

COVER SHEET

Title: Structure and impact of longitudinal curricula in graduate medical education designed to prepare future clinician-educators – a scoping review

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Abstract

Background:

Clinician-educators are invaluable to the educational and clinical mission of academic medical centers, but their promotion often lags behind that of their research-track counterparts. Early career development during graduate medical education (GME) may contribute to the pipeline of clinician-educators and narrow this gap. In the last decade, GME programs have started to offer longitudinal curricula to train future clinician-educators.

Aims: To characterize the structure, curriculum content, instructional methods, and assess outcomes of longitudinal clinician-educator curricula in GME.

Methods: This scoping review will include a search of medical and education databases, as well as the grey literature, for studies and descriptions of longitudinal curricula in GME with the objective of training future clinician-educators. Two independent reviewers will conduct title, abstract, and full text screening. Two independent reviewers will extract data from included studies on program participants, administrative structure, curriculum content, instructional methods, outcomes by Kirkpatrick level, conduct appraisals of study quality, and conduct thematic analysis of qualitative data. Discrepancies will be resolved by consensus. Data will be charted and reported based upon Arksey and O'Malley's framework for scoping reviews. Descriptive statistics and thematic analysis will be reported when appropriate of study characteristics, curricular content and instructional methods, outcomes, curricular challenges, and best practices.

Importance: Results and best practices identified in this review can be used by GME programs that are planning to develop new clinician-educator training curricula or seeking to improve existing programs to better prepare trainees for future academic careers.

Keywords: Clinician-educator, graduate medical education, curriculum, career development

BACKGROUND TO THE TOPIC

Clinician-educator faculty play a central role in the educational and clinical mission of academic medical centers(1). With the advent of competency-based education and curriculum reform in both undergraduate and graduate medical education, the roles and competencies of today's clinician-educators extend beyond providing clinical care and direct teaching of trainees. Clinician-educators are charged with leading curriculum development, learner and program assessment, program administration, and dissemination of education research(2-6). Academic medical centers need clinician-educators trained with the competencies to meet the challenges of medical education reform.

These skills traditionally have not been taught during training prior to clinician-educators entering the academic work force. Skills development for clinician-educators include faculty development through workshops, longitudinal programming, education fellowships or graduate degree training (7-9). However, a lack of protected time, the need for protracted training, and program enrollment limitations may hinder participation. At the undergraduate medical education (UME) and graduate medical education (GME) level, interventions to improve the teaching skills of trainees – often described as student or resident as teacher programs – are well established(10, 11). These programs tend to be brief interventions or short electives that primarily focus on direct teaching skills rather than developing the skills necessary for a career as a medical educator.

Providing skills development to individuals during medical training prior to entering full-time academic careers may help augment the pipeline of competent clinician-educators. In the last decade, graduate medical education programs have started to offer formalized, in-depth, clinician-educator training curricula. These longitudinal curricula—often referred to as “tracks,” “pathways,” “concentrations,” or “distinctions” (12-15)-- typically span the course of 1-2 years and aim to provide skills development—beyond direct teaching skills--to trainees prior to entering full-time academic careers. Specific areas of focus include development of teaching portfolios, leadership skills, curriculum development, and competency in education scholarship. Implementation of these longitudinal curricula requires faculty, trainee, and institutional investment(16). The opportunity to take part in such a curriculum may also affect graduate medical education applicant recruitment(13).

GME programs seeking to develop or improve longitudinal clinician-educator curricula for their trainees may find several limitations in the current body of literature. Descriptions of longitudinal curricula are typically limited to the experience of a single institution or training program. Curricular content, instructional methods, and outcomes studied also vary between programs. These limitations make the identification of evidence-based interventions or assessment strategies for such curricula challenging.

Friedman et al recently published a scoping review on clinician educator tracks in graduate medical education(17). The review included 19 publications covering 18 unique tracks. This scoping review did not include searching of any grey literature, which likely would yield additional programs results. The authors broadly summarize each track's administrative

structure, time commitment, and brief description of outcomes studied. However, they only provide a superficial review of curriculum content – presented as whether or not the tracks addressed pre-specified clinician-educator competencies. The authors also do not review in any detail instructional methods employed outside of mentioning that most programs included a core didactic curriculum and work-place based training. They did not collect data on challenges faced by these programs, nor do they offer any best practices. We do not believe this review provides sufficient detail or guidance to aid GME programs in developing or improving a longitudinal track of their own.

