Variability of ethics education in laboratory medicine training programs: Results of an international survey

David E. Bruns a, Carl A. Burtis b,1, Ann M. Gronowski c, Matthew J. McQueen d,e, Anthony Newman f, Jon J. Jonsson g,h,i, for the IFCC Task Force on Ethics

a Department of Pathology, University of Virginia School of Medicine, Charlottesville, VA, United States
b Oak Ridge National Laboratory, Oak Ridge, TN, United States
c Department of Pathology and Immunology, Washington University School of Medicine, St. Louis, MO, United States
d McMaster University, Canada
e Clinical Research and Clinical Trials Laboratory, Hamilton General Hospital, Hamilton, ON, Canada
f Elsevier B.V., Radarweg 29, 1043 NX Amsterdam, The Netherlands
g Department of Biochemistry and Molecular Biology, Faculty of Medicine, University of Iceland, Reykjavík Iceland
h Department of Genetics and Molecular Medicine, Landspitali – National University Hospital of Iceland, Reykjavík Iceland

A R T I C L E   I N F O

Article history:
Received 31 October 2014
Received in revised form 20 November 2014
Accepted 21 November 2014
Available online 29 November 2014

Keywords:
Ethics
Education
Training
Survey
Postdoctoral

A B S T R A C T

Background: Ethical considerations are increasingly important in medicine. We aimed to determine the mode and extent of teaching of ethics in training programs in clinical chemistry and laboratory medicine.

Methods: We developed an on-line survey of teaching in areas of ethics relevant to laboratory medicine. Responses were invited from directors of training programs who were recruited via email to leaders of national organizations.

Results: The survey was completed by 80 directors from 24 countries who directed 113 programs. The largest numbers of respondents directed postdoctoral training of scientists (42%) or physicians (33%), post-masters degree programs (33%), and PhD programs (29%). Most programs (82%) were 2 years or longer in duration. Formal training was offered in research ethics by 39%, medical ethics by 31%, professional ethics by 24% and business ethics by 9%. The number of reported hours of formal training varied widely, e.g., from 0 to >15 h/year for research ethics and from 0 to >15 h/year for medical ethics. Ethics training was required and/or tested in 75% of programs that offered training. A majority (54%) of respondents reported plans to add or enhance training in ethics; many indicated a desire for online resources related to ethics, especially resources with self-assessment tools.

Conclusion: Formal teaching of ethics is absent from many training programs in clinical chemistry and laboratory medicine, with heterogeneity in the extent and methods of ethics training among the programs that provide the training. A perceived need exists for online training tools, especially tools with self-assessment components.

© 2014 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

1. Introduction

As in other areas of medicine and science, ethical questions are present in laboratory medicine [1–3]. These ethical questions have increased in complexity with the advent of genetic testing, biobanking, direct-to-consumer testing, and genomic testing, among other newer areas of diagnostic testing [4–7]. Laboratory medicine practitioners deal with issues of patient confidentiality on a daily basis, as well as issues of research ethics (including publication ethics), professional ethics (such as financial conflicts of interest) and business ethics (such as intellectual property and human resource management). Despite the need for practitioners to answer the questions in these areas, little is known about the teaching of ethics in laboratory medicine training programs.

PubMed searches for “ethics education pathology” and “ethics education laboratory medicine” returned 195 and 151 results, respectively. Few of the returned papers were relevant to the teaching of ethics in laboratory medicine [2,8,9]. One paper called for increased teaching of ethics in pathology residencies [8] and one indicated a need for increased teaching of ethics in training programs in clinical chemistry and laboratory medicine [2]. Only one paper, from 2002, described an attempt to gain information about the then-current teaching of ethics. In that study, chairs of U.S. pathology departments were asked about the training of pathology residents in the U.S. [9]. Formal ethics training was provided by 62% of the programs and 84% of respondents believed

http://dx.doi.org/10.1016/j.cca.2014.11.023
0009-8981/© 2014 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).
that ethical issues were under-recognized. In the present study, we
aimed to obtain international information about current and planned
Teaching of Ethics specifically in doctoral and postdoctoral training pro-
grams that are designed to train directors of clinical chemistry and
Laboratory medicine.

