



Teaching Students How to Integrate Basic and Clinical Sciences to Enhance Clinical Decision Making

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PURPOSE

- Students tend to learn in silos, and with the amount of material covered in Pharmacy courses, there are few chances to require them to integrate knowledge from different topics, integrate basic and clinical science concepts and be able to address cases with multiple issues that better represent real-life situations. The capstone sessions aim to provide opportunities for such cases.
- The capstone sessions provide opportunities for collaboration between basic and clinical faculty, which may also result in better delivery of material earlier in the curriculum.
- The capstone sessions expose P3 students to many of the topics they learned earlier in the curriculum to better prepare them for their advanced experiential training.

CAPSTONE SESSIONS

Setup:

- The capstone module are made up of eight sessions as part of the Principles of Drug Action V course offered during the Fall of the P3 year.
- Each session runs for two hours and introduces an average of three cases. Each session is based on a specific disease state or patient population (Table 1) but integrates concepts from other topics. For most sessions, at least one faculty from each of the three participating departments, clinical sciences, medicinal chemistry and pharmacology, were present.

Pre-Session Preparation:

- Faculty prepare three to five case studies that integrate basic and clinical science knowledge along with individual assessment questions. The cases and assessments are reviewed by the director of education to ensure comprehensiveness, flow and consistency between sessions.
- Students are given a study guide around one week prior to the session. The guide includes resources that they may use to prepare for the session.

Capstone Session:

- Students are assigned to teams of 5-6 students.
- An open-book individual assessment is given during the first 10 minutes of each session as an assurance readiness assessment. These assessments test basic knowledge of concepts discussed during the session.
- Teams are given around 20 minutes to work on each case and provide answers to accompanying questions.
- The faculty randomly choose a team to go over the case and present their answers to the provided questions. A discussion moderated by the faculty ensues, typically focusing on integration of basic and clinical knowledge and how to utilize such knowledge to arrive to the best clinical decision.

Assessment:

- Each team receives a grade based on the answers and discussion on the cases they are assigned (20% of the grade).
- Students receive individual grades for participation in discussions (10% of the grade).
- Each student receives a grade based on their performance on the individual assessment (20% of the grade).
- A Final written exam, based on the cases and the discussions during the sessions, provides 50% of the total grade.
- The capstone module is graded as a pass/fail, with an incentive where students meeting predetermined grade landmarks can improve their overall course grade.

