

RESIDENT REMEDIATION

RESIDENT REMEDIATION: PROCESSES AND OUTCOMES OVER A 16-YEAR PERIOD AT
MCMASTER UNIVERSITY

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TITLE: Resident remediation: Processes and Outcomes over a 16-year period at McMaster University

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LAY ABSTRACT

Residency training is an apprenticeship period that follows the completion of medical school. It prepares doctors for independent practice within the chosen discipline or specialty of medicine. Some residents struggle during this period and need additional training time and help in order to improve their skills to become safe and effective doctors. It is not always immediately obvious how to help these residents, or which residents may be more likely to encounter difficulty, and who may have trouble completing residency training. This study attempts to answer these questions and has shown some common characteristics to residents who require remediation or additional training. It reflects the strategies that were used at McMaster University in order to help such residents. This study also indicates how many residents were able to complete their residency training programs and it provides linkages to previous research and proposes new directions for future research in resident remediation.

ABSTRACT

Resident remediation is often guided at the residency program level, however some institutions also have designated bodies within their departments of postgraduate medicine for this purpose, such as the Educational Advisory Board (EAB) at McMaster University. Research from the postgraduate department level has been limited, and this study aims to better understand remediation in postgraduate training with two primary objectives: 1) to review remediation processes and practices at McMaster University, from the standpoint of the postgraduate medical Education Advisory Board (EAB), and 2) to describe the characteristics and relevant outcomes for residents who underwent remediation at McMaster. A total of 85 residents were suitable for analysis and the majority of these residents were international medical graduates (62%). Most had knowledge or medical expert weaknesses (92%) while 51% of residents had behavioural (e.g. professionalism, communication) weaknesses, and a total of 42% of residents had both. A number of residents (25%) had a serious coexistent medical or psychosocial factor that contributed to the need for remediation. Remediation strategies were better described for knowledge weaknesses than for behavioural weaknesses, and there was more consistency in the remediation strategies used for knowledge weaknesses. The most commonly implemented strategies for remediation of behavioural weaknesses involved using resources that were external to the department of postgraduate medicine. The majority of residents completed their training programs at 71%. None of the analyzed predictors were found to be statistically significant for program completion, however this study was underpowered to find such predictors given the convenience sample size. This study represents the most comprehensive review of resident remediation at a single institution and it underscores the need for improved documentation and review of remediation practices at institutions. It also raises important questions regarding the effectiveness of remediation and it highlights the critical nature of accurately diagnosing a learner's deficiencies and providing targeted remediation strategies.

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I. INTRODUCTION

Resident remediation is perceived to be a high stakes process for the trainee, which can potentially lead to advancement within a training program or dismissal. This is often a stressful period for trainees, and although the faculty perspective is one of optimizing the resident's skills for the practice of medicine, residents sometimes regard the remediation process as punitive. The trainee's perspective may be that his or her performance is at the maximum capacity and at a level of maximal personal investment, during a training period that pushes individuals to their limits on cognitive, emotional, and physical levels. It is not uncommon for residents to have work hours that double those of other types of work, and at the same time they need to acquire skills on a steep learning curve. Further, there are serious consequences to errors that are made in the workplace as the lives and well being of patients may be affected. Alongside all of these workplace challenges, residents must manage their personal lives and meet their commitments to friends and family. Residents and physicians in general are also highly motivated individuals who have surpassed difficult challenges in order to enter the practice of medicine. For all of these reasons it is often difficult for residents to learn that they are not meeting their expected milestones, and the issue of remediation is a sensitive one. The topic of resident remediation is certainly challenging, however it is important to remember that the perceived culture of remediation amongst residents may make the remediation process more strenuous, and is an aspect that should be addressed over the long term. Faculty and institutional efforts to improve remediation are likely to be more successful if the suggestion and process of remediation is more acceptable to residents, and met with less fear or resistance.

Remediation may be identified as necessary by a rotation supervisor, by the residency program, or by the program director. From the perspective of any of these groups, however, the

remediation of a resident occurs fairly infrequently (1-4). However, when residents have a problem the remediation process is often resource intensive for the program, trainee, and the office of post-graduate education, when involved. When necessary the post-graduate educational advisory boards may have an overseer role of the university postgraduate medicine departments. In these cases they may guide remediation processes from an institutional level and provide guidance for remediation across a number of specialty programs within postgraduate medicine. Some institutions do not have boards with this role, and in those instances remediation is likely guided by the residency program director. Experience in remediation, however, is not the only important factor. It is essential that remediation be consistent across programs and guided by a high quality, formalized remediation program that is informed by evidence.

The optimization of remediation programs to better support trainees and ensure equitable standards is also critical at this juncture in medical education as we move towards competency-based medical education (CBME). CBME requires frequent assessment as part of the learning process(5). With CBME, the thresholds of competency must be clearly defined and alongside this there should be faculty development to ensure there is clarification of which competencies need to be achieved at particular stages, and how these competencies are defined. With increased evaluation using consistent thresholds of competence, there is a possibility of increased identification of residents who are not meeting expected milestone outcomes and thus requiring remedial support. In conjunction with this, some degree of cultural shift in resident perception is required, as residents need to understand that they may not always achieve perfect scores at every point in training, but rather the training period is a continuum with the goal of achieving perfect scores by the end. This potential increase in the use of remediation programs requires that the specialty programs and postgraduate medicine program as a whole be prepared to guide further education and assessment of

the trainee in an effective and evidence-based manner. It must also be remembered that there are several important aspects to the evaluation and remediation processes, and they have interesting parallels. Criteria for good evaluation practices have been described and these include reproducibility and consistency in evaluation, suggesting that the assessment of the student's skill would be the same if repeated under similar circumstances(6). So too should our remediation programs have consistency, both in the manner in which we assess residents and also in the way that we strategize and provide remedial interventions. It has also been elegantly argued that people cannot effectively engage in self-assessment(7). It would therefore be unreasonable to place the burden of self-regulation on residents in difficulty and expect that they will independently devise and successfully complete self-remediation of their deficiencies. The need for consistency when it comes to remediation might suggest that a centralized educational advisory board can provide the relevant structure and organized process, approach and resources to optimize remediation. Practices in remediation can be highly variable between individual programs, and some programs and program directors may have little to no experience in providing and guiding remediation for a resident in difficulty. With the presence of a centralized educational advisory board, the minimum requirement for program directors would be to have an awareness regarding the existence of the board and having an accurate ability to identify residents in difficulty within their programs. Following that, the program director can contact the centralized board for assistance in guiding remediation for that particular resident. The experience and expertise of the board should serve to quickly and accurately diagnose the resident's skills deficiency and provide the most appropriate and effective remediation strategies, as well as support for follow up and reevaluation of the resident.

Although the reasons for moving to a more evidence-based remediation program are intuitive and compelling, the current literature and data which would provide direction in this process are lacking.

There have been two literature reviews on remediation, however only a fraction of the studies included in each review focused on remediation at the level of postgraduate or residency training (8,9). In addition, the majority of the literature that does exist on resident remediation is centred on remediation experiences *within* individual residency training programs. Overall, details on process of remediation are lacking and without this detail, linkages to education theory and pedagogy are limited.

The existing literature on evaluation and remediation of physician competencies is also imbalanced in the types of competencies that are being assessed. The tendency has been to emphasize specific medical knowledge or technical skills that are relevant to the practice of medicine, and this component is referred to as the “medical expert” role within the CanMEDS framework. The CanMEDS physician competency framework describes the knowledge, skills and abilities that physicians need for better patient outcomes(10). The framework does, however, recognize other important competencies to the practice of medicine besides the medical expert roles, and these are sometimes referred to as the “intrinsic roles,” and include such aspects as communication skills, professionalism and collaboration. The existing remediation literature is imbalanced in that it is more focused on medical expert (including both knowledge or technical skill) deficiencies rather than the intrinsic qualities. There is a paucity of data and understanding of the remediation of non-medical expert weaknesses such as professionalism or communication(11). The importance of professional competency in medical school and residency has been illustrated by the finding that trainees who demonstrate unprofessional behavior are more likely to have disciplinary action by a medical board later in independent practice (12-14). Disciplinary actions by medical boards can result in any of the following for physicians in practice: loss of a physician’s license to practice, restrictions on the physician’s medical license, or monetary fines(14). Although there is evidence that poor performance on cognitive and behavioural measures during residency is associated with greater risk of licensing board actions at every point on a performance continuum, the success of remediation of professionalism weaknesses in residency is unknown. Some studies have recognized that

weaknesses in domains outside of pure knowledge, such professionalism or communication, may be more difficult to identify and remediate(2,11,15). There are several reasons why identification of professionalism weaknesses is challenging. One of these is reluctance from faculty to apply harsh labels to trainees as being unprofessional, and smaller lapses in behaviour may be overlooked for fear of applying a harsh descriptor to the person as being unprofessional(16). There are also difficulties inherent to the evaluation process itself, which relate to the issues of consistency in evaluation that have been mentioned above. Professional behaviour is sometimes being defined in abstract terms, and there is a need for multiple observations or adequate sampling of professional behaviour. Consistency is more difficult to achieve for evaluation of abstract items and given that there may be some inconsistency in subjective measures such as professionalism, adequate sampling is paramount in providing a true assessment of competency. There is also context dependency of professional behaviour and faculty have fewer reliable measures to assess professional behaviour, and so they must have the confidence in their evaluation approach in order to declare behaviour as unprofessional.

