GOOD CLINICAL PRACTICE TRAINING FOR THE CONDUCT OF CLINICAL TRIALS

LITERATURE REVIEW REPORT

Purpose of the Report: In 2013, CTTI's Good Clinical Practice (GCP) Training Project Team commissioned a literature review of current practices in the implementation of GCP training in order to inform the project. The review was conducted and prepared at the Duke Clinical Research Institute by Amy Kendrick, MSN, and Megan Chobot, MSLS, of the Duke Evidence Synthesis Group, Gillian Sanders, PhD, Director.

METHODS

Literature Search Strategy

To identify relevant published literature, we searched PubMed®, limiting the search to articles published from January 1, 2003, through July 1, 2013. (Appendix A contains the search terms.) We believe that articles published in the past 10 years adequately represent current practices for Good Clinical Practice (GCP) training. An experienced search librarian guided all searches. All articles were imported into an electronic database (EndNote®, Thomson Reuters, Philadelphia, PA).

Inclusion and Exclusion Criteria

The criteria used to screen articles for inclusion/exclusion at both the title-and-abstract and full-text screening stages were:

Inclusion:

- U.S. focused or U.S. component
- Discussed elements of GCP training
- Related to clinical research beyond Phase 1 (so human subjects are being recruited)
- English language
- Published in the past 10 years

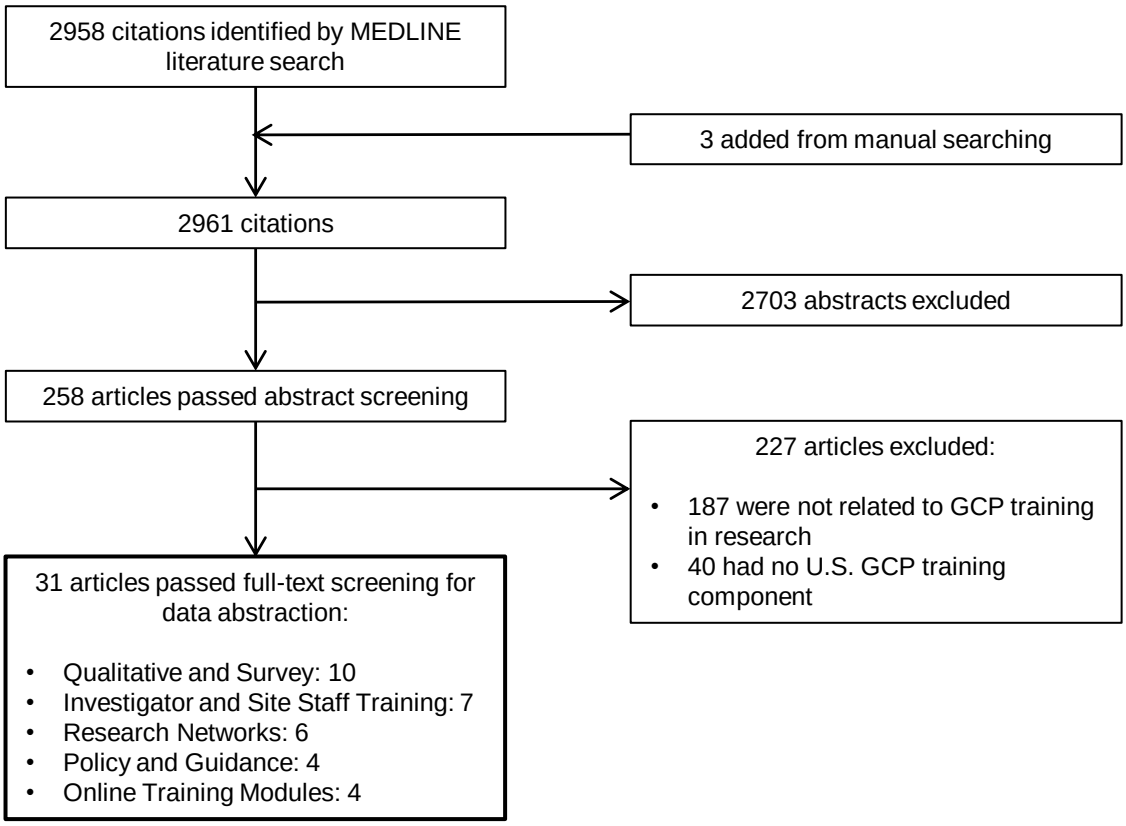
Exclusion:

