

EVALUATING THE APPROPRIATE USE OF PHARMACY CALCULATIONS BY A GENERATIVE PRE-TRAINED TRANSFORMER

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OBJECTIVE

- Conflicting evidence regarding GPT ability to accurately perform clinical calculations
 - ChatGPT is 100% accurate on pharmacy calculations (Munir 2024).
 - ChatGPT is less accurate on calculation questions than non-calculation questions (Kunitsu 2023).
- AI has the potential to assist pharmacists and improve clinical accuracy
- **Need to identify strengths and weaknesses of GPT in answering clinical calculations**

METHODS

- Standard patients with significant differences in CrCL
 - Male/Female differences (0.85 multiplier)
 - Use of different weights (total, ideal, adjusted)
 - Meaningful CrCL cutoffs for specific drugs (rosuvastatin, rivaroxaban)
- Asked 115 sample questions:
 - Direct: directly asked for the calculation result
 - Recommendation: asked for a clinical recommendation based on calculation
 - Caution: asked for clinical cautions based on calculation.

RESULTS

- **Directly calculated CrCL accurate in 2/12 (17%) cases.**
 - Error range 9-138%
- **Clinical recommendations appropriate for 34/48 (71%) of questions**
 - Appropriate for 8/16 (50%) when renal adjustment necessary

DISCUSSION

- ChatGPT is not a reliable method for performing or learning clinical calculations.
- Nor is ChatGPT appropriate to use in situations where calculations are necessary to make clinical decisions.

CHATGPT RESPONSES TO CLINICAL QUESTIONS ARE INCONSISTENT AND OFTEN OMIT CRITICAL INFORMATION NEEDED FOR AN APPROPRIATE RESPONSE

Question Strategies

Strategy	Description
Direct Context	Contains all information needed to complete the calculation in a sentence format.
Clinical Recommendation	Asks for direct clinical recommendation based on information needed to solve the calculation and answer a drug-specific question.
Clinical Caution	Asks to identify any concerns based on information needed to solve the calculation and answer a specific clinical concern.

Example Questions

Strategy	Description
Direct Context	What is the creatinine clearance for a 82-year-old female who is 62 inches tall, weighs 54 kg, and has serum creatinine 1.3 mg/dL?
Clinical Recommendation	A 68-year-old female who is 61 inches tall, weighs 55 kg, and has a serum creatine 3 mg/dL needs anticoagulation for stroke prevention due to atrial fibrillation. What dose of rivaroxaban is appropriate for this patient?
Clinical Caution	Should I be concerned about hyponatremia in a 64-year-old male patient with serum sodium 133 mEq/L and glucose 300 mg/dL?

Task Performance Results

Task	Appropriate Responses n (%)
Calculates Creatinine Clearance	2/12 (17%)
Calculates Adjusted Body Weight	7/10 (70%)
Calculates Ideal Body Weight	0/10 (0%)
Considers SCr/CrCL when recommending a high-intensity statin	4/12 (33%)
Recommends appropriate dose of rivaroxaban	8/12 (67%)
Calculates adjusted calcium (per albumin)	2/3 (67%)
Calculates adjusted sodium (per glucose)	8/8 (100%)
Correctly identifies or rules out hyponatremia	2/8 (25%)
Correctly identifies or rules out hypernatremia	2/8 (25%)

References

- Munir F, Gehres A, Wai D, Song L. Evaluation of ChatGPT as a tool for answering clinical questions in pharmacy practice. J Pharm Pract. 2024;0(0). doi:10.1177/08971900241256731
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