remembered more than they expected to recall</td>
<td>10</td>
</tr>
</tbody>
</table>

SAR=structure-activity relationships

resources. The SAR overviews provided to them had been read, annotated, and highlighted. Many teams brought the relevant section of their Chemical Basis course notes to assist them, and had their materials organized for ready access to information they thought would be asked.

Many students were willing and able to articulate clear and correct answers to both multiple-choice and explanation-based questions, indicating focused study and/or true learning from their year in Chemical Basis. Although this particular class had been shy about voicing thoughts and opinions on course content the year before, during the game they did not hesitate to reason through answers aloud in front of peers, which documented a growth in professional maturity and confidence in their knowledge.

The students also claimed to be highly motivated to win real money for their charity. They remained engaged in the game throughout their session and competed actively for the moolah. Camaraderie within teams was strong and competition between teams was friendly, but at times intense. Class attendance for the session was high, and the few students who were unable to attend made an effort to inform the faculty members of their conflict even though this was not required. Many of these students indicated their intent to make personal contributions to the charity of one of the winning teams.

The plans faculty members made to engage the “studio audience” in the game were not successful. Originally, the faculty members considered dividing the audience into groups supportive of 1 of the 6 playing teams, and posing to them any questions that the teams were unable to answer. If an audience member correctly answered a question, the team he or she was supporting would win moolah. This plan turned out to be too complex; however, and faculty members abandoned the idea at the beginning of the game. The fact that students were not required to be in class during sessions in which they were not actively playing also complicated this approach. While faculty members were pleased with the size of the audience at the beginning of the 3-hour session, the number had dwindled by the last hour of play. An alternate approach to audience engagement could involve having the 3 winning teams compete in a championship round, with audience members serving as “lifelines” for the teams.

In retrospect, using bellstand bells for players to indicate their desire to answer a question was ill-conceived. The fact that all 6 teams used a bell with the same sound made it difficult to discern which team rang in first, and players hotly contested some of the decisions made by faculty members. Even though only 1 team could be chosen to answer a question, several teams rang in, some enthusiastically and repeatedly. By the time 3 hours of play were concluded, everyone’s nerves were on edge. A superior system for team identification would be a series-wired multiple-light board with a bulb and signal button in front of each team. The bulb in front of the first team to hit their signal button would light, inactivating all other lights on the board.

Learning Game Format

In their recent paper on the attitudes and beliefs of Generation X students about school and learning, Romanelli and Ryan reinforced the notion that contemporary pharmacy students gravitate toward experiences that are entertaining, and appreciate and prefer faculty members who present material with “passion… enthusiasm and energy.”

Effectively all of the elements of the Med Chem Millionaire learning game were designed to attract students who respond positively to intense and entertaining activities. The exercise had an air of excitement and anticipation about it that appealed to the students. The game was played at a fast pace, the faculty members were animated, and students were encouraged to engage vocally in the game. The graphics and bright colors of the slides used in the game were also attention-getting.

Romanelli and Ryan also indicated that Generation X pharmacy students are drawn to classroom activities that reflect the “real world” of practice. Medicinal chemistry is sometimes viewed by students as disconnected from actual practice. This concept may spring, in part, from its lack of reinforcement in the final years of the curriculum, and from the opinions expressed by employers who took a medicinal chemistry course in the days when rote memorization of drug structures and
SAR rules was in vogue. Using real patient cases to demonstrate how chemical principles can assist practitioners in predicting drug action and the relative therapeutic value of drug choices can only serve to engage this group of reality-demanding learners.

**Student Evaluation of Learning**

The vast majority of the class believed that the *Med Chem Millionaire* learning game accomplished its goal of reinforcing the importance of medicinal chemistry principles in the contemporary practice of pharmacy. In addition to the 55%-70% of students who answered affirmatively to course evaluation questions about the pertinence and relevance of the session content, 11% took time to write narrative comments indicating their understanding of the practical relevance of the subject. Many students were surprised at how much they knew about the chemistry of topics under discussion, and the faculty members were pleased that this anecdotal evidence supported the notion that persistent understanding had resulted from the students’ study of medicinal chemistry. Several students commented to the EPPE instructors that they had a greater appreciation for the value of medicinal chemistry after they had studied pharmacotherapeutics and recognized their own ability to reason through therapeutic actions and side effects of drugs by looking at their structures. A strong majority of the class stated that the session advanced their learning and, as expected from “Gen-Xers,” they had a good time interacting with the faculty members during the exercise.

