

Teaching Psychopharmacology in the Medically Ill: A Problem-Based Learning Card Game for Consultation-Liaison Psychiatry Didactics

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ABSTRACT

INTRODUCTION: Our educational report discusses a unique card game that provides an engaging, and competitive strategy for teaching psychopharmacology in the medically ill. It engages the players and helps them learn how to justify medical decisions in the context of complicated medical comorbidity.

METHODS: We describe a problem-based learning approach where learners are presented with randomized diagnoses and complications and are then forced to make prescription decisions for treatment from a limited and randomized supply of medication cards. Each round is facilitated by the teacher, who engages the teams and/or individual players in discussions regarding the rationale and justification of the medication decisions. These treatment plans are scored according to the appropriateness of the medication choice and the process is repeated.

DISCUSSION: The game is flexible regarding players' levels of education and has been played by medical students, psychiatry residents, and fellows throughout their years of training. Overall feedback has been positive from facilitators and trainees and the game has been a valuable source of engaging learners in the process of making complex medication decisions in the medically ill.

KEYWORDS: education, consultation-liaison psychiatry, psychopharmacology, medically ill, problem-based learning, didactics

TYPE: Methodology

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Introduction

There is increasing recognition that the combination of psychiatric and medical comorbidities results in more functional impairment, disability days, emergency department visits, etc in comparison to those without a history of such comorbidities.¹ Furthermore, requests for input regarding psychopharmacologic interventions and medication recommendations make up a significant portion of requests for psychiatric consultation in the general medical hospital.² The Accreditation Council for Graduate Medical Education (ACGME) requires psychiatry residents to provide psychiatric consultation in a variety of medical and surgical settings (source ACGME psych). Furthermore, learning about psychopharmacology in the medically ill is a core component of the ACGME requirements for a Consultation-Liaison Psychiatry Fellowship (source ACGME CL). Thus, ensuring psychiatry residents and fellows have an appropriate understanding of the complexities of psychopharmacology in the medically ill is vital to preparing them for future practice. To that end, several psychiatry training programs are beginning to find novel methods of teaching psychopharmacology that are effective and well received by trainees and faculty.³ Furthermore, the educational literature surrounding teaching psychopharmacology has concluded that programs need to go beyond traditional lecture models and attempt to help make learning more fun, relevant, and self-sustaining.³

Thus, we present an original card game that utilizes a competitive, engaging, and relevant method to teaching psychopharmacology in the medically ill. The creation of this game centered around a problem-based learning (PBL) model of teaching. As a modern pedagogical philosophy, PBL is increasingly being recognized as a major research area in health sciences education.⁴ In contrast to a more traditional lecture-based style, PBL prompts students to actively engage in knowledge construction and develop competencies across multiple contexts.⁴ Pedagogical research has found PBL to be more effective than lecture-based learning in the academic performance of medical students.⁵

Traditionally, PBL based curriculum has 4 common elements: (1) learning objectives translated into a problem, (2) successful solutions requiring an explanation, with discussion of the potential diagnosis and treatment, (3) learners use small group discussions to critique and understand both the problem and proposed solutions, and (4) concepts that are not answered within the group discussion form the basis for further learning outside the group environment.⁶ In the context of our game, the learning objective is presented by drawing cards that translate into a problem of treating a randomized diagnosis in the context of challenging medical comorbidities. The learner must determine an appropriate solution by choosing from limited medication options to treat the



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patient. This treatment decision is discussed in the small group with the learners' rationale and treatment justifications supported by literature resources. These treatment plans are scored according to the appropriateness of the medication choice, and the process is repeated. This allows for an engaging and competitive method to quickly discuss multiple scenarios of complex psychopharmacology decisions in the medically ill. Furthermore, it promotes critical thinking and facilitates valuable discussions regarding justification of specific pharmacology choices.

Preparation for the Game

Creating the Game Material

Like many of the formal PBL activities and educational games, this will take time to originally create; however, once created, there will be minimal preparation needed before the didactic.⁷ There are 3 basic types of cards that will be used for this game: medication cards, diagnosis cards, and complications cards. A fourth, optional, card type includes "Extra Point Cards."

