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24 Supporting the Development of Residents as Teachers: Current Practices and Emerging Trends

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Executive Summary

Physicians must be effective teachers in order to fulfill their responsibilities of communicating with patients, working in teams, sharing knowledge with the public, disseminating research findings and teaching both medical students and other resident colleagues. Residents in all disciplines are teachers and role models for medical students. Known as 'near-peer teachers', resident-teachers are ideally placed to pass on their knowledge and experience to more junior learners. Residents also important role models of professionalism and can have a direct impact on medical students' career choice.

While very few residents are naturally gifted teachers, it is widely understood that teaching can be learned and refined over time as long as it is responsive to residents' level of training and integrated into their daily work. The purpose of this review is to provide a comprehensive understanding the role of residents-as-teachers and the responsibility of the academy to support, nurture and develop such a role, based on a literature review. The key messages from this review are:

1. While the value of residents-as-teachers programs has been established, there is no consistency as to the content or design of resident-as-teacher programs. Within the literature, four emerging trends are apparent: 1) programs are increasingly emphasizing learner-centered approaches to teaching; 2) some programs are demonstrating the advantages of working within a developmental continuum across multiple years, based on the residents' level of training; 3) programs that are integrated into residents' daily work are more effective; and 4) there is increasing recognition of the need for discipline-specific programs that develop similar skill sets but with a sensitivity to the context and work of the specialty.

2. Most studies focus on assessment of resident learning rather than evaluation of resident-as-teacher programs. Four common assessment tools are identified in the literature: resident self-assessment, learners' assessment of residents' teaching, direct observation including objective structured teaching exams (OSTE), and indirect observation such as videotaped teaching encounters. By contrast, program evaluations described in the literature are lacking in number and in quality.

3. While there is no consensus as to best practices in the development, delivery or evaluation of resident-as-teacher programs, emerging trends suggest some guiding principles for best practices. Program development, implementation and delivery should encompass a learner-centered approach that is integrated, developmental, and longitudinal and has regard for the specific context and specialty. Assessment approaches that employ more than one indicator of performance provide more meaningful measures of resident teaching skills. Finally, program evaluation should move beyond reliance on the assessment of resident teaching as a sufficient indication that the program is effective, valued, and sustainable over time.

Background

Physicians must be effective teachers in order to fulfill their roles in communicating with patients, working in teams, sharing knowledge with the public, disseminating research findings, providing professional development to colleagues and teaching trainees. Residents also play a critical role in the education of medical students and other resident colleagues. As well, teaching enhances residents' own learning.[1] The Association of American Medical Colleges (AAMC), the Accreditation Council for Graduate Medical Education (ACGME), and the Liaison Committee on Membership Education (LCME) now require that residents be trained as teachers.

This paper is one of 24 papers commissioned for the Future of Medical Education in Canada Postgraduate (FMEC PG) Project. The purpose of this review is to support the generation of a strategic white paper to identify: 1) salient issues and challenges, 2) relevant best practices and 3) major emerging trends in training residents as teachers.

Methodology

We used a narrative synthesis approach to descriptively synthesize a diverse body of literature in order to present a holistic landscape of the existing knowledge about residents as teachers. Our search was primarily based on the terms "residents as teachers" and "resident teaching." Peer-reviewed literature was searched through PubMed and the Education Resources Information Center (ERIC) databases. Grey literature was searched through Google Canada and Google Scholar. Published systematic reviews, current annotated bibliographies and reference lists from searched literature were also analyzed and used as checks on our literature base. The search was limited to published works in English between the years 1990 and 2010 with an emphasis on the last 10 years.

From the resultant search, a review of titles and abstracts was performed to narrow the relevant articles. Based on this initial review, 87 articles were chosen to inform this white paper. The literature was largely from the United States with some contributions from Canadian and European contexts. Bearing in mind the thematic goal of identifying needs and strategies to develop residents' teaching roles, and the natural clustering of the literature, our team addressed three main questions: (1) Why do residents need to learn to teach?; (2) What are current and emerging practices in training residents as teachers?; and (3) How is resident teaching being assessed, and how are resident-as-teacher programs being evaluated?

