A Caries Vaccine: The Moral Imperative

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Introduction

Grammatically, an imperative is a mood—a mood that expresses a command. We understand an imperative to be a pressing matter; an agenda unable to be deterred or evaded. An imperative signals a circumstance that is urgent. Today, my challenge to the international professional research community is the imperativeness of developing a safe, effective vaccine to prevent dental caries.

Morality is that domain of understanding that relates us to our world, and to other humans in our world. Moral behaviors are those actions that can be evaluated as good, and therefore right, using reasoned, objective criteria. The concerns of morality are concerns associated with how we avoid causing harm to one another; how we prevent harm to one another; and how we help one another. Morality is about the social contract—the implicit agreement about human cooperation that enables us to escape the *"state of nature,"* with its many dangers and woes, and live with other human beings in a relatively safe and peaceable society; a society where all have the opportunity to experience the "*good life.*"

My thesis today is that developing a vaccine for dental caries is a moral imperative. Too many people throughout our world, especially children and members of vulnerable populations, suffer harm--untold and undue pain, suffering, impairment of function, and disability as a result of infection with the world's most prevalent infectious disease—dental caries. Such chronic infection significantly affects quality of life, and prevents millions from realizing their full potential for participating in the "*good life.*" They are denied the functional and esthetic enjoyments the dentition contributes to human happiness.

Vaccines

In the late 1700s, Edward Jenner, a shrewd country physician in England, through keen observation, discovered the relationship between cowpox and smallpox. Within a few years, thousands of people protected themselves from deadly smallpox by intentionally infecting themselves with cowpox. Jenner's process came to be called vaccination, after *"vacca"* the Latin word for cow; and the substance used to vaccinate was designated a vaccine. Now, over 200 years later, our entire world has been purged of the suffering and death of smallpox. And today, we are able to provide through vaccinations close to 100% protection from such devastating diseases as diphtheria, pertussis, tetanus, polio,

measles, and mumps, to name a few. Eighty percent of the world's children are vaccinated against one or more of these diseases. Under current guidelines in the U.S., healthy children receive 20 immunizations against 11 diseases during the first two years of life.

Developing a vaccine for dental caries is pursuing and appropriating a good that will enable us to conquer the centuries-old ravages of a disease that has afflicted far too many, and has received far too little attention in both research and health care. It is the right thing to do.

Professional Duty

Society has granted the status of "*profession*" to groups of individuals who, as a result of their intellectual skills (and in some instances associated perceptual motor abilities), are in a position to serve society in unique, important, pragmatic ways. These groups are granted unusual privileges in return for the profession serving society in the context of their specialized knowledge and skills. Classically, sociologists understood the *learned'* professions to be theology, medicine, law, and military science. Dentistry, as a specialty of medicine, was, and is, accorded the status of profession. However, with that appellation comes not only freedom and privilege, but also responsibility and obligation. To "*profess*" literally means to make a vow—to promise. Thus professions promise to society they will use their expertise to serve society.

In the early part of the twentieth century, Abraham Flexner wrote a paper on the nature of professions that became determinative for understanding the nature of professions and the professional life during the last century. (Yes, the same Abraham Flexner of the celebrated Flexner Report on medical education that led to the elimination of proprietary medical schools and brought medical education—and later dental education—into the universities education could be based on sound science.) . In the paper he stated that professionals organize—not to protect the self-interest of their members, but rather in order to promote the good of society.

In the system of morality, a basic obligation is to keep whatever duty one agrees to take on oneself. As a profession, dentistry promises to care for the oral health of all members of society; such is our professional duty—thus our moral responsibility. It is unfortunate that we are increasingly observing circumstances throughout the world where members of our profession, as well as notable professional dental organizations, have lost sight of these basic moral fundamentals of a *learned'* profession, and are using their professional status as a means to their own personal ends, rather than a means for pursuing the end of oral health for humanity. It is in the context of fulfilling our professional duty to the oral health of the world's population, particularly our vulnerable and disenfranchised citizens, and specifically our children, that I argue the moral imperative of a caries vaccine.

