Ethics: responsible scientific conduct¹,²

Elaine R Monsen, Harold Y Vanderpool, Charles H Halsted, Kristen W McNutt, and Harold H Sandstead

Introduction

Nutrition researchers and practitioners may wonder what ethics has to do with their professional activities and investigations. Given widely held impressions about ethics, such questioning, not to speak of outright skepticism, is understandable. Ethics committees in the US Congress virtually identify ethics with the policing and censorship of congressional representatives for breaking house rules. Many social scientists equate ethics with social customs and personal emotion and assume that ethical norms are either relative to specific societies or based on personal feelings. Most ethicists find elements of truth in the above assumptions but view them as fundamentally flawed (1, 2).

First, ethics should not be equated with all judgments concerning what is right or wrong. For example, with respect to decisions over the rightness or wrongness of keeping or breaking certain rules of a group, it would indeed be ethically wrong to break rules that pertain to moral values like honesty and promise keeping. Insofar as the rules of a group involve many types of nonmoral values—including aesthetic, economic, practical, social, and professional values—judgments as to what may be right or wrong are often unrelated to ethics. The statements, “Now that is a good centrifuge,” “That was a bad movie,” and “For a new member of Congress, that was bad protocol,” respectfully involve practical, aesthetic, and professional-group value judgments, not ethical judgments.

Second, claims respecting social or psychological relativism usually assume, because there are so many divergent opinions over the rightness or wrongness of social issues such as euthanasia, capital punishment, abortion, and infanticide, that ethics must be relative. Ethicists fully recognize the fact of such diversity and recognize, in addition, that ethical judgments vary in relation to different social and historical situations and that ethical principles do not constitute nonbreakable absolutes (1, 2). The view that different people and societies hold different and conflicting basic ethical principles does not constitute convincing grounds for ethical relativism. Rather, ethicists generally hold that over time and across cultures, agreement exists as to actions that are fundamentally destructive to human relationships on the one hand and fundamentally constructive to them on the other (1–3).

The purpose of this essay is to identify ethical issues and questions relevant to scientific conduct. We consider the topic in four sections: what ethics is and is not, ethical treatment of human subjects and nonhuman subjects, ethical interactions with colleagues and trainees, and ethical behavior toward the public, media, and funding sources. Landmark references to ethical writings and codes of ethics are noted. Underlying all the sections are the ethical principles of respect for people, beneficence (ie, kindness or charity) toward others, and justice.

It is our hope that this paper will serve as a springboard for discussion among nutrition scientists and clinicians. Rather than giving answers, we are seeking to highlight issues that merit thoughtful consideration and debate.

What ethics is and is not

As a descriptive and analytical discipline, ethics encompasses how, why, and what moral judgments are made by humans: how and why humans assert that certain actions toward each other are right or wrong and how and why we judge each other to be deserving of praise or blame. Ethical values and norms are apparent everywhere. They underlie and infuse law, social custom, religious beliefs, etiquette and propriety, and the codified rules of professional groups. They inform and pervade all research and decision making within the various health-care specialties (4–9).

As a constructive discipline, ethics seeks to determine which actions, relationships, and policies ought to be considered right or wrong. Ethical “oughts” or “shoulds” bear no weight unless they are grounded in reason or fact; they must, in short, prove convincing. Criteria for convincingness or persuasiveness include logical consistency, reliance upon full and accurate facts and data, universalizability, and impartiality (10). By clarifying the language used, examining the worthiness of the reasoning, and ranking the justifiable principles that emerge, we can identify the ethics of practice and policies (7).

Principles of right action are found within Anglo-American law, which accents the rights of privacy and free choice. They are also found within the historic oaths, professional codes, and treatises on the ethics of biomedical research (11, 12). Several

¹ From the Department of Medicine/Nutritional Sciences Program, University of Washington, Seattle; the Institute of Medical Humanities, University of Texas, Galveston, TX; the School of Medicine, University of California, Davis; and the Department of Preventive Medicine and Community Health, University of Texas, Galveston.
² Address reprint requests to ER Monsen, University of Washington, 305 Raft Hall, DL-10, Seattle, WA 98195.
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of the most important bibliographical sources that contain and defend essential ethical principles for conducting biomedical research are described in the following subsections.

