Published in final edited form as:

Med Teach. 2014 June ; 36(6): 475–479. doi:10.3109/0142159X.2014.886767.

A clinical refresher course for medical scientist trainees

TALIA H. SWARTZ and JENNY J. LIN

Icahn School of Medicine at Mount Sinai, USA

Abstract

Introduction—MD–PhD students experience a prolonged hiatus away from clinical medicine during their laboratory research phase and some have experienced difficulty transitioning back to clinical medicine during clerkship years. We developed a clinical refresher program that serves to rebuild clinical skills prior to re-entering the clinical clerkship years.

Methods—A nine-week program includes a combination of didactic and practical review in history, physical exam, presentation and clinical reasoning skills. The program uses multiple modalities from classroom-based activities to patient care encounters and includes a final assessment using standardized patients.

Results—After seven years of experience, we have made modifications that result in our students scoring comparably well on a standardized patient exam to their second-year medical student colleagues. By the end of the course, all students reported feeling more comfortable completing a history and physical examination and some improvement in preclinical knowledge base. Review of clerkship scores showed a higher percentage of MD–PhD students scoring Honors in a clerkship in years after course implementation as compared to years prior to course implementation.

Conclusion—We describe a clinical refresher course for successfully retraining MD–PhD students to re-enter clinical medical training. It is effective at restoring clinical skills to a level comparable to their medical student contemporaries and prepares them to rejoin the medical student class at the conclusion of their research phase.

© 2014 Informa UK Ltd.

Correspondence: Talia H. Swartz, MD, PhD, Clinical Instructor, Box 1090, Department of Medicine, Division of Infectious Diseases, Icahn School of Medicine at Mount Sinai, New York, NY 10029, USA. talia.swartz@mssm.edu.

Notes on contributors

TALIA H. SWARTZ, MD, PhD, is an Instructor in the Division of Infectious Diseases at the Icahn School of Medicine at Mount Sinai and is Assistant Director of the Medical Scientist Training Program. She is also a graduate of the program. She is a KL2 Faculty Scholar through the Clinical Translational Science Award and co-directs the Clinical Refresher Program at the Icahn School of Medicine at Mount Sinai. Her clinical interest is in HIV and her research interests include HIV pathogenesis and inflammation. JENNY J. LIN, MD, MPH, is an Associate Professor of Medicine in the Division of General Internal Medicine at the Icahn School of Medicine at Mount Sinai. She co-directs the Clinical Refresher Program at the Icahn School of Medicine at Mount Sinai. Her clinical interests include preventive medicine, diabetes and hypertension management, women's health and sexual dysfunction. Her research interests are in medical education and issues involved with cancer survivorship, medication adherence and comorbid disease management. She actively participates in the medical education of students and residents at Mount Sinai.

Declaration of interest: The authors report no declarations of interest.

Introduction

Physician scientist training programs support students in obtaining a dual degree of an MD and a PhD in order to encourage individuals to pursue careers doing medical translational research. Students in these programs usually finish two years of pre-clinical classes, alongside graduate coursework, and then move to the research phase, which may take three to five years to complete (Dyrbye et al. 2004; Brass et al. 2010). Students then re-enter the medical school to start their clinical training.

Since there is a long hiatus between the pre-clinical and clinical years of training, these dual-degree students are often at a disadvantage upon entering their clinical clerkships as compared with their single degree medical student counterparts. They report feeling uncomfortable with their clinical skills and knowledge base since their pre-clinical training was several years in the past (Chandavarkar et al. 2007; O'Brien et al. 2007; Roberts et al. 2012; Raat et al. 2013). During the PhD research years, some students may have limited clinical exposure such as participation in a student-run clinic or through shadowing experiences (Chumley et al. 2005; Goldberg & Insel 2013); however, major lapses in clinical exposure often persist.

