Use of Physician-Mentored Patient Rounds (PMPR) to Observe Pre-Clinical Medical Students' Ability to Perform Entrustable Professional Activities 1-4

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Abstract

The pre-clinical years of medical school (years 1-2) focus on the explanatory sciences to inform clinical practice. Entrustable professional activities (EPAs) were created to determine if students can be entrusted with clinical practice. Many different ways to observe and assess students' EPA skills are commonly employed during clinical years 3 and 4. If pre-clinical students' EPA skill development could be observed and assessed, then our students may begin the process of developing EPA skills earlier. We utilize large-group, physician-mentored, patient rounds (PMPR) to observe EPAs 1-4 skills in pre-clinical students. PMPR involves a patient, a physician-mentor and a pre-clinical class of 172 students. Each PMPR is divided into four 30 minute sessions.

Methods

The physician mentor identified a suitable patient from their practice to participate in sessions 1-2 of the PMPR. PMPR sessions followed a patient through history taking (PMPR sessions 1 and 2; EPA-1), physical examination (PMPR session 2; EPA-1), diagnostic test ordering/interpretation (PMPR session 3; EPA-3) and treatment plan creation (PMPR session 4; EPA-4). Between sessions, students completed an assignment submitted via Google Forms™. Assignments included construction and refinement of a differential diagnosis (DDx; EPA-2), ordering diagnostic tests (EPA-3) and developing a treatment plan (EPA-4). The student responses were analyzed, and at the next session the physician provided interactive feedback on students' aggregate thinking.

Results
I. PMPR Experiences and Student Participation

-Three classes of medical students were given opportunities to participate (Class of 2017, 2018, and 2019) **total = 516 students; 172 students/class**
- -2017- **three PMPRs;** second year- Pulmonary (COPD), Endocrine (Graves), and Rhematology/oncology (scleroderma)
- -2018- **four PMPRs;** first year- two PMPRs; Gastrointestinal (short bowel), Cardiovascular (CHF); second year- two PMPRs; Pulmonary (COPD), Endocrine (Hashimoto)
- -2019- **three PMPRs;** first year- one PMPR; Gastrointestinal (celiac); second year- two PMPRs; Pulmonary (COPD), Endocrine (well patient with undiagnosed diabetes)

-Attendance and assignment completion by class
- -Class of 2017- 3 PMPRs (87-92% attendance)
- -Class of 2018- 4 PMPRs (83-95% attendance)
- -Class of 2019- 3 PMPRs (85-95% attendance)

Conclusions: Student attendance varied from class to class and from PMPR session to PMPR but were all high (83-95%).

II. Student-Physician Mentor Interactions During PMPR Sessions

-The physician mentor used PMPR sessions to highlight both appropriate and inappropriate student contributions
-The physician mentor highlighted the students' need to use the knowledge acquired in medical school to solve each patients' case
-Students had a rich opportunity to learn from the aggregate successes and failures of their classmates in a non-intimidating environment.
-The physician mentor created a collective student experience that provided a safe learning environment in a large-group setting
-This was accomplished, in part, by emphasizing EPA skill development rather than specific clinical content or "getting the right diagnosis"

Conclusions: PMPRs were designed for student EPA skill development and were NOT used to "get the right answer". In that context, the physician-mentor had opportunities to highlight appropriate/inappropriate student contributions. This was done without intimidating or singling out students.

III. EPA 1: Gather a History and Perform a Physical Examination

-History gathering in the large group setting was chaotic but complete (verified by faculty observation).
-Most students included the COPD patient's diagnosis in their DDx after getting the patient's history (average = 83.3%; Table 1).
-Less than half the students included the patients' diagnosis in their DDx after taking the patient's history for the following diagnoses (Table 1); scleroderma (30.4%), short bowel (49.6%), CHF (40.5%), celiac disease (12.7%).
-A small number of students' (17.7%) included diabetes in the DDx for a well patient with undiagnosed diabetes (Table 1).

Conclusions: History taking in a large group was chaotic. Patient diagnosis inclusion percentages vary considerably after the history and physical examination and depended on the organ system affected.