Belmont Report: respect, beneficence, justice

In response to alarming exposures of unethical research in America—notably an article by Henry K. Beecher (13) detailing 22 graphic instances of abuse by mainline American researchers, and the discovery in 1972 of some 40 y of deceptive and harmful research on the natural history of syphilis in a population of Southern black males (14)—the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research was formed in 1974. This commission's description of the primary ethical principles necessary for conducting human research appeared as the Belmont Report in the Federal Register in 1979 (15). This report sets forth three basic ethical principles: 1) respect for persons as autonomous agents, 2) beneficence in the form of protecting research subjects from harm and maximizing possible benefit, and 3) justice in the sense of striving to distribute equally the burdens and benefits of research.

The first of these principles calls for careful observance of the various elements inherent to informed consent: providing truthful and sufficient information to the potential research subject, comprehension by the subject of the information given, and fully voluntary and noncoercive enrollment of subject. The second imposes on researchers the necessity of systematic, comprehensive, and ongoing risk-benefit analysis. The third places responsibilities on researchers for a just and fair selection of research subjects as opposed to conducting most research on poor ward patients, on the socially and educationally disadvantaged, or on those in institutions where they are easily drafted into research protocols.

Nuremberg Code and Helsinki Declaration

Supporting the Belmont report were the Nuremberg Code of 1948 and Helsinki Declaration of 1964. In 1948 the Allied war crimes tribunal, realizing that the Hippocratic Oath provided insufficient guidelines for ethical human research, drew up a document on research ethics that set standards that would legitimize war-crime indictments against Nazi researchers. The tribunal's document, known as the Nuremberg Code, accented the necessity of scientific rigor and prior animal experimentation as well as the necessity of truth telling, informed consent, and the rights of subjects to withdraw from an experiment when it seemed impossible for them to continue (16).

Essentially reaffirming the Nuremberg Code internationally, the Helsinki Declaration declared that (17), “Concern for the interests of the [research] subject must always prevail over the interests of science and society.” In addition, the declaration delineated other principles pertinent to research, including the scientist's obligation to preserve the accuracy of results and a list of principles pertaining to research on a patient, including justifying research only if it involves increasing the diagnostic or therapeutic benefit to the patient.

Drawing together the principles set forth in the Belmont, Nuremberg, and Helsinki documents, the ethics of research ought to rest on the following principles: respect for people as autonomous or self-choosing agents, truth telling, beneficence in the form of a careful calculation of foreseeable benefits vs harms, and justice. As evident in the quotation from the Helsinki Declaration, a subject's autonomy or freedom of choice should take precedence over foreseeable benefits to the subject and/or society. Based as they are on reason and fact, these principles should be upheld by researchers whether or not they are enforced by a nation's laws. This means, for example, that nutritionists and other researchers should not ethically fudge with research subjects in underdeveloped nations because of a lack of law or regulatory oversight.

Ethical treatment of human subjects and nonhuman subjects

Responsibilities toward human subjects in research

The ethical principle of respect for people has far reaching implications for the treatment of research subjects. The meaning of respect in ethics is derived from arguments that show how mutual respect for the right of each person to choose a course of action is a necessary condition for a community in which moral judgments serve as authoritative grounds for human behavior. In contrast to communities where values are upheld by force and violence, a moral community predicated on mutual respect for the choices of others enables differences and disputes to be peacefully negotiated by means of reasoned discourse, noncoercive persuasion, and mutual self-interest. The principles and procedures of this community are undermined whenever a person claims to have an autonomous right of free choice while denying that right to others (18–20).

The treatment of research subjects within this ethical framework implies that subjects or their guardians are treated as individuals who have full rights of free choice. Subjects, therefore, must be fully informed by investigators of the nature of the research. Unless sufficient information is provided in a readily comprehensible way, no subject can be said to have personally consented or chosen to participate in the research.

Truth telling is ethically required of researchers and involves two dimensions: 1) providing subjects with truthful and sufficient information about the nature and purposes of the research and 2) not deceiving or lying so as, in effect, to coerce compliance and submission.

The principle of respect also requires that subjects freely choose or consent. To use the language of the Nuremberg Code, free power of choice means that no elements of force, fraud, deceit, duress, or other ulterior form of constraint or coercion may be considered ethical (16). By implication, the rewards for participation should not be so large as to unduly influence the subjects' decision to participate. To maintain their freedom of choice, subjects must be allowed to terminate their participation with neither penalties nor fears of retaliation.

The principle of respect of people further requires that the confidentiality and respect of people encompasses the right of individuals to protect their cognitive, emotional, and biological privacy. Information that could possibly identify subjects must not be made public or released to individuals or institutions without the expressed permission of the research subject.