Our team of six reviewers paired off, with each pair taking one theme area to guide their literature review, synthesis and writing. In addition, all reviewers read the literature across all three themes when necessary, as relevant overlap between themes was acknowledged as an important feature of the literature. In order to evaluate the literature, each pair selected its theme based on level of interest, expertise and experience. An online data sharing site (box.net) and a bibliographic management tool (Refworks) were used to collaborate amongst team members.

Discussion

This environmental scan focuses on understanding the role of residents-as-teachers and the responsibility of the academy to support, nurture and develop such a role. Our understanding is that teaching is an intrinsic part of being a physician and, therefore, the intent of this environmental scan is to better understand this aspect of physician training. 'Teacher' in this review encompasses more than just teaching skills; it is also concerned with changes in knowledge about teaching and learning, a positive attitude towards teaching and the acquisition of an identity as a teacher for the physician-in-training. However, this review does not cover the

small number of trainees that focus their academic careers on medical education by gaining a better understanding of educational theory as well as spending a major portion of their time developing, implementing, participating or leading educational activities.[2] These residents may undertake specific training to improve their knowledge and skills as a clinician educator and engage in scholarly activities, through participation in formal programs, postgraduate fellowships in medical education or advanced degrees.[2] Such activities and professional trajectories are beyond the scope of resident-as-teacher programs in this review.

For the purposes of this review, results are organized and analyzed into three central themes: 1) importance of teaching residents to teach, 2) current and emerging practices in training residents as teachers; and 3) assessment of resident teaching and evaluation of resident-as-teacher programs. Each is discussed in turn.

Importance of Teaching Residents to Teach

Prior to certifying and transitioning into practice, residents fulfill a vital teaching role in medical education.[3–6] For example, it has been estimated that residents spend approximately 25% of their time teaching medical students.[1,7,8] In addition, one third of medical students' fund of knowledge is directly attributable to residents.[9–11] Furthermore, as the health care system becomes more complex and attending physicians' responsibility for patient care and research increases, they have less opportunity to teach.[12] Therefore, at academic institutions, residents are assuming more and more teaching responsibility. Given this shift, residents recognize the role they play and are asking for support and recognition of their teaching roles and responsibilities.[13]

Residents in all disciplines are teachers and role models for students.[14] As such, they have a unique relationship with medical students. Known as 'near-peer teachers', resident-teachers are ideally placed to pass on their knowledge and experience to more junior learners.[15] One study, for example, found that both students and residents felt that residents are "closest to students' training level and therefore understand best how students should be taught".[16 (p. 448)] Wilson contends that, in many areas, residents are better suited than attending faculty to teach.[17] In teaching basic technical skills, for example, residents may be more aware than attending faculty of the individual steps that a beginner must master in order to become proficient.[17–19] In their roles as teachers, residents not only teach their knowledge and skills to medical students and junior residents, they are also important role models of professionalism and professional values.[20] As well, resident-teachers can have a direct impact on medical students' career choices. For example, Musunru found that medical students exposed to surgical residents who were rated as highly effective educators were more likely to pursue surgical residency training, compared with students exposed to the least effective residents.[7,21]

Resident teaching is clearly consequential for medical students and junior residents; however, teaching also directly impacts residents themselves. Many studies have shown that teaching leads to better knowledge acquisition.[9,22–26] Additional research demonstrates that residents' job satisfaction is also improved with the addition of teaching responsibilities.[1,9]

Accreditation bodies, including the Royal College of Physicians and Surgeons of Canada (RCPSC),[27] ACGME[28] and LCME,[29] have recognized the teaching role that residents play.[30–33] In the RCPSC 2005 CanMEDS competency framework, educating others forms a major section of the Scholar Role: "as teachers, they [residents] facilitate the education of their students, patients, colleagues, and others."[34 (p. 21)] In the LCME's "Standards for Accreditation of Medical Education Programs Leading to the M.D. Degree", recognition of resident teaching is described in the ED-24 standard, which specifically states that residents "must be familiar with the

educational objectives of the course or clerkship (or, in Canada, clerkship rotation) and be prepared for their roles in teaching and assessment".[29 (p. 11)] The LMCE also requires that, "the institution and/or its relevant departments provide resources (e.g., workshops, resource materials) to enhance the teaching and assessment skills of residents" and that "there should be formal evaluation of the teaching and assessment skills of residents."[29 (p.211)]

Finally, teaching has a direct impact on patient care.[35,36] "Teaching is a basic skill needed for excellent patient care; regardless of an intended career in academics or practice, some background in formal teaching is necessary."[36 (p. 216)] The same skills used to teach medical students are foundational to effectively educating patients and families about diagnosis, treatment and management of illness.[25,36] Therefore, being an effective educator is foundational to being a competent physician.