Medication Cards. Each medication card should represent one specific psychiatric medication. These cards can cover as many medications as desired by the facilitator; however, to ensure the largest brevity of discussion available, we suggest having at least one card for every psychiatric medication and repeating more commonly used medications. Using a table of contents of a psychopharmacology text (eg, Stahl's Essential Psychopharmacology Prescriber's Guide⁸) can provide a quick and easy list of medications when creating these cards. Practically, making the medication cards can be as simple as using playing cards and writing individual medication names on the cards with a permanent marker. We use stacks of blue-backed playing cards for antipsychotics and mood stabilizers and red-backed playing cards for the remaining medication categories. This allows players to exchange cards of similar type (for instance, if the player just played an antipsychotic, they could pick up another from the designated antipsychotic/mood stabilizer category). This also fosters an easy differentiation of cards if there is a desire to focus the didactic on one class of medications (eg, a game focused on antidepressants in the medically ill) or diagnosis (eg, treating a major depressive disorder in the medically ill). If you wish to facilitate learning of new or rarely used medications, be sure to include these in the medication card stack.

Diagnosis Cards. Diagnosis cards are simply a stack of cards that represent individual psychiatric diagnoses. We suggest using diagnoses or clinical scenarios that are commonly treated with psychopharmacologic interventions. If a more focused didactic is desired, use only one diagnosis for the entire game. When first learning how to play and facilitate

this game, it may be easiest to limit the diagnoses to Major Depressive Disorder, Bipolar I Disorder, and Schizophrenia. Once gameplay is better understood, then begin incorporating anxiety disorders, delirium, etc if so desired. These cards can be as simple as notecards with the diagnoses written on them.

Complication Cards. Complication cards are a stack of cards that represent specific medical comorbidities, clinical scenarios, medication interactions, etc that would require an extra level of thinking beyond the basic treatment of the diagnosis. This can be an endless list; thus, we will only provide some specific examples. We suggest starting off with complication cards that include specific scenarios in the following categories: medication administration difficulties (liquid only diet, NPO, need for intravenous or intramuscular administration, etc), concomitant medication that would pose specific cytochrome P450 interactivity (ciprofloxacin, carbamazepine, gemfibrozil, primidone, etc), medical comorbidities (chronic pain, prolonged QTc, Wilson's disease, hepatic impairment, renal dialysis, HIV/AIDS, bone marrow transplant candidate, Roux-en-Y gastric bypass, etc) age groups (children, women of childbearing age/pregnant, geriatric, etc), most prominent symptoms (sleep difficulty, fatigue, hallucinations, agitation, etc), a patient who has a high propensity for certain side effects and wishes to avoid meds that would continue/worsen these side effects (such as SIADH, sexual side effects, nausea, etc), etc. Clearly, the details of these cards could cover a massive variety of clinical scenarios and can easily be updated as medicine continues to advance. Similarly, these could be as simple as notecards with the complication written on the card (while learning this process, we suggest making these complication cards "cheat sheets" for some pertinent facts about the scenario to help the facilitator create a lively educational discussion).

Extra Point Cards. Extra point cards are an optional addition to the cards that include any random or interesting psychopharmacology facts (see Table 1 for details). We originally created cards for this stack that included unusual or unique FDA approvals, historically interesting information, unique CYP metabolism, etc. Stahl's Essential Psychopharmacology Prescriber's Guide⁸ has an index section of FDA approvals and The Medication Fact Book for Psychiatric Practice⁹ holds many interesting psychopharmacology factoids that can be used as extra point cards. The options for these cards are endless. These cards can simply be a phrase written on a notecard (eg, "Gain 3 points if you can discard a card that is FDA approved for Schizoaffective Disorder").

Participants

Learners. This game can be played by individuals or teams. If the learners are playing as individuals, the best gameplay occurs

Table 1. Additional Point Chart.