Remediation practices and the organization of groups or educational advisory boards to guide remediation can vary across universities. At McMaster University, the Postgraduate Medical Education Advisory Board (EAB) acts as an educational advisor for residents and programs. It is an arms-length body that acts on behalf of the Postgraduate Medical Education Office to assist programs and residents in academic matters and remediation(17). The policy for Postgraduate Medical Education (PGME) at McMaster states that resident trainees who achieve less than a “satisfactory” designation on their In-Training Evaluation Reports (ITERS; see Glossary in Figure 1) require some form of remediation. If the student agrees with the evaluation and does not pursue an appeal, then the student’s ITER and remediation plan must be forwarded to the Postgraduate Medical Education Advisory Board (EAB) by the program director(17). The EAB then reviews the remediation plan and may or may not provide

comments back to the program and student, however the program director or student may request a formal meeting of the EAB for assistance with remediation planning.

Over the time course of data collection for this study, the infrastructure of McMaster Postgraduate Medicine and the EAB has evolved with changes in the EAB's roles and responsibilities. This study considers remediation at the level of the department of postgraduate medicine between 1996 and 2012. In 1996, the Postgraduate Medicine Office had an Educational Review Board or ERB which functioned as an educational advisor to programs and residents (as does the current EAB), however the ERB also adjudicated resident appeals of evaluations. In 2009 it was felt that the separation of the adjudication and advisory roles would create a fairer process for trainees and faculty alike, and so the ERB was dissolved into two separate bodies, specifically the Educational Advisory Board (EAB) and the Appeals Review Board (ARB). The ARB now functions to review appeals of evaluations that are less than satisfactory, and if the appeal is rejected or the evaluation stands as less than satisfactory, then the resident and program are directed toward the EAB for further guidance. The EAB does not adjudicate appeals of academic decisions and with regard to remediation, the EAB may simply review the remedial process that is being implemented by the residency training program, or the EAB may be more actively involved in guiding and overseeing the remediation. If the EAB acts beyond approving a program's remedial plan, then often a meeting is held between the EAB, the program director and the resident. Residents sometimes choose to bring legal counsel to meetings, however this often is not felt to be necessary by the faculty or EAB, as the objectives for the meetings are to discuss deficiencies and strategies for improvement, as well as conditions for moving forward. The meetings and the remediation process are not meant to be punitive. It has never been the case that the meeting serves to inform residents of radical action such as dismissal from the program, however the arrangement of legal counsel likely reflects resident fears regarding the punitive nature of any discussion around the subject of remediation. The members of the EAB are three faculty members as well as one resident. If in a

particular resident's case a meeting of the EAB has been arranged, then plans for remediation and moving forward will be generated and agreed upon at the meeting, and timelines for milestones are typically developed with possible future meetings to take place. Alternatively, a single meeting may be adequate and future communications between the program director and EAB may determine that competencies have been achieved with remediation and no further meetings are necessary.

Since its inception in 1996, the ERB/EAB has reviewed over 100 cases of residents requiring remediation, across a spectrum of subspecialty residency training programs. Review of the ERB/EAB experience in remediation, and exploration of the dataset through the use of focused research questions, serves to narrow the gaps seen in the current literature on remediation. In addition, this undertaking identifies areas for quality improvement in medical education at McMaster and enables program evaluation and development for resident remediation. Given the need for remediation to be guided by evidence, and the previously unexplored nature of the McMaster Educational Board's (ERB and EAB) process, a detailed review of the remedial process within the postgraduate program is required. The review that is undertaken here reflects the continuous involvement of the Educational Boards (EAB and ERB) in remediation at McMaster, however the review of appeals of evaluations has been excluded, as the EAB and ERB have had different roles in this regard. From this point forward, the use of the term EAB will generally refer to the remediation functions of the ERB and EAB from 1996 until 2012. Therefore, the objective herein is twofold: 1) To review remediation processes and practices at McMaster University, from the standpoint of the postgraduate medical Education Board or Educational Advisory Board (EAB and ERB); and 2) To describe relevant outcomes for residents who underwent remediation at McMaster.

Literature Review of Resident Remediation Programs

Two literature reviews on resident remediation have been published to date (8,9), and there has been one retrospective review describing remediation across all residency training programs at a single institution, from the perspective of a postgraduate board of examiners(1).

Hauer, et al., Thematic Review of the Remediation Literature (2009)

The earlier of the two literature reviews of remediation is a thematic review from 2009. The review included 13 studies of remediation at the undergraduate, postgraduate and continuing medical education (CME) level(8). Only two of these 13 studies focused on postgraduate remediation. These studies focused on the progress of residents within specific programs (18,19). In both studies the authors utilized in-training exams to identify residents who scored below a given percentile and then enrolled them into remediation programs. Based on the content of the in-training examination the study was able to focus on knowledge deficits only. Remedial plans included a program of reading and study skills as well as mandated repeating of rotations. Outcome assessment in both was by repeat scores on in-training exams. Edeiken focused on results of a remediation program in Radiology and she demonstrated improvement in-training exam scores and resident evaluations from faculty for the 6 residents who had a year of remediation(19). Harthun, *et al.*, focused on outcomes from a General Surgery training program. This study showed improved exam scores for 7 of their 8 remediation residents following program-supported study plans(18).

When considering remediation across all levels of medical education and practice, including the postgraduate studies highlighted above, Hauer, *et al.*, was able to make important recommendations in her review. She proposed a remediation model with the following steps: 1) multimodal competency assessment, 2) diagnosis of deficiency and development of an individualized learning plan, 3) instruction

or remedial activities that are deliberate in practice, feedback and reflection and 4) focused reassessment and certification of competency(8).

Cleland, et al., Systematic Review of the Remediation Literature (2013)

The second, and more recent review of remediation was published in 2013 by Cleland, *et al* (9). This systematic review included 31 primary studies which had remediation interventions that resulted in at least one outcome measure of satisfaction, across areas of knowledge, skills or effects on patients. The intention of this review was to identify how and why certain remediation interventions may work, however it is important to note that satisfaction with a remediation program does not necessarily correlate with improved resident performance or better outcomes. Cleland, *et al.*'s paper included 9 studies of resident remediation, 7 of which were novel as of the Hauer, *et al.* review in 2009, and all of which were North American reviews of single programs. Five of the nine studies focused on trainees in General Surgery. Of the remaining four studies, two were in Family Medicine, one in each of Radiology and Pediatrics. While Cleland, *et al.* did not provide any meaningful conclusions about the format of resident remediation specifically, a review of the individual studies provided some consensus regarding the types of deficits normally remediated. The majority of these 9 post-graduate studies examined remediation efforts based on knowledge-type or technical skill weaknesses (8 of 9 studies) (18-25). One study examined residents with weaknesses in interviewing, and it is not completely clear if these weaknesses were present due to knowledge gaps or deficient communication skills(26). Of the 9 studies, 7 used in-training exam scores as a measure of identifying or monitoring knowledge or skills development, and the remaining 2 studies used either a licensing exam score(26) or a surgical skills proficiency exam score(24). The remediation interventions across the studies were variable, and most (7 of 9 studies) included either courses or programs with multiple elements (19-23,25,26). The remaining 2 studies had different interventions in that one study provided individualized study plans for residents(18),

while the other study did not clearly describe the remediation strategy(24). Most studies (8 of 9) demonstrated that some type of academic program intervention (e.g. study plans, lecture series or courses) would improve exam scores (18-24,26).

The majority of studies in Cleland, *et al.*'s review focused on medical students needing remediation and most studies focused solely on performance on a specific subsequent examination (e.g. taking a standardized exam). Cleland, *et al.* noted that the more recent studies were of better quality than older studies. Their assessment of quality was favourable in that it linked pedagogic theory with remediation design. Studies were considered to be of better quality if there was enough information provided about the intervention so as to identify the critical components. Despite this, the majority of studies did not report in detail what the remediation interventions were, why, and for how long, making it challenging to glean which elements were successful within a remediation intervention. Of the 31 included studies, 23 did not state the theoretical basis of the remediation intervention, while 2 used learner-centred approaches, 1 used the Kolb cycle, and 4 used multi-faceted approaches (the theoretical basis was addressed for 30 of the 31 studies). The authors also attempted to analyze complexity of the studies, where an intervention could be considered complex if it involved several interacting components, or if there were high degrees of tailoring of those components to individual trainees. Unfortunately many studies did not report their interventions to any significant detail, and few studies justified their approaches on the basis of appropriate theory. Many study authors did not consider the issue of complexity, and therefore the authors of the review could not utilize the aggregate data from the individual studies to make meaningful conclusions about which components of the remediation process were effective.