As Bordley and Litzelman wrote, "we can no longer afford to assume that all residents know how to teach. In fact, like attending faculty, a very small percentage of residents are naturally gifted teachers who will excel without help. Residents are expected to teach a very diverse group of learners (including medical students, junior residents, patients, families, colleagues) in a variety of settings, using a wide array of teaching strategies. Most residents are enthusiastic about teaching and want to do it well but are unsure how."[37 (p. 693)] Formal instruction, observation and guidance are necessary to support residents in this vital role.[38] The issue, therefore, is not whether residents should teach, but how they can be supported to do it most effectively.[17,48]

Current and Emerging Practices in Training Residents as Teachers

The value of training residents to become effective teachers, for the current and future benefit of patients, trainees, colleagues, associates and the public, is becoming more recognized and accepted. Central to the acceptance and impact of this training is the issue of program design and delivery. Not only must programs specify what is to be learned (design), they must also have regard for how it is to be learned (delivery).

In considering the best practices related to training residents as teachers, we reviewed 51 of the 87 articles, including six literature reviews related to programs for developing residents as teachers.[9,39–44] A wide variety of programs have been developed to train residents as teachers, ranging in duration from a few hours to several months. Most of these programs are highly interactive, emphasizing active learning and offering opportunities for practice and feedback in the development of teaching; these programs also emphasize learner-centered rather than teacher-centered approaches.

While there is general agreement about some aspects of resident-as-teacher curricula (e.g., if residents are to be effective in their roles as teachers, they need formal training and opportunities to practice the skills necessary to be effective teachers), there is no consensus as to the content of resident-as-teacher curricula. The content of programs ranges from theoretical concepts to highly practical skill sets, with the majority of programs focusing on a generic and practical skill set. Typical curricular content includes some or all of the following: establishing learning goals, bedside teaching, assessment of learning, use of effective questions, teaching procedures, giving presentations, providing feedback to learners, communication skills and leadership skills.

Few authors used context-specific needs assessment to identify what competencies or skills their residents must attain. Rather, teaching curricula selected for inclusion have been a product of literature reviews and/or the views of faculty regarding what residents need to know

or be able to do.[9,45] In some instances, curricula are modeled on successful faculty development programs within academic centres rather than a resident-as-teacher program tailored specifically to residents' current and future needs. The Stanford Faculty Development Program (SFDP) teaching model is one of the most frequently cited models; it includes modules on the learning climate, control of the session, communication of goals, understanding and retention, self-directed learning and evaluation and feedback.[46]

Most resident-as-teacher programs have not used a conceptual, theoretical, or organizing framework to guide the development or delivery of the curriculum. Several allude to 'adult learning principles' or 'adult learning theory'.[39] Others reference the 'one-minute preceptor' as their organizing framework or the 'best intervention framework' for any resident-as-teacher program.[9,47] In contrast, only a few programs have drawn on more substantive theory to design and then assess the quality of their program. For example, the guiding framework for Hafler's program was derived from a broad base of education literature and included a cycle of experience, observation, reflection, and experimentation or generalization.[48]

Although many resident-as-teacher programs are one-off, stand-alone workshops focusing on generic skill sets, there are some notable exceptions. For example, the works of Dunnington & DaRosa[49], Hafler[48] and Morrison et al[10,50–52] represent complex, collaborative, rigorous and occasionally longitudinal and integrated programs. Hafler's program, for example, was integrated with residents' daily work, rather than an additional obligation, and considered ways to facilitate learning across a range of settings and with a variety of learners over three years of resident training.[48] As Hafler outlines, one of the goals of the program was "to design and implement an enduring resident-as-teacher program that would be integrated into a resident's daily work, not added to it." [48 (p. 544S)] In addition, the program recognized the developmental nature of teacher training by setting appropriate goals for each class of residents based on their level of training.[53] Importantly, it also focused on role modeling as a teaching strategy. Development of the program involved clerkship directors, residency directors, an educator and a survey of third-year medical students. The program included workshops as well as coaching and feedback in the development of teaching competencies. And, as noted above, the guiding framework included a cycle of experience, observation, reflection, and experimentation or generalization.