Table 1: Students that Included the Patients' Diagnosis (Dx) in Their Differential Diagnosis (DDx)			
Section/Patient Diagnosis	Included Patient Dx in DDx After History (%)	Included Patient Dx in DDx After Physical (%)	Included Patient Dx in DDx After Diagnostic Tests (%)
Class of 2017			
Pulmonary/COPD	150/159 (94.3%)	152/154 (98.7%)	158/158 (100.0%)
Endocrine/Graves	143/154 (92.9%)	148/162 (91.4%)	137/147 (93.2%)
Rheumatology-Oncology/scleroderma	**45/148 (30.4%)**	**133/155 (85.8%)**	**160/164 (97.6%)**
Class of 2018			
Gastrointestinal/short bowel	65/131 (49.6%)	127/142 (89.4%)	151/156 (96.8%)
Cardiovascular/CHF	66/163 (40.5%)	88/149 (59.1%)	145/154 (94.2%)
Pulmonary/COPD	109/157 (69.4%)	140/142 (98.6%)	161/161 (100%)
Endocrine/Hashimoto's	**148/159 (93.1%)**	**149/158 (94.3%)**	**143/159 (90%)**
Class of 2019			
Gastrointestinal/Celiac disease	20/158 (12.7%)	31/150 (14%)	158/160 (98.8%)
Pulmonary/COPD	137/159 (86.2%)	147/157 (93.6%)	149/151 (98.7%)
Endocrine/Well patient with undiagnosed diabetes	28/158 (17.7%)	39/160 (24.4%)	156/159 (98.1%)
Average Percent for All PMPRs	**58.6%**	**74.9%**	**96.7%**

IV. EPA 2: Prioritize a Differential Diagnosis Following a Clinical Encounter

-After the physical exam the percentage of students including the patients' diagnosis in their DDx increased for all PMPRs except in the patient with Graves disease (92.9% to 91.4%; Table 1).
-Diagnostic testing increased the percent inclusion of patient diagnoses for all PMPRs except in the patient with Hashimoto's disease (94.3% to 90%; Table 1).

Conclusions: Nearly all the students could narrow their DDx to the most likely diagnosis (90-100%; average = 96.7%; Table 1)

V. EPA 3: Recommend and Interpret Common Diagnostic and Screening Tests

-During the PMPR with the class of 2017 (COPD patient) the physician mentor noticed that students ordered too many diagnostic tests.
-Following physician mentoring (order tests to prioritize DDx) students ordered fewer and more appropriate diagnostic tests (Figure below).
-Median lab test costs went from $145 to $90 after physician mentoring
-Median procedure and imaging costs went from $525 to $290 after physician mentoring
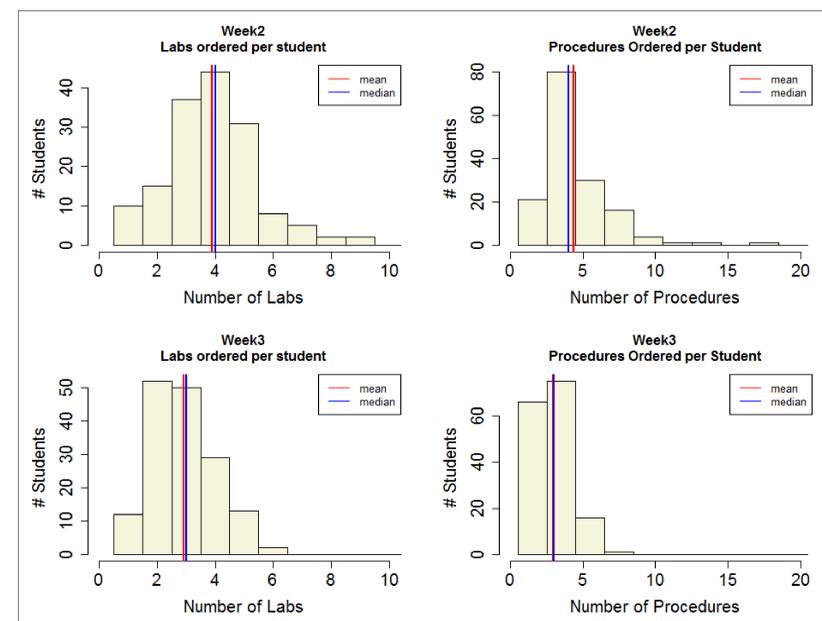
Conclusions: Expert guidance that directed the student to have a reasoned approach to testing resulted in reductions in lab test and procedure orders and billing.

VI. EPA 4: Enter and Discuss Orders and Prescriptions

-Most students developed appropriate treatment plans.
-However, during one PMPR [class of 2017 (COPD patient)] at least eight students prescribed a muscarinic agonist rather than a muscarinic antagonist and two students prescribed a beta-antagonist rather than a beta-agonist.
-Thirty other students may have made these errors but were not identified because they used abbreviations for beta and muscarinic medications (SABA and LABA or SAMA and LAMA).

Conclusions: Confusing the distinction between terms like agonist and antagonist is potentially problematic for some medical students when prescribing medications and the use of abbreviations may also lead to patient harm.