Optional Strategies for Additional Points ^a				
Strategy	Example	Positives	Negatives	From experience
Input “Extra Point Cards” for random or interesting psychopharmacology facts in the complications deck	3 to 5 points if you can discard a card that: —is FDA approved for schizoaffective disorder —is metabolized into another marketed medication —is metabolized by CYP 2A6 0 points for a wrong answer	Keeps audience interest. Can be used to incorporate any facts that you want to ensure are “taught” during the didactic. Allows for discarding of medication cards that would not be as frequently used.	Could take the focus away from the main topic of medications in the medically ill. Takes more effort to create interesting factoids in preparation for the game rather than discussing randomized clinical combinations.	Good strategy, typically well received. Consider making an “interesting facts” pile and separately draw from the stack if you find you have a large amount of factoids.
Offer points to the first player or team to submit their answer	3 points—first to submit 2 points—second to submit 1 point—third to submit	Saves time, allows faster answers thus more rounds, thus more discussions. Often an extra piece of enjoyment for the competitive players	May promote players to blindly answer just to get the points. Does not allow time for searching the literature prior to answering.	Good strategy that has been overall well received from players. Would not recommend if <3 teams or players. The risk of negative point values addresses the drawbacks to a degree.
Offer points for “teaching” about the medication card	1 extra point for each fact presented on submission: (not limited to these examples) 1. Mechanism of action 2. FDA approval 3. CYP substrate 4. CYP interactions 5. Monitoring parameters 6. If you had never heard of the medication before	Puts teaching back on the learners (active learning). Refreshes basic sciences discussions. Gives motivation to look up details that sometimes can be glossed over when quickly making decisions. Allows discussions to occur about rarely used medications.	May extend the game time, and slow down players from submitting an answer (to look up all these details each time). Thus less rounds of the game.	To be used appropriately, players either need to be well versed in these facts, or there needs to be a decent amount of playing time for fact lookup. An in-between is to make this strategy a single or random occurrence (perhaps as a card in strategy #2)
Offer Points for their “uninhibited” choice	1 to 2 extra points for the players’ ideal medication choice if not restricted by their medication card options	Allows players to get some points for knowing a correct answer, despite not having a card to represent their knowledge. Allows players to give their own personal rationale behind their prescribing practices.	May prevent the players from putting in the effort to make the difficult decision of choosing a medication within the limited scope of their med options (part of the very crux of the game’s learning focus)	Use this sparingly (if at all). When used, press for collaborative learning and require a good justification explanation. This is helpful if teams do not have ANY appropriate answers to the prompt, but it does take away aspects of gameplay enjoyment (risk of negative points for a bad answer)

Abbreviations: FDA, Food and Drug Administration; CYP, Cytochrome P 450.
^aBased on player feedback.

within the range of 3 to 8 players. If the learning group is broken up into teams, the ideal gameplay occurs within the range of 2 to 5 teams (averaging 2-5 individuals on each team). If there are more learners than recommended for the style of play (>8 if playing as individuals, or >25 if playing in groups), there would need to be separate games conducted by separate facilitators. The recommended lowest level of education for learners would be a third-year medical student and/ or a student who has completed step 1 USMLE/COMLEX. However, the training level that allows the most productive discussions includes psychiatry residents, fellows, and attending physicians. A prerequisite of a basic understanding of cytochrome P 450, pharmacology, and the pathophysiology of diseases promotes the best collaborative discussions.

Facilitator. Expert consensus in teaching psychopharmacology indicates that the most important qualities of an effective psychopharmacology educator include attributes such as knowledge, enthusiasm, honesty, an ability to encourage critical thinking, and genuine interest in the student.¹⁰ One of the greatest factors that influences the success of PBL is the skill and knowledge of the facilitator.⁶ The PBL literature consensus seems to indicate that the best facilitator is a content area expert, who is fully familiar with the medical curriculum being taught, and has been appropriately trained in facilitation.⁶ Considering the scarcity of board-certified consultation-liaison psychiatrists who specialize in psychopharmacology, appropriate facilitators typically include attending psychiatrists > consultation-liaison psychiatry fellows > upper-level psychiatry residents.