The principles of beneficence, justice, and promise keeping are prima facie ethical standards, each critical for meaningful human relationships (1, 10). Beneficence is an obligation that includes not harming patients and maximizing possible benefits...
for both individual patients and members of the larger society (15). To prevent harm, research design must be rigorous and precise, particularly about the nature, probability, and magnitude of risk. Justifications of significant risks of serious impairment must be counterbalanced by complete voluntariness and the likelihood of counterbalancing benefit. Should harm occur, investigators and their institutions should accept responsibility for alleviating and rectifying that harm whenever possible. Acceptance of this responsibility by society at large through its agents, such as funding agencies, is an essential component of benevolence.

*Responsible use of nonhuman subjects in research*

Discussions over the ethics of research on nonhuman subjects center upon the principle that living beings that are similar should be treated similarly and those that are different should be treated in direct proportion to their differences (21). Nonetheless, all species deserve respect. Because even smart animals do not and cannot intentionally perform and control their actions according to rational deliberation and moral rules, issues such as informed consent, truth telling, or rights of privacy for nonhuman subjects are meaningless.

Animals and humans nevertheless do share similar capacities for pain and certain kinds of suffering, such as tension, exhaustion, and fear. Like experiments with humans, therefore, beneficence requires that research undertaken with animals should be well-defined and justified, that the pain and suffering of nonhuman subjects should be minimized, and that thresholds of allowable harm should be established (21). The facilities housing nonhuman subjects should also reflect an awareness of their needs and level of comfort.

Because nonhuman subjects, like noncompetent human subjects, are incapable of giving informed consent, a means of providing for their interests should be established. The director of the vivarium along with a committee of persons who are knowledgeable about animal care and experimentation best serve as responsible agents or guardians for nonhuman subjects. For these agents to make informed decisions as to the appropriateness of proposed research, investigators should fully inform them about the nature of the research, the procedures to be used, and the benefits and risks of the study. Records should be carefully maintained and made available to reviewing agents. These agents should also be free to act in behalf of the animal subjects they are charged to protect; for example, they should not receive rewards that compromise conscientious appraisals of prospective research. Agents should be fully informed of the progress of the research and, in a timely manner, of protocol changes before the initiation of such changes. Agents must be free to terminate the research if it becomes apparent that nonhuman subjects are suffering unnecessarily or that the research is not productive. Finally, the roles and positions of these agents should be defined so as to protect them from direct and indirect coercion by investigators or institutions.

*Ethical interactions with colleagues and trainees*

Ethical scientific conduct requires respecting a colleague's right of access to true discovery. The ethical scientist must hold a policy of full disclosure and fair interpretation of scientific data. Because most scientific investigation is expensive and requires the efforts of many individuals, the leader of each group must adhere to a policy of authorship that justly distributes credit as deserved. The scientist is also responsible for the inculcation of ethical behavior in students, trainees, and younger colleagues.

*Responsibilities toward students, trainees, and younger colleagues*

Few graduate students or medical trainees have been introduced to issues of ethical scientific conduct during their formal curriculum. If they lack prior experience in the laboratory, these students and trainees must be taught both directly and by example the principles and practices of ethical scientific behavior (22).

Students must be taught how to record laboratory procedures and results in such a fashion as to be immediately available and understandable to a coworker and/ or colleague. They should understand that truthful reporting and interpretation of data require that data be recorded accurately and in sufficient detail at the time of acquisition. The full recording of scientific data also respects the rights of future colleagues to have access to the entire scientific basis of each new discovery.

Students must be taught certain basic principles about discovery and research both for their own sake and in the service of moral and humanitarian ends. They should be taught how to use the scientific method of drawing a hypothesis from an existing body of knowledge on an unresolved issue, how to develop vigorous experimental design appropriate for testing the hypothesis and excluding a contradictory result, and how to interpret accurately an experiment's results, which includes accounting for unexpected results. The student should be taught the dangers of self-delusion stemming from exaggeration of the importance of the experiment's hypothesis and downgrading of the importance of negative data. As part of the scientific method, the student should be taught that data are potentially reportable whether or not they support the original hypothesis and that each new testing of the hypothesis requires honest interpretation of the complete collection of data.

The student must be taught the meaning and responsibility of authorship, as described below. The ethical scientist instructs the student in scientific verbal presentation and writing.

The ethical scientist does not exploit the teacher-student relationship by requiring tasks or roles that are unrelated to the education of the student or trainee. For example, sexual harassment constitutes a coercive use of others.