- Discussed only HIPAA (Health Insurance Portability and Accountability Act)
- Focused on building clinician-researcher workforce for the future (for example, generic descriptions about how to ensure there are enough dentists, surgeons, psychiatrists, pediatricians; doing research in the future)

Article Selection

Figure 1 shows the flow of literature through the search and screening process. Using the prespecified inclusion and exclusion criteria described above, two individuals independently reviewed 2,961 titles and abstracts for potential relevance. There were 258 articles included by either reviewer that underwent full-text screening. At the full-text review stage, two individuals independently reviewed the articles and indicated a decision to include or exclude the article for data abstraction. Disagreements on inclusion or exclusion were reconciled by a secondary review or a third-party arbitrator if needed. Thirty-one full-text articles met eligibility criteria and were included for data abstraction. All screening decisions were made and tracked in a Distiller SR database (Evidence Partners Inc., Manotick, ON, Canada).

Figure 1. GCP Training Literature Flow Diagram



Data Abstraction

The research team created data abstraction forms and evidence table templates for abstracting data. One reviewer abstracted the data, and the second reviewed the completed abstraction form alongside the original article to check for accuracy and completeness. Disagreements were resolved by consensus, or by obtaining a third reviewer's opinion if consensus could not be reached. To aid in both reproducibility and standardization of data collection, data abstraction instructions were reviewed at each stage of the process.

The elements collected in the data abstraction forms were specified in consultation with the GCP Training project team. These included the type of article, training audience, frequency of training, proof of training, and components of GCP covered in training. We also recorded if data elements were not reported in the article. (Appendix B contains a list of data elements abstracted.)

We obtained the GCP components by evaluating sample articles for how the training elements are commonly divided and presented. Thus, our list of GCP components included:

- Overview of GCP/International Conference on Harmonisation (ICH)
- Drug development/investigational new drug (IND)
- Institutional review board (IRB)/independent ethics committee (IEC) oversight
- Investigator responsibilities
- Staff training and delegation of responsibilities
- Protocol adherence
- Data management
- Investigational drug (accountability, masking, randomizing)
- Statistics (data and safety monitoring board [DSMB], randomization plans, analysis plans, sample size)
- Informed consent
- Vulnerable populations
- Serious adverse events(SAEs)/adverse events (AEs)
- Monitoring
- Trial records (mandatory files, timeframe to retain)
- Audits and inspections
- Reporting (FDA, sponsor)
- Medical device regulations

Data Synthesis

The set of 31 included articles was sorted, based on a review of their content and structure, into the following 5 categories for further discussion in the Results section:

1. **Qualitative and Survey** (10 survey summaries and qualitative reviews)
2. **Investigator and Site Staff Training** (7 author recommendations)
3. **Research Networks** (6 descriptions of experiences implementing GCP training across a research network)
4. **Policy and Guidance** (4 articles clarifying how regulations are to be interpreted)
5. **Online Training Modules** (4 descriptions of software developed to implement GCP training)

RESULTS

Qualitative and Survey Articles

We identified 10 articles[1-10] that were primarily qualitative and survey-based, and this group highlights the variability in implementation of GCP training programs (Table 1). The first such article[1] is based on survey results from 1,479 NIH-funded scientists in 2002. Six articles[2,3,5,8-10] based on surveys of various groups within the clinical research arena each make a case for a unified and consistent approach to training in research ethics. Another article[6] also highlights the inadequacy of training but expands this idea further by calling for clear research ethics training goals, with measurable outcomes, as a way to facilitate consistency in content and requirements of training programs. Two articles focused their surveys on specific components of GCP training: conflict of interest disclosure to potential subjects[4] and IRB guidelines.[7] These articles also reinforce that GCP training programs vary both in content and audience.