We propose a scoping review that will synthesize the broader landscape of current clinician-educator curricula in graduate medical education. Our review will include a search of the grey literature. We believe many of these curricula exist but may be described outside of published literature, such as presentations during conferences. We will also contact all primary authors of included references to identify any ongoing outcomes measured. We will provide synthesis of curriculum content and instructional methods utilized, in addition to reviewing administrative structure, outcomes, and gaps in the literature. Through our review, we aim to identify best practices that will help educators develop or improve similar curricula at their local institutions.

REVIEW TOPIC / QUESTION(S), OBJECTIVES AND KEY WORDS

Review Question

Our review will address the following question: What are the components of longitudinal curricula that prepare future clinician-educators during graduate medical education, and what is the impact of these curricula?

For the purposes of this review, we defined clinician-educator training as curricula aimed to develop competency skills in direct clinical teaching, as well as in leadership, assessment, curriculum development, and/or education scholarship(2, 3).

To address this main research question, we will consider the following sub questions:

1. How are GME-based longitudinal clinician-educator curricula structured administratively?
2. What are the objectives of these curricula?
3. What clinician-educator skills do these curricula address?
4. What instructional methods do programs employ?
5. What are the criteria for successful completion of these longitudinal programs?
6. What is the impact of participation in clinician-educator curricula on program graduates?
7. What is the impact of having GME clinician-educator curricula on host programs/institutions?
8. What challenges do programs or institutions face when implementing longitudinal clinician-educator curricula?
9. What are the best practices in design and implementation of clinician-educator curricula?

The objectives of this review are to:

1. Characterize the structure and program content of GME-based longitudinal clinician-educator curricula
2. Describe common and unique instructional methods employed in GME clinician-educator curricula
3. Assess reported outcomes of longitudinal clinician-educator curricula in GME
4. Characterize challenges reported by programs/institutions in implementing clinician-educator curricula for GME trainees
5. Review strengths and weaknesses of research on this topic
6. Identify gaps that exist in the literature surrounding GME clinician-educator curricula that medical education researchers should address
7. Formulate recommendations for GME programs wishing to develop or enhance a longitudinal clinician-educator curriculum for trainees in light of findings from this review

Key Words:

Clinician-educator, graduate medical education, curriculum, career development

SEARCH SOURCES AND STRATEGIES

Search for prior systematic reviews

A scoping review on clinician-educator tracks was recently published in Academic Medicine, as described in the introduction. Otherwise, a search of the PubMed, PROSPERO, Cochrane Database of Systematic Reviews demonstrated no other scoping or systematic reviews on longitudinal clinician-educator training curricula in graduate medical education. Review of the BEME website including Just Registered Topics, Reviews in Progress, and Published Reviews yielded no similar systematic review on this topic.

Database searching

We plan to conduct a search of the following databases starting from 2008 to present. Our preliminary search did not reveal publications related to clinician-educator training curricula prior to 2010:

- OVID MEDLINE
- Embase
- Scopus
- Web of Science
- ERIC
- ProQuest Dissertations and Theses Global
- CINAHL Complete
- Cochrane Library

Using representative articles, we performed a MeSH (medial subject headings) analysis to develop a preliminary concept table of MEDLINE search terms (appendix 1).

Reference Searching:

Once included articles have been identified, we will use Scopus to identify articles cited by included articles, as well as subsequently published articles that cite included articles.