2. Methods

This study used online survey teaching of ethical issues by training
programs in clinical chemistry and laboratory medicine. A question-
naire with 43 questions was designed to obtain (A) general information
about each surveyed training program (such as the requirements for
prior education of applicants to the program) and (B) specific information
on various aspects of ethics education, such as the presence or ab-

3. Results

3.1. Characteristics of training programs of survey respondents

The survey was completed by 80 training-program directors. The
largest numbers directed postdoctoral training of scientists (42%) or
physicians (33%); post-masters degree programs (33%); and/or PhD
programs (29%). The 59 survey respondents who identified themselves
were from 24 countries (Table 1A).

As shown in Table 1B, 82% of the programs were accredited by an
outside organization. The largest number, 27, was accredited by the
Commission on Accreditation in Clinical Chemistry (CoACC). This
number of responses approaches the number of programs accredited
by CoACC, but may be an overestimate of the response rate as more
than one co-director of a program may have completed the survey.

For 82% of the programs, the length of training was 2 years or longer.
Forty-six percent of programs produced 1, 2, or 3 trainees per year, al-
though 12 (16%) graduated more than 10. The most common number of
graduates per year was one.

As an indication of where the graduates of the programs start their
careers after completing their training programs, the respondents
were asked to indicate the preferences of trainees for employment. Uni-
versity hospital employment was the clear first choice, followed, in di-

c found 3 (4%)

None or no response 18 (18%)

* The numbers are minimum estimates as not all respondents identified themselves.
The number of respondents who identified themselves from each country is indicated in
parentheses if greater than one.

3.2. Teaching of ethics in training programs

3.2.1. Overview

As shown in Table 2A, 35% of the respondents indicated that formal
training was provided in research ethics, although only 24% of programs
indicated that training in research ethics was required. Fewer programs
offered training in medical ethics (29%), professional ethics (20%) and
business ethics (8%), with only 21%, 16% and 4%, respectively, requiring
training in each of these latter 3 areas. Only three programs provided
and required training in ethics in all 4 areas. The teaching of business
ethics was so infrequent that it will not be dealt with further here.

Results for programs providing training in selected areas of ethics for
different types of training programs are shown in Table 2B. Training of
ethics was less commonly offered in postdoctoral programs compared
to the other three training levels. Interestingly, training in medical
ethics appeared to be less likely to be provided in postdoctoral programs
for scientists (22%) than in postmedical programs (40%).

3.2.2. Research ethics

The topics that were most frequently listed as taught in the 25 pro-
grams that provide training in research ethics are listed in Table 3A. Most of these critical topics, such as the Helsinki Declaration and protec-
tion of participants, were included in over 80% of programs that had for-
mal training in research ethics.

For approximately half of these programs, the time allotted to lectures/seminars on research ethics was 1–6 h (Table 3B). In approxi-
mately two-thirds of the programs, the teaching of ethics was done by
an interdisciplinary team that included an ethicist. Just over 60%
indicated that teaching of research ethics was incorporated in other
teaching. Almost 90% of this group indicated that students’ knowledge
of research ethics was tested, most commonly (74%) by multiple-choice examinations.

3.2.3. Medical ethics

The topics that were most frequently listed as covered in the 22 programs that provided training in medical ethics are shown in Table 4. Not surprisingly, the most common topic was principles of medical ethics, included in 20 (91%) of these 22 programs as a topic. Specific topics, such as patient privacy (77%), were less commonly included. Surprisingly, the concept of equipoise, which provides the ethical basis for medical research that involves assigning patients to different treatment arms of a clinical trial, was covered by only 2 programs perhaps reflecting the paucity of randomized controlled trials in laboratory medicine.