Clinical refresher or re-immersion programs exist in dual-degree programs in various forms at different institutions (van Gessel et al. 2003; Poncelet & O'Brien 2008; Roberts et al. 2012; Goldberg & Insel 2013). They vary in factors including duration of course, whether the course is required, the level of required participation of students and the amount of clinical exposure and didactic experiences. Programs range in duration and some strongly encourage, students to take a course to refresh their clinical skills prior to re-entering the clerkship years but do not require it (Chumley et al. 2005; Chandavarkar et al. 2007; Brass et al. 2010; Bills et al. 2013). At University of Pennsylvania, students participate in an observational course in which students are assigned to inpatient teams and learn through observation. At the University of South Florida, students spend the full year prior to third year spending a half-day clinic/week in an observational role. At Dartmouth University students are set up with individualized clinical exposures in a shadowing role. At Harvard Medical School, a Longitudinal Course in Clinical Medicine runs for eight weeks and is recommended (but not required) for all returning MD–PhD students (Bills et al. 2013). The course consists of weekly two-hour sessions to re-introduce history and physical exam skills and subsequent sessions include interactive case discussions presenting common clinical problems. One morning per week, students participate in rounds with an inpatient team and then are assigned to a patient whom they follow and then present to an inpatient preceptor.

We have developed a formal clinical refresher training course to help dual-degree students more smoothly transition into clinical years by refreshing their skills in history taking, physical examination, oral and written presentation, and clinical reasoning.

How to start/How we started/ What we did

Program development

We started our clinical refresher program in 2007 with a group of seven students who were starting their clinical clerkships after three to five years of PhD training. The course was developed around a multi-disciplinary approach to refreshing clinical skills and consisted of weekly half-day sessions over three months. Each week, there were organized didactic sessions on the history and physical exam and then practice sessions with patients in the outpatient clinic. Small group sessions led by subspecialist faculty focused on specific clinical diagnoses to help encourage students' problem-solving skills.

During the first several years, students had a heterogeneous experience during the refresher course depending on who led the outpatient practice sessions. Additionally, the course was initially an elective course for those students who were interested in attending and students were able to return to clinical clerkships at any time in third year (not necessarily at the beginning of the academic year). Over the years, we made several observations and modified our program accordingly. We noticed that students who entered in the first module (between July and September) did better in their clerkships compared with students who entered later. MD-PhD students are now required to enter the third year within the first module. We also noticed that attendance dropped off over the length of the course as students were nearing their thesis defense so course attendance is now mandatory for all students in the MD-PhD Program who are returning to the clinical clerkships, and excused absences are limited and must be authorized by the Director of the MD-PhD program. Finally, in student feedback, we learned that students found the practical clinical sessions more rewarding than the didactic sessions, so we have incorporated more direct patient care with supervised presentation skills in the curriculum. We have integrated a combination of didactic and practical sessions, utilized standardized patients for both practical training and evaluation and feedback, incorporated shadowing an inpatient medical team to give students insight into clerkship expectations, and paired students one-on-one with attending preceptors who give individualized feedback on oral and written presentations.

Program description

The goals of the course are to enable students returning to the clinical years to: (1) know the components of the history and physical (H&P) examination, (2) present the complete H&P (both orally and in written format) and (3) recall the pathophysiology of common disease processes and clinically reason through a broad differential diagnosis for a presenting symptom. To achieve these goals, in addition to the interactive didactic sessions, students do five complete H&P examinations on inpatients, write up and perform the oral presentation for each inpatient encounter, and generate a differential diagnosis and discussion for each patient they examine.

The course currently spans nine weeks and the format includes a full eight-hour orientation followed by once weekly four-hour morning sessions for the subsequent eight weeks. The course is divided into five sections. (1) Clinical basics orientation. This is a full-day program designed to re-orient students to clinical medicine where they review history-taking and the