The qualitative and survey-based articles had some limitations. The most recent survey[9] did not capture any details about the content or delivery methods used in GCP training across the 200 NIH-funded institutions they surveyed. The data used in one[1] was 5 years old, and in another[4] the survey was limited because it used a convenience sampling strategy of 300 coordinators attending a professional conference. Further, the surveys did not include information on the frequency of training or what sort of testing/proof of training was required.

Table 1. Summary of Qualitative and Survey Articles

Article	Type of Study	Training Audience	Frequency	Proof of Training	Overview of GCP/ICH	Drug Development	IRB/IEC Oversight	Investigator Responsibilities	Staff Training/Delegation	Protocol Adherence	Data Management	Investigational Drug	Statistics: Design, Analysis	Informed Consent	Vulnerable Populations	SAEs/Adverse Events	Monitoring	Trial Records	Audits and Inspections	Reporting (FDA, Sponsor)	Medical Device
Anderson, 2007[1]	Survey: 7,700 researchers	Investigators	NR	NR	X			X	X					X							
DeBruin, 2007[2]	Survey: 48 ASBH members	Investigators and site staff	NR	NR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dubois, 2010[3]	Survey: 38 CTSA institutions	Investigators and site staff	NR	NR	X			X	X	X	X			X			X		X		
Friedman, 2007[4]	Survey: 300 CRCs at 2006 conference	Site staff	NR	NR										X							
Heitman, 2007[5]	Survey: 251 graduate students	Investigators and site staff	NR	NR	X		X	X	X	X	X			X	X			X	X	X	
Kalichman, 2007[6]	Survey: 67 RCR trainers	Investigators and site staff	NR	NR	X		X	X	X		X			X	X						
Kotzer, 2007[7]	Survey: Online, 643 research staff	Investigators and site staff	NR	NR			X							X	X						
Redman, 2006[8]	Survey: 39 cases of misconduct	Investigators and site staff	NR	NR	X			X	X	X	X		X	X			X	X	X		
Resnik, 2012[9]	Survey: 200 NIH-funded institutions	Investigators and site staff	NR	NR																	
Steneck, 2007[10]	RCR overview	Investigators and site staff	NR	NR	X		X	X	X	X	X			X	X						

Abbreviations: ASBH=American Society for Bioethics and Humanities; CITI=Collaborative Institutional Training Initiative; CRC=clinical research coordinator; CTSA= Clinical and Translational Science Award; FDA=Food and Drug Administration; FHI=Family Health International; GCP=good clinical practice; ICH=International Conference on Harmonisation; IEC=independent ethics committee; IRB=institutional review board; NIH=National Institutes of Health; NR=not reported; RCR=responsible conduct of research; SAEs=serious adverse events

Investigator and Site Staff Training Articles

We identified seven articles[11-17] that discuss the variability of training for investigators and staff (Table 2). These articles, however, are not survey-based, and several of them go into more detail about training strategies for both staff and specific investigator subgroups. Another article[13] discusses training needs in relation to FDA monitoring for compliance and implications for misconduct. One article[15] discusses the variety of training programs for consent administrators, making the case that consent training needs to be a priority in order to help mediate health disparities found in recruitment of subjects for clinical research projects. Another[17] calls for certification to enhance regulatory compliance by investigators, as proposed by Academy of Pharmaceutical Physicians and Investigators (APPI).