There has been only one study to date that has described resident remediation across a spectrum of different specialty programs. This study reviewed remediation of residents across specialty programs at a single institution, from the perspective of a postgraduate educational board of examiners (1). The structure, roles and responsibilities of the board are mentioned and appear to be similar to those of the McMaster EAB. Cases were reviewed over a 10-year period and the aim was to determine the prevalence of residents in difficulty, the characteristics of these residents, their areas of weakness, and the outcomes of residents who underwent remediation. It was found that all 100 of the residents reviewed had either medical expert weaknesses (85% of total residents), professionalism weaknesses (51% of total residents), or both (unreported). Of the 7 CanMEDS roles(10), residents had an average of difficulty with 2.6 roles. No specific comments were made on remediation strategy, and therefore it is not known if the remediation strategies were specific to CanMEDS role weaknesses. Roughly half of the residents required a single remediation period, and usually remediation was deemed successful. Slightly fewer than half of the residents required multiple remediation periods. The outcome measure defining a successful remediation was program completion. A total of 78% of residents completed residency education, 17% were unsuccessful, and 5% remained in training at the time of writing. Unfortunately this study did not describe which remediation strategies used and how or why they might have been effective. The larger and more recent systematic review of resident remediation by Cleland and colleagues(9) had also found that most studies in their review did not report in detail what the remediation interventions were, why they were used, and for how long, making it challenging to identify which elements were successful within a remediation intervention.

Studies of Remediation at the Postgraduate Program Level

The vast majority of publications on resident remediation are at the program level and discuss remediation within various residency training programs of different specialties (e.g. Family Medicine or General Surgery Residency Training programs), with some of these articles describing actual remediation practices within programs and the remainder being opinion papers on how remediation ought to be conducted. With regard to other residency program-level publications found in PubMed, there were 9 papers that were not included in the Cleland or Hauer reviews and these were published from Anesthesia, General Surgery, Emergency Medicine, Otolaryngology, Obstetrics and Gynecology, and Family Medicine training programs in the United States. Three of these publications are recommendation papers on how remediation ought to be conducted and they do not describe existing remediation practices or provide primary data(27-29). Four publications were surveys of program directors across the United States (in Anesthesia, Obstetrics and Gynecology and General Surgery) on how residents in difficulty are identified and managed(30-33). The survey of Anesthesia programs suggested that about two thirds of U.S. programs had written policies on probation periods for residents in difficulty and the “probation” or remediation process involved creating a written plan with specific goals with a time course for meeting and the consequences of failure(30). Remediation strategies included the provision of remedial assignments or study plans, assignment of a one-on-one preceptor, revocation of the resident’s senior or “moonlighting” privileges, extra time on rotations or the repeating of a year of training. The survey of U.S. Obstetrics and Gynecology programs examined how unprofessional behaviour is managed and the most common methods they used included expression of expected improvement to the resident without specific assistance from the program, mandated psychological counseling (68%), placing the resident on probation (59%), the requirement of some other type of education activity regarding professionalism with the specifics not described (41%) and dismissal (30%)(31). The General Surgery publication from a single program used increased bedside rounds, “think

out loud” techniques and increasing resident accountability for learning as part of their strategies for guiding residents in difficulty(34). The other General Surgery publication reflected the American Board of Surgery’s policies concerning additional training for residents who failed the qualifying or certified oral exams, which included a remedial year that was specifically designed for the needs of the resident in difficulty, and had to include an identified preceptor, as well as a board-approved remediation plan which should include specific rotations, locations, mentors, duties and call schedules(33).

Of the nine program-level publications not included in the Cleland or Hauer reviews, one of them provided some greater depth on remediation practices in a Family Medicine program over a 25-year timeframe (2). Their residents were labeled as having difficulty based on various categories, including those beyond knowledge, and they also went so far as to describe the following remediation methods and the frequencies of their use: faculty advisor meetings (used in 61.9% of cases), assigned core content review (52.4%), increased clinic videotape review (42.9%), changes in rotation schedules, elective choices or extended training (42.3%), psychiatric counseling (38.1%), modified clinic schedules (28.6%), or a formal rehabilitation program (14.3%). The reported outcome for residents in trouble was program completion, and 19 of the 21 identified residents had successful remediation and completed program training, while 2 were dismissed from the training program.

Summary

Most postgraduate studies and literature reviews have focused on deficiencies in knowledge or the medical expert role, and many have used standardized tests to diagnose weaknesses and to evaluate the effects of remediation. There has been little data to indicate which interventions are effective for specific deficiencies, although it seems that knowledge weaknesses may be remedied with interventions such as structured courses or formal study plans. It has been recognized that weaknesses in domains outside of pure knowledge, such professionalism or communication, may be more difficult to identify

and remediate(2,11,15). Additionally, exceedingly little has been published in the specific realm of remediation of professionalism weaknesses. This is especially relevant given that unprofessional behavior both in medical students and residents is predictive of subsequent disciplinary action by medical boards(12,14). Unfortunately, what remains unanswered from the current literature is whether or not remediation could reduce the association between professionalism deficits in training and subsequent disciplinary action from state medical boards. The experience of Obstetrics and Gynecology(31) as well as General Surgery(35) programs has been that remediation of professionalism weaknesses is either partially or not at all successful, and in the General Surgery study specifically, it was felt that this was partially due to remediation efforts not being targeted precisely to the problems(35).

In brief, the current gaps in the literature on remediation include the roles, responsibilities and processes of remediation at the level of postgraduate medical education, particularly at the level of postgraduate medical educational advisory board. Further, the interactions of such boards with individual programs and residents, the remediation strategies and processes that are implemented for different weaknesses, and professionalism weaknesses in particular, are poorly described in the current literature. Lastly, robust outcomes data for residents in difficulty is lacking. This present study addresses these gaps by examining which remediation strategies are used for specific types of weaknesses. Although the number of cases in this study is limited, one could imagine an ideal scenario where outcomes in remediation could be analyzed based on the type(s) of remediation strategies that were used. The role of the EAB in remediation is also described, and program completion is analyzed as a primary outcome. This study also serves to narrow the void in the literature on predictors of successful outcomes after remediation, which are important to identify for the purpose of creating effective remediation programs. Further recommendations are also made for narrowing these gaps with future studies.

Study Objectives

Given the limitations of the current literature, this study aims to better understanding of remediation in postgraduate training with two primary objectives. The first objective is to review remediation processes and practices at McMaster University from the standpoint of the postgraduate medical Education Advisory Board. The second objective is to describe relevant outcomes for residents who underwent remediation at McMaster.

II. METHODS

Data Collection

Data extraction was performed through review of documentation belonging to the Department of Postgraduate Medicine's Educational Advisory Board (EAB) at McMaster University. EAB resident cases for study inclusion were identified by the Postgraduate Program Manager (PPM) within Postgraduate Education in the Faculty of Health Sciences, at McMaster. The EAB maintains a file on each resident who was identified as requiring remediation, and these files were de-identified and provided to JY for review in a blinded fashion. Each resident case was issued a numerical identifier, and the resident's name and other personal identifiers were removed from the documents prior to being provided to JY. The list of names matched to identifiers was held by PPM, who is aware of all of these cases through her roles in the EAB and Postgraduate Medical Education at McMaster. EAB files given to JY consisted of various documents, including progress reports that were prepared either by program directors or the EAB, resident evaluations, or other letter communications between the EAB and a resident's program director or faculty supervisor. JY was provided with paper copies of EAB documents, and these documents were stored in a locked cabinet, inside a locked office, at the McMaster University Medical Centre and JY was the only individual accessing these files. Hamilton Integrated Research Ethics Board (HIREB) approval was obtained prior to the initiation of the study, and approval was maintained for the duration of data collection.

Data extraction from EAB files was done as per the data collection form (Appendix A). Several resident demographic characteristics and other relevant descriptive information were captured from the EAB file. These include type of medical school (Canadian versus other), funding source (Ministry of Health versus other, where "other" can be funding from another country for an International Medical Graduate resident, or from an alternate funding agency), residency program type, postgraduate year

(PGY) level when weaknesses identified, and the deficits requiring remediation. The deficits requiring remediation were captured according to two scales. The first scale categorized weaknesses according to knowledge/technical skills or behaviour, where behaviour included various aspects such as professionalism, communication and collaboration (sometimes referred to as “intrinsic roles”). Here we used the term “behavioural,” and this term is also used in the literature, while other terms that have been used to describe the same type of weakness include “attitudinal” or “professionalism” weaknesses. All study residents had either a knowledge or behavioural weakness as a cause of remediation. In addition, it was noted whether there were other contributors to the need for remediation such as personal medical or psychosocial problems.

