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Alliance for Clinical Education Perspective Paper: Recommendations for Redesigning the “Final Year” of Medical School

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Background: Although medical school typically lasts 4 years, little attention has been devoted to the structure of the educational experience that takes place during the final year of medical school. **Summary:** In this perspectives paper, we outline goals for the 4th year of medical school to facilitate a transition from undergraduate to graduate medical education. We provide recommendations for capstone courses, subinternship rotations, and specialty-specific schedules, and we conclude with recommendations to medical students and medical schools for how to use the recommendations contained in this document. **Conclusions:** We provide an overview of general competencies and specialty specific recommendations to serve as a foundation for medical schools to develop robust 4th-year curricula and for medical students to plan their 4th-year schedules.

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BACKGROUND

Medical school typically lasts for 4 years; to date, little attention has been devoted to the structure and educational goals for the final year of medical school. There have been calls to eliminate the 4th year of medical school altogether and to devote this time to postgraduate training.^{1–4} Significant curricular changes have generally been limited to the first three years of medical school although some schools have modified the 4th year of medical training.⁵

With this in mind, the Alliance for Clinical Education (ACE) sponsored a panel discussion about the merits of the 4th year at the 2011 Association of American Medical Colleges meeting. ACE comprises representatives from clerkship

director organizations in emergency medicine, family medicine, internal medicine, obstetrics, and gynecology (OB/Gyn), pediatrics, psychiatry, and general surgery. The authors, who were members of the panel, believe that the 4th year of medical school has great potential for enhancing the preparedness of graduating medical students for residency and should thus be a crucial component of medical education. This is particularly significant in light of the recently released competency-based milestones for resident performance issued jointly by the Accreditation Council for Graduate Medical Education (ACGME) and subspecialty organizations.⁶ As interns and residents train to meet the milestones in the face of reduced duty hours, it is increasingly important that students enter residency with the cognitive abilities, affective characteristics, and clinical skills necessary to “hit the ground running.”^{7–11}

The literature provides insight to those involved in undergraduate medical education for potential curricular topics.⁸ In a 2009 study, residency program directors from nine specialties identified self-reflection, organizational skills, professionalism, and medical knowledge as challenges for entering interns.¹² All of these areas can potentially be addressed by structured, meaningful experiences after students have completed their core clinical rotations. Walling and colleagues outline the need for reform in the 4th year of medical school, calling for (a) clarification of goals for the year, (b) time for the United States Medical Licensing Examination and residency applications/interviews, and (c) improvement in the design and evaluation of 4th-year courses to allow for a more seamless transition to residency.¹³ We agree with these recommendations. Our aim in this paper is to provide, as experienced educators and leaders in our respective disciplines, specific and actionable recommendations to senior medical students, medical schools, and residency program directors regarding the structure of the 4th year of medical school. The 4th year of medical school can be thought of as equivalent to the “final phase” of medical school. It is a time when students have finished their basic science and core clerkships and can participate in clinical rotations that require increased levels of responsibility.

Because the 4th year is a bridge between medical school and residency, the ACGME Competencies and AAMC Core Entrustable Professional Activities (EPAs) should be used to guide curriculum development.^{14,15} These competencies and their accompanying specialty-specific milestones and EPAs provide guidance to medical schools for the minimum level of competency for a starting intern and can thus be used to design 4th-year curricula.

We begin our recommendations by outlining general goals for the 4th year of medical school and guidance for the development or improvement of capstone and subinternship rotations. This is followed by suggestions for students that are tailored to their intended specialty and conclude with a summary of recommendations to medical students and medical schools. Medical schools may use different nomenclature for this period of medical school; for simplicity, we will use the term “4th year” to represent this final phase of medical school training.