Table 2. Summary of Investigator and Site Staff Training Articles

Article	Training Audience	Type of Training	Frequency	Proof of Training	Overview of GCP/ICH	Drug Development	IRB/IEC Oversight	Investigator Responsibilities	Staff Training/Delegation	Protocol Adherence	Data Management	Investigational Drug	Statistics: Design, Analysis	Informed Consent	Vulnerable Populations	SAEs/Adverse Events	Monitoring	Trial Records	Audits and Inspections	Reporting (FDA, Sponsor)	Medical Device
Beresin, 2003[11]	Investigators	Classroom	NR	None	X	X	X	X		X	X	X	X	X	X	X		X	X	X	
Chen, 2003[12]	Investigators and staff	Classroom, paper-based	NR	None	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	
Hamrell, 2010[13]	Investigators and staff	Online and paper-based	NR	None	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	
Jha, 2010[14]	Site staff	Paper-based	NR	Certificate				X	X	X	X			X							
Larson, 2009[15]	Site staff	Classroom	NR	Test			X	X	X					X	X						
Trembath, 2011[16]	Investigators and staff	Paper-based	NR	None	X		X	X	X	X	X	X					X	X		X	
Vulcano, 2012[17]	Investigators	NR	NR	Certificate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Abbreviations: FDA=Food and Drug Administration; GCP=good clinical practice; ICH=International Conference on Harmonisation; IEC=independent ethics committee; IRB=institutional review board; NR=not reported; SAEs=serious adverse events

Research Network Articles

We identified six articles[18-23] with discussions of implementing GCP training across research networks (Table 3). Two of these[18,23] discuss experiences in the Practice-Based Research Network (PBRN) when instituting GCP training across research sites. One[18] reports that a variety of training methods allow training to be more flexible to adapt to community-based researchers. This article suggests discussing with IRBs how to define the appropriate levels of training needed for site staff by taking into consideration the lower risk emphasis of PBRN research (surveys, practice improvement, or behavioral interventions).

Two articles[19,20] discuss processes implemented by the Academy of Family Physicians National Research Network (AAFP-NRN) in instituting GCP training across their research sites. In one of these,[20] the initial emphasis is to provide classroom training during weekend site initiation visits. Written materials are also provided so that as site staffing changes and responsibilities are delegated, the site staff can update their own training. In the other,[19] the Collaborative Institutional Training Initiative (CITI) training modules, either online or paper-based, are presented as an alternative method to ensure that a consistent GCP training message is achieved and certified at least every 3 years.

One article[21] details the online GCP training developed for the military research network, as mandated by the Human Use Regulatory Affairs Advisor (HURAA). For this network, the online aspect is easy to universally implement, and there is a testing requirement at the end of the training to document that content was delivered and processed by the individual. Another article[22] provides details about the content and experience of the National Institute of Drug Abuse (NIDA) when instituting GCP training across their research network. While that network had no testing or certification requirements, the content is comprehensive and is provided in all three possible modalities: classroom, online, and paper-based self-study. The article also discusses NIDA's quality assurance and monitoring initiative and suggests that it be left to the study's principal investigator to determine the training content and frequency based on each site's performance.

Table 3. Summary of Research Networks Articles

Article	Training Audience	Type of Training	Frequency	Proof of Training	Overview of GCP/ICH	Drug Development	IRB/IEC Oversight	Investigator Responsibilities	Staff Training/Delegation	Protocol Adherence	Data Management	Investigational Drug	Statistics: Design, Analysis	Informed Consent	Vulnerable Populations	SAEs/Adverse Events	Monitoring	Trial Records	Audits and Inspections	Reporting (FDA, Sponsor)	Medical Device
Dolor, 2008[18] PBRN	Investigators and site staff	Classroom, paper-based, online	NR	Test + certificate	X		X	X	X	X	X			X	X	X	X	X	X	X	
Graham, 2007[19] AAFP-NRN	Investigators and site staff	Paper-based, online	3 years (minimum)	Certificate	X		X	X	X	X	X			X	X						
Graham, 2007[20] AAFP-NRN	Investigators and site staff	Classroom, paper-based	Start of study	None			X	X	X	X	X			X	X	X					
Hu, 2004[21] HURAA	Investigators and site staff	Online	NR	Test			X	X	X	X	X	X		X	X	X	X	X	X		
Rosa, 2009[22] NIDA	Investigators and site staff	Classroom, paper-based, online	NR	None	X		X	X	X	X	X	X		X	X	X	X	X	X	X	
Yawn, 2009[23] PBRN	Site staff	NR	1 year, 2 years	None			X		X	X				X							

