

***Escaping the Routine:
Design and Evaluation of an Escape Room Themed
Nonprescription Drugs Lab***

An Application for the Newell Innovative Teaching Award

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Description of the Project

The Accreditation Council for Pharmacy Education (ACPE) *Standards 2016* articulate elements Doctor of Pharmacy programs must meet in order to ensure that student pharmacists are *Practice-ready* and *Team-ready*.¹ The standards include expectations and recommendations for utilization of active learning strategies, such as audience response activities, case-based teaching, and flipped classroom to promote student learning. Additionally, the American Association of Colleges of Pharmacy (AACP) recommended the use of *serious games* to enhance student collaboration, and train students in a simulated environment.^{2,3}

First year students of the Union University College of Pharmacy complete the PHRM 718 Nonprescription Drugs course which focuses on the identification, assessment, and treatment of medical conditions utilizing nonprescription therapies. The course comprises both didactic lectures and a traditional lab component with standardized patient cases to provide students with practice opportunities. To meet the diverse learning needs of students and expectations of the academy, we designed escape room themed lab sessions for three conditions for which nonprescription therapies are commonly used in pharmacy practice. These include: 1) Cough, Cold, and Allergy, 2) Ophthalmic, Oral, and Otic Care/Disorders, and 3) Dermatologic Conditions.

For each lab session, a total of 53 students were randomly assigned to nine teams, with each team comprising 5-6 students. Each escape room session challenged student teams to complete a variety of gaming tasks pertaining to the Pharmacists' Patient Care Process to successfully escape. Students were challenged to collect and assess patient information, identify an appropriate nonprescription medication, and counsel regarding its optimal use within the time limit. Sample games include: crossword puzzles, mason ciphers, shooting a basketball into a goal, memory matching games, preparing nonprescription remedies, patient counseling, and blood pressure measurement (**Table 1**). Per their discretion, each team was allowed to request a maximum of 2 lifelines. A 2-minute penalty was assessed for each lifeline to encourage students to communicate and collaborate with each other. During each session, Zoom[®] video conferencing platform was used to observe student interactions and to maintain a line of communication between faculty and teams. Following the escape room activity, a 15-minute debriefing session was conducted to review lab content and to provide teams with formative feedback regarding their

strengths and opportunities for improvement. During this time, students were also provided the opportunity to ask questions and discuss the topics with faculty experts.

Student learning and effectiveness of the escape room activity was assessed via pre- and post-knowledge assessments and a perceptions survey, respectively. Prior to entering the escape room, teams completed a pre-assessment to determine their baseline knowledge. Following the debriefing session, students completed a post-knowledge assessment. The perceptions survey assessed effectiveness of the escape room activity in reinforcing lecture content, fostering problem-solving and interpersonal skills. Student performance in the escape room activities and knowledge assessments had no impact on their course progression.

Table 1: Escape Room Themed Nonprescription Lab Format

1. Cough, Cold and Allergy Escape Room Lab			
N = 53	5-6 Students per Team	35 minute Time limit	Tasks Completed: SCHOLAR-MAC Puzzle (Patient Interviewing); Cipher (Non-pharmacologic Therapies); Crossword Puzzle (Treatment Exclusions); Locked Box (Allergy Case Study); Dose Calculation Challenge (Pseudoephedrine); Locked Box (Cold/Cough Case Study); Counseling Challenge (Patient Education)
2. Ophthalmic, Oral, and Otic Escape Room Lab			
N = 53	5-6 Students per Team	35 minute Time limit	Tasks Completed: Interactive Board Matching (Clinical Knowledge); Treasure Hunt (Otic Therapy Exclusions); Charades (Clinical Exclusions); Basketball Challenge (Team work); Eye Chart Game (Water Clogged Ear Remedy); Water Experiment (Home Remedy Preparation); Crossword Puzzle (Non-pharmacologic Therapies); Tiles Game (Match Symptoms with Condition); Counseling Challenge (Allergic Conjunctivitis)
3. Dermatology Escape Room Lab			
N = 53	5-6 Students per Team	25 minute Time limit	Tasks Completed: Patient Assessment Challenge (Blood pressure measurement); Case Study (Therapy Selection); Crossword Puzzle (Patient Counseling); Locked Box Game (Patient Counseling); Wall Game (Drug Facts); Tiles Game (Match Symptoms with Condition or Characteristics)

How the Project Differs from Current Methods

Pharmacy programs have assimilated a variety of student-centered active learning strategies to supplement traditional classroom lectures. However, with regards to nonprescription drugs, active learning strategies employed include case studies, journaling, and team-based learning, with none reporting use of an escape room strategy.^{4,5} To our knowledge, we are the first ones to utilize an escape room strategy to reinforce nonprescription drug

knowledge and patient counseling skills in a simulated environment. Highlights of our escape room project are listed below.

1. Pharmacists regularly encounter questions regarding safe and optimal use of nonprescription drugs. Consequently, pharmacists must be well versed to adequately assess patient needs, select appropriate therapy and educate patients regarding optimal use of these drugs. In this context, our escape room lab covered several conditions for which nonprescription therapies exist.
2. The layout of our escape room activity: baseline knowledge assessment followed by the escape room activity and real time formative feedback from faculty experts, reinforced content and patient education skills as evidenced from study findings (**Table 2**).
3. For each escape room activity, team members were randomly assigned, and tasked to work in a simulated clinical environment. This approach improved team dynamics and enhanced problem solving skills (**Table 2**).
4. The simulated nature of the lab allowed us to train students without the risk of harm to a patient, challenged students of all performance levels, and encouraged students to learn from mistakes without becoming discouraged (**Table 2**).
5. The escape room lab sessions differed from the traditional lab routine in that it provided students with an active learning environment which encouraged students to collaborate, learn from each other, develop and to practice clinical decision-making skills (**Table 2**).
6. Finally, our effort is interdisciplinary. The research team comprised faculty from both departments of UUCOP, pharmaceutical sciences and pharmacy practice, in addition to student pharmacists. This collaboration encouraged merging of drug action principles with clinical practice, and also allowed us to mentor student pharmacists interested in joining the academy post-graduation.