physical exam using both lecture and practice sessions with standardized patients. (2) Module 1: Supervised clinical skills. For the next three weeks, students have an hour didactic session on basics of note-writing, presentation skills, and use of the electronic medical record followed by an inpatient clinical experience. In the first session, students observe a full history and physical examination by preceptors with an oral presentation demonstrated. Over the subsequent two weeks, students work in pairs or individually to perform a history and physical examination, and practice presenting this information to an attending physician preceptor. Preceptors supervise each student intermittently and observe a full interaction by each student at least once during the three weeks of the module. Students write up the notes for patients they examined and receive feedback on their work. At lunchtime, students convene to discuss several “high-yield” cases that illustrate the pathophysiology of a particular organ system, led by a specialist in the field. (3) Inpatient shadowing: For one session, each student is assigned to an inpatient Medicine team to follow through work rounds and morning report. This experience helps students better understand the workflow and roles of various members of the medical team. The students meet with their residents for morning rounds and follow the team through noon. (4) Module 2: Independent clinical skills. For the last three weeks, students are individually assigned to an inpatient preceptor who helps hone their skills in conducting a history and physical examination and presenting their findings in both oral and written forms. Feedback is provided during and after each encounter. Students meet together for lunch, during which time case discussions help students further develop their clinical reasoning skills. Students are asked to work through cases that correlate pathophysiology with signs and symptoms and reviewing diagnostic testing and treatment options. (5) Final assessment. Students conduct an observed hour-long complete history and physical examination encounter with a standardized patient. They then receive direct feedback from the standardized patient and an observer and have another hour to write the complete history and physical exam of the case. Finally, they give a 10-min oral presentation of the case that is recorded and evaluated by the preceptors. Students individually meet with preceptors after the conclusion of the exam for debriefing and feedback on their examination performance and overall performance during the course.

Program evaluation

A survey of the first two years of the course indicated that students perceived that they had increased confidence in physical exam and history taking skills, interpreting laboratory data, generating differential diagnoses, formulating assessments and plans, writing notes, and understanding the role of a third year clinical clerk on the wards (Smith 2007). At the time, the only form of course assessment was students’ self-report; there was no standardized measure of academic achievement to assess the MD–PhD students performance in comparison to their medical student peers. In subsequent years, attempts to standardize student assessments were done with observed structured clinical examinations (OSCEs). The OSCE-based exam was effective at creating a standardized format on which to evaluate the students; however it had limited application in terms of clinical success and relevance. For this reason, we established the use of a standardized patient encounter at the conclusion of the course in which students must conduct a full history and physical examination followed by a written and oral presentation. This evaluation is the same as the final assessment that

second-year medical students take at the end of their year-long clinical reasoning and physical exam skills course.

Eleven students took the clinical refresher course during the spring of 2013. Students were asked to self-assess at the beginning and end of the course and reported universally that the goals of the course were met. They reported feeling competent to perform a screening physical examination and to perform a complete “History and Physical” examination on patients. They reported that they had begun to recall the pathophysiology of disease processes to better clinically reason through a differential diagnosis and stated that they now felt more familiar with the role of the third year medical student on the wards.

For the final assessment, students were evaluated on their history taking, physical examination and communication skills. Results from the assessment indicated that the MD–PhD students who completed the clinical refresher course scored comparably to their second-year (MS2) medical student peers (Figure 1, $p > 0.05$ for all comparisons). For history taking skills, the MD–PhD students scored an average of 74% compared to the MS2s who scored on average 75% ($p = 0.83$). For physical examination skills, the MD–PhD students scored an average of 85% compared to MS2s who scored on average 92% ($p = 0.08$). For communication skills, the MD–PhD students scored an average of 84% compared to MS2s who scored on average 92% ($p = 0.27$). For overall score, the MD–PhD students scored an average of 81% compared to MS2s who scored on average 86% ($p = 0.19$). Students also completed oral presentations and write ups that were evaluated individually by their inpatient preceptors and qualitative comments indicated improvement in their data gathering skills, organization, and differential diagnoses.

In review of the performance of MD–PhD students compared with their medical student peers in the third year of medical school, there has been improvement noted in their clinical performance that is noted by an increase in the average shelf scores across all clerkships (Figure 1E). In review of clerkship scores across all MD students and MD–PhD students, a higher percentage of MD–PhD students scored Honors in the years after course implementation as compared to the years prior to course implementation (Figure 1F).