The Devastation of Dental Caries

Oral health is a significant component of general health and well-being, and quality of life. Unfortunately, dental caries continues to be a chronic infectious disease which dominates, not only middle and upper income countries, but is becoming increasingly prevalent in the world's poorest developing countries, placing an additional burden on top of the other infectious diseases that afflict these countries. The World Health Organization affirms that dental caries qualifies as major public health problem owing to its high prevalence in all regions of the world, with the greatest burden of disease being on disadvantaged and socially marginalized populations. According to the WHO's "*World Oral Health Report 2003*," the World Health Organization has reoriented its policies toward a new emphasis of oral disease prevention.

The "*World Oral Health Report 2003*" indicates that dental caries is a major health problem in most industrialized countries, affecting 60-90% of school children, and the vast majority of adults. The DMFT for twelve year olds in the Americas is 3.5; 2.0 in Europe; 2.4 in the Western Pacific; 2.0 in the Eastern Mediterranean; and 1.5 in Southeast Asia and Africa. In light of changing living conditions it is expected that the prevalence of caries will increase in Africa as a result of the growing consumption of sugar and inadequate exposure to fluoride. It is important to note that this prevalence of caries in the permanent dentition of twelve year olds is within only six years of the eruption of the first permanent teeth, and with premolars and second molars either not having erupted, or having only recently erupted. In the United States, 98% of our 40-44 year olds have experienced carious infection—affecting an average of 44 tooth surfaces.

The edentualism rates in the world are staggering for those 65 years of age or older. Bosnia/Herzegovia – 78%; Albania – 69%; Canada – 58%; Bulgaria – 53% Malaysia – 57%; Great Britain—46%; Finland—41%; Denmark—27%; the US—26%. While some of this edentulism is due to periodontal disease, caries is a major contributor. In my native state of Kentucky, 45% of our population, age 65 and over, is edentulous, and sadly, a large percentage of these individuals have been edentulous since young adulthood—due to dental caries. Many, like my own aunt, had their teeth extracted as a result of caries, and dentures fabricated as a high school graduation present--a cultural tradition in Appalachia.

In the United States, dental care for children has been identified as the nation's most prevalent unmet health need. Dental caries is the nation's single most common childhood disease. Our Surgeon General's Report of 2000, Oral Health in America, documented the profound and significant disparities that exist in oral health among Americans. Eighty percent of dental caries is found in 20-25% of our children (approximately 20 million children), and these are primarily children from African-American, Hispanic, American Indian, Alaskan Native and low income families. Early childhood caries (baby bottle tooth decay) has been found to exist in 70-90% of very young children in some socio-economically defined sub-populations in the U.S. The prevalence and severity of caries is linked to socio-economic status across all age groups. American children lose 52

million hours of school time each year due to dental caries. Toothaches are our teachers most common classroom health problem. Poor children experience nearly twelve times as many restricted activity days from the disease as do children from high income families. The so-call *"silent epidemic"* of dental caries is no longer silent. It is screaming at us to *"do something!"*

It is estimated that in 2004, Americans will spend approximately $75 billion on oral health care. While the figure includes expenditures for esthetic dentistry, the treatment of periodontal disease, and the correction of malocclusions, there is little question that the overwhelming preponderance of these dollars will be to treat dental caries and its sequela. Treating the virtual pandemic of early childhood caries frequently requires hospital-based care, the average cost of which is between $2,000–3,000/case. As the colloquial aphorism expresses so well—*"an ounce of prevention is worth a pound of cure;"* and that worth is both an experiential issue and a financial one.

Professional Ethics

Moral imperatives must be justified. It is in the context of professional ethics that I justify the moral imperative for a caries vaccine. As previously suggested, a universal and foundational moral rule is to do one's duty. Professions take on extraordinary moral duties to society. Bioethicists advance four cardinal duties that exist for health professionals. They are the duty of beneficence--to benefit, that is, do good for society generally and for individuals specifically; the duty of non-maleficence--in benefiting the health professional should not cause harm; the duty of respect for autonomy--the requirement that professions and professionals affirm they serve the best interest of others, but that individual patients and society at large are partners with professionals in determining what constitutes best interest; and finally, the duty of ensuring justice in both its individual and social contexts.

The profession of dentistry, including our research scientists who develop the profession's intellectual and scientific base, has an ethical obligation, flowing out of our profession, our promise to society, to pursue the development of a caries vaccine. This duty is specifically related to the principle of beneficience—the obligation the profession has to do all within its power to benefit the oral health of society. However, the obligation is further advanced and supported by the ethical obligation to promote justice.