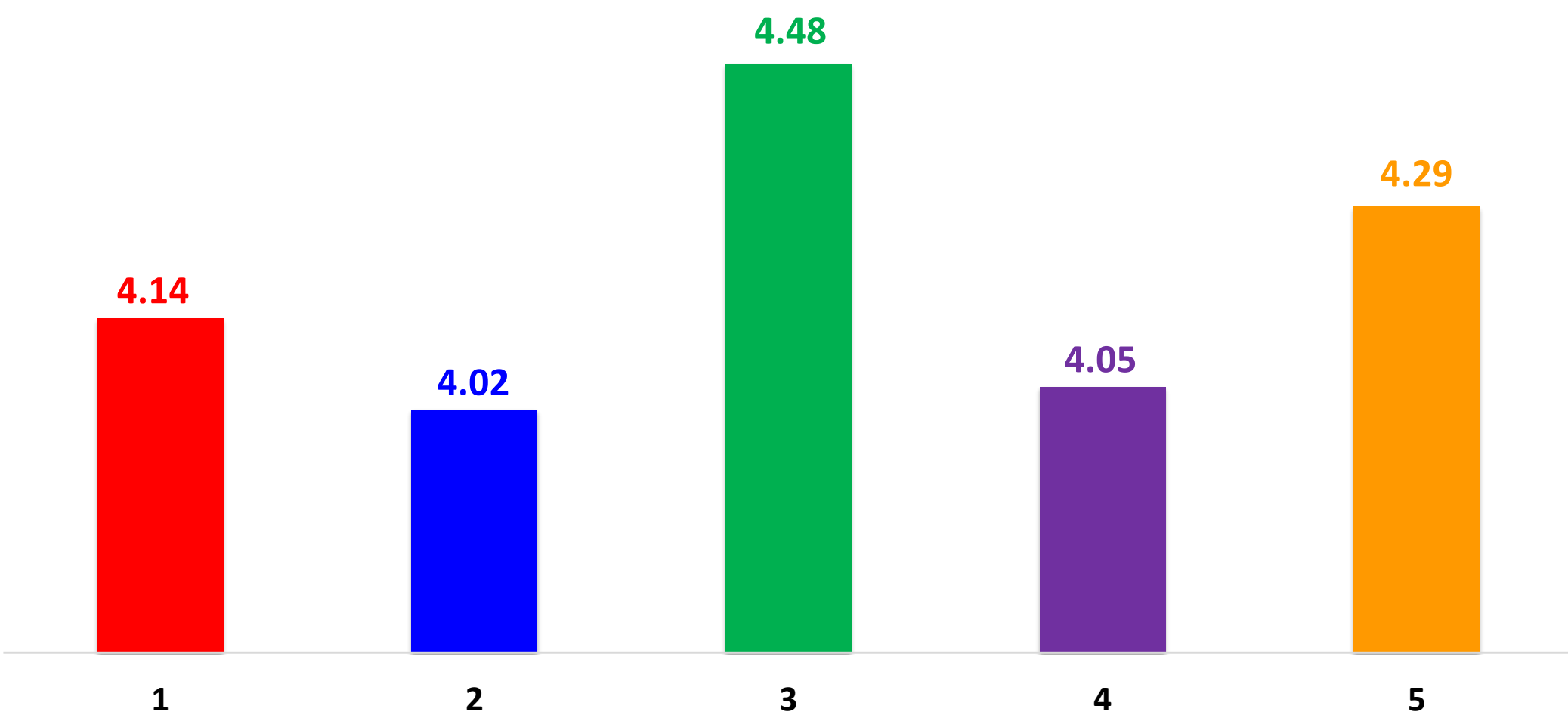
CAPSTONE SESSION CONTENT

Table 1: Capstone Sessions – Fall 2017

Capstone Session	Focus
Drug Metabolism	Drug-Drug Interactions and Pharmacogenomics
Pain, Asthma, Allergies and Inflammation	Managing patients with these conditions, including the elderly
Cardiology	Managing patients with multiple cardiovascular disorders
Diabetes	Therapeutic approach for special patients and those with comorbidities
Endocrine Disorders	Managing patients with thyroid disorders and other hormonal imbalances
Neurology and Psychiatry	Managing patents suffering from psychosis, depression and neurological disorders
Pediatrics and Geriatrics	Managing medications and dose adjustment for pediatric patients - Managing elderly patients on multiple medications
Infectious Diseases	Therapeutic decision making for patients with community-acquired and hospital-acquired infections