TABLE 1
General competencies for graduating medical students

ACGME Core Competency: Patient Care
<ul style="list-style-type: none"> ● Data gathering and history/physical skills ● Time management/efficiency ● Competency assessment of skills and knowledge ● Use of point of care databases and EMR ● Interviewing skills with patients and families ● Management of undifferentiated patient problems
ACGME Core Competency: Medical Knowledge
<ul style="list-style-type: none"> ● General knowledge base ● Ability to formulate a basic differential diagnosis ● Up-to-date scientific evidence ● Interpretation of common imaging studies ● Informed decisions based on patient information and preferences ● Clinical reasoning and problem solving ● Information management ● Translate knowledge into best practice
ACGME Core Competency: Systems-Based Practice
<ul style="list-style-type: none"> ● Accurate documentation ● Electronic Medical Record familiarity and use ● Knowledge of healthcare systems, financing, and regulation ● Handling of transitions of care for patients
ACGME Core Competency: Practice-Based Learning
<ul style="list-style-type: none"> ● Lifelong learning ● Intellectual curiosity ● Learning on the fly
ACGME Core Competency: Professionalism
<ul style="list-style-type: none"> ● Treat patients with dignity, civility, and respect, regardless of race, culture, gender, ethnicity, age, sexual orientation, or socioeconomic status ● Empathy ● Dress and behave appropriately ● Maintain appropriate professional relationships with patients, families, and staff ● Work ethic ● Integrity ● Optimism ● Maintaining wellness ● Confidence ● Prioritization ● Prepare students for realities and transition to internship ● Document and report clinical information truthfully ● Follow formal policies ● Long-standing passion for helping others
ACGME Core Competency: Interpersonal and Communication Skills
<ul style="list-style-type: none"> ● Coordination of care

(continued on next page)

TABLE 1
(Continued)

<ul style="list-style-type: none"> ● Effective communication with patients, families, and coworkers. ● Teamwork ● Efficiency

RECOMMENDED GOALS FOR THE 4TH YEAR OF MEDICAL SCHOOL

The following are general goals for the 4th year that are relevant to all students, regardless of intended specialty:

1. Students must demonstrate that they have mastered the objectives outlined in Table 1. These objectives are categorized within the framework of the six ACGME clinical competency domains.¹⁵
2. Students should complete a required capstone course that covers topics that prepare students for residency.¹⁶ These topics are summarized in Table 2.
3. Individual students should be advised to structure their 4th-year schedules to accomplish specialty-specific objectives that prepare them for their intended specialty. These are summarized in Table 3 along with suggestions for coursework.^{17–26}
4. Students should additionally be advised to engage in a thoughtful inventory of their medical school training. Identified gaps should be addressed through the deliberate participation in rotations that address the identified areas.

RECOMMENDATIONS FOR CAPSTONE COURSES (TABLE 2)

As interns begin their training, they contend with a number of challenges that are not typically covered in standard medical school curricula. The term “capstone” is often used to define courses that focus specifically on preparing students to become interns. A number of medical schools have created capstone courses intended to better prepare students for the responsibilities of residency. These courses range in length from 2 to 4 weeks and are offered near the conclusion of the 4th year of medical school.¹⁶ The curricula vary widely between institutions, but often include “boot-camp” style sessions on the management of common clinical situations and medical emergencies. Interdisciplinary collaboration, advanced communication skills, and stress management are examples of topics that are not typically covered in medical school but that are nonetheless important to the preparation of graduating medical students.^{27,28}

Teaching and assessment methods of capstone courses can include didactics, small-group learning, simulation, and use of standardized patients. Students may be divided into small groups based on specialty choice, particularly during sessions relating to management of specific clinical situations and emergencies.

TABLE 2
Recommended syllabus for a capstone course

Topics	Example Teaching Modalities
<ul style="list-style-type: none"> ● Management of common clinical scenarios that may be encountered while providing cross-coverage ● Basic procedural skills (e.g. placing Foley catheters) <ul style="list-style-type: none"> ● Advanced Cardiac Life Support Courses ● Effective consultation skills ● Communication at the end of life ● Obtaining informed consent ● Effective “sign-out” of patients ● Bedside teaching techniques ● One-minute preceptor ● How to provide and accept feedback ● Introduction to quality improvement ● Recognizing and understanding roles of other members of the healthcare team ● Introduction to risk management and patient safety ● Stress management ● Financial planning ● Time management 	<ul style="list-style-type: none"> ● Small-group case-based discussions ● Simulated patients ● Procedure lab ● Standardized patients ● Standardized residents ● Residents as teachers curriculum ● Didactics ● Didactics

The development and implementation of a capstone or transition course requires the investment of time and resources. The involvement of instructors from multiple disciplines to cover a broad range of topics is optimal. Buy-in from students for a capstone course is critical particularly because implementation of required courses typically involves the conversion of previous “elective” time at the end of the 4th year to “required” curricular time. This loss of flexibility comes at a time when students may be preparing to move to a new city and at a point in their training that has long been viewed as a time for relaxation prior to the rigors of internship. Some level of initial resistance can thus be expected. Overcoming this challenge will require input from students in the design of new required courses and ongoing communication with students to sustain support. Capstone courses have generally received high marks from students on course quality and utility, but research on the long-term effects