One of the most important and influential books of political philosophy written in the 20th century was *A Theory of Justice* by the late Professor John Rawls of Harvard University. In it Professor Rawls carefully explicates the nature of justice. His definition is based on his now famous hypothetical in which he asks one to stand behind a so-called *"veil of ignorance"* and envision a world into which one will be born, however not knowing into what circumstance one will be born, that is, to a rich or poor family, intelligent or dull, male or female, European or African. He argues that given such a condition, people will design a world with some degree of risk aversion, in which the following three conditions would exist: 1) each person will have an equal right to the most extensive system of

liberties comparable with a system of equal liberties for all; 2) persons with similar skills and abilities will have equal access to offices and positions of society; and 3) the critical one for our consideration of a caries vaccine: social and economic institutions will be so arranged as to maximally benefit the worse off. Such a design he affirms would be "*just.*"

Given a Rawlsian view of social justice, our profession's duty to the oral health of the world's citizens, if is it to be just, must be such as to be committed to maximally benefiting the "*worst off*" in our global community--those with little or no protection against oral disease, specifically dental caries. As we have demonstrated, the ravages of dental caries are visited disproportionately on countries, societies, and socio-economic groups that are the least well off. Poor and minority children, the most vulnerable individuals in our world, and the "*worst off*", have the highest prevalence of dental caries, as well as the poorest access to oral health care, and the poorest overall oral health. Justice demands they be maximally benefited, in order that they ultimately have "*equal opportunity*" to do well. If justice is to be served, the dramatic inequities with regard to oral health and oral health care must be addressed.--and addressed by us!

A caries vaccine offers great hope for rectifying this injustice, which deprives so many of our world's citizens of equal opportunity. Due to economic, behavioral and cultural barriers, it is highly improbable that our profession will ever be able to reach the millions of susceptible children through the use of our classic preventive armamentarium of water fluoridation, topical fluorides, brushing and flossing, dental sealants, dietary restriction, and the like. However, it is not improbable that a significant majority of these otherwise disenfranchised children could be reached with a vaccine against dental caries. Vaccines are particularly well-suited for public health applications in environments that do not lend themselves to regular health care. Yet today, initiatives for developing a vaccine seem to be stymied, with major research resources directed to other agenda. Few, if any, issue in oral health research could be as compelling as the eradication of dental caries from the face of the earth. In fact, the eradication of dental caries would make superfluous some research initiatives that currently command significant resources.

Conclusion

Martha Nussbaum, the distinguished American Aristotelian philosopher, has revisited Aristotle's notion of *eudamonia,* the Greek expression literally translated--*the good life*, in her recent book, Sex and Social Justice. In it she argues against cultural relativism, and delineates several principles of social justice which should guide all societies on the earth. Her argument is that all peoples, no matter their sex, nationality, culture, ethnicity, or religion, should have the opportunity to fulfill what she calls *"central human functional capabilities."* Among the ten principles she identifies and justifies is bodily health and integrity. Clearly, the development and maintenance of the natural dentition in health, function, esthetics, and comfort for life is a critical and *"central human functional capability"* and a necessary ingredient to an individual fulfilling their potential for experiencing *eudamonia--the good life*. The 20th century humanistic psychologist,

Abraham Maslow, challenges all of us with the moral obligation to "*be all you can be.*" Such a moral aspiration cannot be fully operationalized absent good health generally, and oral health specifically.

Embedded in these comments—though not explicated—are references to six major ethical theories: social contract theory, deontology, utilitarianism, virtue theory, pragmatism, and feminist ethics. Moral theories are united in justifying the development of a caries vaccine.

The time has come for the profession of dentistry to seriously and courageously provide preventive oral health care to all of our world's citizens. The development and utilization of a caries vaccine can help destroy one of the major barriers to oral health, and can help ensure that human beings, no matter their setting or circumstance, are treated justly, in that they have equal opportunity, with others of greater means, for good oral health.

Paul Tillich, acknowledged by many as the foremost philosophical theologian of the 20th century, in his book, Morality and Beyond, stated what he understood to be life's moral imperative: "*to become what you are potentially, a person, in a community of persons.*" I conclude by adapting Tillich's moral imperative to our profession. Dentistry's moral imperative is "*to become what we are potentially, a profession, doing all we can possibly do for the oral health of our world community.*" Aggressively pursuing a safe and effective caries vaccine becomes for us – a moral imperative!