What to do next/What's next

The true success of the course will hinge on the success of the students in their third year clerkships and beyond. More time is needed to monitor these students longitudinally to observe their performance during their clinical years and beyond. Our next step will be to monitor the progress of these students through their clinical clerkships and determine whether their performance is on par with their medical student colleagues. Students with particular weaknesses will be identified and offered early remediation to ensure the successful completion of their training. Fundamentally, the most important purpose of this course and systemic evaluation methods will be to identify the needs of students to best prepare them for their training as clinicians. Few studies demonstrate the efficacy of such a program based on outcome data from performance on shelf scores or clinical evaluation (Rosenberg 2008; Bills et al. 2013).

One concern that exists is that the MD–PhD students still tend to score below the average of their medical student colleagues on clerkship-based standardized examinations. This difference is most likely due to their basic science pre-clinical knowledge deficit. This knowledge deficit remains a challenge to address in the clinical refresher course, as two years of pre-clinical training is difficult to condense into a nine-week training period. Key points and clinical reasoning cases are designed to help stimulate thinking and encourage recommended readings; however, this is an area that still requires improvement. To this end, the MD–PhD program has provided access to preclinical pathophysiology lecture material to students at least one year prior to clinical clerkship reentry. In addition, students are now expected to have regular clinical exposure experiences during the PhD phase, which will also serve to stimulate clinical reasoning. Altogether, these initiatives are expected to help improve performance in the clinical MD years of training among MD–PhD students.

Conclusion

There are limited reports in the literature about programs designed to help re-orient students in a medical scientist track back into clinical medicine from the research phase of their training. This transition is a difficult one because it requires a shift in learning paradigms from hypothesis-driven questions in the laboratory to a more patient-centered practical approach coupled with the necessary re-learning of the pre-clinical knowledge base. The lack of uniform guidance about how to re-introduce MD–PhD students back to clinical medicine has compelled us to create such a program. Over the past six years, we have developed and modified our course to allow us to maximize the quality of our curriculum and build in formal assessments to evaluate the course quality and student preparedness. While our outcome measures are somewhat indicative of clinical success, i.e. higher percentage of MD–PhD scoring honors in clerkships, it is difficult to interpret these data because of shifts in clerkship grading that occurred over this time. Furthermore, the clinical refresher course teaches clinical skills that are not reflected on shelf exams, which largely test information less amenable to teaching in such a forum. The final clerkship scores also reflect shelf scores to some extent and for this reason may not be most accurate in determining efficacy of this course. Nonetheless, an improvement over the years since the course has been implemented reflects positively on the performance of students in the program.

Through the earlier offerings of the course, our evaluation process focused on self-assessment rather than a standardized measure of students' progress. With the development of a standardized examination for our students to complete at the end of the course, we are able to accomplish several goals: (1) to determine clinical competence by the completion of the course, (2) to identify students who may require additional support prior to or during the third year, and (3) to compare the MD–PhD students to the medical students who will be entering third year contemporaneously.

More years of experience with this course will enable us to create a better evidence-based curriculum. Through the use of multimodal techniques, MD–PhD students can regain the skills needed to be successful as they begin their clinical clerkships.

Acknowledgements

We would like to thank the following individuals who made the program development possible: Dr David Thomas, Dr Lisa Satlin, and Dr Goutham Narla for their contributions to starting this course, to Dr Eric Smith for compiling the early outcome data on the course, and to the Icahn School of Medicine at Mount Sinai and the Graduate School of Biological Sciences for their support of this program. Special thanks to Dr Yasmin Hurd, the Medical Scientist Training Program Director at Mount Sinai, for her support of and dedication to this program and for helpful feedback during the writing of this manuscript.