Abbreviations: AAFP-NRN=Academy of Family Physicians National Research Network; FDA=Food and Drug Administration; GCP=good clinical practice; HURAA=human use regulatory affairs advisor; ICH=International Conference on Harmonisation; IEC=independent ethics committee; IRB=institutional review board; NIDA=National Institute on Drug Abuse; NR=not reported; PBRN=Practice-Based Research Network; SAEs=serious adverse events

Policy and Guidance Articles

Among the four articles[24-27] we identified that are policy or guidance documents, three are from U.S. government entities: FDA,[24] Department of Health and Human Services (DHHS),[25] and Office for Human Research Protections (OHRP)[27] (Table 4). Articles that discuss the FDA and DHHS each reinforce that it is ultimately the investigator's responsibility to ensure that their staff is adequately trained and that responsibilities have been delegated appropriately. Another article[26] presents a competence statement from the Academy of Physicians in Clinical Research (APCR). This article asserts that after an investigator receives certification in clinical research, which is available through the APCR, the investigator should be deemed exempt from additional research training—provided that the research they are participating in is within his or her area of clinical expertise.

Table 4. Summary of Policy and Guidance Articles

Article	Training Audience	Type of Training	Frequency	Proof of Training	Overview of GCP/ICH	Drug Development	IRB/IEC Oversight	Investigator Responsibilities	Staff Training/Delegation	Protocol Adherence	Data Management	Investigational Drug	Statistics: Design, Analysis	Informed Consent	Vulnerable Populations	SAEs/Adverse Events	Monitoring	Trial Records	Audits and Inspections	Reporting (FDA, Sponsor)	Medical Device
Anderson, 2011[24] FDA	Investigators and staff	Paper-based	NR	None	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X
U.S. Department of Health and Human Services, 2009[25] DHHS	Investigators	Non-binding guidance document	NR	None	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Koren, 2011[26] APCR	Investigators	NR	Once certified, never need to repeat	Certificate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Schwetz, 2007[27] OHRP	Investigators and staff	Classroom, paper-based, online	NR	None	X		X	X	X	X				X	X	X					

Abbreviations: APCR=Academy of Physicians in Clinical Research; DHHS=Department of Health and Human Services; FDA=Food and Drug Administration; GCP=good clinical practice; ICH=International Conference on Harmonisation; IEC=independent ethics committee; IRB=institutional review board; NR=not reported; OHRP=Office for Human Research Protections; SAEs=serious adverse events

Online Training Module Articles

We identified four articles[28-31] that discuss a specific online GCP training package or system (Table 5). The package with the most components[29] was developed with the University of Miami and provides training to users at academic institutions, government agencies, and commercial organizations in the United States and around the world. They have added recertification modules to streamline training when IRBs require recertification within a specific timeframe.

Two of the four articles discuss the training system developed by Family Health International (FHI).[30,31] This system was created to help address international training needs, especially in underserved areas of the world, where FHI does much of their research. The components are streamlined and made available on a CD as well as paper-based to be accessible in areas that may not have internet access or abundant computer availability. Materials for the FHI training were tested in five countries (India, Kenya, Zimbabwe, Philippines, and United States) and have been translated into many languages, allowing a multinational study to deliver the same training content in a variety of languages.

A system developed by the University of Pittsburgh,[28] contains items determined to be the most essential for their research staff. Functionality of this system includes links within a module quiz to instructional material that lets users learn why their answer was incorrect. When the user must repeat the training module, subsequent quiz questions can be pulled randomly from a group of similar questions.