The second scale that was used to categorize deficiencies was the CanMEDS scale, which includes 7 domains of competency: medical expert, professional, communication, collaboration, health advocate, manager and scholar. It is important to note that the CanMEDS roles were introduced in Canada during the timeframe of this study, and therefore it cannot be certain that all of the CanMEDS weaknesses were identified for the earlier residents in the cohort, and perhaps only the most problematic weaknesses were documented.

For remediation process, it was determined whether remediation recommendations were made by the EAB as opposed to being program-driven and EAB approved, and the duration of the remediation period and the remediation strategies that were used were also noted. The checklists of remediation strategies that are seen in Appendix A are a reflection of typical strategies that were encountered during a pilot data collection phase with review of the first ten resident cases. On further data collection, if other novel strategies were mentioned, then this was documented qualitatively and subsequently reviewed in a descriptive manner. Resident program completion was documented on the data collection form if that information was available from the EAB. The primary outcome of interest was residency

program completion, and resident characteristics were analyzed as possible predictors of program completion.

One critically important consideration for this study was the preservation of resident confidentiality. In order to uphold this, certain aspects of the data are intentionally not quantified, and specific resident cases are not described. Specifically if a cell size was viewed as too small, such that the resident would become easily identifiable, such data were not reported.

Analysis

The characteristics of the resident pool and their reasons for remediation are analyzed in a descriptive manner, as are the remediation strategies. These descriptive statistics are parametric (i.e. mean; standard deviation; median for duration of remediation). For statistical analysis, multivariate methods were used to determine predictors of program completion. A factor analysis strategy was used to determine if the variance in program completion could be explained by the resident characteristics and other data that was extracted for this study. A discriminant function analysis ascertained which of the demographic and resident characteristics can best predict the program completion status.

III. RESULTS

There were 99 cases identified in the EAB repertoire of case files, from the inception of the EAB (initially the ERB) in 1996 until the end of 2012. Of the 99 initial cases, there were a total of 14 exclusions, resulting in 85 cases that were suitable for analysis. Two of these 14 cases were excluded on the simple grounds that they did not meet study eligibility criteria; one case was a non-MD graduate who was in a fellowship outside of clinical medicine, and the second was a case of a resident who filed a complaint of sexual harassment from a faculty member. Of the remaining 12 excluded cases, 7 had some form of assessment and were deemed not to require remediation, while 5 had very vague documentation in the EAB files and it was not certain if remediation was recommended (Figure 2).

For the 7 cases that had some form of assessment with an ultimate decision against remediation, 5 had formal reviews by the EAB, however the evaluations identifying weaknesses were invalidated because the programs did not follow due processes (e.g. residents were not informed of weaknesses in a timely manner, or they received their evaluations after deadlines). These 5 trainees therefore could not be mandated to undergo remediation or repeat rotations, as the original evaluations documenting weaknesses became invalid. These 5 cases were equally distributed throughout the study period, with 2 occurring in the first half of the study (1996-2003), 1 occurring in 2004, and 2 occurring in the latter half of the study period (2005-2012). For the other 2 residents for whom the validity of evaluations was not an issue, one had very minimal information in his or her case file and it is not clear why there was no remediation, while the other resident had further assessments performed by the residency program and was ultimately found to have satisfactory performance, thereby no longer having necessity for remediation.

For the 5 excluded cases with vague documentation and uncertainty that remediation was even recommended, one of these had evidence of switching subspecialty training programs, and it was not

clear if the requirements of the initial program were fulfilled prior to changing training programs. Another one of these 5 cases was an instance of alleged sexual misconduct by the resident, but how this was managed is very poorly described. It is therefore not clear how the allegation was settled or if remediation was offered, however it seems that the trainee likely completed a full training period and he or she organized legal counsel. This set of 5 exclusions due to vague documentation is also distributed evenly through the study period, with 2 occurring in the first half of the study period and 3 in the latter half of the study period.

In summary, the system issues leading to case exclusion seem to be consistently present throughout the study period of 16 years. These systems issues include failure of programs to follow due process and invalidation of student evaluations as a result, as well as vague documentation of case histories. The total number of residents enrolled in postgraduate medicine residency programs at McMaster during 1996-2012 was 3,733 [Private Communication from Dr. J. Mark Walton, Assistant Dean, Postgraduate Medical Education, McMaster University], suggesting a prevalence of 2.3% for residents requiring remediation.

Demographics/Descriptive Variables

After exclusions, there were 85 medical resident cases of trainees who had remediation and were suitable for analysis. Within this pool of 85 remediation cases, 32 (38%) were Canadian Medical Graduates (CMGs) and 53 (62%) were International Medical Graduates (IMGs)(Table 1). The majority of the pool had funding for residency training through the Ministry of Health (65 residents or 76%), while the minority was funded by other means (20 residents or 24%). Some examples of alternate funding include foreign government funding for residency training in Canada, or other agencies such as the Canadian Bureau of International Education. The details regarding alternate funding sources were not collected. Within the IMG group, 33 residents (62% of the IMG pool) were MOH funded, while 20

residents (38% of the IMG pool) had other sources of funding. All of the CMGs were MOH funded. Within the MOH funded pool, 33 residents were IMGs (51%) and 32 residents were CMGs (49%). The specialty areas of training were varied, and the number of remediation residents by training program was as follows: Family Medicine (25 residents or 29%), Pediatrics (8 residents or 9%), Orthopedics (7 residents or 8%), Anesthesia (6 residents or 7%), General Surgery (4), Obstetrics and Gynecology (4), Family Medicine Emergency (4), Royal College Emergency Medicine (3), Neurosurgery (3), Psychiatry (2), Neonatology (2), Radiation Oncology (2), Public Health and Preventative Medicine (2) and Internal Medicine (2). There following training programs had only one resident who required remediation: Developmental Pediatrics, Plastic Surgery, Urology, Vascular Surgery, Gastroenterology, Cardiac Surgery, Physical Medicine and Rehabilitation, and Anatomical Pathology. A significant number of residents had their needs for remediation identified in later stages of residency training, as 26 of the 85 (31%) residents were recognized to require remediation in postgraduate year (PGY) 4 or later. When Family Medicine streams are excluded, the proportion is greater as it is 26 of 54 residents or 48% that were identified in PGY4 or later. Over the roughly 17 year timeframe of the study, 7 of these residents were identified during 1996-2003, 3 were identified in 2004, and 16 were identified in 2005-2012. The first half of the study period is reflected during the time interval of 1996-2003, and the second half of the study period during 2005-2012, with 2004 being an in-between year with case identification that could have occurred at any time point in the year. The cases from 2004 therefore cannot be delineated as occurring in the first or second half of the study period. From the entire resident pool, 27 were identified during 1996-2003, 6 in 2004, and 51 were identified during 2005-2012, suggesting that the vast majority of the residents were identified in the latter half of the study period. Although an increasing number of residents were identified in later years, the proportion of senior trainees (PGY4 and higher) that were identified also increased (31% of identified trainees during 2005-2012 compared to 26% of identified trainees during 1996-2003).

Remediation Process

With regard to remediation planning, nearly half of the residents had an EAB meeting to help guide the remediation process, with 38 of the 85 (45%) residents having at least one EAB meeting. Forty-six residents did not have an EAB meeting, and for one resident it was not clear whether or not an EAB meeting took place. The number of EAB meetings held per resident was not formally collected, however some residents had one meeting and some had multiple EAB meetings. The resident subset with multiple EAB meetings would be an interesting group for further analysis, however this was not a preplanned subgroup analysis and unfortunately data on this group was not collected. The contributions of the EAB to resident remediation cases where a formal EAB meeting was not held is unclear based on the existing documentation. It seems that the EAB simply had an overseeing role and collected documentation while allowing programs and program directors to implement their own remediation plans. McMaster PGME Policy and Procedures dictate that a program director and/or student may request the assistance of the EAB in the development of a remediation plan(17), however the existing documentation also does not delineate if the EAB had any role in determining if a meeting was necessary.

