An Evaluation of Open Artificial Intelligence Derived Patient Cases in an Online Pharmacotherapeutics Course

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Background

- Incorporating artificial intelligence (AI) in pharmacy education is an expanding area of opportunity. A recent review identified only five studies highlighting AI in pharmacy teaching and learning.[1]
- Potential uses of AI for pharmacy education discussed in recent literature include **AI-generated educational material** such as lectures, **clinical cases,** assignments, and exam questions.[2]
- The Doctor of Pharmacy curriculum teaches student pharmacists how to utilize the Pharmacists' Patient Care Process (PPCP) model to identify and analyze drug-related problems (DRPs) within patient cases.
- One challenge that course instructors have is creating **unique patient cases** to ensure that students are **working independently** and exposed to a **wide variety** of clinical scenarios.
- ChatGPT, a form of open AI, can be used to generate individualized patient cases for students.

Objective

- To evaluate the creation of unique patient cases using ChatGPT for second-year student pharmacists to work independently on case-based assignments across multiple topics in a seven-week pharmacotherapeutics course.

Methods

- Second-year student pharmacists (P2s) (n=44) enrolled in an **online neurologic and psychiatric pharmacotherapeutics course** (4 credits) utilized ChatGPT to generate three **individual** patient cases to **independently** complete DRP assignments.
- Three DRPs were assigned throughout the seven-week course.
  - Topics included **seizure disorders** (week 1), **schizophrenia** (week 4), and **major depressive disorder** (week 5).
- Data regarding the variation of patient cases were retrieved from student Canvas Learning Management System (LMS) submissions and analyzed using descriptive statistics.

Methods (continued)

Figure 1. **Major Depressive Disorder (MDD) DRP Assignment Process**

The instructional designer developed detailed assignment instructions on the Canvas LMS course page including how to use ChatGPT

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Students utilized the template below containing a bank of prompt variations to choose from regarding symptomatology, demographics, comorbidities, healthcare setting, and other clinical characteristics

Instructions:

1. Choose one item from each list (A-G) below and insert in the appropriate place in Prompt #1 and #2
2. Copy Prompt #1 into ChatGPT and submit
3. Copy Prompt #2 into ChatGPT and submit

#1. ChatGPT Prompt (Patient Case)

Provide a unique patient case scenario for a A patient with major depressive disorder with their B depressive episode for a pharmacy student without an answer key. The patient is C. The patient has a history of psychiatric treatment with D FDA-approved psychiatric medications. Provide the drug names and the treatment efficacy. The patient has a significant E. The patient also has F. Use an FDA-approved F medication with a dose. The patient has one drug allergy to an FDA-approved medication. Do not provide the recommendation to the drug-related problem.

#2. ChatGPT Prompt (Objective Results)

Provide hypothetical results of a height, weight, vital signs, comprehensive metabolic panel, fasting lipid panel, thyroid function tests, vitamin D, vitamin B12, and complete blood count with differential for a A patient with major depressive disorder and F which is G to their symptoms. Do not provide a summary.

Prompt Examples:

A	C	E	F
Young adult	Currently admitted to the hospital on a medical unit	Sleep symptoms	Hypertension
Pregnant	Currently admitted to the hospital on a behavioral unit	Appetite symptoms	Alzheimer's disease
Post-partum	Presented to a comprehensive psychiatric emergency program	Suicidality	Acute kidney injury
Middle-age	Is at an outpatient psychiatrist appointment	Fatigue symptoms	HIV
Older adult	Is at an outpatient primary care apppointment	Substance use	Parkinson's disease

Assignments were completed and assessed using the School of Pharmacy standardized Drug-Related Problem form and rubric

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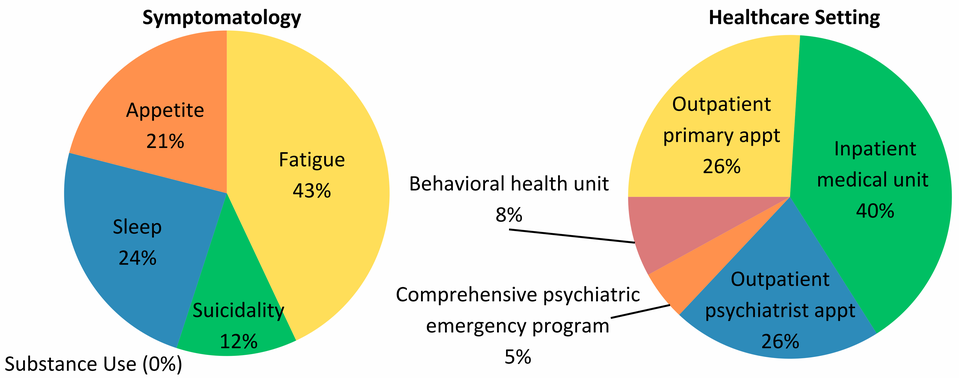
Students uploaded a three-minute video to a class discussion board summarizing their patient case and DRP evaluation

Results

- For the topics of seizure disorders and schizophrenia, **over three fourths** (79.1% and 86.4%, respectively) of the cases generated were unique and utilized by a single student.
- **All but two** (95.3%) of the cases generated for major depressive disorder (MDD) were unique and utilized by a single student.
- For each of the three clinical topics, **no identical case was used by more than 3 students.**
- Clinical case diversity was evident within and across topics.

MDD Case Prompt Variation



Discussion

- The assignment required **effective prompts** to provide intent and allow ChatGPT to establish context, for example:
  - "FDA-approved" prevented cases generated with fictitious drug names.
  - "Do not provide the recommendation" and/or "without an answer key" were incorporated.
  - "With a dose" provided critical medication details.
  - "Hypothetical" was used for laboratory values because ChatGPT will not generate medical results.
- For future assignments students should:
  - Submit their ChatGPT-generated case for instructor context and clarification.
  - Choose prompts of varying difficulties to expand their clinical competency (e.g., nearly all students chose hypertension for prompt "F").
  - Be provided detailed video submission instructions to ensure concise case review by students (e.g., three minutes).

Conclusions

- The use of ChatGPT successfully created individualized patient cases for student pharmacists, thus improving their ability to independently assess diverse elements of clinical cases.
- This assignment template can be utilized throughout the Doctor of Pharmacy curriculum to generate unique patient cases across varying specialties.

References: 1. Cain J, Malcom DR, Aungst TD. The Role of Artificial Intelligence in the Future of Pharmacy Education. Am J Pharm Educ. 2023;87(10):100135. doi:10.1016/j.ajpe.2023.100135
2. Abdel Aziz MH, Rowe C, Southwood R, Nogid A, Berman S, Gustafson K. A scoping review of artificial intelligence within pharmacy education. Am J Pharm Educ. 2024;88(1):100615. doi:10.1016/j.ajpe.2023.100615