Table 5. Summary of Online Training Modules Articles

Article	Training Audience	Type of Training	Frequency	Proof of Training	Overview of GCP/ICH	Drug Development	IRB/IEC Oversight	Investigator Responsibilities	Staff Training/Delegation	Protocol Adherence	Data Management	Investigational Drug	Statistics: Design, Analysis	Informed Consent	Vulnerable Populations	SAEs/Adverse Events	Monitoring	Trial Records	Audits and Inspections	Reporting (FDA, Sponsor)	Medical Device
Barnes, 2006[28]	Investigators and staff	University of Pittsburgh: Online	NR	Test + certificate	X		X	X	X	X	X			X	X	X	X				
Braunschweiger, 2007[29]	Investigators and staff	CITI Program: Online	NR	Test + certificate	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X
Merritt, 2010[30]	Investigators and staff	FHI: Online and paper-based	NR	Certificate	X		X	X	X		X			X	X	X	X	X	X		
Rivera, 2005[31]	Investigators and staff	FHI: Online and paper-based	NR	Test + Certificate	X		X	X	X	X	X			X	X	X	X	X	X		

Abbreviations: CITI=Collaborative Institutional Training Initiative; FDA=Food and Drug Administration; FHI=Family Health International; GCP=good clinical practice; ICH=International Conference on Harmonisation; IEC=independent ethics committee; IRB=institutional review board; NR=not reported; SAEs=serious adverse events

LITERATURE REVIEW SUMMARY

In 2013, CTTI's Good Clinical Practice (GCP) Training Project Team commissioned a literature review of current practices in the implementation of GCP training in order to inform the project. A variety of GCP training curricula and methodologies have been developed. Some of these implement training for local research investigators and staff, and others have started at the university level to invoke standards for faculty and staff. Several government agencies (such as NIH, FDA, OHRP, and National Institute of Allergy and Infectious Diseases) also have developed various GCP training modules.

In reviewing the 31 articles identified in this literature search, we noted several recurrent concepts:

- GCP training is an important way to try to safeguard the integrity of clinical research.
- In the past 10 years, a variety of training programs have been developed. The varied content of these training efforts has challenged the GCP training message and at times has slowed the initiation of clinical studies.
- Clarifying GCP training goals and increasing guidance for the research community will help to streamline GCP training practices.
- Online GCP training has the benefits of flexibility and convenience, and researchers who want classroom or face-to-face training can apply their time together to concentrate on protocol-specific items.
- GCP training usually includes the following components:
    - IRB/IEC oversight
    - Investigator responsibilities
    - Staff training and delegation of responsibilities
    - Protocol adherence
    - Data management
    - Informed consent
    - Vulnerable populations
    - SAEs/AEs
    - Monitoring
- We found little information about the optimum frequency for GCP training and only a few mentions of testing or proof of training (i.e., documentation).

An agreement on a core GCP training curriculum appears to be something the research community seeks in order to streamline the research process while enhancing the GCP training message. The upfront investment of time in a core GCP curriculum will ultimately be a resource saver.