Manual Searching

We plan to conduct a hand search of the table of contents of the following medical education journals beginning in 2008 until present:

- Academic Medicine
- Teaching and Learning in Medicine
- BMC Medical Education
- Medical Education
- Medical Teacher
- The Clinical Teacher
- Journal of Graduate Medical Education
- International Journal of Medical Education
- Journal of Medical Education and Curricular Development
- Journal of Educational Evaluation for Health Professions

In addition, we plan to search grey literature including MedEdPortal, a peer-reviewed online database of medical education curricula, as well as medical education conference proceedings, including:

- AMA – The American Medical Association
- AAMC – The Association of American Medical Colleges
 - CGEA – Central Group on Educational Affairs
 - SGEA – Southern Group on Educational Affairs
 - WGEA – Western Group on Educational Affairs
 - NEGEA- Northeast Group on Educational Affairs
- AMEE - Association for Medical Education in Europe
- APDIM – Association of Program Directors in Internal Medicine
- ACGME – Accreditation Council for Graduate Medical Education
- IAMSE – International Association of Medical Science Educators

Personal Communication

For all included references, we plan to contact the primary authors in order to obtain information from the abstraction tool not mentioned in the reference, as well as the following information: 1) new outcomes since reference publication, particularly availability of long-term outcomes, 2) changes to curriculum since reference publication, 3) snowball identification of other longitudinal curricula.

STUDY SELECTION CRITERIA

We will consider all relevant publications using the following criteria for inclusion / exclusion:

Inclusion criteria

Subjects:

- Target curriculum population includes physician trainees in graduate medical education (residents or fellows)

AND

Intervention:

- Curriculum that is delivered longitudinally, defined as experiences spanning at least 2 months (to differentiate from shorter education electives)
- Curriculum with the primary goal of developing clinician-educators – addresses at least two clinician-educator competencies: teaching, curriculum development, assessment, education scholarship, leadership

Exclusion criteria

We will exclude references that are not in English.

For the purposes of our search, we will include longitudinal clinician-educator curricula targeted only to medical students or faculty for our full text review to ensure useful or relevant data are not missed. The goal of this review is to identify the components and outcomes of curricula for aspiring clinician-educators during graduate medical training prior to starting work as faculty. Therefore, based upon the extent of longitudinal curricula for faculty or medical students found during the full text review, the reviewers will come to consensus regarding inclusion versus exclusion of medical student or faculty-only curricula for data extraction.

Studies will not be excluded based upon study design or geographic location. We aim to capture longitudinal clinician-educator programs in graduate medical education globally, and believe the results of this review can inform program development at an international level.

Descriptive and qualitative studies on clinician-educator training will be considered. We will also include perspective pieces related to longitudinal clinician-educator training curricula, which may include commentary on best practices.

Selection screening

Two reviewers will independently screen the titles and abstracts to narrow the search results for full text review. Any discrepancies will be resolved by a third reviewer. Full text screening will be performed by two reviewers, who will indicate reasons for exclusions. Differences will be resolved by consensus within the study group.

PROCEDURE FOR EXTRACTING DATA

We developed a preliminary extraction form utilizing exemplar papers from our initial search (appendix 2). We will pilot the extraction form on non-included studies to improve clarity of items and calibrate reviewers. Once the extraction form is finalized, three members of the research team will participate in data extraction. Included articles will be randomly assigned such that two reviewers will evaluate each article independently. Reviewers will use the extraction form to evaluate each article. Reviewers will conduct thematic analysis of qualitative data and personal communications when appropriate. Differences that arise between reviewers during extraction will be discussed by the 3-member extraction team and resolved by consensus. Extracted data will be entered into Microsoft Excel for data storage.

APPRAISAL OF STUDIES

We will appraise the methodologic quality of primary studies with quantitative data using the MERSQI score(18). Two reviewers will independently calculate the MERSQI score for included studies during data extraction. Any differences will be resolved with the 3-member extraction team by consensus.

At present, there is no single guideline or consensus criteria for the appraisal of qualitative research. For this review, we will appraise qualitative studies using a checklist based upon criteria created by Mays & Pope(19, 20). This checklist offers a thorough approach to quality appraisal without being overly prescriptive. The checklist is composed of 15 questions that address study relevance, clarity of aim and context, sampling, data collection and analysis, and reflexivity. Two reviewers will independently appraise included studies. Any differences will be resolved with the extraction team by consensus.