Timeframe. The best learning experience occurs if there is ample time to allow appropriate discussions and literature searches. We found that a minimum of > 45 min was necessary to dedicate to gameplay. We often played this game 1- and 1.5-h timeslots that were dedicated for resident and fellow didactics. If these games were played at the end of the day or on retreats (with ample time available), the game naturally tended to last 2 h.

Pre-Game Setup

Player Cards. Each individual player or group is given roughly 10 to 20 medication cards (agree upon the number before starting the game) and the remainder of the medication cards are placed face down in stacks in front of the learners. The number of cards in hand is based on the skill level of the players (more cards in hand is typically easier) and mathematically if there are limited cards available to distribute. If you wish to focus your didactic on a particular medication class or diagnosis, only hand out cards equivalent to that scenario (eg, only use medication cards that represent antidepressants if the focus of the didactic were to be “using antidepressants in the medically ill,” or “treating depression in the medically ill”). Players/teams are allowed to see all of the cards in their hand, but are not allowed to see other players/teams’ cards. They also are not allowed to see the medication cards that are face down in front of them.

Facilitator Cards. Place the stack of diagnosis cards and complication cards (optional: extra point card stack) in front of the facilitator. When first learning how to play this game, it may be beneficial for the facilitator to be aware of the upcoming diagnoses and complications. This would allow for more appropriate preparation for the upcoming discussion, if necessary. Unless attempting to focus the didactic on one single medication class or diagnosis, we would suggest the learners be blinded to the upcoming diagnosis cards, and always be blinded to the upcoming complication cards.

Resources Available to the Group. We found benefit in both open and closed book gaming sessions; however, the best discussions occurred with open book sessions as this allowed use of references to strengthen the treatment justification conversations. The internet provides an unlimited variety of journal resources for use in these discussions; thus, players would benefit from bringing a device that can quickly search the internet. Tangible books were also found useful in educational discussions. A noncomprehensive list that would be of benefit to have available during the game (in alphabetical order) include: Clinical Manual of Psychopharmacology in the Medically Ill,¹¹ Managing the Side Effects of Psychotropic Medications,¹² Massachusetts General Hospital Handbook of General Hospital Psychiatry,¹³ Psychosomatic Medicine:

Pittsburgh Pocket Series,¹⁴ The American Psychiatric Association Publishing Textbook of Psychopharmacology,¹⁵ The American Psychiatric Association Publishing Textbook of Psychosomatic Medicine and Consultation-Liaison Psychiatry,¹⁶ Schatzberg’s Manual of Clinical Psychopharmacology,¹⁷ Stahl’s Essential Psychopharmacology: Neuroscientific Basis and Practical Application,¹⁸ and Stahl’s Essential Psychopharmacology Prescriber’s Guide.⁸

Gameplay

To visualize an algorithmic walkthrough of the gameplay, please see Figure 1.

Facilitator Prompt

The facilitator draws a diagnosis card as well as a complication card and announces “Treat a patient with (drawn diagnosis) in the context of (drawn complication).” Example: “Treat a patient with schizophrenia in the context of severe hepatic impairment.” If the majority of the players are more advanced learners, the facilitator can draw 2 complication cards to add more difficulty to the PBL scenario. Example: “Treat a patient with schizophrenia in the context of severe hepatic impairment and Parkinson’s disease.” If the didactic is to be focused on one diagnosis, the facilitator only needs to draw complication cards. If the didactic is to be focused on one medication type, the facilitator would still need to draw both diagnosis and complication cards. If using the optional “extra point cards” with interesting facts, the facilitator can draw them in place of one of the complication cards. Example: “Treat a patient with schizophrenia in the context of severe hepatic impairment and gain 3 points if you can discard a separate card that is metabolized by CYP 2A6.”