TABLE 3
Specialty-specific recommendations for 4th-year courses

Specialty	Specialty Specific Objectives (in Addition to General Competencies) Students Should:	Recommendations for Subinternship	Recommended Electives	Audition Rotations Recommended?
Emergency Medicine ¹⁹	<ul style="list-style-type: none"> • Complete an Advanced Cardiovascular Life Support (ACLS) class* • Undergo assessment of proficiency in conducting common procedures encountered in emergency departments • Participate in a “resident as teacher” course • Participate in interdisciplinary team training courses • Demonstrate knowledge of patient advocacy skills 	<ul style="list-style-type: none"> • Emergency Medicine if available as a subinternship option • Alternatives: Internal Medicine or Surgery subinternships 	<ul style="list-style-type: none"> • Critical Care • Ophthalmology • Otolaryngology • Anesthesia 	One away rotation is generally recommended
Family Medicine ^{20–22}	<ul style="list-style-type: none"> • Complete an Advanced Cardiac Life Support class* • Be able to manage, in a basic manner, common pediatric problems and wellness • Be proficient in performing the pelvic exam • Engage in courses that review and clinically correlate basic science to clinical medicine • Participate in courses that promote the development of analytic and interpretive skills 	<ul style="list-style-type: none"> • Family Medicine if available • Alternative: Internal Medicine subinternship 	<ul style="list-style-type: none"> • Emergency medicine • Dermatology • Obstetrics • Ambulatory family medicine 	No
Internal Medicine ¹⁷	<ul style="list-style-type: none"> • Engage in courses that review and clinically correlate basic science to clinical medicine • Participate in courses that promote the development of analytic and interpretive skills 	<ul style="list-style-type: none"> • Internal Medicine subinternship 	<ul style="list-style-type: none"> • Pathophysiology clinical correlative courses* • Quality and safety • Evidence Based medicine • Procedural skills rotation 	No
Neurology	<ul style="list-style-type: none"> • Demonstrate awareness of the use and interpretation of common neurologic tests • Demonstrate the ability to: <ul style="list-style-type: none"> • perform a focused, reliable neurologic examination • recognize neurologic emergencies • distinguish normal from abnormal findings on neurologic exam • examine patients with altered mental status or altered consciousness • localize the lesion • perform lumbar punctures (desirable but not mandatory) 	<ul style="list-style-type: none"> • Neurology if available as a subinternship • Alternative: Internal Medicine subinternship 	<ul style="list-style-type: none"> • Ophthalmology • Psychiatry • Physical Medicine & Rehabilitation • Internal Medicine 	Optional

(Continued on next page)

TABLE 3
Specialty-specific recommendations for 4th-year courses (Continued)

Specialty	Specialty Specific Objectives (in Addition to General Competencies) Students Should:	Recommendations for Subinternship	Recommended Electives	Audition Rotations Recommended?
Obstetrics and Gynecology (OB/Gyn) ³³	<ul style="list-style-type: none"> • Demonstrate: • An adequate knowledge base in general medicine and OB/Gyn • Competency in OB/Gyn related procedures based on the Association of Professors of Gynecology and Obstetrics objectives • Balance continuum of education and USMLE requirements with ACGME regulations and needs of residencies • Advanced specialty specific training • Flexible schedule to arrange for hospital certification 	<ul style="list-style-type: none"> • OB/Gyn, or rotating sub-internship • Four week introduction to OB/Gyn Residency module 	<ul style="list-style-type: none"> • Capstone course/boot camp 	Optional but highly Recommended
Pediatrics ^{17,18,23}	<ul style="list-style-type: none"> • Demonstrate the ability to interact with children of all ages and with families • Meet the objectives outlined in COMSEP/APPD pediatric subinternship curriculum²⁵ 	<ul style="list-style-type: none"> • Pediatric subinternship (preferred) or Internal medicine subinternship 	<ul style="list-style-type: none"> • Critical Care (adult or pediatric) • Dermatology (general) • Emergency Medicine (adult or pediatric) • Evidence Based Medicine • Radiology (general) • Neurology 	No
Psychiatry	<ul style="list-style-type: none"> • Perform in-depth mental status examinations • Demonstrate proficiency in interviewing patients, including taking a thorough psychosocial history • Participate in courses that examine human behavior and/or psychiatric illnesses • Demonstrate through volunteer activities or service learning a passion for helping others 	<ul style="list-style-type: none"> • If psychiatry clerkship < 4 weeks, psychiatry subinternship; otherwise subinternship in medicine or pediatrics (if interested in child psychiatry) 	<ul style="list-style-type: none"> • Emergency Medicine • Cardiology • Dermatology • Endocrinology 	No
Surgery ²⁵	<ul style="list-style-type: none"> • Prerequisite Objectives for Graduate Surgical Education: • Successfully Navigating the First Year of Surgical Residency: Essentials for Medical Students and PGY-1 Residents 	<ul style="list-style-type: none"> • Surgery 	<ul style="list-style-type: none"> • Critical Care • Anesthesia^a • Radiology • Internal Medicine • Intensive care • Pulmonary • Cardiology • Boot camp: Anatomical dissections; lab simulations; technical experiences 	<ul style="list-style-type: none"> • Not necessary for general surgery • Orthopedics: 2–3 rotations • Urology: two rotations • Variable for other subspecialties