Morrison and colleagues present perhaps the most rigorous and long-standing series of studies on programs intended to train residents-as-teachers. These studies establish novel approaches, including resident-managed programs, learning styles workshops, month-long elective rotations to develop teaching abilities, and targeted training in ambulatory teaching skills.[54] In 2003, they developed and tested a curriculum composed of eight modules representing what residents said they wanted, combined with a literature review and clinical teaching expert opinion. That curriculum included: (1) leading teams and role modeling; (2) orienting learners; (3) giving feedback; (4) bedside teaching; (5) teaching procedures; (6) group teaching and in-patient work rounds; (7) teaching charting; and (8) giving mini-lectures. The program was part of a longitudinal, interdisciplinary curriculum called the BEST initiative (Bringing Education & Service Together).[52,52] Morrison and colleagues also suggest that different medical specialties should approach resident-as-teacher training differently, and that there is no 'one size fits all' approach that can be recommended for either training, resident assessment or evaluation of resident-as-teacher programs.[30]

In summary, there is no consensus as to the content of resident-as-teacher curricula, the length of time, or the formats for such programs. Programs range from a few hours to several months, with the majority focusing on development of a generic skill set that includes some or all of the

following: communication skills, establishing learning goals, use of effective questions, teaching procedures, giving presentations, and assessment and provision of feedback to learners.

Four trends are apparent: first, programs increasingly emphasize learner-centered approaches to teaching;[1,39,52] second, some programs are demonstrating the advantages of working within a developmental continuum across multiple years, based on the residents' level of training;[38,48,51] third, programs that are integrated into residents' daily work, rather than added to the daily work, are more acceptable to residents;[48] and fourth, there is increasing recognition of the need for discipline-specific programs that develop similar skill sets but with a sensitivity to the context and work of the discipline or specialty.[10,14,30,55]

Assessment of Resident Teaching and Evaluation of Resident-as-teacher Programs

There is some confusion and significant overlap in the assessment of resident learning and the evaluation of programs intended to engender that learning. Most studies, for example, focused solely on the assessment of resident learning to teach rather than the evaluation of the resident-as-teacher programs. While this is one important aspect of program evaluation, it is not a sufficient indication of a program's value or effect. Therefore, we begin with a discussion of the approaches used to assess resident performance and then move to program evaluation approaches.

Assessment of Resident Teaching - Four types of assessment tools have been used to assess residents' learning to teach: 1) resident self-assessment, 2) learners' assessment of residents' teaching, 3) direct observation including OSTE, and 4) indirect observation including videotaped teaching encounters.

One common means of assessing individual growth and programmatic effect has been self-assessment. For example, Litzelman and colleagues asked residents to self-assess before and after participating in a resident-as-teacher program.[37] Residents rated their teaching skills more highly after being involved in a course or workshop as well as reported increased confidence.[60] While this means of individual assessment may be useful for understanding perceived changes in an individual's skill and/or confidence, it is also limited, as are any self-reports of learning.[56,57]

The most commonly cited method of assessing both individual change and programmatic effect is through the use of learners' assessment of resident teaching.[11,45,56] Usually the learners are medical students who, at the end of their clerkship rotations, complete questionnaires rating the effectiveness of residents' teaching. Although it is usually not possible for the same students to assess a residents' teaching before and after a resident-as-teacher intervention, improved ratings of teaching behaviours have been reported.[8,23,35,58] For example, medical students' assessments of obstetrics and gynecology residents who had undergone a one-day teaching skills workshop, scored significantly higher than counterpart residents at other sites who had not completed the workshop.[58]

As early as 1997, researchers incorporated faculty members' direct observation of resident-student teaching interactions in the ambulatory care setting to assess the improvement of residents' teaching skills after a teaching curriculum.[9,23,39,59] These assessments of residents noted improvement in all categories addressed in the curriculum and represent an important shift toward 'authentic assessment' that is, assessing resident teaching in a real-life clinical setting.[59]