Learners’ Response

The players/teams look through the 10 to 20 medication cards in hand and attempt to decide what medication card would best treat the diagnosis in the context of the drawn complications. Learners can use whatever resources they have available to prepare for their decision (and eventual justification of this decision). When the learners have decided on what single medication card would best fit the scenario, they officially “submit” the card by placing it face-up on the table. Depending on the comfort and experience level of the group, this step can be timed to not delay the game. See Table 1 for pros and cons of giving points to the first team to submit a card. If playing with “Extra Point Card” scenarios, the learners can submit an additional medication card to address the additional prompt.

Discussion of Justifications

Once all players/teams have formally submitted their one medication card that they feel best treats the diagnosis in the context

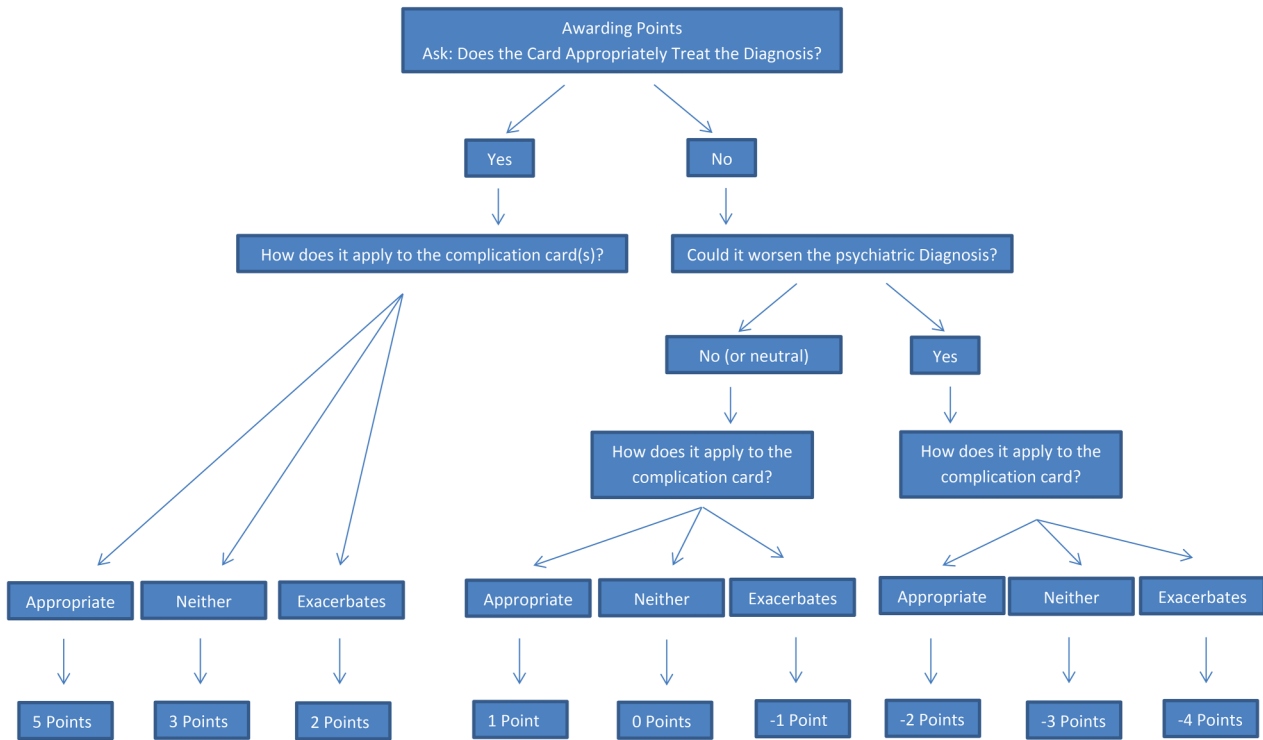


Figure 1. Gameplay algorithm. ©[2021] Mayo Foundation for Medical Education and Research. All rights reserved.

of the drawn complications, the learners give their justification and rationale behind why they chose the submitted card. The facilitator will coordinate the discussion to allow the players’ thought processes to be unveiled, and the literature justifying their decision to be shared. The goals of this discussion should include disseminating knowledge, familiarizing the group with the literature, becoming comfortable with the available resources, rationalizing decisions in complex medical situations, critiquing treatment justifications, and practicing the art of psychopharmacology. See Table 1 for pros and cons of optional methods of gaining points in this section by offering points for “teaching” certain aspects about the chosen medication as well as offering points for their “uninhibited” choice (if they were not restricted to using the cards in their hand).