^aSome residency programs may include Advanced Cardiovascular Life Support as a component of residency orientation.

of such courses is lacking.¹⁶ Although capstone and transition courses appear to be on the rise on a national level, there is little data on their prevalence or long-term outcomes. In 2010, a database search identified information on such courses at only 15 U.S. medical schools and one Canadian school. There is great potential for collaboration that would benefit course directors of both well-established and new capstone programs. In addition to educational scholarship in traditional print journals, online dissemination of information and resources through services such as MedEdPORTAL^{®29} would be particularly effective in promoting collaboration on a national level.

RECOMMENDATIONS FOR SUBINTERNSHIPS

Subinternships have become increasingly important in preparing medical students for their postgraduate training. Several specialties have developed detailed curricula for subinternships in their respective fields. An example is the “Internal Medicine Subinternship Curriculum” position paper published by the Clerkship Directors of Internal Medicine Subinternship Task Force.^{30–32} Similarly, a pediatric subinternship curriculum was developed through a collaboration between the Council on Medical Student Education in Pediatrics and the Association of Pediatric Program Directors with specific objectives in each of the six ACGME core competencies.¹⁸ Such explicit curricula can transform the traditional subinternship into a more rigorous and meaningful educational experience. The 2011 ACE panel supports the development of this type of curriculum in all specialties that choose to offer subinternship experiences during the 4th year. Subject examinations may be used in conjunction with a subinternship curriculum to assess student mastery of the subject material.

SPECIALTY SPECIFIC RECOMMENDATIONS (TABLE 3)

Guided by specialty-specific recommendations for coursework, students should be encouraged to engage in rotations both within and outside their intended specialty to add breadth to their medical school experience.^{17–25,33} In addition to completing a subinternship and a capstone course, students should schedule electives that will enhance their ability to effectively practice in their chosen specialty. For example, an OB/Gyn elective for those who choose careers in family medicine can refresh and supplement the knowledge and skills students previously acquired during their required 3rd-year clinical rotations. Specialty specific recommendations for courses outside of the student’s chosen field are shown in Table 3.

Students may also wish to engage in a rotation at another institution to “audition” for a specific program, to explore a new clinical environment, or to obtain an experience unavailable at their local institutions. Recommendations to engage in audition rotations are more common within surgical specialties. Students applying to other specialties may, however, wish to experience a new clinical environment by engaging in an extramural elective or subinternship. Students should be advised that there is no

evidence to suggest that audition electives enhance students’ chances of matching into a program.³⁴ Program directors from each specialty should provide clear guidance regarding whether audition rotations are necessary and under what circumstances such rotations are recommended.

Organizations that represent undergraduate and graduate medical educators in each specialty should review their individual specialty’s ACGME milestones to create consensus documents outlining the learning objectives for the 4th year of medical school. In addition, to facilitate students’ participation in a robust course of study during the 4th year, program directors should try to minimize the disruption caused by the match process by allowing students to have flexible options for interviews. Examples of how this may be done are to avoid midweek interview dates and providing students with flexible options for interview dates.

RECOMMENDATIONS TO ALL MEDICAL STUDENTS

When preparing a 4th year schedule, we advise students to balance school-specific and specialty specific requirements with courses designed to address self-identified knowledge gaps. Medical schools should provide mechanisms for students to complete an inventory to determine gaps in their knowledge and skills at the end of their core clinical rotations. This inventory can then be used to create a customized learning plan for the final year of medical school with a focus on cementing knowledge and addressing gaps in students’ education. Patient logs, United States Medical Licensing Examination performance profiles, and end of clerkship comprehensive examinations are examples of data-points that may be used to complete such an inventory. Tools to aid students in effectively assessing gaps in their knowledge are needed and may be guided by instruments similar to Lypson et al.’s postgraduate orientation assessment.³⁵ A “customized” schedule should be created with these factors in mind. Reviewing learning needs with a trained faculty advisor is essential to developing an informed and well-rounded schedule.