In summary, this is the first report of an active learning opportunity presented to students in an escape room lab setting.

Opinion of the Success of the Project and Opportunities for Improvement

Overall, we consider this project to be a success. Please refer to **Table 2** for a summary of study results from the first two escape room sessions. At the time of submission, the third lab session is in progress (April 1-5, 2019). Data from the first two sessions indicated that majority of students agreed (98.12%/96.22%) that the escape room activity reinforced lecture material, enhanced problem solving skills (96.23%/90.56%), and improved team dynamics (98.11%/92.45%). A paired sample *t-test* revealed a statistically significant increase ($p = 0.000$) in knowledge post completion of the escape room sessions (**Table 2**). Also, the pre and post-knowledge assessments for the first two sessions showed an average improvement of 13.96% and 14.72%, respectively.

While executing the project, we constantly monitored student feedback to identify opportunities for improvement. At the end of each escape room session we collected student feedback from the perceptions survey and refined subsequent tasks. For example, following the first escape room, we identified the need to increase the number of tasks that required students to work as a team. Accordingly, for the second escape room, we increased the number of tasks, with enhanced level of difficulty and with ones that are more interactive in nature (**Table 1**). Students responded well to this challenge, interacted better with teammates and took time to complete the activity. For the third escape room, we reduced the allotted time to complete the activity from 35 minutes to 25 minutes. This change allowed us to gauge potential improvements with regard to peer interactions, and encouraged decision-making skills and information recall of our students. Additionally, we saw a correlation between improved course exam 1 scores and the first escape room session. At the end of the semester, we plan to evaluate student performance in course level exams to determine the overall impact of this active learning strategy on student learning.

In line with the tradition of excellence at Union University, we designed and executed this project to enhance student learning within an escape room setting. Through the use of interactive educational games, we modified the traditional lab experience and avoided repetition of stimuli while increasing the possibility of student engagement within the learning process. Students indicated that they looked forward to the friendly competition among teams and the opportunity to review the lecture and lab material within a new environment.

In conclusion, data analysis and student feedback points to a positive impact of this approach in improving student learning and skill acquisition and contributed to our efforts to train UUCOP students to be *Team-ready* and *Practice-ready*. Lessons learned from this iteration will be used to expand escape room lab offerings during the 2019-2020 academic year.

Table 2: Study Findings

Cough, Cold and Allergy Escape Room 1 (ER 1)	Pre-assessment (Mean Score)	Post-assessment (Mean Score)	Paired Sample <i>t</i> -test	
	56.04%	70%	$p = 0.000$	
Ophthalmic, Oral, and Otic Escape Room 2 (ER 2)	Pre-assessment (Mean Score)	Post-assessment (Mean Score)	Paired Sample <i>t</i> -test	
	43.77%	58.49%	$p = 0.000$	
Student Perceptions Survey Data			ER 1 (Strongly Agree + Agree) %	ER 2 (Strongly Agree + Agree) %
1. The activity was an effective way to reinforce information I learned in the lecture portion of class.			98.12	96.22
2. The activity fostered my problem-solving skills			96.23	90.56
3. The escape room activity allowed me to collaborate with my team members.			98.11	92.45
4. The activity allowed me to learn from my teammates.			94.34	94.34
5. The escape room activity allowed me to practice my clinical skills in a simulated environment.			92.46	86.79
6. The debriefing session was valuable			86.80	90.57
7. This type of gaming activity motivated me to participate in group work			96.23	96.23
8. The activity encouraged me to better communicate with my teammates			98.11	96.22
9. I learn better from active learning techniques such as escape room than from in-class lectures.			84.90	79.25
10. The escape room activity encouraged me to learn from mistakes without becoming discouraged.			94.34	92.46
11. After completion of the activity, I feel confident in recommending OTC medications for THIS condition.			84.91	73.58
12. After completion of the activity, I feel confident in recommending non-pharmacologic options for THIS condition.			88.68	86.79
13. The games included in the escape room made me anxious and hindered my learning			5.66	1.89
14. I would recommend this escape room activity for other OTC topics.			98.11	100.00

References:

1. Accreditation Council for Pharmacy Education. Accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree. Standards 2016. <https://www.acpe-accredit.org/pdf/Standards2016FINAL.pdf>. Accessed April 2, 2019.
2. Cain J, Conway JM, DiVall MV, et al. Report of the 2013-2014 Academic Affairs Committee. *Am J Pharm Educ.* 2014;78(10): Article S23.
3. Cain J, Piascik P. Are Serious Games a Good Strategy for Pharmacy Education?. *Am J Pharm Educ.* 2015;79(4):Article 47.
4. Dicks M, Romanelli F. Impact of Novel Active-Learning Approaches through Exploration of iBooks® and Gamification in a Reformatted Pharmacy Course. *Am J Pharm Educ.* e-View. Posted online on 7 Jun 2018.
5. Eukel H, Frenzel J, Cernusca D. Educational Gaming for Pharmacy Students – Design and Evaluation of a Diabetes-themed Escape Room. *Am J Pharm Educ.* 2017;81(7):Article 6265.