One of the most rigorous direct observation assessment tools is the objective structured teaching examination (OSTE). First described in the 1990s, it was modeled after the objective

structured clinical exam (OSCE), but focuses on assessing resident teaching competencies.[1,54,60] This assessment tool makes use of standardized medical students who are trained to portray difficult learners, thereby providing a more objective measure of improvement in resident teaching skills.[61]

However, results from OSTE assessments have been mixed.[8,9,23,43,45,49,52] Dunnington and DaRosa used the OSTE to test for behavioural changes in residents and found minimal changes in surgical resident teaching behavior after a resident-as-teacher intervention.[49] In contrast, Morrison et al used the OSTE to determine the effectiveness of a 13-hour teaching curriculum, and found that residents' overall teaching scores improved by 28% compared to a control group.[51] As noted in the literature, some of the drawbacks to OSTEs include lack of testing in a real life context and the time- and labour-intensive nature of such assessments.[9,23,45]

In addition to direct observations, indirect observations such as videotaped teaching encounters have also been used in assessing teaching. For example, D'eon et al videotaped residents from different specialties giving presentations before and after a workshop on presentation skills and found that presentation skills were better following the workshop.[62] A similar study examined resident teaching skills before and after instructions and feedback.[63] Overall teaching quality scores also significantly increased.[63]

Occasionally, researchers used a combination of methods to assess improvement, application, and maintenance of teaching in daily clinical life.[5,14,44,45] Snell, for example, triangulated self-assessments, pre-post checklists, ratings by learners (students, junior residents and peers) and teachers (attending staff) and observations by an education expert.[44] She found that residents who participated in a course, which included five three-hour sessions, improved resident teaching skills, showed better use of those skills in the clinical context and maintained those skills over the academic year. This kind of triangulation with respect to the question of improvement, application, and maintenance of teaching skills, however, was rare in the literature.

Evaluation of Resident-as-teacher Programs - Evaluating program effectiveness by understanding the impact on residents and medical students fits well with the assumption and intention that residents-as-teachers training should improve medical student and junior resident learning; but this is only one aspect of a well-developed approach.[64] Program evaluation should also include activities which evaluate: 1) the need for the program, 2) program design, 3) program implementation, 4) impact or outcomes and 5) cost/benefit and efficiency of the program.[65]

In contrast to assessment of resident teaching, program evaluations described in the literature are lacking in number and in quality. Relying heavily, if not exclusively, on the assessment of residents' teaching neglects many of the broader programmatic aspects.[65] Thus, while the assessment of residents' ability to teach has become more objective, program evaluations are either absent or rely too heavily on the assessment of residents' improvement in teaching. [9,45,49] Ostapchuk's program evaluation is one of the few examples of an evaluation approach based on a conceptual framework (see Kirkpatrick[66]), which included faculty feedback on core program strengths and areas for improvement.[5]

For program evaluations to improve, developers of resident-as-teachers programs need to take a broader approach to program evaluation as defined above. This would include moving beyond the simple question of 'did it work' to also consider what worked, for whom, under what conditions and what did not work, and why. Also important is how context and discipline impacts the program's quality and efficacy, whether integration was important (or not) to the

success of the program, how the duration of the program contributed (or not) to residents' learning, and the feasibility of a program over the duration of a developmental trajectory. As well, there is a need for better logic models or conceptual frameworks to guide curriculum development, implementation and evaluation.[9,45] This was lacking in the program evaluations we reviewed. In addition, programs need to be perceived as worthwhile and cost effective for administrators, staff, residents, students and, ultimately, patients. These questions will help clarify the confusion in the current literature regarding resident teaching assessment and program evaluation and may lead to a more robust review of effective teaching and the efficacy of programs implemented to support residents.

Summary

Resident-as-teacher programs do not stand-alone. If residents are to have an opportunity to integrate what they have learned, they must receive feedback on their efforts. Although there is little literature on this, it is implicit that parallel faculty development programs about teaching need to be developed and include how to best provide feedback to residents on their teaching.

