

Educational Ethics in Regenerative Medicine; a Hippocratic Oath for Biomedical Engineers

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Abstract— The Hippocratic Oath has long been viewed as the cornerstone of modern medicine. However, contemporary medicine relies heavily on technology developed by biomedical engineers and other non-medical personnel. This paper presents the challenging question of whether all non-physician professionals involved in one way or another with the act of treating patients, should take a binding oath, similar to the Hippocratic Oath taken by graduating medical students. This paper also proposes an adapted version of the Oath to be used by biomedical engineering students upon graduation.

Keywords — biomedical engineering, ethics, bioengineering

Every profession has a code of honor of moral and ethical principles. The Hippocratic Oath, highlighting the ideal conduct for a physician, is one of the oldest binding documents in history.¹ These principles set the basis for the American Medical Association's Code of Medical Ethics and almost 100% of students graduating from medical schools in the US administer the oath as part of the ceremony. The covenant, now about 1500 years old, was translated and adapted to a “modern” version by Louis Lasagna, Academic Dean of the School of Medicine at Tufts University in 1964. The oath is being held sacred by doctors and patients alike and viewed as an important philosophy which ensures unbiased and ethical behavior when serving and treating fellow patients.

Much like your favorite family doctor of today, Hippocrates (Fig. 1), also named the “father of medicine”, practiced the art of medicine with the highest respect for the patient, under very strict rules of professionalism, discipline, honesty and calm. He insisted on great attention to detail, including positioning of the patient, room lighting and cleaning the instruments. Hippocratic medicine, akin to modern medicine today, is based on careful clinical observation and strict record-keeping of simple symptoms such as pulse, fever, pain, environment and family history.

Today's modern medicine encompasses new technologies, biomedical engineering, regenerative medicine and stem cell treatments, all of which expand the horizon of health care practice to a variety of non-physician professionals. These include, naming just a few, cell biologists, biochemists,

bioengineers, biophysicists, computer scientists, veterinary doctors, etc.

Therefore the question arises whether a code of honor should be proposed for all professionals involved in tasks related to life-saving tasks. The Biomedical Engineering Society (BMES) which serves as the lead society for biomedical engineering has published a code of ethics in 2004² which highlights professional, research, health care and training obligations. There is also a “Hippocratic Oath for scientists” which also highlights ethical and professional codes.³

While teaching a cardiovascular bioengineering class to undergraduate and graduate students at Clemson University, I have often wondered how we should best prepare future biomedical engineers when they come in contact with patients and health care providers and whether adapting the Hippocrates Oath to bioengineering would make any sense. As a homework assignment in 2014, I have asked the students to find the “modern” version of the oath online, comment on whether it applies to bioengineering and if so, come up with a personal version adapted to the bioengineering profession. A summary of the student's replies follows.

An overwhelming majority of students (98%) considered that the oath does apply to bioengineering. To adapt it, students proposed to include new terms such as “design”, “medical technologies” and “devices”. Notably, most students mentioned that a bioengineer should: “focus on the patient”, “be humble”, “not be ashamed to ask for help”, “focus on preventing disease”, “and realize the importance of sympathy and understanding”. As another student mentioned, “bioengineering is more than design and calculations; it's about people”.

Thus, I would like to propose the following oath, to be taken by bioengineers, biomedical engineers and other health associated professionals upon graduation. It should not be a legally binding pledge, but rather a “mission statement”, a sign of personal and professional commitment, bonding with our fellow students and mentors and an expression of our dedication to the patients in need of our expertise.

I invite the readers to send your comments and suggestions on this topic to dsimion@clemson.edu. I would be happy to continue this dialogue in the form of an open forum to be published in future issues of *Challenges in Regenerative Medicine*.

The Hippocratic Oath for Biomedical Engineers

I will respect biomedical engineers who have come before me.

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I will share my knowledge of design, medical technologies and devices with those who are to follow.

I will hold high regard for intellectual integrity, ethical practices and the privacy of patients.

I will humbly acknowledge my own weaknesses and will ask for help and collaborate with others.

I will strive to cure but also to prevent diseases.

I will do no harm to patients through my designs, devices and technologies.

I will serve first and foremost the needs of the patients, their families and the community.

If I do not violate this oath, may I enjoy life and gain satisfaction from my work as a biomedical engineer”.

REFERENCES

- [1] Peter Tyson, posted 03.27.01 on NOVA online, at <http://www.pbs.org/wgbh/nova/body/hippocratic-oath-today.html>
 [2] www.bmes.org, accessed 08.02.2014
 [3] http://en.wikipedia.org/wiki/Hippocratic_Oath_for_Scientists, accessed 08.02.2014

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Fig. 1: Left: Hippocrates. Engraving by Peter Paul Rubens. Photo credit: public domain. Right; images of Hippocrates' writings. Photo credit: public domain.