SYNTHESIS OF EXTRACTED EVIDENCE

Once data is extracted as above, we will report our findings based upon Arksey and O'Malley's reporting framework for scoping reviews(21). We will first tabulate for each curriculum the study type, reported or planned outcomes by Kirckpatrick's Hierarchy, and study quality. We will provide a table that maps program characteristics, including geographic location, types and numbers of participants, and program administrative infrastructure. For each clinician-educator competency domain, we will provide a separate table highlighting curriculum content topics covered by included programs. We will also provide a table highlighting instructional methods utilized by included programs. We will tabulate highlights of outcome findings for each study.

To provide a more detailed review on the structure and outcomes of these longitudinal curricula, we aim to also incorporate the description, justification, clarification framework proposed by Cook et al. in our synthesis(22). Description of these longitudinal curricula will include descriptive statistics when appropriate to summarize curricula characteristics, curriculum content and instructional methods. Additional narrative synthesis and thematic analysis will highlight both common and unique curricular content and instructional methods. For justification, we will use descriptive statistics to summarize study types, outcome types, and study quality. Narrative and thematic analysis will identify outcome themes between studies. Based upon the studies included, we will also attempt to provide clarification on why or how

longitudinal clinician-educator curricula produce the demonstrated outcomes in the included studies.

Finally, we will identify curriculum challenges/lessons learned, identify gaps in the literature that will inform future research, and suggest best practices for longitudinal clinician-educator curricula based upon our study findings.

SCOPING SEARCH

We conducted an initial scoping search in December of 2018 with preliminary results below.

MEDLINE (Ovid)	1446
Embase (Ovid)	1564
Scopus	1503
<i>Web of Science (Indexes=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH, ESCI)</i>	318
ERIC (Proquest)	19

Based upon our initial search, we anticipate that 20-30 studies will be included in the review. This search was updated on 10/2/2019 yielding 900 new citations between December 2018 and October 2019. We will perform additional updated searches of the literature prior to manuscript drafting to ensure inclusion of recent publications.

TRANSLATION INTO PRACTICE

Many graduate medical training programs are offering longitudinal clinician-educator curricula, but descriptions of these curricula are scattered across individual publications. Our review will provide a synthesis of the landscape of clinician-educator curricula in graduate medical training programs. This review will highlight both common and unique aspects of curriculum structure, content, and instructional methods that can inform ongoing curriculum development. By providing a global summary of the impact of current curricula on trainees and host institutions and identifying challenges in implementing such curricula, this review may help programs leverage national/international data to garner additional institutional resources and support for their local clinician-educator training curricula. We will also identify gaps in the field that can inform future education research. Most importantly, this review aims to provide practical guidelines and best practices for institutions that are planning to build new clinician-educator training programs or looking to improve existing curricula.

PROJECT TIMETABLE

- BEME protocol: October 2019
- Literature search: October-November 2019
- Inclusion: November-December 2019
- Abstraction: January 2020
- Descriptive tables: February 2020
- Quantitative synthesis: March 2020
- Manuscript writing: April - June 2020

CONFLICT OF INTEREST STATEMENT

The authors have no financial, personal, political, institutional, or other conflicts of interest to report

PLANS FOR UPDATING THE REVIEW

Longitudinal clinician-educator training curricula are new to graduate medical education this decade. We anticipate that additional curricula and long-term outcomes will be reported as more graduates from these programs establish careers. Therefore, this review should be updated in 10 years' time to track reporting of longitudinal outcomes.

CHANGES TO THE PROTOCOL

We will record any changes to the protocol as amendments, and communicate the changes with a rationale to BEME.