The instructors of record for the EPPE course were also asked to provide their impressions of the success and value of the *Med Chem Millionaire* session. They both felt that the session accomplished its goals, particularly given the time constraints and initial uncertainty of what was actually going to transpire during class. The faculty members also noted that the participating students received a needed boost in confidence in their ability to evaluate drug structure and use the insight gained to make informed clinical decisions.

We were disappointed that a quarter of the class felt the major goal of the exercise (reinforcing the relevance of chemistry to the practice of pharmacy) was not met. To gain perspective on this statistic, the faculty members revisited the second semester’s *Chemical Basis of Drug Action* course evaluation data, which were provided by this same group of students in spring 2002. This was the last year in which the department-structured evaluations were focused almost exclusively on the instructor rather than on the course itself, and questions that would have been appropriate for identifying changes in attitude were, unfortunately, not asked. A review found that the narrative comments provided by students in their *Chemical Basis* year were consistent with the quantitative outcome of the *Med Chem Millionaire* assessment: some students appreciated the clinical relevance of the course content while others did not.

The apathy (or worse) exhibited by some students about the role chemistry will play in their future practice has been experienced by medicinal chemistry faculty nationwide. Several have expressed concern over negative student attitudes and/or uninformed faculty attitudes, both verbally at meetings of pharmacy educators and in writing. This concern prompted the planning of a joint Academic Sections program on the pharmaceutical sciences as the essential foundation to doctoral-level professional pharmacy education, which was presented at the 2004 AACP Annual Meeting in Salt Lake City. What is underscored by these collective experiences is the continuing need for chemistry (and the other pharmaceutical sciences) to be regularly reinforced in the later years of the professional curriculum. Clinical faculty members and pharmacy employers, as the practitioner role models for pharmacy students, can do much to alter negative or apathetic attitudes about medicinal chemistry by simply confirming the importance of the chemical sciences to the understanding of drug action. The invitation to the *Chemical Basis* faculty members by the practitioner faculty members coordinating the EPPE sequence to contribute to the P3 course represents this type of positive reinforcement. However, a more consistent emphasis is needed if long-term improvement in student attitudes is to be realized. Practitioner faculty members and employers should routinely engage students in pertinent discussions of the chemical basis of the pharmacological action of drugs being administered to their patients. Those uncomfortable with discussions at this level can ask the students to share what they know about the chemistry of the drugs being used, which not only emphasizes the value of the discipline to students, but explicitly demonstrates the critical professional value of lifelong learning as well.

**Med Chem Millionaire Revisited**

The success of the *Med Chem Millionaire* experience with P3 students stimulated us to play the game with the campus-based P2 students enrolled in the *Chemical Basis* course in fall 2003 as a review for the final examination. While attendance in the *Chemical Basis* courses is not required, the faculty members identified this class session as mandatory and almost everyone came. The format differed from that described above in that no formal teams were established prior to the class period in which the game was played. There were 112 students in the campus-based
Chemical Basis class in fall 2003 and only 50 minutes were available for the game. Therefore, the classroom was simply divided in half, and each side of the room played as a large team. Questions were projected as described previously and any student in the room could raise his or her hand to answer. Faculty spotters on both sides of the classroom did their best to select the student whose hand was raised first to answer. At the end of the class period, winnings for each side of the room were totaled. A virtual tie was achieved, and the faculty members made a $75 donation to the charities selected by each of the 2 teams.

As previously noted with the P3 students, the P2 class was uncharacteristically responsive during the playing of the game. One section of our published course objectives addresses communication skills and professional confidence. Specifically, we tell our students that we expect them to:

- demonstrate the ability to coherently, succinctly and professionally communicate information that advances the understanding of his/her classmates and enriches the classroom experience,
- respond accurately and appropriately to questions posed by classmates and instructors, and
- grow professionally by gaining competence, as well as confidence in one's knowledge and abilities.

Despite attempts to promote an interactive classroom environment where students feel engaged and motivated to ask questions and/or volunteer comments and opinions, only a small fraction of the class contributes proactively, and some remain silent even when specifically called upon for their thoughts. The game format of the review session, however, seemed to put the students at ease, and prompted some who are normally quiet to offer answers to game questions. The challenge, of course, will be to carry the momentum and energy so obvious during the game into the class sessions where we are attempting to dialog in a more traditional fashion with students about course content and the application of chemical principles to patient care.

While no formal evaluation of the P2 Med Chem Millionaire class period was conducted, students commented favorably about the session to faculty members, both orally and in the end-of-term course evaluation. One student said that it was “awesome” to be in class that day, and others suggested that the format of the active-learning class periods that are a regular component the Chemical Basis courses be changed to this learning game format. The faculty members have decided to incorporate a Med Chem Millionaire active-learning exercise before each Chemical Basis examination in the 2004–05 academic year. We are hopeful that the regular playing of this learning game will not only promote engaged attendance at the active-learning sessions, but also help us accomplish the communication and professional competence goals noted above.