*Responsibilities toward oneself, peers, and colleagues*

Science is a societal enterprise that depends upon truthful reporting and objective and passionate evaluation of the accuracy and significance of data and discovery (23). The success of the scientific enterprise depends on responsible ethical behavior of the scientist to self, immediate colleagues, and peers in the scientific community.

Academic promotion requires continued publication and successful applications for research funding. Although competitive pressures promote hard work, the requirements for success may lead to self-delusion on the accuracy and significance of scientific results. Responsibility to self requires day-to-day adherence to the scientific method and continual recognition that careful and rigorous scientific proof and passionate data evaluation are of primary importance. The decision to publish in-
evitably includes degrees of self-interest but publishing should also reflect the primary ethical motive that sustains research: social benefit. The ethical scientist is responsible for the accuracy and significance of experimental data before submitting the data for peer review. As The American Institute of Nutrition (AIN) and The American Society for Clinical Nutrition (ASCN) Code of Professional Responsibility emphasizes, submission of accurate data includes the responsibility of citing fairly "the work of others that is relevant to the interpretation of the research presented." Truth telling also entails not contracting to undertake a study with the knowledge that its outcome will determine whether or not the results will be submitted for publication.

With few exceptions scientific experimentation and interpretation are a group effort, requiring fair recognition of the efforts of each individual and entailing responsibilities toward colleagues. Authorship should be accorded to individuals who have made a substantial intellectual contribution to the design, process, and/or interpretation of the project. Multiauthorship carries the risk of diminishing the contribution of respective authors, and gift authorship, that is, naming an individual as an author for personal or political reasons, is a form of deception. Authorship encompasses the responsibilities of both accepting liability for the results and being capable of defending the scientific product in public.

Honesty is the moral foundation for relating and communicating with peers. Withholding contradictory data, plagiarism, and fabrication displays personal disrespect toward peers and a disregard for the moral foundations that sustain ongoing human relationships. Dishonesty erodes and destroys trust among peers, disrupts the focus and productivity of the group, and ultimately undermines the reliability and reputation of the perpetrator. Truthfulness with peers includes accurately recording scientific data, honestly evaluating that data, and making it freely available upon request. Procedures to deal with fraud in research have been developed recently by universities and federal organizations (24).

Peer review is the best available mechanism for objective and rigorous scientific evaluation of manuscripts and applications for research funding. Although history records examples of self-publication of major scientific achievement, such as Beaumont’s description of gastric secretion and Lind’s discovery of the dietary cure for scurvy, peer review remains the safeguard of scientific accuracy and significance in modern competitive, large-scale research. The ethical scientist must be willing to accept implicitly and explicitly this moral contract: submitting research for peer review and, correspondingly, the responsibility of dispassionately reviewing the works of peers. As a peer reviewer, objective appraisal requires full and honest consideration of the accuracy and originality of scientific data and disclosure of existing and potential conflicts of interest. The ethical scientist should accept the responsibility of evaluating the work of peers only when a guarantee can be made to avoid personal considerations that would prevent complete objectivity. This exemplifies how the generally used phrase personal integrity encompasses morally specific behavior, that is, the ethical scientist will integrate moral standards into conduct and relationships whether or not the standards could be subtly or cunningly breached.

The scientific journal is the final repository of the objectively reviewed scientific product. Readers assume the truthfulness of published results as well as reasonable and objective interpretation of their significance. Responsibilities of journal editors include establishing and abiding by policies that promote responsible authorship through disclosures of previous contributions and assurances of the originality of each publication. Guidelines should also assure objective peer reviews of submitted manuscripts.

In dealing with allegations of scientific misconduct, the editor is responsible for notifying the author’s institution so that an investigation of scientific misconduct can be initiated. If inaccuracy of reporting is proven, the editor is responsible for correcting such inaccuracy through published retraction.

Ethical behavior toward the public, media, and funding sources

Interacting with the media for the public good

The public wants to know about nutrition. The print and electronic media are a primary source of information people use to make choices in the marketplace. Professional society members have both an opportunity and an obligation to contribute to this communication process. To do so will require overcoming a reluctance to speak to the public and journalists because of fears of being quoted or the resulting peer criticism. The principle of beneficence motivates us to provide the public with truthful information so that they will have better regard of the public good and to protect citizens from harm—long-standing responsibilities within American medicine (11). Providing the public with truthful information also displays respect for others as individuals endowed with the right to make their own decisions.

Scientists can interact with the media in many ways, such as speaking with journalists after making a presentation at public or professional meetings or talking with journalists doing research for articles. Because journalists today often cover scientific sessions, nutritionists must think in advance, whenever speaking in public, about the importance of abiding by the types of ethical principles discussed in this paper.