In some instances, the EAB invalidated evaluations for residents belonging to the remediation pool, as 5 of the 85 residents had evaluations that were deemed invalid due to failure of programs to follow due process. In these instances, however, there was enough concern for resident weaknesses being present and it was thought that remediation would be beneficial, despite the technical concerns with the evaluations. All 5 of these *included* cases were brought to the attention of the EAB prior to 2009. There were also 5 residents who were *excluded* from the study because of invalidated evaluations, where the invalidations of the evaluation resulted in a status change for the residents and these 5 residents no longer required remediation. These 5 excluded cases also had their cases brought to the attention of the EAB prior to 2009, when the EAB was in fact the former ERB. As mentioned in the

introduction, the ERB was in existence between 1996 and 2009, when it functioned in the current capacity of the EAB but it also had a role in adjudicating resident appeals of evaluations, which has been the role of the ARB since 2009. In 2009 it was felt that the separation of the adjudication and advisory roles would create a fairer process for trainees and faculty alike, and so the ERB was dissolved into two separate bodies, specifically the EAB and the ARB. These 10 cases (5 included in the study and 5 excluded from the study) are recognized as probably having an appeal as part of the process, however it cannot confidently be stated that the remaining cases reviewed for this study did not have an appeal. Some of the study cases have very vague and minimal documentation, and therefore it is possible that there have been other appeals however the relevant documentation is missing. In addition, it was not formally a part of the study design to collect data surrounding appeals, however it may be interesting to know if the excluded resident cases had different outcomes from residents who underwent remediation.

The length of the remedial period was variable, with a range of no additional training time (i.e. remediation experiences were built into existing or future rotations) up to a maximal remediation length of 48 additional months of residency training. If the remediation was built into future rotations without an increase in the total residency training time, then it often was not specified what proportion of the next scheduled rotation was dedicated to remedial activities. McMaster Policy and Procedures suggests that a provisional satisfactory designation on a rotation identifies a deficiency that is usually not severe enough to necessitate the student repeating the entire rotation, but rather the deficiency can likely be corrected within the timeframe of a subsequent rotation(17). On the other hand, an unsatisfactory designation is understood to reflect a more serious deficiency, where the performance standard can be met only during a remediation that requires repeating an entire rotation. Unfortunately, the specific evaluation designations were not consistently documented in the EAB files and were not collected a priori, however it might be useful to collect this data in a future study. It is known, however, that there were 2 residents who had 0 or no extra months of training time for remediation, with remedial activities

built into future rotations. This may suggest that, if the data is fully reliable, there were only 2 residents who had provisional satisfactory evaluations and the others had unsatisfactory evaluations, although the duration of remediation was not specified for 1 of the 85 residents.

The average length of a remedial period was 7.6 months and the median length was 6 months with a mode length of 4 months. Of the 85 residents, 24 (28%) had remedial periods that were considered short, or ≤ 3 months, which is roughly equal to the amount of time required to repeat a rotation. The average length of a rotation at McMaster is 2 months [Private Communication from Dr. J. Mark Walton, Assistant Dean, Postgraduate Medical Education, McMaster University]. The vast majority (60 residents or 71%) had a remediation time that exceeded 3 months. The length of remediation time could not be determined for one resident. The number of remedial periods was determined for all but two residents. The average number of remedial periods across 84 residents was therefore 1.4, with a range of 1-4 remedial periods. The majority of residents had only one remedial period.

The reasons for remediation were generally based on two broad categories: medical knowledge/technical skill deficits, or due to behavioural weaknesses. The former category would refer to such aspects as knowledge of various medical conditions, diagnosis and management, and surgical or procedural skills. The category of professional or behavioural weaknesses would include such aspects as communication, collaboration and professionalism. This dichotomous scale of categorization of deficits was used as the CanMEDS categories were not developed or applied until well into the study period, and earlier evaluations as well as the international education literature would categorize residents similarly. Of the 85 residents who underwent remediation, 78 (92%) had some knowledge weaknesses and 43 (51%) residents had some behavioural weaknesses. A total of 36 (42%) residents had both knowledge and behavioural weaknesses, and 49% of the residents had knowledge weaknesses alone while 9% had behavioural weaknesses alone (Figure 3). Weaknesses according to CanMEDS competencies are shown

in Table 2. This table shows weakness data for all 85 of the residents, with application of the CanMEDS framework even to those residents who were identified prior to the application of the framework in McMaster's evaluation system. For these residents from the earlier half of the study period, it is recognized that weaknesses may not be captured to the fullest extent. The CanMEDS framework allows for more detailed identification of weakness types (e.g. weaknesses of collaborative skills was more likely to be identified post-CanMEDS rather than in the pre-CanMEDS study period), and so it is possible that the pre-CanMEDS residents actually had more weaknesses than what is reported here. Twenty-one of the 85 residents (25%) also had other reasons for remediation that were considered to have an impact on their performance of competencies in medicine, however the underlying deficiency was typically completely separate, such as a medical problem that impaired the resident's performance. A complete list of these "other" deficiencies is listed in Table 3.

Outcomes

Of the 85 residents, 60 (71%) residents completed their training programs, while 13 (15%) did not, and 12 (14%) were still in active training at the closure of the data collection period. A total of 80 residents remained in their training programs (i.e., they were not dismissed from the training programs), while 3 residents were dismissed from their programs, and the dismissal status of 2 residents was unknown. These 2 residents did not complete their training programs and it is unknown whether or not they were dismissed from their programs. The unknown status is based on the fact that these outcomes were not documented in EAB files and only the primary programs have this information. The cases are not older cases, as one was identified in 2005 and the other in 2010. In other words, of the 13 residents who did not complete training, 3 were dismissed from their programs, 2 had unknown dismissal status, and 8 were not dismissed and likely failed to complete their training for reasons outside of program and EAB support for further training. Unfortunately there was no specific data on these 8 cases, based on

existing EAB documentation. Some possible reasons why these residents did not complete training may include lack of follow through with remediation, interruption of training for personal or other reasons, or switching of program. The 3 residents who were dismissed from their training programs all had a combination of both knowledge and behavioural weaknesses, and for one trainee there was a co-existence of a serious psychiatric problem. These three residents were from two different training programs, and were identified as requiring remediation either in the PGY2 or PGY3 year. The training programs are not listed here as a measure to protect resident confidentiality. The duration of remedial periods for these three residents was 4, 12 and 14 months, for each of the trainees.

Remediation Strategies

Remediation strategies were often devised either by a resident and program director, or together with the assistance of the EAB, if a formal EAB meeting was held. Pilot review of the first 10 resident case files revealed some patterns in suggested remediation strategies. Remediation strategies were not described for 7 of the 85 resident cases. All of these 7 residents had knowledge weaknesses and 5 of the 7 also had behavioural weaknesses. The quality of reporting for the remaining 78 residents was variable. Of the 78 residents with knowledge weaknesses, remediation strategies were therefore reported for only 71 residents. The most commonly used remediation strategies were for these 71 residents with knowledge weaknesses are shown in Table 4. Remediation strategies for residents with behavioural weaknesses were less well described and more variable. Of the 43 residents with behavioural weaknesses, 13 had no clear description of remediation strategy for the weakness. For the remaining 30 residents with behavioural weaknesses, the most commonly used remediation strategies are shown in Table 5. Relevant findings from neuropsychological testing included attention deficit hyperactivity disorder. Using external resources to assist remediation of a behavioural deficit was common, and the spectrum of services is listed in Table 6. The nature of the mentorship relationship

with an internal faculty person often was not specified, however in some instances it was indicated that a preceptor would have focused tasks with the learners, such as review of a “communication case of the week,” or tape reviews of scenarios or of the learners’ performance.

Of the 85 residents who underwent remediation, 21 were determined to have an “other” reason for remediation, typically of a personal nature, outside of a knowledge or behavioural weakness. Seventeen of these 21 residents (81%) had medical assessments as part of their remediation process. There were also 3 additional residents who had medical evaluations, however they were not identified as part of the 21 individuals who had an “other” cause for remediation. This was either because the medical evaluation was within normal limits, and therefore the queried medical problem was non-contributory, or because the medical problem was fairly undisclosed and it could not be determined if it contributed significantly to cause impaired performance during residency. Residents were encouraged to ask the EAB for assistance of any kind in the remediation process, however some individuals preferred to keep their medical histories confidential. Some residents also had other aspects to the remediation process that were unique and unconventional. Examples of this include providing statements of disability to supervisors so that accommodations could be made during training, turning to religious advisors, and referral to the Physician or Employee Wellness Program.

Statistical Analyses

A factor analysis strategy was used to assess the variance observed in program completion rates amongst the remediation resident pool. Three factor clusters were analyzed; Factor 1 considered the type of weakness (knowledge or behavioural weakness), Factor 2 looked at the duration of remediation (number of months of remediation and number of remedial periods) and Factor 3 considered the resident’s demographic profile (funding source, type of medical school and presence of other reason for

remediation). These three factors accounted for 77% of the observed variance in program completion.

Table 7 reflects the variance explained by each of the factors.