Medical ethics was taught in lectures (11 programs), seminars (8 programs), online (7 programs) and other ways (6 programs). Thirteen (59%) of the 22 respondents indicated that teaching of medical ethics was incorporated in other teaching either along with or in place of formal allocation of time. For approximately three quarters of these programs, the time allotted to lectures/seminars on medical ethics was between 1 and 6 h. Training was most often provided by an interdisciplinary team that included an ethicist (10 programs) and by an instructor in a field other than ethics (5 programs). In 10 programs, teaching of professional ethics was incorporated in teaching of other topics. Only 9 programs indicated that trainees’ knowledge of professional ethics was tested.

3.2.4. Professional ethics

The topics that were most frequently listed as covered in the 15 programs that provided training in professional ethics were codes of practice (codes of conduct) in all 15 programs, conflicts of interest (13 programs, 87%), and duties to society (10 programs, 67%). The number of hours of lectures/seminars on professional ethics was 1–3 h for 10 programs, but 4 programs indicated 7–9 h. Teaching was done by an interdisciplinary team that included an ethicist (10 programs) and by an instructor in a field other than ethics (5 programs). In 10 programs, teaching of professional ethics was incorporated in teaching of other topics. Only 9 programs indicated that trainees’ knowledge of professional ethics was tested.

3.3. Planned changes in teaching of ethics

When asked if changes in teaching of ethics were planned, 34 of 63 responding directors (54%) indicated that changes were planned. Among 17 free-text responses were comments about (1) a new module being developed on a specific topic in ethics, (2) planned annual sessions on ethics, (3) a workshop on laboratory ethics for professionals, (4) self-learning opportunities, (5) the use of case studies in small group teaching, and (6) creation of a national commission. Two respondents specifically mentioned business ethics as an area for attention.

The survey invited the directors to rate the potential usefulness of possible new tools in their programs. The 63 directors who responded ranked on-line resources that included self-assessment as the most useful tools, followed by on-line tools generally. Ethics sessions for trainees at national meetings ranked third, with books and monographs far behind.

4. Discussion

This is the first international study of the teaching of ethics in educational programs in laboratory medicine and the largest survey of

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training in selected areas of ethics as reported by all 80 surveyed programs (A) and according to type of program (B).</td>
</tr>
<tr>
<td><strong>A. Topics taught</strong></td>
</tr>
<tr>
<td>Research ethics</td>
</tr>
<tr>
<td>Medical ethics</td>
</tr>
<tr>
<td>Professional ethics</td>
</tr>
<tr>
<td>Business ethics</td>
</tr>
<tr>
<td>Any of four ethics categories</td>
</tr>
<tr>
<td>All four ethics categories</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>B. Topics taught according to type of program</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number and % of programs that teach each area</strong></td>
</tr>
<tr>
<td><strong>Topic</strong></td>
</tr>
<tr>
<td>Research ethics</td>
</tr>
<tr>
<td>Medical ethics</td>
</tr>
<tr>
<td>Professional ethics</td>
</tr>
<tr>
<td>Business ethics</td>
</tr>
</tbody>
</table>

* The 80 surveyed directors led the 104 programs above and 9 additional programs that did not fit into any of the 4 categories represented in this table.

<table>
<thead>
<tr>
<th>Table 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most-recently covered topics in research ethics (A) and time devoted to teaching of research ethics in 25 training programs that offer formal training in research ethics.</td>
</tr>
<tr>
<td><strong>A. Topics covered</strong></td>
</tr>
<tr>
<td>Responsibility of investigators</td>
</tr>
<tr>
<td>Protection of participants</td>
</tr>
<tr>
<td>Helsinki Declaration</td>
</tr>
<tr>
<td>Publication ethics</td>
</tr>
<tr>
<td>Biobanking</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>B. Time devoted to teaching of research ethics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of teaching hours</strong></td>
</tr>
<tr>
<td>1–3</td>
</tr>
<tr>
<td>4–6</td>
</tr>
<tr>
<td>7–9</td>
</tr>
<tr>
<td>10–12</td>
</tr>
<tr>
<td>More than 13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most-frequently covered topics in teaching sessions in 22 training programs that offer formal training in medical ethics.</td>
</tr>
<tr>
<td><strong>Topic</strong></td>
</tr>
<tr>
<td>Principles of medical ethics</td>
</tr>
<tr>
<td>Patient privacy</td>
</tr>
<tr>
<td>Ethical decision-making</td>
</tr>
</tbody>
</table>
teaching of ethics in laboratory medicine or pathology. The survey results indicate that (1) training in medical, research, professional and business ethics was absent from a sizeable majority of the respondents' training programs, (2) about half of the responding program directors plan to add or enhance ethics training and (3) there is a desire for online resources to aid in ethics training in laboratory medicine.