REFERENCES

1. Anderson MS, Horn AS, Risbey KR, Ronning EA, De Vries R, Martinson BC. What do mentoring and training in the responsible conduct of research have to do with scientists' misbehavior? Findings from a National Survey of NIH-funded scientists. *Acad Med*. 2007;82:853-60.
2. DeBruin DA, Scholder SL, Kahn J, et al. Educational approaches to the responsible conduct of clinical research: an exploratory study. *Acad Med*. 2007;82:32-9.
3. DuBois JM, Schilling DA, Heitman E, Steneck NH, Kon AA. Instruction in the responsible conduct of research: an inventory of programs and materials within CTSAs. *Clin Transl Sci*. 2010;3:109-11.
4. Friedman JY, Sugarman J, Dhillon JK, et al. Perspectives of clinical research coordinators on disclosing financial conflicts of interest to potential research participants. *Clin Trials*. 2007;4:272-8.
5. Heitman E, Olsen CH, Anestidou L, Bulger RE. New graduate students' baseline knowledge of the responsible conduct of research. *Acad Med*. 2007;82:838-45.
6. Kalichman MW, Plemmons DK. Reported goals for responsible conduct of research courses. *Acad Med*. 2007;82:846-52.
7. Kotzer AM, Milton J. An education initiative to increase staff knowledge of Institutional Review Board guidelines in the USA. *Nurs Health Sci*. 2007;9:103-6.
8. Redman BK, Templin TN, Merz JF. Research misconduct among clinical trial staff. *Sci Eng Ethics*. 2006;12:481-9.
9. Resnik DB, Dinse GE. Do U.S. research institutions meet or exceed federal mandates for instruction in responsible conduct of research? A national survey. *Acad Med*. 2012;87:1237-42.
10. Steneck NH, Bulger RE. The history, purpose, and future of instruction in the responsible conduct of research. *Acad Med*. 2007;82:829-34.
11. Beresin EV, Baldessarini RJ, Alpert J, Rosenbaum J. Teaching ethics of psychopharmacology research in psychiatric residency training programs. *Psychopharmacology (Berl)*. 2003;171:105-11.
12. Chen DT. Curricular approaches to research ethics training for psychiatric investigators. *Psychopharmacology (Berl)*. 2003;171:112-9.
13. Hamrell MR. Raising suspicions with the Food and Drug Administration: detecting misconduct. *Sci Eng Ethics*. 2010;16:697-704.
14. Jha S. The nurturing of the clinical research coordinator. *Acad Radiol*. 2010;17:1325.
15. Larson EL, Cohn EG, Meyer DD, Boden-Albala B. Consent administrator training to reduce disparities in research participation. *J Nurs Scholarsh*. 2009;41:95-103.
16. Trembath L, Opanowski A. Clinical trials in molecular imaging: the importance of following the protocol. *J Nucl Med Technol*. 2011;39:63-9.
17. Vulcano DM. CPI Certification as Predictor of Clinical Investigators' Reglatory Compliance. *Drug Inf J*. 2012;46:84-7.

18. Dolor RJ, Smith PC, Neale AV. Institutional review board training for community practices: advice from the Agency for Health Care Research and Quality Practice-Based Research Network listserv. *J Am Board Fam Med*. 2008;21:345-52.
19. Graham DG, Spano MS, Manning B. The IRB challenge for practice-based research: strategies of the American Academy of Family Physicians National Research Network (AAFP NRN). *J Am Board Fam Med*. 2007;20:181-7.
20. Graham DG, Spano MS, Stewart TV, Staton EW, Meers A, Pace WD. Strategies for planning and launching PBRN research studies: a project of the Academy of Family Physicians National Research Network (AAFP NRN). *J Am Board Fam Med*. 2007;20:220-8.
21. Hu X, Graesser AC. Human use regulatory affairs advisor (HURAA): learning about research ethics with intelligent learning modules. *Behav Res Methods Instrum Comput*. 2004;36:241-9.
22. Rosa C, Campbell A, Kleppinger C, Sampson R, Tyson C, Mamay-Gentilin S. Quality assurance of research protocols conducted in the community: the National Institute on Drug Abuse Clinical Trials Network experience. *Clin Trials*. 2009;6:151-61.
23. Yawn BP, Graham DG, Bertram SL, et al. Practice-based research network studies and institutional review boards: two new issues. *J Am Board Fam Med*. 2009;22:453-60.
24. Anderson C, Young PA, Berenbaum A. Food and Drug Administration guidance: supervisory responsibilities of investigators. *J Diabetes Sci Technol*. 2011;5:433-8.
25. U.S. Department of Health and Human Services, Food and Drug Administration, Center for Drug Evaluation and Research (CDER), Center for Biologics Evaluation and Research (CBER), Center for Devices and Radiological Health (CDRH). Investigator Responsibilities - Protecting the Rights, Safety and Welfare of Study Subjects. 2009.
26. Koren M, Koski G, Reed D, et al. APCR Physician Investigator Competence Statement. *The Monitor*. 2011;25:79-82.
27. Schwetz BA. Protecting subjects without hampering research progress: guidance from the office for human research protections. *Cleve Clin J Med*. 2007;74 Suppl 2:S60-2; discussion S68-9.
28. Barnes BE, Friedman CP, Rosenberg JL, Russell J, Beedle A, Levine AS. Creating an infrastructure for training in the responsible conduct of research: the University of Pittsburgh's experience. *Acad Med*. 2006;81:119-27.
29. Braunschweiger P, Goodman KW. The CITI program: an international online resource for education in human subjects protection and the responsible conduct of research. *Acad Med*. 2007;82:861-4.
30. Merritt MW, Labrique AB, Katz J, Rashid M, West KP, Jr., Pettit J. A field training guide for human subjects research ethics. *PLoS Med*. 2010;7.
31. Rivera R, Borasky D, Rice R, Carayon F. Many worlds, one ethic: design and development of a global research ethics training curriculum. *Dev World Bioeth*. 2005;5:169-75.

