HIGH SCHOOL RESEARCH PROGRAMS SHOULD BE COUPLED TO PUBLIC HEALTH

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Abstract

In the United States there are an enormous number of high school research programs that demand the expertise of the educator and interaction with other labs. The Department of Health (DOH) has several important functions that must ensure the safety of this population. Among these functions is notably the necessity to become involved in health issues that would possibly arise in high school research programs. The National Institutes of Health (NIH) establishes guidelines of ethical standards that laboratories and researchers must follow. Considering the potential hazards, ethical guidelines fall under the broader umbrella of public health which will ensure the safety of the community of high school students in a laboratory setting. Transparency is critical in order to avoid potential unethical situations and conflicts related to high school science teachers in the laboratory and how they help to maintain a safe environment for their students. A uniform code of ethics should incorporate standards from established organizations that are applicable. It is important that NIH enforces specific guidelines to make sure ethical practices are adhered to. Health concerns must be taken into consideration in high school research, since the community is part of public health given the nature of the work being performed.

Key words: *high school research – public health – biohazards – experimentation*

REVIEW

INTRODUCTION

To fully understand the goals of the Department of Health (DOH), it may be beneficial to also understand how this sector of health care differs from personal health. The differences between public health and personal health can be understood by examining the fundamental ideas separating each type of health care. There are structural reasons that call for a separation between the two. The Department of Health addresses issues that the individual is normally unable to address, including public health affairs such as: the contamination of food and water, pandemics, contagious diseases, occupational diseases, diseases that arise from the working environment, and pollution (Odin 1985). Personal health care lies within the premise of one-on-one health relationships established between a qualified health care provider and a patient (Odin 1985).

The principal concern of the DOH deals with a few central, important public health issues. Primarily, evaluating and regulating the general health of the public, including engaging in various activities wherein potential health problems may emerge, i.e., high school research programs. Further, the DOH needs to be armed with the resources and knowledge of how and when to deal with such threats when they do arise. In her book, "Taking Action, Saving Lives", Shrader-Frechette makes a valid point that citizens should be aware of potential life threatening issues, if they are to help the government (i.e., DOH) in reducing these threats (Shrader-Frechette 2007). In order for the DOH to successfully improve our citizens' safety, they must inform the public of threats to their health.

A third function of the DOH is to assure the availability and means of health services, as well as the assessment of whether these health services are performing favorably. The intention of the DOH in serving the community is to improve the health of the population. The department is obligated to assure that these health services are available, and affordable. Additionally, when individuals cannot afford the health services provided by the DOH, the department must bear the financial cost. For example, the state of Michigan has a law that guarantees prenatal care to every woman in Michigan (Committee for the Study of the Future of Public Health 1988).

An in-depth distinction between public health and clinical health professions exists. There is a wide range of clinical professions that fall under the umbrella of public health concerns, including practicing medicine, dentistry, optometry and social work (Greenberg 1987). Professionals employed under these disciplines serve mainly to address the health concerns of the individual in society. For example, a pediatrician will examine the health issues of the individual child. One of these health issues could be identifying signs of abuse in children (Klass 2009). While it is the tradition for the clinical health professional to address the health of the individual, it is the tradition of the Department of Health to provide health services to the community. The Public Health Service (PHS) was established in 1798 as the Marine Hospital Service (MHS). The main goal of MHS at the time was to provide medical attention and aid for sick merchant seafarers (Patel and Rushefsky 2005). Later, MHS's goal evolved into a more complex medical care system which grew to further address the cause of disease, prevention, and research. Through the MHS, the PHS was able to ward off numerous epidemic outbreaks including yellow fever, cholera, and smallpox. Throughout the years, Congress continuously passed various public laws to accommodate a Public Health System that would efficiently address the pressing aspects of public health; today the PHS is situated under the Department of Health and Human Services – DHHS (1990) (Patel and Rushefsky 2005).

In order to better understand the scope of the DOH, we will examine some of the organization's most distinguished public health accomplishments of the 20th century (Committee for the Study of the Future of Public Health 1988). One major fulfillment was the development of vaccines. Due to the Department of Public Health's call for the establishments of laboratories focusing on methods of sanitation, and bacteria control in the environment and water in the 19th century, the eradication of many diseases was made possible. This helped lead to the important revelation that a deadly and infectious disease known as typhoid fever was due to contaminated water supplies. Consequently, the DOH recognized the urgency to treat sewer systems in order to eliminate these bacteria from the water supply. Other pressing work that was being carried out within these State and Local Health Department Laboratories involved pathologists' ability to recognize bacteria, especially bacteria that caused harmful diseases. This was a major step in the development of vaccines. Further progress was made in vaccine development eradicating many deadly diseases of the time, namely: smallpox, meningitis, tuberculosis, and typhoid (Committee for the Study of the Future of Public Health 1988).