STUDENT SURVEY

Figure 1: Student Perception of the Capstone Sessions

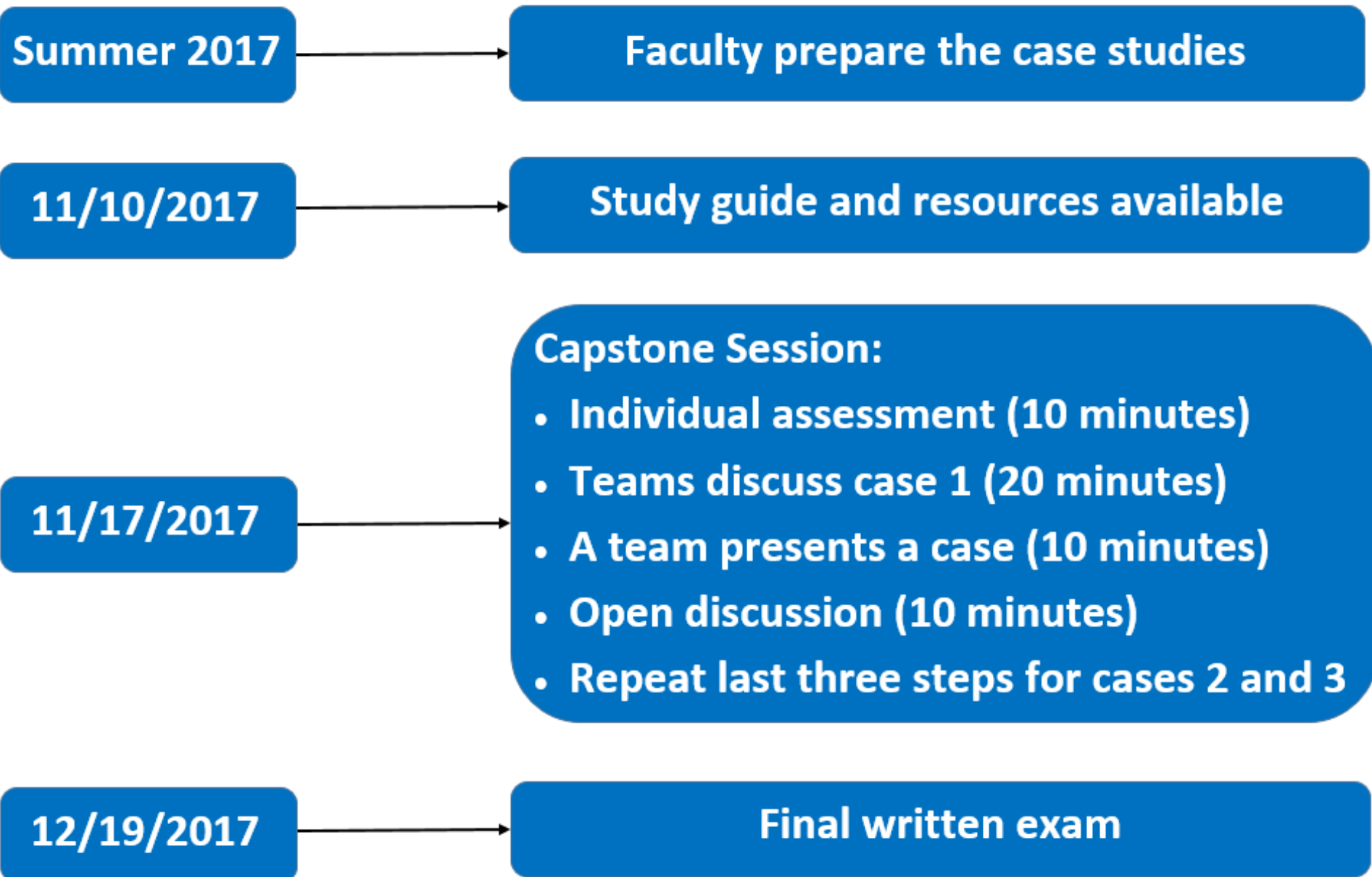


Question List:

- Overall I am satisfied with the capstone sessions
- The capstone sessions provided a good educational value
- I prefer the sessions where a clinical expert was present
- Most sessions were successful in integrating the basic and clinical knowledge
- The workload of the capstone sessions was manageable

TIMELINE

Session Two: An Example: Pain, Asthma, Allergies and Inflammation



CONCLUSIONS

- Introduction of the capstone sessions was generally well received by students.
- Collaboration between faculty on the design of the cases resulted in improved communication when teaching the same material earlier in the curriculum.
- A few changes to the sessions will be implemented starting in the fall of 2018, based on student feedback. These changes include:
 - Inclusion of a clinical expert in every session.
 - Modification of amount of time per topic. For example, less time will be given to drug metabolism and more time for cardiology.
 - Better resources will be available to students for preparation for the sessions.
 - Individual assessments will be part of the pre-session preparation, allowing for real time assessment and more time for case presentations.

CASE STUDY – AN EXAMPLE

Suzanne Jones is a 76-year-old female with a past medical history of hypertension, type 2 diabetes, chronic obstructive pulmonary disease, osteoporosis, gastroesophageal reflux disease, insomnia, and glaucoma. She experienced a fall that resulted in a right hip fracture 10/21. She reported that she woke up in the middle of the night and fell, but was not sure of a specific cause. Her family brought her to the Michigan Medicine Emergency Department and she was subsequently transferred to the Acute Care for Elders (ACE) unit. You are the pharmacist working on the floor today (10/22) and you gather the following information from her medical chart:

Medication list at admission to hospital:

