

STEM AND PHYSICIANS- DO YOU WANT YOUR DOCTOR TO BE ABLE, OR AFFABLE, OR BOTH?

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Disclosures

- All comment are the personal research from Dr. Reines and do not represent any of the organizations he is a member of



The Problem

- Not enough US graduates going into STEM related fields
- Foreign graduates are coming to the US for these jobs
- We are losing our “cutting edge”

The Place of US Medical Research in the Global Marketplace

- Despite NIH funding and terrific resources
 - New England Journal Medicine March 2014- 5/5 Original Articles from Europe
 - Journal of Trauma 11/33 original articles from outside USA (China= most)
 - Nature- 5/10 original research papers – overseas
 - Journal American College Surgeons- 7/15 outside USA

O*NET (Occupational Information Network), COMPETENCIES ASSOCIATED WITH STEM KNOWLEDGE

- Production and Processing
- Computers and Electronics
- Engineering and Technology
- Design
- Building and Construction
- Mechanical
- Mathematics
- Physics
- Chemistry
- *Biology*



O*NET (Occupational Information Network) COMPETENCIES ASSOCIATED WITH STEM SKILLS

- Mathematics
- Science
- Critical Thinking
- Active Learning
- Complex Problem Solving
- Operations Analysis
- Technology Design
- Equipment Selection
- Programming



Rating of the Importance of the Natural Sciences to Success in Medical School

- Biochemistry
- Biology
- Cellular/Molecular Biology
- General Chemistry
- Physics
- Research Methods & Statistics
- Organic Chemistry
- Behavioral Sciences

What is the Role of STEM in the new Health system?

- There will be a Physician Shortage
- The shortage will be most acute in Primary care, but also in general surgery, psychiatry, some pediatric subspecialties
- We need to increase the number of US grads interested in medicine and expand the Graduate Medical Education positions available for US grads.
- We need physician/scientists who can relate to people and understand the underlying principles

Measuring by relative wage gains over the past 30 years, Healthcare Professional and Managerial and Professional workers are the biggest winners. We've separated these two occupational categories from the rest of the non-STEM group because, these occupations are competing for and diverting STEM talent both in the education system and in the labor market.

STEM- Georgetown Center on education and the Workforce 2011

Demographics

- There are now more women in medical school than men
- >40% of surgical applicants, >80% OB/GYN, >60% pediatric are women
- There are many fewer women in STEM courses and occupations
- There is a severe underrepresentation of minority men (especially African American and Hispanic) entering medicine (and STEM)

The Changing Paradigm

- We want a doctor (physician) who can relate to people and knows his/her science
- Medical schools are now taking a “holistic” approach to admissions (AAMC)
- Although sciences are required, community service and personal interactions are gaining importance

MR5 is AAMC's fifth comprehensive review of the Medical College Admission Test (MCAT®)

- The committee's recommendations describe four test sections:
 - Biological and Biochemical Foundations of Living Systems
 - Chemical and Physical Foundations of Biological Systems
 - Psychological, Social, and Biological Foundations of Behavior
 - Critical Analysis and Reasoning Skills

MR5

- **To help medical schools consider data on integrity, service orientation, and other personal characteristics early in student selection, the committee recommends that the AAMC:**
- 13. Vigorously pursue options for gathering data about personal... applicants to reflect on experiences demonstrating their personal characteristics.

MR5- the New Paradigm for Medical School Admission Tests- AAMC

- The proposed changes aim to balance the exam's focus on the natural sciences with the testing of critical analysis and reasoning skills, and direct attention to the behavioral and social sciences by:
- Updating the exam's two natural sciences sections to reflect current science and test how examinees solve problems in a way that helps demonstrate their scientific thinking and research skills;

What is Medicine doing to encourage STEM education?

- At Inova Heart and Vascular Institute, we have brought over 4,000 high school students in to our "dome " to watch cardiac surgery



What is Medicine doing to encourage STEM education?

- Last year, the Kaiser Permanente Community Foundation awarded a \$100,000 grant to Centro Cultural of Washington County to expand a Science, Technology, Engineering, Arts, and Math (STEAM) program for Latino students in Washington County
- **Chesterfield County Public Schools Health Sciences Academy Program Focus:** program of studies that allows students to explore a wide range of health science-related fields, while building an understanding of the core skills necessary to enhance students' ability to find success in higher education and the 21st century workplace. .. centered around hands-on classroom and lab experiences at VCU

The Scientist/physician

- How many medical students know who the Vice President of the USA is?
- How many medical students know who their Senator is?
- Can the average medical student perform simple multiplication without a calculator/computer?
- How important is it to memorize medication side effects?

Conclusions

- We need more scientists, engineers, and mathematicians
- We need more physicians
- The US is falling behind in these areas
- We must start early and develop a passion for STEM in a new group of students
- STEM must be balanced by holistic and broader knowledge in our new generation of physicians