A discriminant function analysis was applied to the 60 residents who completed their programs, in order to determine if there are any predictors for program completion. These residents were compared to the 13 residents who did not complete their programs, and a Chi-square analysis was used to determine statistical significance. None of the following predictors were statistically significant for program completion: funding source, shorter versus longer remedial period, number of remedial periods, type of deficit (knowledge or behavioural problem), PGY level when remediation needs identified (only the specialty program residents with longer training periods were analyzed and Family Medicine trainees were excluded), occurrence of an EAB meeting, and presence of “other” cause or reason for remediation. The presence of a knowledge problem alone, however, approached statistical significance with a p value of 0.057 by the Fischer’s Exact Test. More of the program completers (57/60 = 95%) had a knowledge problem, irrespective of a co-existent behavioural problem, than residents in the non-completed group (10/13 = 76.9% (Chi square calculation shown in Appendix C). In other words, the presence of a lone behavioural problem was almost significantly more common in non-completers rather than residents who completed their training programs.

Given that a large proportion of the remedial resident group was International Medical Graduate or IMG at 62%, further analyses were added post-hoc to determine if there were any statistically significant differences between the IMG and Canadian Medical Graduate (CMG) residents. There was no statistically significant difference in program completion between IMGs and CMGs. In addition, there was no significant difference in the occurrence of knowledge weaknesses, or behavioural weaknesses, between the IMG and CMG groups. There was, however, a significant difference in the occurrence of “other” contributors to remediation, outside of medical practice competencies. CMGs were significantly

more likely to have an “other” reason for remediation, with 15 of 32 CMGs (47%) having an “other” reason, while only 6 of 52 IMGs (12%) had an “other” reason (p 0.00028).

IV. DISCUSSION

This study represents the most comprehensive review of resident remediation at a single institution, and possibly within the remediation literature. This review has yielded novel insights regarding remediation residents, and it has also been a candid examination of how residents are guided through remediation at a particular institution. Most specifically, it serves to identify areas of weaknesses in the remediation process at the program and PGME level, and it informs areas for improvement.

The earlier systematic review by Hauer, *et al.*, proposed a remediation model with the following steps: 1) multimodal competency assessment, 2) diagnosis of deficiency and development of an individualized learning plan, 3) instruction or remedial activities that are deliberate in practice, feedback and reflection and 4) focused reassessment and certification of competency(8). The study herein has attempted to assess remediation at McMaster keeping this model in mind, with specific identification of weaknesses and diagnosis of deficiencies, along with a focused review of remediation strategies, which are generally poorly described in the existing literature. Unfortunately, the data source that was used for this study was not rich in content on focused reassessment and certification of competency. This is also an area of weakness in the existing remediation literature, however will be increasingly important in the advent of CBME. The more recent review by Cleland, *et al.* (9), attempted to better understand remediation interventions and their efficacy, however many of the primary studies did not report their interventions to any significant detail, and few studies justified their approaches on the basis of relevant pedagogical theory. The study reported herein has the potential to improve understanding for remediation interventions and their efficacy, as one element of this research was to closely examine remediation interventions. Another important feature of this present study is the examination of remediation practices across programs, from the perspective of PGME. Prior to this study, one study has

reported data on remediation from the level of a PGME board of examiners, and our findings regarding frequencies of weaknesses and program completion are comparable to those of Zbieranowski, *et al*(1). We have also tried to further explore our data set of remediation at the institutional level, and report the remediation practices at McMaster. Our detailed reporting of practices at a single institution, for a pool of 85 residents undergoing remediation across several residency programs, is novel. It is also imperative for program development and improvement. In addition, we have performed an in-depth analysis of predictors of successful outcomes, in order to recognize at-risk subgroups and to explore the needs of the heterogeneous population of residents who require remediation. The overarching objective has been to deepen our understanding of remediation residents and their needs, so as to provide more streamlined and effective remediation in the future.

Our study sample was derived from the pool of 99 resident cases identified in the EAB files, however only 85 cases were eligible for inclusion with a total of 14 excluded cases. The majority of the excluded cases (11 of 14) were ineligible because of failure in the remedial process at the program and postgraduate system levels. Of the 11, five were excluded because of invalidated evaluations, such as rotation supervisors or programs failing to follow due process in completing evaluations in a timely manner or providing residents with adequate feedback. The other 6 cases were excluded from the review because documentation in their case files was poor or lacking. For these 6 cases it seemed as though there were weaknesses present, however it was not clear if these residents had remediation or how their cases were managed. This then identifies an area of improvement for the EAB and also provides a suggestion for remediation programs at large, and that is that remediation programs need to carefully document and follow their resident cases, to ensure that the appropriate actions are being taken and that important steps are not overlooked. For instance, in hindsight it is impossible to tell if these 6 residents had further evaluations that were satisfactory and deemed to have corrected their weaknesses, or if there was a failure to provide remediation because of poor follow up from the

residency program or EAB. Fortunately, EAB documentation and record keeping has improved with time, and the quality of records from recent years has been high with ample detail regarding resident cases. Proper attention to these records will enable program evaluation and development, and all remediation programs should undergo periodic review to ensure programs are performing at high levels and improvements continue to be made. In addition, it is important to ensure that the residency programs themselves adhere to a certain standard of record keeping or provision of files for the EAB to review. Although it was not the focus of this present study, it is possible that program administration is variable and influenced by the style of the program director. It may be worthwhile to provide all program directors with standardized orientation to the EAB and ensure their awareness of remediation processes from the post-graduate medicine departmental level.

Following exclusions, there were 85 resident cases that were suitable for study analysis. The demographic profile of this group is interesting in that the majority of residents (62%) are International Medical Graduates (IMGs). Possible reasons for this include a lack of familiarity with the Canadian system, a medical knowledge base that is not as robust as that of Canadian graduates, greater difficulty with some of the intrinsic roles due to cultural or other differences, or other reasons for residents to encounter difficulty in meeting our performance standards on rotations. The disproportionate number of IMGs in the remediation group begs the question of how we are preparing IMGs for entry into Canadian postgraduate medical programs. There is a greater emphasis at this time on pre-residency programs and it is now probable that the vast majority of IMGs attend such programs prior to residency (Private Communication: Touchstone Institute, Toronto, Canada). It would be interesting to determine if remediation status has any correlation with attendance in a pre-residency training program, and if there is a correlation between remediation status and performance in the pre-residency program. If so, greater efforts can be made at the start of residency training to ensure that these IMG residents stay on track, and a forward feeding process may be considered to ensure residents have the appropriate support

during residency training. Currently the data on how well pre-entry programs prepare IMGs for residency training is lacking. In Canada, most provinces provide pre-entry orientation programs to IMGs and these programs have been identified by the 2004 IMG Task Force to be an essential part of acculturation to the Canadian healthcare system(36). Four foundational issues for orientation have been identified, and these include oral and written language skills, communication skills for an effective physician-patient relationship, culture, and expectations around behaviour, attitudes and relationships, particularly in team-based environments. Orientation programs may have an important role to play, as studies have identified lower pass rates certification examinations for IMGs compared to locally trained medical graduates(36-40).

Not surprisingly, residents who require remediation are identified across the spectrum of residency programs. It was found that the majority of residents are from Family Medicine and this is not unexpected, as this is the largest training program in Canada. Interestingly, a significant proportion of specialty residents are identified in later stages of training and a total of 48% of specialty-program residents (non-Family Medicine) were identified in the fourth post-graduate year or later. It is not clear why so many residents are identified at later stages, and it may be that our evaluation systems are not adequate enough to capture residents early, or it may be that there is an evaluation culture within the physician supervisor group that discourages negative or borderline evaluations. It has been perceived that it is more difficult, and sometimes even punitive, for physicians to identify borderline residents, due to the documentation and justification that would be expected to support the claim of inadequacy. Empirical research has supported this notion and Dudek, *et al.*, have identified four major barriers to the reporting of a trainees poor performance: lack of documentation, lack of knowledge regarding what specifically must be documented, the anticipation of an appeal, and the lack of remediation options(41). Both Dudek, *et al.*'s study and this study's findings support the rationale for faculty development

initiatives to inform physician supervisors of documentation requirements and also of remediation options and supports that are available at one's institution.

Aside from barriers to reporting inadequate performance, an alternate explanation for resident weaknesses being recognized later in training may be that the finer skills for subspecialty training are harnessed in these later stages, and perhaps it is then clearer to determine if resident performance meets the standards and expectations of the specialty. Another possibility may be that residents have multiple weaknesses, both in basic skills and more complex specialty-specific skills that are demonstrated later in training. The advent of CBME may affect the timeline of weakness identification. It has been argued that with CBME, learners can progress at an individualized pace and residents in difficulty should theoretically be identified sooner(5,42), although no empirical evidence exists to support this.