Award Points

After the educational discussion has occurred, points are scored. See Figure 2 for the point-scoring algorithm. In short, when scoring the “appropriateness” of the chosen medication card, the facilitator (or a designated scorekeeper) determines if the played card appropriately treats the relevant diagnosis. If the answer is no, the only way to achieve any points for the round is if the card is appropriate to the drawn complication (this keeps players from frivolously playing any card when they are unable to treat the drawn diagnosis). If the card does not treat the diagnosis and could actually worsen the diagnosis (eg, playing a stimulating

antidepressant for a patient suffering from mania), points can be lost from negative point values. Similarly, the card is scored in relation to its ability to apply to (or worsen) the drawn complication card. This scoring method rewards players in a way that demonstrates the priorities of psychopharmacology treatment in the medically ill: attempt to treat both the diagnosis and the comorbidity; however, ensure the diagnosis is appropriately treated first.

We acknowledge that such a strict, “by the numbers” algorithm for scoring implies absolutes, when in actuality, psychopharmacology in the medically ill is an artform as well as a science. In these clinical scenarios, there are many correct answers and very few absolute wrong answers. From our many playthroughs of this game, we found that the facilitator plays a crucial role in ensuring this brevity of appropriate answer choices is understood. We feel that the facilitator can and should use their clinical experience and the available resources to come to the final decision regarding the “appropriateness” of a medication (hence the facilitator makes the final decision on awarded point values). Furthermore, the fact that scoring comes after the discussion, oftentimes brings forth far more rigorous literature searches for justification of why a card is classified as “appropriate” > “neither” when considering the complication cards.

Set up for the Next Round

After points are awarded, players/teams place the submitted medication card in a discard pile and draw a new card from



Figure 2. Points algorithm. © [2021] Mayo Foundation for Medical Education and Research. All rights reserved.

the large stack of face-down medication cards in front of them. The players cannot look at the card's face before drawing it out of the card stack. In essence, the new card drawn must be completely blinded, with the exception of potentially knowing the medication's general class (if the medication cards are color coded—as noted above we use blue-backed cards represented antipsychotics and mood stabilizers while red-backed cards represented the rest of the medication). Players should always start each round with the same number of medication cards in their hand (thus, if they discarded 2 cards to also fulfill the optional "Extra Point Card," they would need to draw 2

cards). This step should only take a few seconds. Once the players'/teams' hand of cards is replenished, repeat the game-play sequence.

Game Feedback

Feedback was obtained from debriefing discussions at the end of each session as well as anonymous surveys when the game became more popular and utilized on a more frequent basis. Feedback was received from medical students, psychiatry residents, consultation-liaison fellows, child and adolescent fellows, and attending psychiatrists.

Trainee Feedback

The vast majority of trainee's feedback was positive. Medical students were particularly complimentary about unveiling some of the complexities of the interface between psychiatric treatment and medical comorbidities. The largest negative feedback from medical students was that the discussions could be "over their heads" at times. This is understandable, as the target demographic includes psychiatric physicians in training. The vast majority of the feedback from psychiatric physicians in training came from psychiatry residents. They noted that they greatly enjoyed the competitive nature of the game and appreciated the engaging content provided by the discussions around treatment justifications. One resident noted, "This was the most interested I have ever been in a psycho-pharm didactic." The majority of the negative feedback from the psychiatry residents in training were reviewed and addressed by creating additional strategies to award points beyond the basic algorithm discussed above, see Table 1 for additional methods for awarding points. Other aspects of negative feedback from psychiatry residents in training included appropriate pacing of the game. This was greatly improved over time as the groups began better learning the flow of the game and how to better formulate their reasoning behind their treatment choices. Pacing was also improved after adjusting for appropriate time for players to use textbook and journal resources versus time to teach from the facilitator.

