

Medical education needs typical cases of common diseases

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Reality is the best teacher. In a perfect world, students would learn the basic science of medicine by seeing real patients under the guidance of physicians who knew every aspect of basic science needed to understand each feature of each patient's disease. In this perfect world, patients would show up with just the right diseases that students were ready to learn and in a logical order that allowed students to gradually build skyscrapers of understanding. For instance, seeing their patient Fernando with cardiac tamponade, they would be shown to measure the abnormally high drop in his blood pressure on inspiration and taught how impaired filling of his heart causes his pulsus paradoxus, and they would effortlessly remember it because they would remember Fernando. Of course, in a perfect world, there would be no disease. Seriously, though, case-based medical education seeks to approximate the perfect world of medical education.

Case-based teaching of the basic sciences often uses clinical scenarios that are approximately the length of case presentations within case reports in the medical literature. One common way to use these clinical scenarios is to have small groups of students discuss each important concept of basic science illustrated by the case, guided by a medical school faculty tutor. This integrates the teaching of basic science with clinical science, which enhances learning.¹ If these groups of medical students can be guided to create a list of these important concepts, assign learning about them among the group members and then have a later meeting with the tutor to teach each other, that is problem-based learning, which enhances

skills in problem solving, teamwork and independent responsibility for learning.² Clinical scenarios to serve the purpose of illustrating important basic science concepts, especially scenarios detailed enough to stimulate students to see these concepts on their own in problem-based learning, need to be robust.

It is extremely difficult for medical school faculty to supply all the clinical scenarios needed for case-based learning from their clinical practice. Real cases of any particular disease usually have features that are not typical. They often lack features that are typical. To make these cases work for medical education, faculty add typical features, subtract atypical features and change the features to suit pedagogical needs. Medical school curricula typically require teaching far more topics than the number of cases the students have time for, so cases of multiple diseases are edited to illustrate what is typical of so many different diseases than the resulting clinical scenario can become an impossible chimera, sometimes with contradictory features. Medical schools often lack real cases and simply invent them.³ Such approaches get farther and farther away from the perfect world of medical education.

An ideal clinical scenario for introducing medical students to a disease is a case of a patient with only this disease or a cluster of diseases that naturally go with it. An example would be a patient with a myocardial infarction, who has a history of smoking, hypertension, obesity, diabetes mellitus and dyslipidemia. An ideal clinical scenario for medical education must be robust. A robust clinical scenario has a paragraph, or two, or three of the history of the present illness. A robust

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clinical scenario has a paragraph or more of the past medical history. Even a neonate has a past medical history of prenatal care, usually. A robust clinical scenario has a paragraph, or two, or three of the social history and family history. The family history is important for genetic diseases, and that includes cancer. A robust clinical scenario has a full set of vital signs (temperature, heart rate, blood pressure, respiratory rate and oxygen saturation by oximetry). A robust clinical scenario has a paragraph, or two, or three of thorough careful physical examination. A robust clinical scenario has both common routine laboratory test results and relevant less common laboratory test results. Common routine laboratory tests include a complete blood count of hemoglobin, white blood cell count and differential, platelet count, mean corpuscular volume and red cell distribution width. Common routine laboratory tests also include what is often called a basic metabolic panel with electrolytes (sodium, potassium, chloride, and bicarbonate), creatinine and glucose. Teaching specific diseases requires specific additional tests. For example, a case with acute renal insufficiency should include blood urea nitrogen as well because of the value of the ratio of blood urea nitrogen over creatinine in determining whether the renal insufficiency is pre-renal, due to inadequate renal perfusion. Similarly, a case with diabetes mellitus should include hemoglobin A1c because of the value of this blood test in determining blood glucose levels over the past few months.

Images are essential for a good clinical scenario for medical education. For instance, if the patient has a skin condition, an image of this is crucial in teaching medical students how to recognize this skin condition. A verbal description will not suffice. A robust clinical scenario has an electrocardiogram and often a chest radiograph.

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A case with focal neurological findings should have images of computed tomography or magnetic resonance imaging. A case with biopsy should have images of the microscopic pathology. A case with autopsy should have images of the gross and microscopic pathology.

Case-based teaching of basic medical science to medical students needs typical cases of common diseases. They need to be robust to illustrate the concepts and principles of basic science. They need to be real cases to avoid anatomic, physiologic and pathologic implausibilities and contradictions, what should be regarded as medical educational fake news. Case reports in the medical literature are real cases, but they are the opposite of typical cases of common diseases. Cases are reported in the medical literature when they have uncommon manifestations of common diseases or are simply rare. This is what fully educated practicing physicians need. The worldwide community of medical education needs some noble, far-sighted journal to publish typical cases of common diseases.

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