

ESSENTIAL COMPETENCIES FOR MEDICAL STUDENTS AS MEDICAL EDUCATION RESEARCHERS

SDRME 2010 – EDITORS FERGUSON AND HUGGETT

BACKGROUND & PURPOSE

Although medical students may have opportunities to develop research competencies specific to scientific and clinical research, it is less likely they will have formal opportunities to learn about and conduct medical education research. At the 2010 Society of Directors of Research in Medical Education annual meeting we sought to outline the competencies essential for students who wish to participate in medical education research.

METHODS

SDRME members reviewed a list of medical education research competencies derived from the task force report “Review Criteria for Research Manuscripts” edited by Bordage and Caellegh and published in *Academic Medicine* (2001). We used discussion and iterative review to determine, by consensus, which competencies should be addressed, either as required or recommended. The required competencies were those that could be accomplished in a one-month rotation, while the recommended competencies were believed to require a longer time period (perhaps a three-month summer fellowship). Finally, there were two competencies adapted from the Bordage and Calleigh article on which the group could not reach consensus in terms of whether they should be required or recommended.

RESULTS

ESSENTIAL COMPETENCIES FOR MEDICAL EDUCATION RESEARCH	Required	Recommended	Corresponding Bland Competencies
1. Define a focused research question in a larger area of interest	✓		
2. Access prior research and interpret it in context of the research question – recognize that most questions build on existing research and gaps in the literature that add to the body of research	✓		
3. Understanding the conceptual/theoretical framework underlying the question	✓		
4. Identify types of methods in medical education research, especially as they contrast with biomed research paradigms	✓		
5. List and describe the steps in the research process, particularly for educational research	✓		
6. Critically appraise literature by applying published criteria relevant to the research paradigm (e.g., Acad Med checklist)	✓		Bland #11 and #12

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ESSENTIAL COMPETENCIES FOR MEDICAL EDUCATION RESEARCH	Required	Recommended	Corresponding Bland Competencies
7. Operationalize dependent and independent variables and develop a research design for their research question – including basics of data management	✓		Bland #13
8. Identify and differentiate inductive (observational) and deductive (interventional) approaches to examining a research question	✓		
9. Distinguish the similarities and contrasts between social/educational research and biomedical research	✓		
10. Compare and contrast quality criteria for different paradigms/genres of research		✓	Bland #14
11. Design and <u>carry out</u> a small study (including data analysis, reporting and presentation of results)		✓	Bland #15 and 16
12. Data management principles		✓	Bland #17

FOR FURTHER DISCUSSION

The group was not able to reach consensus on the following competencies:

- Be able to select conceptual models for various research procedures OR recognize variations in logic models for various research procedures.
- How much and when to introduce analytic procedures, both quantitative and qualitative.

Brief discussion of the Bland competencies for research centered on the similarities of the competencies to those adapted from Bordage and Calleigh. The discussion suggests that some of the corresponding Bland competencies would be considered required, while others would be recommended. An educational strategy deemed helpful in accomplishing the required competencies would be to identify a body of educational research that exemplified the principles being taught (e.g., literature related to admissions procedures, burn-out and empathy, or clinical evaluation forms).

REFERENCES

Bordage G and Calleigh A. *Acad Med.* 2001;76:(9):959.

Bland CJ, Schmitz CC, Stritter FT, Henry RC, Aluise JJ. *Successful Faculty in Academic Medicine.* New York, NY: Springer; 1990.