Remediation practices in terms of duration of remediation and the strategies that were used reflected the individualized approaches used for residents and the heterogeneity of possible solutions. Roughly half of the residents had remediation guided by their residency programs, while the other half had assistance from the EAB with development and implementation of the remediation program. The average length of remediation was 7.6 months, with a broad range from 'no additional training time' (i.e. the remediation was built into the time allocated for subsequent rotations) with a maximal duration of 48 additional months, or 4 more years, of remediation. The majority of residents (71%) had durations of remediation that exceeded the length of a typical rotation, which perhaps suggests that most residents had some complexity to the remediation process as the remedial time window consumed more time than that required to simply repeat a rotation. An alternative explanation is that residents may have complex weaknesses with several microdeficiencies within a given realm, and that basic skills need to be enhanced so that the more complex skills can be learned in a superimposed manner. It may be that we

are not sensitive enough to detect residents in difficulty, and that the individuals whom we identify actually have combined deficiencies in basic and more complex skills. The range of durations of remediation with a maximal time of an additional 4 years of training should also prompt us to ask the question of how effective and efficient are we at providing remediation. Perhaps remediation is not always the solution, and there should be some capacity to define and determine what is not remediable, both for the benefit of the trainee and for resource allocation. It would be interesting to know if a trainee who requires 4 years of remediation in conjunction with 5 years of the program's standard training will be successful in practice or if he or she will encounter further difficulty. If some residents have unremediable weaknesses, then perhaps the best solution is finding alternative career paths. This would of course be contingent on remediation programs being of high quality and following sound pedagogical principles, as well as having a history of providing effective remediation, so that it is not a failure on the part of the program to provide adequate supports and infrastructure for remediation.

Nearly all of the remediation residents had a knowledge or technical skills weakness, at 92% of the resident pool, with 51% have behavioural-type weaknesses and many of these residents had combined weaknesses within the knowledge and behavioural realms (42%). It may be that the majority had knowledge weaknesses because those are often considered easier to evaluate and identify as insufficient, since medical knowledge is a more objective quality than is a behaviour, such as professionalism or communication. It is also interesting that nearly all of the residents who had behavioural weaknesses also had knowledge weaknesses, as only 9% of residents had behavioral weaknesses alone. The alternative explanation may be that these weaknesses truly coexist in residents in difficulty, as perhaps behavioural issues impede residents in achieving adequacy in medical knowledge, either because professional or communication and collaboration weaknesses inhibit adequate learning of the technical skills of medicine.

One important finding in this study is that a significant number of remediated residents (25%) have other reasons for remediation. The “other” factors are independent of the skills required for the practice of medicine, but rather are critical causes that impact one in his or her professional goals, such as personal medical illness or other type of psychosocial difficulty. It is also critical to note that this proportion (25%) may also be an underestimate, as the admission of these problems is likely highly sensitive and an individualized decision, and it may be that many trainees do not feel comfortable in sharing this information with their supervisory staff. The significant difference in the occurrence of other reasons or factors in IMG residents as compared to CMG residents also raises many questions. It is not clear if this difference is seen because of differences in reporting of other factors (e.g., possibly other factors are less reported in the IMG cohort in comparison to the CMG cohort), or if the IMG and CMG residents require remediation for different reasons. One possibility is that IMGs have a weaker presence of other factors and it is truly their previous foreign training that has left gaps in terms of what is expected during Canadian residency, whereas CMGs may be better positioned to meet the expected medical competencies but more frequently fail to do so because of conflicting personal factors. It is difficult to make any meaningful conclusions as the IMGs themselves can be a heterogeneous group, including foreign-born and foreign-trained residents, as well as Canadians who have studied medicine abroad, and then elected to return to Canada for residency training. Regardless of the exact explanation for this difference in frequencies between IMGs and CMGs, review of the list of these “other” contributors to weak performance is enlightening as the presence of a serious psychiatric or other medical problem can continue to be an impediment on performance unless it is identified and corrected. For example, the presence of anxiety and social phobia may limit patient interviews. One possible solution may be aligning residents in difficulty with independent mentors who do not have a stake in the resident’s evaluation or remediation outcome, but can simply act as a support for the well being of the resident.

The vast majority of residents completed their training programs, at 71%, while a smaller proportion did not complete their training programs (15%) and 14% were still in training at the time of study closure. Only 3 of the 13 residents who did not complete training were actively dismissed, and the decisions for dismissal are poorly described in the EAB files. It is possible, however, that the EAB is not required to track such information, particularly if the decision for dismissal was made outside of the context of a remediation program or outside of a predetermined outcome for a failed remediation. It is therefore difficult to discern what magnitude of difficulty or incompetency warrants dismissal from a program, although posing a danger in patient care was mentioned as a factor and thus patient safety may be an important aspect to resident being eligible to continue in their training programs.

Remediation strategies were variably documented in EAB files, with robust documentation and description for some residents, and poorer documentation for others. There were some trends in reporting and documentation. Firstly, documentation improved over time, and the strategies that were recommended for more recent trainees were better described than for those at the start of the study period, or when the EAB was first created. In addition, remediation strategies were better described for knowledge-type weaknesses than for behavioural, with some comment on strategy for 91% versus 70% of residents, respectively. For both knowledge and behavioural weaknesses, it appears that assigning a specific faculty supervisor was an important component to the remediation strategy, and this was particularly important with knowledge deficits, as 81% of residents with knowledge weaknesses were assigned specific faculty mentors or carefully selected locations for the remedial period. Not surprisingly, increasing assessments of residents and providing more teaching sessions were the next most common strategies that were used for knowledge weaknesses. These strategies are in some ways an extension of knowledge or medical content that is taught and evaluated in undergraduate medical training, and these strategies are already pervasive in our curricula.

The approaches to remediation of behavioural weaknesses are more interesting, and perhaps harder to explain. The most common approach to remediating behavioural weaknesses is to look for solutions and mechanisms outside of the postgraduate medical program. This strategy was adopted for 70% of the trainees with behavioural-type weaknesses. This is suggestive of any or several of the following: adequate corrective solutions for behavioural weaknesses are not present within postgraduate medical training programs, other programs can teach these skills better than what can be done in postgraduate medicine, or we as medical professionals do not understand this skills set well enough in so far as defining adequate skills and providing solutions for skills optimization. Despite the reasons, one standing concern is that if the teaching of these skills is not within our postgraduate medicine domain, then we have little control over the quality of programs that is being used and whether they are truly suitable for the needs of our trainees. Our only other notable strategies are to increase time spent with specific supervisors and to increase the monitoring or supervision of our trainees, and these two strategies were often, if not always, linked. There was also little descriptive data on these strategies, so it would be difficult to discern if the supervisor was someone who could simply have intermittent meetings with the resident without any additional clinical observation, or if the observation and the advising was done by separate faculty people. Although the strategies used by these faculty supervisors are minimally described, in some cases it seems that case review or simulation was used to teach communication and professionalism skills. It would be interesting to know how successful and effective these approaches are in teaching residents.

Given that there is little empirical data on the remediation of professionalism weaknesses, it may be worth considering theoretical models and their implementation. One interesting model that was devised by Dr. David McKnight suggests that there are 3 general reasons for residents acting unprofessionally: 1) inadequate knowledge regarding professional behaviour, 2) inadequate interest in displaying such behaviour, or 3) an inability to behave professionally [Private Communication from Dr.

David McKnight: Dept. of Anesthesia, University of Toronto]. Based on these categories, the appropriate remedial interventions can be selected. For problems of inadequate knowledge or understanding of professional behaviour, solutions would include informing and educating residents regarding standards or professionalism, appealing to the ethos of good, as well as informing residents of regulations and the law and indicating consequences within those realms. For problems of inadequate interest in displaying professional behaviour, some strategies to consider are appealing to the self-interest of the resident. This strategy may be useful as while it may be difficult for some individuals to relate to the concept of altruism, it is more likely that everyone can identify motivation to improve a situation for one's self. For example, if a resident cannot identify with being on time for the sake of respecting others and not wasting their time, then perhaps it would be more convincing to indicate that the resident's success and well being will be enhanced by not making others angry. The third category, specifically the inability to behave professionally, is based on the premise that residents are overwhelmed and unable to cope, and often contributors to this include coexistent medical or psychosocial problems. One general recommendation for remediation of any professionalism lapse is written reflections that describe the effect of the lapse on others as well as one's self. There are several theoretical pedagogical benefits to this approach. Written reflection is a form of active learning and studies have suggested that reflection may increase the ability to form associations and integrate information, and consequentially result in deeper learning(43). Additionally, reflective practice may improve relationships between teachers and learners, and improve the quality of teaching. Learners also often perceive improvement in clinical practice, likely because reflection allows learners to better connect theory and practice.