References

- Bills JL, Davidson M, Dermody TS. Effectiveness of a clinical intervention for MD/PhD students re-entering medical school. *Teach Learn Med.* 2013; 25:77–83. [PubMed: 23330899]
- Brass LF, Akabas MH, Burnley LD, Engman DM, Wiley CA, Andersen OS. Are MD-PhD programs meeting their goals? An analysis of career choices made by graduates of 24 MD-PhD programs. *Acad Med.* 2010; 85:692–701. [PubMed: 20186033]
- Chandavarkar U, Azzam A, Mathews CA. Anxiety symptoms and perceived performance in medical students. *Depress Anxiety.* 2007; 24:103–111. [PubMed: 16845642]
- Chumley H, Olney C, Usatine R, Dobbie A. A short transitional course can help medical students prepare for clinical learning. *Fam Med.* 2005; 37:496–501. [PubMed: 15988643]
- Dyrbye LN, Rohren C, Tiegs R. An MD-PhD re-entry curriculum. *Med Educ.* 2004; 38:548–549. [PubMed: 15107093]
- Goldberg C, Insel PA. Preparing MD-PhD students for clinical rotations: Navigating the interface between PhD and MD training. *Acad Med.* 2013; 88:745–747. [PubMed: 23708597]
- O'Brien B, Cooke M, Irby DM. Perceptions and attributions of third-year student struggles in clerkships: Do students and clerkship directors agree? *Acad Med.* 2007; 82:970–978. [PubMed: 17895662]
- Poncelet A, O'Brien B. Preparing medical students for clerkships: A descriptive analysis of transition courses. *Acad Med.* 2008; 83:444–451. [PubMed: 18448897]
- Raat AN, Kuks JB, van Hell EA, Cohen-Schotanus J. Peer influence on students' estimates of performance: Social comparison in clinical rotations. *Med Educ.* 2013; 47:190–197. [PubMed: 23323658]
- Roberts SF, Fischhoff MA, Sakowski SA, Feldman EL. Perspective: Transforming science into medicine: How clinician-scientists can build bridges across research's "valley of death". *Acad Med.* 2012; 87:266–270. [PubMed: 22373616]
- Rosenberg LE. MD/PhD programs—A call for an accounting. *J Am Med Assoc.* 2008; 300:1208–1209.
- Smith, E.; Satlin, L.; Thomas, DC. The evaluation of a formal clinical refresher course for MD/PhD students returning to the wards. Mount Sinai School of Medicine; National MD/PhD Student Conference, Keystone, CO: 2007.
- van Gessel E, Nendaz MR, Vermeulen B, Junod A, Vu NV. Development of clinical reasoning from the basic sciences to the clerkships: A longitudinal assessment of medical students' needs and self-perception after a transitional learning unit. *Med Educ.* 2003; 37:966–974. [PubMed: 14629409]

Practice points

- A clinical refresher course can facilitate the transition from research phase of training to clinical training for MD–PhD students
- Multimodal teaching methods improve the learning experience
- Students are able to retrieve their basic clinical skills but require more practice to use these skills
- MD–PhD students demonstrate large gaps in basic science knowledge after returning from their research phase of training
- A standardized approach to evaluation and feedback is instructive in gauging MD–PhD students' clinical proficiency compared to medical student counterparts

Figure 1.

Performance of students on standardized exam at completion of the Spring 2013 clinical refresher course. A total of 11 MD–PhD students (MDPhD) were compared to second year medical students (MS2) on their performance as evaluated on the basis of four parameters: (A) History taking skills, (B) Physical examination skills, (C) Communication skills, and (D) Overall. An unpaired two-tailed t-test with a 95% confidence interval was performed on each parameter between the two groups and no statistical significance was noted for any of the four measures. (E) Shelf scores for each clerkship were pooled and averaged among the MD–PhD students (MDPhD) compared to third year medical students (MS3) in the years pre-implementation of the refresher (pre-2007) compared to post-implementation (post-2007). (F) Clerkship scores among those who scores Pass (P, white), High Pass (HP, grey), Honors (H, black) were pooled among all clerkships and averaged among the MD–PhD students (MDPhD) compared to third year medical students (MS3) in the years pre-implementation of the refresher (pre-2007) compared to post-implementation (post-2007).