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Appendix 1 - Concept Table

	Population/Environment		Field of Study		Study Focus
Controlled Vocabulary	Education, Medical Education, Medical, Continuing Education, Medical, Graduate "Internship and Residency" Residency Education Postgraduate Education		Career Choice Teacher Training Faculty, Medical		Curriculum Program Development Program Evaluation
	OR		OR		OR
Keywords or Textwords	graduate medical education.mp. (medic* adj2 (traine* or intern or residen*)).mp. (house staff or housestaff or house-staff or PGY*).mp.	AND	(clinician-educator track or CET).mp. (residen* and ((clinic* adj2 educat*) or teach* or scholar*)).mp. resident educator track.mp. (resident as teacher or RAT).mp. clinician teacher.mp. (clinic* adj2 (educat* or teach* or faculty)).mp. (health profess* adj2 (educat* or teach* or faculty)).mp. teacher training.mp. teaching experience.mp. (scholar* adj2 (concentrat* or track* or path* or career*)).mp. (career adj2 (develop* or path* or choice*)).mp. identity formation.mp. academic medicine.mp.	AND	(curricul* adj2 (develop* or assess* or evaluat*)).mp. (longitudinal adj4 (track* or program* or curriculum*)).mp. program development.mp. (program evaluation or program assessment).mp.

Appendix 2 – Extraction Form

Reference Number:

Reviewer:

Date:

Source Information

- Journal / article citation: (Authors, Title, Publication, Year)
- Conference Proceedings
- MedEdPortal
- Thesis
- Personal communication: (Name, contact method, date contacted)

Search Method: electronic hand search grey literature

Aim / Objectives of Curriculum explicitly stated implicit not available
Specify:

Participants & Setting

- Country / Location:
- Single or multi institution:
- Level of training of participants (check all that apply):
 resident fellow medical student other: ____
- Trainee specialty/specialties:
- Number of participants started program:
- Number of participants completed program:
- Number of cohorts:

General Program Description

- Program title:
- Year of program inception:
- Length/duration of curriculum:
- Hours required to complete curriculum requirements: explicit _____ not stated
- Is there an application for entry into the program? Y/N (Describe)
- Do participants have the option to earn an advanced degree? Y/N (Specify)
- Does the curriculum require time away from medical training Y/N (Describe)
- Is a certificate offered at completion? Y/N
- Institution infrastructure & support :
 - o Funding? Y/N (describe any stated cost and source of funding)
 - o Number of faculty involved in curricula: ____ not stated
 - o FTE support? Y/N not stated

Curriculum content (refers to overall topics addressed by curriculum. Check all that apply and describe)

- Teaching Skills
 - o Adult learning theory
 - o Large group teaching
 - o Small group teaching
 - o Bedside teaching
 - o Procedural teaching
 - o Ambulatory teaching
 - o Feedback
 - o Learner remediation
 - o Simulation
 - o Other (specify) _____
- Curriculum development
 - o Needs assessment
 - o Creating goals and objectives
 - o Education strategies
 - o Implementation
 - o Course evaluation and feedback
- Assessment
 - o Learner assessment
 - o Program assessment

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- Education scholarship
 - o Mentored research project
 - o Submitting IRBs
 - o Grant writing
 - o Research methods/statistics
 - o Scholarly writing
 - o Creating posters
 - o Creating workshops
 - o Other (specify)
- Administration/Leadership
 - o Education portfolio
 - o Time management
 - o Promotion in academia
 - o Negotiation skills
 - o Financing in medical education
 - o Mentorship/Advising
 - o Other (Specify)
- Required components to complete program (please describe):

Instructional Methods (refers to the instructional methods used within the curriculum). Please check all that apply and describe

- Not stated
- Needs assessment
- Didactic teaching (lecture)
- Online learning
- Structured opportunities for reflection
- Observation of master teachers
- Observation of peers
- Skills workshops
- Small group discussions or exercises
- Observed teaching with feedback
- Role plays and simulations
- Films and videotapes
- Research in progress
- Journal clubs
- Written materials and readings
- Independent learning / projects
- Coaching / mentoring
- Career panels
- Role modeling
- Participation in education committees
- Other: please specify

Evaluation Methods (select all that apply)

- Study Design
 - o Randomized control trial
 - Pre-post
 - Post only
 - Delayed post
 - Crossover
 - o Quasi-experimental
 - [] single group [] non-equivalent control group
 - Pre-post
 - Post only
 - Delayed post
 - [] time series
 - [] repeated measures
 - o Non-experimental
 - [] cross sectional [] case control [] cohort
 - o Qualitative
 - o Mixed methods
 - o Review
- Data collection methods
 - o Questionnaire
 - o Interview
 - o Focus group
 - o Observation
 - o Testing
 - o CV search
 - o Teaching portfolio
 - o Other
- Data sources
 - o Curriculum participants
 - o Program coordinators / faculty developers
 - o Colleagues and peers
 - o Students
 - o Other