CONCLUSIONS

In summary, the Who Wants To Be A Med Chem Millionaire? learning game proved to be an effective vehicle for demonstrating the relevance of chemical principles and SAR to therapeutic decision-making and patient care. The therapeutic decisions described in the pharmacotherapeutics case studies on arthritis, infectious disease, and asthma/COPD were supported through an analysis of the structure and chemical properties of the drug choices provided in the case, and most students recognized the professional value of their unique knowledge of drug chemistry. The learning game proved equally popular with students currently enrolled in the Chemical Basis of Drug Action courses. The faculty will employ the game regularly throughout the academic year in an attempt to assist students in mastering our course objectives related to chemical competence, practical relevance, professional confidence, and communication.

ACKNOWLEDGEMENTS

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REFERENCES

Appendix 1. Pharmacotherapeutics Case Summaries

Pharmacotherapeutics Case Studies
(Please consult the complete cases/answers on the PHA 450 web page)

8:30-9:20 Session: Rheumatoid Arthritis

Barbara L. Flynn, Pharm.D.

Mr. Art H. Ritis is a 78 yo male admitted to a local hospital with a two week history of progressive weakness and increasing confusion. His daughter brought him to the hospital because he was “unsteady on his feet” and refused to take a nap, stating that “he would not be able to sleep because of all of the bugs crawling on the walls”.

Past/Current Medical History

Current Medications

Glaucoma
Pilocarpine eye gtts.

Angina
Diltiazem, SL nitroglycerin

H/O alcoholism

Rheumatoid Arthritis (RA)
Prednisone 10mg po QD (tapering regimen from 30mg po QD six months ago)

Naproxen 750mg po BID (started 3 years ago)

Salsalate 1500mg po BID (started 6 months ago)

APAP 500mg 1-2 tabs. po Q 4 hours prn pain

Additional history regarding Mr. Ritis’ arthritis: He has had classic seropositive RA for 25 years. It has affected the PIP and MCP joints of both hands, elbows, knees, and ankles, resulting in joint deformity. He uses paraffin wax baths daily for his hands and has been instructed to do exercises but is noncompliant because of pain.

A.R. did not tolerate ASA due to GI upset, so he was treated with various NSAIDs. About 10 years ago, he was given a trial of gold therapy which was discontinued due to lack of efficacy. After this, he was placed on prednisone and has never been steroid-free despite several attempts to taper off the medication.

A.R.’s regimen includes prednisone, naproxen and acetaminophen. Of these drugs, prednisone and naproxen can contribute to CNS toxicity in the elderly. Although almost every currently marketed NSAID has been associated with CNS toxicity, three are particularly prominent: INDOMETHACIN, IBUPROFEN and NAPROXEN.

The addition of a NSAID to ASA or other salicylate products has been used to achieve greater anti-inflammatory response than can be obtained with either product alone. However, clinical data supporting this potential synergism are lacking. In general, when patients receive optimal doses of salicylates the addition of NSAIDs renders little, if any, benefit. Additionally, there is increased risk for adverse drug reactions/interactions (increased risk of GI intolerance, bleeding and nephrotoxicity).

The elderly are at risk for salicylate intoxication due to age-related pharmacokinetic changes and polypharmacy. In the elderly, no changes in aspirin or salicylate absorption or metabolic pathways have been demonstrated. Aging has been associated with decreases in serum albumin, which may be exaggerated by malnutrition. Reduced serum albumin increases the fraction of unbound (active) salicylate and may predispose the elderly to salicylate toxicity. Age-related reductions in renal function cause decreased elimination of salicylates. Consequently, normal adult doses may result in toxic total and unbound concentrations in the elderly patient.

Limiting their use of corticosteroids may be even more important in their elderly RA patient because steroid-related side effects may magnify age-related risks for disease (i.e., osteoporosis, cataract formation, increased susceptibility to infections, hyperglycemia and changes in mental status).

9:30-10:20 Session: Antibiotics

Christopher J. Destache, Pharm. D.

A 72 yo (70 inch; 170 lb.) BM is admitted to the hospital complaining of decreased mental status, productive cough that is blood-streaked, fever to 102.7 F, elevated RR (to 40), and signs and symptoms consistent with CHF. His past medical history is positive for coronary artery disease, COPD with bronchitis, and mild CHF controlled with low dose lasix. On
admission, his sputum shows many PMNs and no squamous epithelial cells but no organisms on Gram stain. His labs show a WBC=21.4 with 58% segs and 14% bands. Admission creatinine and BUN are 2.2 mg/dl and 58 Gm/dl, respectively.