Disclosures of possible conflicts of interest

The Code of Ethics of AIN and ASCN requires members to disclose "professional and/or funding relationships in making public statements when professional relationships and sources of research and personal support are or may be interpretable as a source of bias." It is sometimes difficult to identify possible bias or what could be interpreted as bias (25). Scientists should consider the following: 1) with respect to the audience and the subject matter in question, would disclosure of your relationship with a third party or organization raise questions in the audience’s mind as to your scientific objectivity being influenced by that relationship? 2) Is it likely that the assistance you could render to the public would be enhanced by your prior clarification of a relationship that could be misinterpreted? 3) Would colleagues who know of your third-party relationship think that the audience’s knowing about such interactions would be significant information? 4) When your promise to a third party to keep information confidential (one ethical value) conflicts with your duty to inform others of your having a relationship with that party (another ethical value), would the most ethical behavior be for you not to comment to the public or in professional circles on nutrition topics related to that relationship?
questions rests the ethical principle of conducting oneself so as to maximize the public good.

The timing and detail of disclosures should be adapted to various situations. A brief live interview on television or radio probably allows little or not time for disclosure, but relevant relationships can be explained to the journalist before going on the air. When working with a research journalist, exploratory conversation regarding the interview topic may suggest that disclosure is unnecessary because the topic is unrelated. However, if the topic of the interview evolves in scope and potential bias might be interpreted, disclosure might become necessary later in the interview.

If disclosure seems beneficial when speaking publicly, an adaptation of the following statement could be used: As a professional in the field of nutrition (or as a member of XYZ Society), I think that it is important for this audience to be aware of my relationships with organizations other than my employing organization. This statement would be followed by the names of public or private funding sources, book publishers, voluntary and corporate board memberships, or other connections.

Assessment of scientific knowledge

In an interview the nutrition scientist needs to make the public aware of the broader state of knowledge in nutrition science and the interpretive nature of scientific data by making sure that proponents of other points of view are speaking concurrently or that the interviewer is experienced in in-depth analysis and is aware of the interpretive nature of the information and its importance. In settings where the scientist’s views may be naively accepted and published as hard and fast data rather than a legitimate interpretation of such data, the interpretative nature of the scientist’s views should be stressed. This includes settings where the audience or journalist is largely dependent on a single nutrition expert, and the expert is speaking about a controversial topic lacking scientific consensus. Depending on the circumstances the nutrition scientist can summarize opposing points of view or refer the journalist to other experts in the field. In keeping with the AIN and ASCN code, this includes minimizing misinterpretation by lay audiences by distinguishing clearly between anecdotal information and data from controlled studies.

The scientist who is convinced that diet and health are related and that changing diet patterns will benefit health, even though this relationship has not been conclusively proven, faces an ethical dilemma. The principle of beneficence requires making the strongest, most convincing presentation of this perspective when speaking to the public. However, treating people as capable of making their own choices requires the nutrition scientist to provide the public with arguments of other experts who interpret differently the current scientific knowledge or the public health implications of that knowledge.

Under such circumstances the nutrition scientist should examine the communication of scientific data in light of the following questions pertaining to the ethical principle of respect for people: 1) Is it fair to people who do not have the advantage of my knowledge to withhold information from them that might be important to their decision making? 2) If I were facing an important decision respecting my own health and my understanding of the science of nutrition was comparable to this audience’s, would I want the expert to give me only a particular perspective as conclusive or would I prefer all points of view so that I could decide for myself?

Implications for the nutrition scientific community

Respect, beneficence, and justice are basic ethical principles upon which practical guidelines for each scientific and professional activity can be drawn. These principles are based on ethical reasoning. They apply to all scientists and health-care providers and can be used to evaluate decision processes that will serve constructively both society and science.

Further discussions within the scientific profession can be built upon the bibliography provided in this paper. Seminars could be formulated on each of the major sections of this paper: what ethics is, responsible use of experimental subjects, ethical interactions with peers and trainees, and ethical behavior toward the public, media, and funding sources. Diversity of interpretation is to be expected and welcomed as long as it increases understanding and critical awareness.

Many questions remain to be considered. Prominent among them are, What is the responsibility of the individual scientist and of the institution? And how does law impact ethics and ethics impact law? Thoughtful discussion of these questions will highlight key issues and facilitate responsible modes of behavior (26). Through such discussion our profession can identify, incorporate, and ensure ethical actions within our own community and responsible interactions with other organizations that are similarly engaged and concerned.

References


