FOUNDATIONS PHASE COMMITTEE

COMPOSITION OF THE CURRICULUM

Overall Educational Philosophies

Vertical Integration

In the present curriculum there is a disconnect between the teaching of basic science and its clinical relevance. Often times the material is taught two or more years, if ever, before its translational application becomes apparent. Moreover, we are asking students to synthesize diverse information without doing so ourselves, as teachers. On top of that, there are redundancies and gaps in the coverage of important topics.

The curriculum should be taught in a way so that the connections between the various layers of basic and clinical science—molecular, gross anatomy, microscopic anatomy, physiology, pathology and infectious (when applicable)—are obvious for any given clinically-focused problem. Approaches to diagnosis (including physical exam, how basic science translates to laboratory testing, and imaging studies) and treatment, especially pharmacological, should also be integrated. In the best case scenario, clinical instruction in the relevant portions of the H&P as well as patient contact would be similarly aligned. To accomplish this goal, we propose that teaching be organized around particular diseases. To take endocrinology, for example, topics would include diabetes, hypo/hyperthyroidism, pituitary disorders, disorders of calcium and the parathyroid, Cushing syndrome/disease, Addison’s disease, etc. An alternative approach would be to organize teaching around clinical problems or symptom complexes. However, students lack sufficient knowledge of actual disease, so formulating relevant differential diagnoses could prove challenging.

It is also recognized that there are some topics that do not well lend themselves to vertical integration and that remain as necessarily foundational subjects. This would include fundamental biochemistry, at least some gross and microscopic anatomy, pharmacology, and epidemiology. Nevertheless, inventive approaches for marrying fundamental topics with their clinical relevance should also be sought. To take biochemistry, for example, DNA synthesis could be taught in association with the pharmacology of antiviral medications.

Horizontal Integration

At the same time, there is a need to show interconnection between related disorders and underlying scientific principles, emphasizing that clinical problems seldom occur in isolation but rather within a common context of biological, environmental, and psychosocial determinants. Thus it is appropriate to continue to organize teaching along lines that emphasize organ systems, although another scheme might cluster topics with respect to traditional medical specialties. Using rheumatology, for example, while the relevant diseases primarily involve the musculoskeletal system, it would be difficult to address the full range of complications of SLE, for example, without also including skin, CNS, renal, heme and other manifestations.

Foundation Phase as Preparation for the Clinical Phase

Clinical immersion during the clerkship phase can be psychically overwhelming, and it is not the time during which the additional demands of synthesizing a disparate group of facts should be occurring.
Instead, upon completion of the Foundation Phase, students should be equipped with the basic education needed to understand, diagnose, and treat common diseases. While they will be building upon this foundation as they expand the depth and breadth of their knowledge and hone clinical skills, it should not be as if they are learning about particular illnesses (for example, the diagnosis and treatment of pneumonia) for the first time, which is, all too often, the present case. Students should be able to ‘hit the ground running’ when they enter the clinical phase, not learn it for the first time, so that they can make maximal use of their time in the clinic.

**Teaching Principles**

*One Class at-a-Time*

Classes are currently often taught without much thought to coordination of testing schedules, resulting in poor attendance at the courses for which no exam is imminent. While similar classes, such as cardiovascular and pulmonary, are grouped together by quarter, the connections between course subject matter are not always apparent. The overall schedule can be unpredictable from week-to-week, resulting in unnecessary student anxiety and complicated coordination of lectures, rooms, testing schedules, etc. for faculty. A guiding principle is that, perhaps with the exception of the introductory fundamental material taught concurrently (as described below), there should be only one (integrated) course, with a fairly regular schedule of activities within a week as well as from week-to-week.

*Integrated Testing*

Current testing philosophy and practices vary by individual course. Testing should be predictable and relevant. Testing should help to unify the WWAMI curriculum. We propose a regular weekly or biweekly schedule of testing, always occurring on the same day, perhaps Friday, to relieve stress on the weekend. Each test would be low stakes, in contrast to the current situation of just a few important midterms and finals. There would, in fact, be no midterms, and finals. To reflect both real-world preparation and improve readiness for board exams, questions should be in board format, such that they include a clinical scenario, take advantage of multimedia (i.e. photographs of skin findings, imaging studies, electrocardiograms, audio clips of heart sounds, etc.), and require a second- or third-order level of abstraction to arrive at the correct answer. A descriptive answer key should also be made available so that the exam itself, is a learning exercise. When commercial test questions are available, their use should be strongly considered, as often times, these products are well thought out, standardized, and accurately reflect board content.