Impact of Intervention Studied Code and summarize results of the intervention at the appropriate level. Note: include both predetermined and unintended outcomes. Please check all that apply and provide as much detail as possible

Kirckpatrick Hierarchy

Level 1

Reaction – covers participants' views on the learning experience, its organization, presentation, content, teaching methods, and aspects of the instructional organization, materials, quality of instruction (*i.e.* "happiness data")

Reaction

Results:

Level 2a

Change in attitudes – outcomes here relate to self-reported changes in the attitudes or perceptions among participant groups towards teaching and learning, including a sense of confidence or self-efficacy.

Learning

Results:

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Level 2b <i>Learning</i>	<input type="checkbox"/> Modification of knowledge or skills – for knowledge, this relates to the acquisition of concepts, procedures and principles; for skills, this relates to the acquisition of thinking/problem-solving, psychomotor and social skills. Results:
Level 3a <i>Behavior</i>	<input type="checkbox"/> Behavioral change (Self-Reported) – documents the transfer of learning to the workplace and changes to professional practice, as noted by the participants Results:
Level 3b <i>Behavior</i>	<input type="checkbox"/> Behavioral change (Observed) – documents the transfer of learning to the workplace and changes to professional practice, as noted by a third party Results:
Level 4a <i>Results</i>	<input type="checkbox"/> Change in the system/organizational practice – refers to wider changes in the organization, attributable to the educational program. Results:
Level 4b <i>Results</i>	<input type="checkbox"/> Change among the participants' students, residents and colleagues – refers to improvement in student or resident learning/performance as a direct result of the educational intervention. Results:

Based on this article, did the clinician-educator longitudinal curriculum reach its intended educational outcomes?

Does this article provide new insights/implications for clinician-educator longitudinal curricula, if so what were they? Y/N

Program challenges stated? Y/N (Describe)

Avenues for further research (indicated by the article)

Additional comments

MERSQI score (next page)

Personal Communication (Name, Method of Communication, Date of Communication):

- 1) Please describe any additional outcomes that have been assessed since initial publication/presentation of this clinician-educator curriculum?
- 2) Please describe any changes that have been made to the curriculum since the initial publication/presentation of this clinician-educator curriculum?
- 3) What are potential best practices that can help guide programs that are developing similar clinician-educator curricula?
- 4) Have you collaborated on a clinician-educator track with another institution or program (collect contact information for other institution)?

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Domain	MERSQI Item	Score	Max Score
Study design	Single group cross-sectional or single group posttest only	1	3
	Single group pretest & posttest	1.5	
	Nonrandomized, 2 groups	2	
	Randomized controlled trial	3	
Sampling	<i>Institutions studied:</i>		3
	1	0.5	
	2	1	
	3	1.5	
	<i>Response rate, %:</i>		
	Not applicable		
	<50 or not reported	0.5	
	≥75	1.5	
Type of data	Assessment by participants	1	3
	Objective measurement	3	
Validity of evaluation instrument	<i>Internal structure:</i>		3
	Not applicable		
	Not reported	0	
	Reported	1	
	<i>Content:</i>		
	Not applicable		
	Not reported	0	
	Reported	1	
	<i>Relationships to other variables:</i>		
	Not applicable		
	Not reported	0	
	Reported	1	
Data analysis	<i>Appropriateness of analysis:</i>		3
	Inappropriate for study design or type of data	0	
	Appropriate for study design, type of data	1	
	<i>Complexity of analysis:</i>		
	Descriptive analysis only	1	
	Beyond descriptive analysis	2	
Outcomes	Satisfaction, attitudes, perceptions, opinions, general facts	1	3
	Knowledge, skills	1.5	
	Behaviors	2	
	Patient/health care outcome	3	
Total possible score*			18