While there is no consensus as to best practices in the development, delivery or evaluation of resident-as-teacher programs, emerging trends suggest some guiding principles. First, programs should be learner centered, addressing both what residents need and the most effective method of learning. Second, the content and format of such programs should use well-established educational frameworks that are suited to variations in both context and discipline. Third, programs should, where possible, be integrated into the daily life of residents – rather than added to their work – if programs are to be viable in the crowded curriculum of resident training. Fourth, they should be longitudinal and developmental across the years of residency training, building on what residents learned and practiced in previous years. Fifth, programs to train residents as teachers should be sensitive and responsive to the context and practice of each specific discipline. It is untenable to expect that some generic set of teaching skills is appropriate across situational, contextual, and disciplinary variations. Sixth, residents' teaching should be assessed using more than one measure or indicator of improvement through the continuum of acquisition, application, and maintenance of teaching skills, knowledge, and attitudes. Finally, program evaluation should move beyond reliance on the improvement in resident teaching as sufficient indication that the program is effective, valued, and sustainable over time. In this way, resident-as-teacher programs should not only provide exposure to foundational skills and knowledge but also recognize residents' developing professional identities, which should include a recognition of their role as teacher, communicator and role model.

What is universally accepted in the literature is the presumed value of training residents to become effective teachers - for the current and future benefit of patients, trainees, colleagues, associates and the public. Accreditation bodies including RCPSC, ACGME and LCME have recognized the important teaching role that residents play.[30–32,57] In reality, residents spend a great deal of time teaching medical students, and this, in turn, has a direct impact on medical students' training.[9–11] Moreover, Borden and Litzelman suggest that very few residents or faculty are naturally gifted teachers.[37] Thus, as with clinical training, teaching can be learned and refined over time but must be responsive to residents' level of training and integrated into their daily work. Residents' teaching abilities are arguably even more important to effectively educate patients and families about diagnosis, treatment and management of illness.[25,36] Being an effective educator is foundational to being a competent physician, and programs to improve resident teaching skills should be mandatory for all postgraduate trainees.

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Appendix 1: About the Authors

Dr. Sandra Jarvis-Selinger, PhD is an Assistant Professor in the Department of Surgery and Associate Director in the eHealth Strategy Office. In 2008 she received a Michael Smith Foundation for Health Research Career Investigator Award. She is a PhD-trained developmental psychologist in the area of Human Learning, Development and Instruction. Her work focuses on educational innovation and knowledge translation, which specifically includes: 1) the development of excellence in teaching and learning, 2) curriculum design, and 3) the use of technology to support education. All of her research focuses on how to translate knowledge into action. Dr. Jarvis-Selinger has been included in the top 15 Knowledge Translation researchers by dollar amount in Western Canada, tied for second in BC (Alberta Heritage Foundation for Medical Research).

Dr. Yasmin Halwani MD is from Montreal and completed her undergraduate medical training at McGill University (Anatomy and Cell Biology and Hispanic Civilizations). She is currently completing her residency in General Surgery at UBC (currently a PGY-3). She is actively engaged in the education field and is completing a Masters in Adult Education at UBC, with a fellowship at the Centre for Health Education Scholarship at UBC. Her research interests lie in global health, assessment, intraoperative judgment/decision-making, and residents as teachers.

Dr. Karen Joughin MD, PhD, FRCSC is currently the Interim Associate Dean, MD Undergraduate Education, Curriculum & VFMP at UBC. She graduated from medical school at Dalhousie University. She interned as a family medicine resident in Saskatchewan, did two years of general surgery training and completed the plastic surgery training program at Dalhousie University. Karen also has a Master's degree in Medical Education from University of Calgary and she completed a PhD at the University of Queensland, studying surgical errors. She has served in many teaching and education administration roles at undergraduate, postgraduate and continuing professional development levels over the course of her career.

Dr. Daniel Pratt, PhD is Professor of Adult & Higher Education in the UBC Department of Educational Studies and holds a cross-appointment in the Faculty of Medicine, where he served for five years as the Director of Clinical Educator Fellowships in Medical Education in the Centre for Health Education Scholarship (CHES). He is currently a Senior Scholar with CHES. For the past six years he has been a faculty member for the American Academy of Orthopaedic Surgeons (AAOS) Educators' Course. Dan has been a visiting professor at universities across North America, Europe, Asia, and Australia and his research and publications on teaching and learning are used in universities around the world. In 1992 Dan received the Killam Teaching Prize at UBC. In 1999 his book, Five Perspectives on Teaching in Adult and Higher Education, won the Cyril O. Houle Award for most outstanding literature in adult education. In 2008 he received Canada's most prestigious university teaching award – the 3M National Teaching Fellowship.