Exams could be administered through a computer portal, centralized across WWAMI. Individual questions could be assigned ‘meta tags’ in which the primary subject, corresponding to a boards subscore is determined, but that other relevant topics are also noted. Students and administration should have access to the data, such that, at any given time, a student’s performance can be plotted temporally and performance on specific topics could be evaluated. Such data might prove particularly valuable when students are preparing for boards, so that more attention can be devoted to studying areas of weakness. Similarly, for students running into academic difficulties, it could be useful to determine trends in academic performance which could aid in the identification of non-academic stressors.
If courses and exams were organized around disease topics, then students could make better use of abundant generic materials now readily available on the Web, instead of catering to the idiosyncratic organization of particular instructors and their courses. For example, if the test were to be on “SLE”, one could read about the disease from any number of sources and still arrive prepared for the exam (and, later, be well prepared to take care of patients with the disorder).

Compelling Classroom Experiences

Currently, attendance at lectures is uneven. Students frequently rightfully believe that their time is better spent in self-study reviewing lecture material either specific to their course or readily available on the Internet. Yet, the foundational phase of medical school should be something more than what a smart and ambitious student could accomplish on their own merely by reading Wikipedia and a few good boards review books. Time spent together as a class should, in general, be reserved for activities that uniquely define the profession and that require interpersonal interaction, rather than passive attendance at lectures, and should emphasize group discussions, patient demonstrations, pathology exhibits, and labs. As classroom contact time is reduced, it will become especially important to make meaningful use of time spent together and ‘offload’ ‘book learning’ to make better use of electronic resources.

In the ideal case, even the out-of-classroom time would be spent in an environment unique to medical school. Students should have a place to congregate and interact, even as they perform the necessary background studying.

Resources for Instructors

Not everyone need be expert in the areas they are teaching. An argument can even be made that it is preferable to occasionally gain fresh perspective and insight by being forced to learn about, and subsequently teach, unfamiliar topics. It is recognized that curriculum reorganization will require that some instructors will need training. At WWAMI sites, additional clinicians interested in teaching students during the foundational phase may be required.

Block Structure of the Courses

Perhaps course organization may best be thought of as a two-dimensional grid of rows and columns. The rows would, grossly, correspond to present-day first-year (or in some cases, second-year) basic science courses, such as Biochemistry, Genetics, Anatomy, Histology, Physiology, Microbiology, Pathology, Pharmacology, Epidemiology, and Ethics. The columns would vary by week and would consist of diseases emblematic of particular disciplines that would be taught in several-week blocks. One way to look at the organization of a new curriculum would be that much of the existing material will continue to be taught, but that each course will ‘slide’ within the calendar such that material relevant to particular diseases are all taught at the same time in a highly integrated fashion.

A short phase in which the fundamentals of each of the basic science topics would be taught concurrently in a condensed format would precede each of the disease-focused blocks. Ideally, much of the content in these basic science-focused fundamental mini-blocks would be aggregated into self-study exercises requiring passing of a single competency exam. Students could challenge out of these mini-blocks by taking a challenge exam. The first intersession would occur after the fundamentals portion, to
give students who had problems completing this introductory phase time to re-take and pass the initial exams.

Two blocks of fundamental courses may be needed. The first would correspond to current first-year courses, as described above, with the exception of physiology. Disease-focused courses not especially requiring physiological integration would include infectious disease, cancer, allergy/immunology, dermatology, hematology, and rheumatology. Another separate block, incorporating subdisciplines of physiology would focus, in turn, on the fundamentals of neuroscience, the heart and cardiovascular system (including ECG fundamentals), respiratory physiology, and acid/base and fluid balance. After completion of this block, courses would then focus on discrete diseases in neurology, psychiatry, cardiology, pulmonary, and renal. However, each of these clinical subjects incorporates material from the basic science disciplines mentioned previously, so there would be rows added that incorporated relevant biochemistry, histology, pathology, pharmacology, microbiology, etc.

Not every “horizontal” subject would make a contribution when the calendar advanced into disease-focused teaching. For example, not every disease has a microbiological component (though conversely, infectious disease span multiple disciplines). There is no need to dogmatically include all topics in all diseases. There will be time in clerkships to learn more about clinical features of disease. But essential clinical features should be taught prior to entry into clerkships in order to both motivate and prepare students. Flexibility on the part of instructors and judicious editing of material relevant to particular diseases will be required.

**Weekly Organization within Courses**

Each course will have a consistent weekly schedule. One disease, or a group of related diseases, will be taught each week. Students will prepare for the week on the weekend by “pre” homework consisting of reading assignments, video lectures, or more ideally, short-interactive computer-based exercises. Monday will be devoted to the basic science (biochemistry, genetics, histology/pathology etc.) relevant to the disease. Tuesday will introduce presenting features and diagnostic tests. Wednesday will likely be devoted to longitudinal clinical activities. Thursday will be devoted to treatment of the disease, including pharmacology of relevant drugs. Friday will have a clinical emphasis. If patients cannot be brought in, then, one possibility is to introduce role-playing. (Students could assemble in small groups. One student is assigned to play the patient and masters the history. Another is a patient who learns the physical signs of the disease and then represents them with stickers or some other avatar. The other students play the role of physicians and have to correctly ferret out the history and describe the expected physical findings.) A clinician with expertise in the disorder could describe the clinical approach to the patient. The week would conclude with an exam and review of the answers.