The intern notices you and asks for assistance with antibiotic selection.

Gary N. Elsasser, Pharm.D.

Alicia is a 82 year old female nursing home resident with severe Alzheimer’s disease and has developed a cough and shortness of breath. Her physician suspects pneumonia and prescribes levofloxacin 500 mg PO QD for 10 days with orders to contact him if she has not improved in 48 hours.

10:30-11:20 Session: Asthma and COPD

Pamela A. Foral, Pharm.D. and Keith Christensen, Pharm.D.

C/C: “I am having trouble catching my breath”

HPI: JC is a 56 y/o female who presents to the ER with a 3 day hx/o increasing SOB, wheezing, non-productive cough and flu-like symptoms (N/V/HA). She has had to increase the use of her inhalers over the last 3 days because of increasing SOB (approx. 5-6 times/day). She does not monitor her peak flows at home; she just knows when her symptoms become severe. She claims medication compliance but has been out of prednisone for 5 days; her last dose of Theo-Dur was earlier in the day. The patient also complains of frequent exacerbations and frequent nighttime symptoms.

PMH: Asthma with hx/o intubation,
HTN
Hx/o stomach upset (Cimetidine 400mg po bid started 1 wk ago)
Hx/o drug abuse

SH: + EtOH and tobacco use

Meds: Theo-Dur 300mg po qd
Albuterol MDI 2 puffs bid and prn
Procardia XL 90mg po qd
Cimetidine 400mg po bid
Prednisone 10mg po qd

ALL: None

ROS: No URI sx other than cough and wheezing

PE:
Gen: The patient is a female in obvious respiratory distress
VS: BP 140/90, P 120, RR 30, T 36.7*C, wt 65kg
Chest: Diffuse expiratory wheezes bilaterally
Neuro: Alert and oriented x 2, but confused

ECG: Sinus tachycardia with occasional PVCs
CXR: Mild atelectasis, hyperinflated lungs with air trapping

1. Focusing on asthma, design and write a “SOAP” note, which in the Plan must include the Pharmaceutical Care Plan (ie. 1) Problem(s) matched with 2) drug(s), including dose, route, duration; 3) goal(s), 4) objective monitoring parameters).

JC initially had an incomplete response to the treatment plan you recommended, as indicated by persistent mild wheezing and a PEFR >50% but <80% of baseline. With continued treatment, she improved further, as assessed by the presence of only slight wheezing and a PEFR >80%. The decision was made to discharge the patient to home.

2. What pharmacologic interventions would you recommend for the treatment of severe persistent asthma in this patient upon discharge? Design and write a Pharmaceutical Care Plan (ie. 1) Problem(s) matched with 2) drug(s), including dose, route, duration; 3) goal(s), 4) objective monitoring parameters).
Appendix 2. Sample Med Chem Millionaire game slides

Appendix 3. *Who Wants to Be a Med Chem Millionaire?* Game Rules

1. Teams must work collaboratively on the answers to game questions. Teams will be allowed to use the printed version of the case studies, the SAR overviews, Chem. Basis class notes, texts, etc. during the game.
2. After a question is projected and read out loud by the faculty “host”, the first team to ring in will be given 10 seconds to answer. A correct response on the first try is worth $50. In order to keep all groups involved in the game, the “host” can give a group that has not rung in for awhile the first chance at answering a question.
3. If the first group to attempt an answer gets it wrong, up to two other groups may try. The second attempt at a question will be worth $20.
4. A team that answers a question correctly *may* be able to earn another $50 (*Double Your $*$) if they are able to provide an accurate chemical explanation for the correct answer they chose. Not every question will have this option. The team will have 30 seconds to come up with their explanation before time is called.
5. The team that answered the question correctly may *play or pass* on the explanation. If they pass, or if they play but answer the question incorrectly, another team can steal the first team’s moolah by providing a correct explanation to the question. The first team to ring in after the original team passes or runs out of time for an explanation will have the opportunity to answer.
6. If no one is able to provide the correct answer to a question, the host will reveal the answer and move on to the next question.
7. The team that ends up with the most moolah at the end of the session will be proclaimed *Med Chem Millionaires*. The faculty host will write a check for $50 to the charity for which the team was playing. The *Overall Winner* (the team who won the most moolah out all of the sessions) will have another $50 donated to their charity by the faculty.