- Albuterol 90 mcg inhaler, 1-2 puffs every 4-6 hours as needed
- Aspirin 81 mg tablet, once daily
- Diphenhydramine 25 mg tablet, 3 tablets at bedtime as needed
- Insulin glargine 100 units/mL pen, 18 units once daily
- Latanoprost 0.005% solution, 1 drop in both eyes at bedtime
- Lisinopril 10 mg tablet, once daily
- Tiotropium 18 mcg capsule, inhale the contents of 1 capsule once daily

New medications since admission:

- Acetaminophen 325 mg tablet, 2 tablets three times daily as needed
- Oxycodone 5 mg tablet, 1 tablet every 4-6 hours as needed

Allergies: Metformin: severe diarrhea

Vital signs: (10/21)

Height: 5' 3"
Weight: 124 lbs
Blood pressure: 152/86 mmHg
Heart rate: 88 bpm
Respiration rate: 16 bpm
Temperature: 98.8 °F

Pertinent labs: (10/21)

Test	Ref Range & Units	Result	Test	Ref Range & Units	Result
Sodium	136-146 mmol/L	139	Urea nitrogen	8-20 mg/dL	8
Potassium	3.5-5.0 mmol/L	3.7	Creatinine	0.50-1.00 mg/dL	1.3
Chloride	98-108 mmol/L	103	Glucose	73-100 mg/dL	112
CO ₂	22-34 mmol/L	28	Calcium	8.6-10.3 mg/dL	8.7

Questions:

- What most likely contributed to the hospitalization and why?
- Are there any potential contraindications among these medications for this patient?
- What is the name of the guidelines that describe potentially inappropriate medications that should be avoided in older adults?
- Review table 7 in the guidelines identified above. Which medications are currently available as over-the-counter products in the United States?
- Why is the regulatory status of these medications relevant?
- What do you recommend regarding this medication given the likely indication and the patient's preference for non-prescription products? What reference contains reliable information to support this recommendation?

Follow-up:

Ms. Jones is transferred to the subacute rehabilitation facility, Glacier Hills, on 10/27. You are working as a consultant pharmacist and review her medical chart on 10/31 to assess medication safety and efficacy.

Questions:

- What is the therapeutic use and mechanism of action for any new drugs in the medication list?
- What is your primary medication-related concern and why?
- What do you recommend? If a medication includes name, strength, frequency, and monitoring parameters.

Follow-up:

Ms. Jones was discharged home on 11/14. You conduct a pharmacy telephone transition of care visit today (11/17) in preparation for her appointment with her primary care physician on 11/20. The purpose of your visit is to assess medical stability and perform a comprehensive medication review. During the phone call you collect the following information from Ms. Jones:

Click for current medication list:

Medication adherence/cost: Manages her own medications using a weekly pillbox. Son lives nearby and picks up medications from local pharmacy. She reports missing no doses of medications since arriving home. She is concerned about the cost of her medications, but she has been able to obtain all of them from the pharmacy.

Medication efficacy/safety: She is unsure whether her medications are working well as she has been on many of them for a long time. She does not believe she is having any side effects from her medications.

Symptom assessment: Reports that she is no longer experiencing any pain related to the hip fracture.

Patient self-assessment: Hip fracture: pain is well controlled with acetaminophen. Hypertension: BP yesterday 138/72 mmHg and HR 68 bpm using automatic arm cuff.

Type 2 diabetes: does not check blood glucose at home due to difficulty reading the small screen. Chronic obstructive pulmonary disease: used albuterol once since being home.

Osteoporosis: eats 1 serving of dairy with breakfast and 1 serving of dairy with dinner. Gastroesophageal reflux disease: had acid reflux three times during subacute rehab.

Glaucoma: has follow up scheduled with optometrist.

Diet: Adjusted her diet approximately a year ago to try to better control her diabetes. Includes vegetables, lean protein, whole grains, low fat dairy, some fruit, and she limits sweets and fats. Reports that she had difficulty sticking to diet while in subacute rehab due to limited options.

Exercise: Is scheduled to receive twice weekly physical therapy at home. She reports following their instructions related to safe exercises in between visits. She is using a cane to ambulate and has not experienced any falls since hospital discharge.

Questions:

- What is your primary medication-related concern and why?
- What do you recommend instead? If a medication include name, strength, frequency, and monitoring parameters.

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DISCLOSURES

The author has no relevant disclosures concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.