Facilitator Feedback

The feedback from facilitators was also mostly positive. They particularly voiced appreciation for how little time was needed to prepare for the didactic (after the initial cards were created). In addition, facilitators noted that these games were quite academically stimulating to them as well. The facilitator's largest negative feedback centered on the initial learning curve on leading the game while maintaining the educational discussions. This feedback quickly improved overtime as the game flow became more understood by those involved. Additionally, facilitators noted that it was essential for game leaders to be open about gaps in their own knowledge and to be willing to collaboratively learn alongside the players, thus shifting the teaching expectation to the group as a whole and fostering the use of the available resources to answer unknown questions.

Discussion

In this report, we presented an original card game that utilizes a unique, engaging, and competitive PBL method for teaching psychopharmacology in the medically ill. It has the potential to be used for focused didactics regarding specific drug classes and also has the ability to be used for broad psychopharmacology reviews. It engages the players and helps them learn how to justify complicated medical decisions. In addition, the limited

card allotment allows for creative thinking in the context of complex medical decision-making—drawing a parallel to the medication restrictions seen with some hospital and insurance formularies. The game allows both open book and closed book playthroughs. If using an open book method, it can help players familiarize themselves with the available resources that would be used to support their justifications. The game is also flexible in regards to the players' levels of education and has been played by medical students, psychiatry residents, and fellows throughout their years of training with positive feedback from each category.

Learning theory emphasizes that adults better retain knowledge when the content is delivered in more immersive and interactive environments and provides relevancy to their professional goals.¹⁹ Providing psychopharmacologic instruction in the context of a clinical case provides better assimilation for the learners as they can see directly how the pharmacology knowledge is applicable to patient care.¹⁹ As better outcomes are produced by this type of active learning, many psychiatry residency programs are moving away from traditional didactic lectures in an effort to better both resident satisfaction and success.²⁰ To that end, games are becoming more widely applied within health sciences education to facilitate learning through the integration of information in an active and competitive environment.⁷ Games engage learners beyond the focus of information transmission (as seen in conventional lecture-based teaching) and instead confront students with an interactive problem while offering ways to explore the problematic situation. This provides the learners with opportunities to further to develop higher levels of learning, such as application and analysis.²¹ Games can support higher-level discussions that assist in enhancing communication, social collaboration, and critical-thinking skills, which are essential components in appropriate medication decision making in the medically ill.⁷

We acknowledge that the use of rewards in the educational setting to improve student motivation is controversial (as seen by utilizing a scoring system in our game).⁷ Researchers that support this method of approach note that rewards contribute to increasing motivation and performance.⁷ We found this to be true with our game, where the motivation for engagement was far superior when utilizing a graded point system in comparison to a binary point system or no reward for giving appropriate answers. We also found that solely relying on a positive point system caused many of the highly competitive players to primarily focus on attaining points rather than producing a scientifically validated and thought-out medication justification. This behavior was quickly countered by incorporating a negative point value system that takes away points for inappropriate and harmful answers. We found that the graded point system created the highest yield conversations among trainees as the positive point system engaged learners, while the negative point risks produced more quality engagement. This graded point system reflects the educational

gaming literatures' recommendations that the competitive element of the game should be sensible to encourage motivation without promoting conflict between students or discouraging individuals with insufficient knowledge or low self-esteem.⁷

The majority of studies regarding games being used to teach medical curriculum report that students are highly satisfied with games and find them enjoyable, interactive, and stimulating.⁷ In order for games to be successful, games should be continuously updated and modified in tandem with the advances in medical sciences, the needs of a program's curriculum, and student feedback.⁷ We found that our game is easy to modify according to these designations as additional information can easily be added, removed, or edited within the facilitator's card decks. Our card game reflects the literature's findings of other gaming pedagogical techniques where educational games can help complement and reinforce taught material by promoting students' participation and engagement in an interactive, enjoyable, and motivational learning environment.⁷

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