Table 1. Public Health associated concerns are varied and profound in the scope of influence. We are advocating for high school research experiences, which also fall in this realm of public health concern, to be part of public health endeavors since it embraces a community engaged in an important learning experience involving health and safety activities.

Public Health Concerns

- Medicine
- Dentistry
- Community Health Issues
- Sanitation
- Infectious Disease
- Death
- Motor Vehicle Concerns
- Environmental Concerns
- Research Ethics and Safety
- Now-High School Laboratory Research Experiences

DISCUSSION

In order to further maintain the health of society, ethics and the actual research considerations addressing high school research programs must fall under the umbrella of Public Health. The underlying principle of ethical issues is the transparency of the individual. Specifically, in an environment currently estranged from public health, the high school laboratory setting, science teachers control and maintain the health status of their students. It is imperative to fully understand how this notion of transparency and health concerns can impact the well being of a population of high school students. The following illustrations of possible conflicts of interest, as it relates to ethics, and the importance of being transparent, highlight how the welfare of the high school research community can be affected.

There are many critical ethical concerns that occur in high school settings. The National Institute of Health (NIH) provides a code of ethics for government employees in many situations and thus may serve as a substrate from which to draw upon for high school public health concerns (National Institutes of Health 2010). This set of regulations and standards for professionals creates an environment of safety, transparency and legitimacy. Adopting portions of this national code of ethics will further strengthen the education system's credibility and ethical structure and acquaint students with these concerns at an early age. In particular, the ethical guidelines describing: managing conflict of interest, participation in grants and collaboration, political activities and the Hatch Act, acceptance of gifts, laboratory ethics, and the use of a disclaimer can be useful in the educator's ethical code. These topics are ongoing concerns that occur in high schools, and the NIH provides valuable guidance to determine how to handle related issues.

Managing conflict of interest is important in all careers. A "Conflict of Interest arises when an employee is involved in a particular matter as part of his/her official duties with an outside organization with which he/she also has a financial interest, or one which is imputed to him/her, i.e., the employee's 1) spouse, 2) minor children, 3) general partner, 4) an organization in which the employee serves as officer, director, trustee, partner, or employee, or 5) a person or organization with which the employee is negotiating for, or has an arrangement for, prospective employment" (National Institutes of Health 2010). The government provides a highly specific outline on how employees should handle conflicts of interest. When an employee or a family member is involved in an outside organization, a real or apparent conflict of interest may be present. For example, if a faculty member arranges for a personally known student to enter into a research program without going through the normal channels or is on this

particular student's evaluation team. In either case, disclosure is required. A real conflict of interest is clear and there is no question that an educator should immediately disclose such information to a supervisor. Together, the administrator and the teacher can discuss the appropriate level of action. An example of a real conflict of interest can be if a parent gives the teacher money to further assist the needs of their child over the needs of the classmates. This is a real conflict of interest because the teacher's job is to teach and supervise all the students within the classroom equally and accordingly. Another example of a real conflict of interest is if a teacher co-wrote a textbook and requires that the students buy it for the class; this is a violation of ethics if the teacher is financially benefiting from the purchases. As outlined by the NIH, an NIH employee participating in grants and collaboration, or serving on an external advisory board must only provide advice and the individual should not be involved in writing the application for the grant, the progress reports or any other documents. In regards to a secondary school educator acting as an advisor on a science project, the teacher may provide advice and encouragement, but exclude themselves from performing experiments, and writing reports. This will ensure that the project is uniquely the students and will garner integrity and academic honesty during the research.

An apparent conflict is when an outside party perceives dishonesty or a conflict of interest, where one may not truly exist. It is known that federal employees must follow specific guidelines with regards to accepting gifts from outside sources as well as from co-workers. It is considered traditional, especially among the younger grades, for students or their parents to give gifts to a teacher as a sign of appreciation. While at the core, there is nothing wrong or unethical about this situation; it can be problematic because of the potential appearance of impropriety. The government identifies a gift as "anything of value (gratuity, favor, discount, entertainment, hospitality, loan, forbearance; includes services, training, transportation, local travel, lodging, meals)" (National Institutes of Health 2010). This can be especially important to educators for the purpose of remaining transparent and maintaining an ethical environment.