Students can use the recommendations noted in this paper to plan their schedules by reviewing Table 3 and composing a schedule based upon their intended specialty and a holistic inventory of their strengths and areas for improvement. For example, a student applying to neurology would schedule a neurology subinternship and electives in ophthalmology, psychiatry, physical medicine and rehabilitation, and internal medicine. The student may decide not to spend money to engage in an audition rotation, as it is noted to be optional. Last, the student may have discovered through his or her personal inventory that he or she is unsure of the student’s abilities to interpret MRIs of the brain. The student would then enroll in a radiology elective in neuroimaging. Thus, the 4th-year medical student’s schedule would consist of (a) neurology sub-internship, (b) ophthalmology elective, (c) psychiatry elective, (d) Physical Medicine & Rehabilitation (PMR) elective, (e) internal medicine elective, (f) a capstone course, and (g) a neuroradiology elective. This

leaves approximately 3 to 4 months (depending on the timing of the school's graduation) for interviews, United States Medical Licensing Examination Step 2, and other electives.

RECOMMENDATIONS TO MEDICAL SCHOOLS FOR REDESIGN OF THE 4TH YEAR OF MEDICAL SCHOOL

To facilitate career selection, consideration should be given to including an option to complete a clinical elective in the 3rd year of medical school. Furthermore, offering flexible rotations that can be completed during the residency application process will allow students to engage in education while interviewing. Examples of such flexible educational opportunities include longitudinal electives whose requirements which can be fulfilled throughout the academic year³⁶; options for students to complete coursework online and allowing students to take electives that last for 2, rather than 4, weeks.³⁷ The latter also provides students with time to explore more disciplines. Providing students with the opportunity to enroll in a rotation after match day and before graduation in the institution where they will be doing their internship can facilitate the transition to internship. Medical schools may have rules that restrict off-campus electives at the end of the year, and we encourage allowing flexibility with such policies to promote a smooth transition from student to intern. Medical schools should approach redesign of the 4th-year curriculum with creativity and recognition of the competing priorities of students during the final stage of undergraduate medical education.^{38,39}

We strongly believe that all medical schools should require a subinternship and a capstone course for every medical student. For students matching in direct patient care specialties, schools should also consider requiring an intensive care unit experience to provide students with an opportunity to learn how to take care of patients in this complex environment. Increased responsibility for patient care in the 4th year is essential to helping students advance their clinical skills. Faculty and residents, whenever possible, should provide opportunities for the 4th-year student to function as a "manager" or "educator" rather than as an "interpreter" or "reporter" of data.⁴⁰

Finally, schools should assess that medical students have attained the appropriate competencies before they graduate. Assessment of 4th-year students should focus on higher orders of mastery ("actions") rather than solely knowledge or competence as outlined in Miller's Pyramid.⁴¹ A variety of modalities can be used and combined to assess the varying goals of 4th-year rotations. For example, clinical knowledge can be assessed by using standardized multiple choice type examinations or oral exams; attitudes and skills can be assessed using direct observation or Objective Structured Clinical Examination. Direct observations can be particularly useful as they provide workplace based assessment and prepare students for such assessments during residency. Checklists can be used to facilitate assessment through direct observation.⁴² An example of such an assessment is available through the Clerkship Directors of Internal Medicine.¹⁷

Ongoing course evaluation is essential to the maintenance of the vitality and utility of 4th year rotations. Programmatic evaluation should focus on whether curricular redesign has successfully accomplished the goals and objectives of each course.

Future directions for research include the assessment of outcomes of curricular change and the effects of innovative instructional and assessment methods in the final year of medical school.

SUMMARY

The ACGME Next Accreditation System began in July of 2013 and signals a movement toward competency based instruction and assessment of interns and residents. The utilization of a criterion versus normative-based assessment system provides specialty organizations with an opportunity to create a clear picture of how an entering intern should look and by extension, provides medical schools with a picture of how a medical student should look at the time of graduation. In this paper, we have set forth guidelines for redesigning the 4th year of medical school to optimally prepare students for the next stage of training.

We hope that these guidelines will serve as a foundation for medical schools to develop robust 4th-year curricula and for medical students as they plan their 4th-year schedules to prepare for residency. Enhancing the utility of the 4th year of medical school will require a shift in students', medical schools', and program directors' perception that the 4th year of medical school is an informal and unstructured time intended primarily for residency application followed by relaxation. We call upon medical schools, students, and residency programs to begin viewing and utilizing the final year of medical as a time to solidify students' preparedness for residency. It is time to meaningfully use all years of medical school.

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