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RESEARCH (from Bland Competencies)

- 11 ___ Access and critically read the research literature in medicine, education, and other domains.**
- 12 ___ Understand theory and empirical findings in one's own research area.**
- ___ Identify an area of interest in a given body of literature
 - ___ Identify experts in that area of interest
 - ___ Use appropriate resources to complete literature searches; be familiar with available software packages to search (Medline, Grateful Med.)
 - ___ Evaluate a research article critically
 - ___ Explain the importance of theory to research
 - ___ Relate specific questions of interest to underlying theory
 - ___ Pursue an area of interest over an extended period of time, remaining current in pertinent literature
 - ___ Recognize the classic studies, traditional designs, common forms of measurement, common variables, and common methodological problems related to their own research content
 - ___ Critically synthesize the literature relevant to a particular research question
 - ___ Identify the professional conferences and organizations that focus on this area in their agendas and missions
- 13 ___ Formulate a research question and operationalize variables.**
- ___ Identify a problem or general question to investigate
 - ___ Refine the problem so it can be investigated
 - ___ Establish a clear purpose to the research
 - ___ Translate the general question into specific hypotheses, recognizing the difference between research, null, and alternative hypotheses
 - ___ Define variables and terms operationally
 - ___ Recognize the difference between independent and dependent variables when applicable
 - ___ Determine how each variable will be measured, recognizing different levels of measurement
 - ___ Evaluate the reliability and validity of a given instrument
 - ___ Evaluate variables and their measurement in one's area of research and know how they compare to other similar measures
- 14 ___ Design descriptive and/or explanatory studies.**
- ___ Categorize research design (e.g., observational/interventional, prospective/retrospective)
 - ___ State the purpose, strengths, and limitations of each design
 - ___ Compare major types of studies, such as case reports, case controls, cross-sectional, longitudinal, and epidemiological studies, clinical trials, survey studies, field research, and evaluation studies
 - ___ Explain important threats to internal and external validity applicable in each design
 - ___ State the relationship between the chosen research design, the type of data collected, and the necessary statistical techniques
 - ___ Prepare for and use consultation from design specialists
 - ___ Thoroughly analyze the dominant research designs used in one's special area of study
 - ___ Recognize sources of error in one's study and methods to minimize error when possible

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15 ___ Collect and analyze data.

- ___ Distinguish inferential from descriptive statistics
- ___ Determine the universe, population, appropriate sample, sample size, and appropriate sampling technique for a given study
- ___ Understand basic statistical concepts such as: statistical significance, mean, median, mode, standard deviations, standard error, prevalence rate, incidence rate, and p-value
- ___ Understand commonly used statistical tests, such as chi-square, t-test, analysis of variance, correlations, and multiple regression
- ___ Construct a plan for managing data files and for analyzing those data according to their level of measurement and the research design
- ___ Be familiar with available statistical packages (e.g., SPSS-X, SAS, BMD) to direct computer personnel in what analysis to use and what related decisions must be made
- ___ Interpret printouts from available statistical packages for one's research study
- ___ Understand how to graphically summarize and communicate data in an efficient manner
- ___ Report results correctly, and be able to cite strengths and limitations of the study based on data
- ___ Prepare for and use consultation from computer analysts and statisticians
- ___ Understand more advanced statistical tests used in one's special research area, such as discriminant analysis, principal components analysis, multiple logistic analysis

16 ___ Evaluate and discuss study findings.

- ___ Explain the outcomes of given analyses in terms of the originally stated hypothesis
- ___ Conduct additional literature review as needed to elaborate upon findings and their implications for a given body of research
- ___ Integrate the research findings into the existing literature by discussing what is known, unknown, and requires further study
- ___ Express appropriate cautions in interpreting results, and base these cautions on methodological and theoretical conditions
- ___ Place one's study in the context of existing research and justify how it contributes to important questions in the area

17 ___ Manage research projects.

- ___ Develop plans for implementing a study, including timeline, budget, requirements for personnel, facilities, and supplies exist for monitoring and planning a research project
- ___ Identify appropriate funding sources (local, state, national)
- ___ Identify faculty collaborators from within and outside the discipline who can offer guidance to the project
- ___ Hire, manage, and evaluate personnel involved with a study
- ___ Prepare and submit required reports, budget requests, and other administrative documents
- ___ Secure permission from human subjects, research, & other institutional review committees/boards
- ___ Implement and direct a research project
- ___ Prepare a research proposal suitable for submission to one's research area

___ **List Additional Goal/s** in the research domain which are important to you but not listed above (if possible, include specific objectives for each goal. Use back for more space.):