Dr. Tracy Scott, MD, FRCSC is a Clinical Educator Fellow at UBC. She completed her undergraduate and medical education at Memorial University of Newfoundland, General Surgery residency at UBC, and is scheduled to complete a Master's degree in Medical Health Professions Education from the University of Illinois at Chicago in July 2011. Her research interests and publications have focused on resident technical skills evaluation as well as curriculum design. Currently her Master's thesis is focused on trauma team leadership identification and evaluation. Her research is balanced with clinical practice in General and Trauma Surgery.

Dr. Linda Snell, MD, MHPE, FRCPC, FACP is a Professor of Medicine and an active member of McGill's Centre for Medical Education. She completed her undergraduate and medical education at the University of Alberta, her residency at McGill University, and has a Master's degree in Medical Education from the University of Illinois at Chicago (thesis topic: Teaching Residents how to Teach). She is currently Vice-Chair (Education) of the McGill Department of Medicine, Director of McGill's Postgraduate Core Competency Program and has recently been appointed Senior Clinician Educator for CanMEDS at the Royal College of Physicians and Surgeons of Canada. Linda has been active in teaching, administration and educational research at all levels of medical training. Her current research interests include improving teaching skills of faculty and residents, issues in clinical teaching and learning, teaching & evaluating CanMEDS core competencies, leadership in medicine and medical education and education scholarship. She has led and participated in various faculty development and teaching improvement programs across Canada and internationally and also has a busy internal medicine practice.

Appendix 2: Annotated Bibliography

Robert E. Post, MD, R. Glen Quattlebaum, MD, MPH, and Joseph J. Benich, III, MD, RaT Curricula: A Critical Review, Acad Med. 2009; 84:374–380.

Post et al (2009), in their critical review of literature from 1978-2008 (English language only) concluded that the methodology of studies has improved and demonstrates that residents-as-teachers curricula of 3-hours duration or more, with periodic reinforcement, can significantly improve residents' teaching skills. They further recommend that OSTEs be used as the standard outcome measure.

Andrew G Hill, Tzu-Chieh Yu, Mark Barrow & John Hattie, A systematic review of resident-as-teacher Programmes, Medical Education 2009: 43: 1129–1140

Hill et al performed a systematic review in order to investigate the effectiveness of resident-as-teacher programs on resident teaching abilities and to identify the features that ensure success. Hill et al concluded that more rigorous study designs and the use of objective outcome measures are needed to ascertain the true effectiveness of resident-as-teacher programs. Future research should focus on determining the impact of these programs on learning achievement at the level of medical.

Wamsley MA, Julian KA, Wipf JE. A literature review of "resident-as-teacher" curricula: Do teaching courses make a difference? J Gen Intern Med. 2004;19: 574–581.

Wamsley et al reviewed 13 studies with various experimental designs and concluded that teaching residents to teach improved confidence in teaching and self-reported use of teaching behaviors. They also linked teaching interventions to improved student evaluations of residents' teaching effectiveness. However, due to methodological limitations, the authors made no recommendations about optimal teaching strategies or programs.

Bensinger, L., Meah, Y.S., Smith, L.S. (2005). Resident as Teacher: The Mount Sinai Experience and a Review of the Literature. The Mount Sinai Journal of Medicine, 72(5), 307-311

Bensinger et al (2005), in their review of the literature, found that although data from resident-as-teacher showed great variation in content, duration, and measures of effect, successful teaching skills programs had the following features: 1) Provided opportunities for active learning; 2) Drew upon residents' own experience, 3) Allowed for practice, 4) Provided feedback, 5) Encouraged self-assessment and goal setting, 6) Considered residents' time constraints, 7) Built in time to discuss problems of confidence and conflicting roles, 8) Focused on problem areas specific to residents, e.g., use of questions, giving feedback and 9) Teaching problem solving.