Sometimes students and parents offer a gift to a teacher at the end of the year, or mid-semester to commemorate a job well done or as a symbol of gratitude. In many instances this may be benign, but accepting gifts can be perceived as a bribe, or may unintentionally influence a teacher's opinion of the student. It may also suggest the student is getting greater assistance in the laboratory setting, implying other students are getting less, creating an unsafe environment. All of these considerations need to be understood and followed, because accepting gifts is a common violation of ethics. It may seem rude to deny a gift from someone, however according to NIH, there are ethical practices that are violated when the exchange of gifts occurs. In order to maintain an honest and transparent relationship, an educator should politely decline any gift offered. In this case, an educator should consult with an administrator. In the end, providing disclosure will protect the individual from future complications. If the relationship is disclosed and everyone is made fully aware before the question can even be raised, it offers protection both to the teacher, and to his or her students.

Regarding ethics in the high school science classroom, the educator must ensure that when working on a research project the idea provided by the student is original. By having students record every action and observation engaged in the lab we give them a framework for learning how to be accountable. This will teach students to be truthful and accurate when reporting their findings and provide a strong foundation of good research habits and skills for their future in the field of science. By employing techniques such as collecting the notebooks and checking them after each class and by having students date and time each entry with no blank spaces further encourages truthful recording.

The teacher should supervise the students in the lab to ensure that there are no violations of ethics or public health laws since they may be handling some hazardous materials. Upon starting lab work, teachers should inform the students on laboratory ethics. Unethical behavior includes "possession of another person's laboratory solutions from the current or previous year, reference to or use of another person's laboratory notes from the current or previous years, submission

of work that is not done by your laboratory group, allowing another person to copy your laboratory solutions or work, cheating on quizzes" (Perdue University 2007). In terms of laboratory work, and if the student is receiving funding, a "financial disclosure... is important in science and research projects to avoid any conflicts of interest. A record of bank statements and/or documentation of funds used should always be kept" (National Institutes of Health 2010) and held by the lab instructor to remain transparent (Porter 2006).

When faced with an ethical dilemma, educators currently turn to their own morals and ethical training. A general code of ethics will help to unify educators and provide a consistent level of care and education to our nation's youth. The scope of ethics should go beyond academic integrity. Ethical practices should be evident throughout academia including secondary and elementary education (Porter 2006).

Science teachers can contribute to the overall education experience of the student and give them the tools necessary to make moral decisions (Webster 2008). Providing an ethical example to a student coupled with ethics education can guide them toward better research and life decisions. Much can be done to improve the knowledge base of ethics for educators in our nation's Middle School and High School settings. Holding a teacher to a particular set of guidelines will change the experience a student has throughout their academic career. Providing the moral tools necessary to become ethical models, both nationally and internationally, will give our youth an advantage in their professional careers.

CONCLUSIONS

The ability to make decisions based on one's morals and ethics is vital to a successful personal and professional environment, including its safety components. It is critical that educators provide an example of ethical decision making and engage their students in ethical exercises. Early childhood educators can help to mold a strong foundation for basic ethical practice. As a student continues through the education system, problems become more complex, moving on into the secondary education system and higher education a student may be presented with unique ethical dilemmas. A child that has had consistent and progressive ethical training will have an easier time making the best decision (DePree and Jude 2010). It is vital that educators provide such a structure through education and example. To create a uniform code of ethics, the secondary and higher education system should incorporate those standards from established organizations that are applicable.

High school science has the potential to be a complicated field full of hidden problems and unforeseen consequences due to variations in its training programs. However, if you are always careful to be accountable for your actions and practice the policy of full transparency it is easier to teach your students to do the same. The National Institutes of Health Ethics Program (NIH) helps break down ethical concerns into what is acceptable and what is unethical. After evaluating the ethical practices that the NIH stresses are important, we can see that working in a high school setting goes further than teaching in a classroom. There are responsibilities that carry outside the classroom, and students must take these widely accepted guidelines that NIH establishes seriously. Therefore, it is important that schools enforce specific guidelines to ensure that ethical practices are maintained in the high school setting. Furthermore, given the activities of what occurs in the high school research setting, health concerns are involved. Thus, this community also is part of the public health agenda given the nature of the work being performed.

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