Appendix A. Search Strategy

Topic: Good Clinical Practice Training
Date: July 1, 2013
Database: PubMed

Set #	Terms	Results
1	"Clinical Trials as Topic/ethics"[majr] OR "Clinical Trials as Topic/organization and administration"[majr] OR ("Biomedical Research/education"[majr] OR "Biomedical Research/ethics"[majr] OR "Biomedical Research/history"[majr] OR "Biomedical Research/methods"[majr] OR "Biomedical Research/organization and administration"[majr]) OR ("Clinical Protocols/history"[majr] OR "Clinical Protocols/methods"[majr] OR "Clinical Protocols/organization and administration"[majr]) OR ("Clinical Nursing Research/education"[majr] OR "Clinical Nursing Research/ethics"[majr] OR "Clinical Nursing Research/history"[majr] OR "Clinical Nursing Research/methods"[majr] OR "Clinical Nursing Research/organization and administration"[majr]) OR ("Ethics Committees, Research/ethics"[majr] OR "Ethics Committees, Research/history"[majr] OR "Ethics Committees, Research/organization and administration"[majr]) OR ("Clinical Trials Data Monitoring Committees/ethics"[majr] OR "Clinical Trials Data Monitoring Committees/history"[majr] OR "Clinical Trials Data Monitoring Committees/organization and administration"[majr]) OR "Patient Selection/ethics"[majr] OR “good clinical practice”[tiab] OR “code of federal regulations”[tiab] OR “common rule”[tiab] OR “declaration of Helsinki”[tiab] OR "Health Insurance Portability and Accountability Act/organization and administration"[majr] OR HIPAA[tiab]	Majr - 54568
2	"Education"[majr] OR "staff development"[tiab] OR "training"[tiab]	546092
3	#1 AND #2	4768
4	Limits: English, last 10 years	2958

Appendix B. Sample Data Abstraction Form

- Type of article *(radial button, choose one)*
  - Current GCP Training Practices
  - Recommendations for GCP Training in Future
  - Both
- GCP component *(check all that apply)*
  - Overview of GCP/ICH
  - Drug Development
  - IRB/IEC Oversight
  - Investigator Responsibilities
  - Staff Training/Delegation
  - Protocol Adherence
  - Data Management
  - Investigational Drug
  - Statistics: Design, Analysis
  - Informed Consent
  - Vulnerable Populations
  - Serious Adverse Events/Adverse Events
  - Monitoring
  - Trial Records
  - Audits and Inspections
  - Reporting (FDA, Sponsor)
  - Medical Device
  - Other (specify) _____
- Type of training *(check all that apply)*
  - Class/instructor led
  - Self-study (online)
  - Self-study (paper-based)
  - Other (specify) _____
- Frequency of training *(radial button, choose one)*
  - 6 months
  - 1 year
  - 2 years
  - Other (specify) _____
  - Not Reported
- Participants *(check all that apply)*
  - Investigators
  - Site Staff (specify) _____
- Proof of Completion *(check all that apply)*
  - Test
  - Certificate
  - None
  - Other (specify) _____
- Verification of Data Overread/Confirmation _____