The results reported above can be compared to some extent with the results of a survey of teaching of ethics in U.S. pathology residency programs [9]. That survey, published in 2002, was directed to chairmen of U.S. pathology departments, among whom 36% (53/148) responded. Among the 45 chairmen who responded to a question about the presence or absence of formal training in ethics, 28 (62%) indicated that formal training was provided, a proportion that seems large compared with the data in the present study. The chairmen reported a mean (range) duration of formal instruction in ethics per year of 3.8 (0.75–18) hours in those programs that offered training. In the present study, approximately half (46%) of programs that offered training in research ethics devoted 7 or more hours to the topic (Table 3b); smaller additional blocks of time were devoted to other areas of ethics. The topics of most interest in the survey of pathology chairmen were issues related to (1) the use of tissue for research, (2) confidentiality and privacy, and (3) professionalism. These topics overlap considerably with the topics covered by training programs in the present survey.

In the present survey, the methods for teaching of ethics varied considerably among programs, with lectures and seminars appearing to be popular and with textbooks ranking low. The respondents' low rating of books and monographs as tools may reflect lack of interest in learning from books or may reflect the fact that books on ethics relevant to laboratory medicine already exist and there is no need for new ones. The latter possibility seems unlikely as we have not been able to find a book with its focus specifically on ethics and laboratory medicine, and coverage of ethical topics in general textbooks of clinical chemistry and laboratory medicine tends not to be extensive. For example, the most-recent editions of two textbooks in clinical chemistry [10,11] include brief descriptions of topics in ethics in their short first chapters, but the coverage is not adequate to form a basis for a formal series of lectures or seminars. One textbook in molecular diagnostics contains a section on ethics in each chapter [12]. Whether these sections are useful or even used is unknown. The present study cannot address the fundamental question of which, if any, of the pedagogical techniques used in the surveyed programs is likely to be successful in affecting behavior in a positive way [13]. This is potentially a fertile area for future investigation.

Strengths of the current study include its international scope, the reasonably large number of responses, the high agreement on some measures among the respondents (such as the very low rates of teaching of business ethics), and, in the case of ComACC-approved programs, an apparently high response rate.

The study has several weaknesses. The generalizability of the results is unknown as the proportion of all training programs that responded is unknown. The response rate for ComACC-accredited programs (mostly in the U.S.) appeared to be high. By contrast, the response rate worldwide is unknown as there is no international directory of training programs. A high response rate does not appear to have been achieved world-wide, as suggested by the absence of respondents who identified themselves as being from numerous populous countries such as Brazil, China, Egypt, Russia, Saudi Arabia and the United Kingdom, although 21 respondents did not identify themselves and some of them may have been from countries not listed in Table 1A. Caution should be used in any attempt to generalize the findings to a specific country or region. An additional limitation is the possibility of bias in self-selection of respondents. Directors with an interest in ethics may have been more inclined to respond to a survey on ethics. If so, the reported rates of teaching of ethics may be overestimates, and the teaching of ethics may be even more limited than the survey results suggest.

In summary, the teaching of ethics appears to be highly variable among training programs in laboratory medicine. The reasons for this variability warrant study. As with heterogeneity in other activities in medicine, variability suggests opportunities for improvement.

Acknowledgments

We thank Graham Groom senior administrator in the Association for Clinical Biochemistry, UK and Paola Bramati, administrative secretary in the IFCC office, for the help with the survey; and the National Representatives in IFCC for introducing the survey to program directors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.cca.2014.11.023.

References