Beyond the remediation of specific weaknesses, this study also examined predictors of program completion. The factor analysis strategy that was used indicated that 77% of the variance in program completion could be explained by the 3 factors that were assessed, namely type of weaknesses, duration of remediation, and demographic profile. This suggests that this study design has anticipated, to a

significant degree, the putative factors that influence completion of residency training. However, statistical analysis using the discriminant function analysis has identified only one predictor of program completion that approaches statistical significance. The reason for this discrepancy may be that the study was underpowered to find statistically significant predictors, as we had a convenience sample of 85 eligible EAB cases. For an effect size of 30% with an alpha level of 0.05, a beta level of 0.20 and power of 0.80, a sample size of 88 is required. Our study sample of 85 residents falls slightly short from the projected sample size to detect statistically significant predictors. Our findings suggest, however, that the presence of a knowledge problem alone was nearly significantly more likely to lead to program completion than the presence of a behavioural problem or a combined problem. This may indicate that knowledge gaps are more remediable than behavioural weaknesses. If this is the case, then this increases the importance of better diagnosing and correcting behavioural weaknesses in residents, namely problems in communication, professionalism and collaboration.

Limitations

The primary limitations of this study are the sample size of residents and the quality of primary data. In order to capture the entire eligible study population, there is reliance on program directors to correctly identify residents who require remediation and bring their cases to the attention of the EAB. It is possible that some residents have received remediation at the program level and the EAB was never notified. This may help explain why some programs had relatively few residents requiring remediation relative to the number of residents enrolled. A second limitation to sample size is that fairly few residents require remediation compared to the number of residents enrolled in training, and therefore it is more challenging to acquire a high volume of cases for review. Our prevalence of residents requiring

remediation was 2.3%, and this is comparable to the annual prevalence rates of 0.2-1.5% observed by Zbieranowski, *et al*(1).

Given that EAB case files were used as primary sources of data, organizational issues with EAB files would limit data extraction and further analysis. The quality of documentation changed over time, with more scanty records at the start of the study period and more extensive records at later stages. In addition, the changes in the organization and structure of the ERB into the EAB and ARB may have resulted in loss of resident cases. Generally the reporting of appealed evaluations was variable and inconsistent, and it was difficult to discern in which resident cases an appeal was part of the process. Case reporting and documentation was poorer in the earlier half of the study period, however in the latter half of the study period, after the ERB was dissolved in the EAB and ARB, it is possible that certain residents were identified as requiring remediation but appealed their evaluations with the ARB and in fact never made it to the EAB for planned remediation. Although it is likely a small number, we do not know if residents who appeal their evaluations have different outcomes from those who do not appeal and undergo remediation. In addition, there have been other changes to the EAB over the 16-year time period that may have impacted on the EAB's functioning. For instance, the position of Assistant Dean of Postgraduate Medicine has been held by two different individuals during the study interval. EAB practices may have been influenced by the direction of the Dean, or perhaps by changes in the Chair of the Board, which may have affected the change in numbers that we have seen with case identification. Two important time points in the EABs history are 2005, when the Assistant Dean had changed, and 2009, when the Policy and Procedures of McMaster Postgraduate Medicine were revised. It may be of interest to review EAB practices before and after these important timelines in the EAB's history.

Another variable that affected capturing of weaknesses was the introduction of the CanMEDS roles during this study period. The subjective impression is that the introduction of CanMEDS roles led to

clearer description of resident weaknesses and perhaps an increase in the number of identified weaknesses. The experiences of Zbieranowski, *et al.*, were similar in that they found statistically significantly more identified weaknesses after their standardized remediation reporting template was adjusted to focus on the CanMEDS roles(1). Consistency in record keeping was also a factor in terms of which documents were kept in a student's file. In some instances, rotation evaluations were included as well as letters of communication between decision makers (e.g., the EAB and a residency program director), however, these critical pieces of information were often missing. Given these limitations, the numbers reported herein may be considered minimum numbers, and the extent of these problems may not fully be known with the data as it currently exists. Certain areas of documentation were particularly weak, and these include behavioural-type weaknesses (both descriptions of the weakness and often the remedial strategies), the severity and management of "other" problems contributing to remediation, and follow up on recommended strategies. It was often not documented how many of the recommended remedial strategies were actually implemented, and what the perceived effects of these strategies were. In some circumstances residents would have multiple meetings with the EAB and therefore multiple generated reports, however the tendency with subsequent reports would be to make further recommendations, without clearly revisiting what worked and did not work with the previous approach, and how well it was followed. It may be that these steps in fact do take place, but this cannot be determined based on the status of the vast majority of the resident files.

Future Directions

The results reported herein describe the remediation process for residents at McMaster, and also program completion as an outcome measure. The approach of investigating remediation processes and outcome described herein may be generalizable to other programs and universities, both within and outside of medicine. Regardless of the program of study, it is reasonable to consider asking questions of

the nature that have been asked here, such as how students in difficulty are identified, what the remediation process entails, which strategies are used to provide remediation for which types of weaknesses, and what the relevant outcome measures are for students who require remediation. There are, however, also several other important outcome measures that need to be considered for remediation residents. The second phase of this study will emphasize assessment of these other outcome measures, and involve collaboration with Medical Council of Canada (MCC), the College of Family Physicians (CFPC), the Royal College of Physicians and Surgeons of Canada (RCPSC), and the College of Physicians and Surgeons (CPSO)(Appendix B).

At this time we are working on establishing data sharing processes with the above-mentioned groups. The Medical Council of Canada (MCC) is being asked to provide exam scores for the remediation residents, specifically the Part I and II pass rates, as well as performance on the component sections. The MCC Part I exam is a multiple-choice exam that is written at the end of medical school and prior to the start of residency in Canada. There are nine sections on this exam, eight of which evaluate medical knowledge or content, and one section that evaluates legal, ethical and organizational aspects of medicine (CLEO section). A combined medical knowledge score will be determined from the eight sections on the exam assessing this competency, and the CLEO score will be viewed as a marker of professional competency. The MCC Part II exam is an OSCE-style exam that is done in the second year of residency training. This exam consists of four sections. We would like to assess scores on individual components and combine the scores evaluating medical knowledge (Data Acquisition and Problem Solving sections) and also the scores evaluating professionalism (Patient/Physician Interaction and C2LEO). Ultimately we will evaluate if there is correlation between a resident's weakness identified for remediation and those component scores on the MCC exams.

MCC component scores will also be analyzed for predictive power for correlation with residents' areas of weakness. A preliminary step will be to examine the correlation between knowledge and professionalism scores from the MCC exams to the identification of knowledge or professionalism type weaknesses, as identified by the residency programs and EAB. The aim would be to answer such questions as "Do residents with deficits in professionalism, as identified by their programs and the EAB, have lower scores on the C2LEO components of the MCC exams?" and "Can the MCC part I be used as a predictive tool?"

With regard to specialty certification rates, we are hoping to obtain specialty exam certification pass rates for all remediation residents from the College of Family Physicians of Canada and the Royal College of Physicians and Surgeons of Canada. Statistical comparisons will be done only for the three specialties that comprise the largest number of remediation residents. These specialties are Family Medicine, Orthopedics, and Pediatrics. Exam pass rates for these three resident subsets will be compared to the general pass rates for these three specialty certification exams. The CPSO and CMPA are being contacted for data on medical legal claims made against remediation residents that were judged to be valid. Analysis of valid medical legal claims will be performed by comparing the proportion of remediation residents with medical legal claims to the proportion of all practicing physicians who have had valid medical legal claims. Canadian Post-M.D. Education Registry (CAPER) is a third party that will be used to match all external data and ensure anonymity.

These added outcome measures are not only novel from the standpoint of existing literature on resident remediation, but they are also of critical importance in a quality assurance review of the EAB. Review of these outcomes will reflect how successful remediation residents are with the assistance that is being provided by the EAB, and it will also help to identify areas for improvement in the remediation process.

This study has also elucidated important future directions for optimization of the EAB's processes and functioning within McMaster. Data for the study residents has not been universally and consistently captured, and therefore an opportunity exists to streamline data collection and implement quality assurance measures. A checklist tool can be used consistently at every EAB meeting, to ensure that important points are addressed and the relevant data for each resident case has been collected. The checklist tool can also be used to provide consistency and comprehensiveness, and help navigate each resident through the system. The checklist can ensure that several important steps are covered for each case, such as consistent and thorough reviewing of borderline evaluations, critical appraisal of remediation plans put forward by programs, the establishment of timelines for milestones to be attained, follow up with programs for progress reports and further remediation planning and scheduling of EAB meetings, if necessary. This would hopefully enhance communication between the programs and the EAB and ensure timeliness in the remediation process. The EAB can also establish a prospective database to follow remediation residents, and use this database also in program evaluation, and assess the McMaster remediation programs as a whole.

Additionally, the data provided herein suggest that there is less organization and ownership for the remediation of behavioural or professional weaknesses. If training and ensuring certain behavioural competencies in our trainees is the responsibility of the university and the training programs, then perhaps remediation of these deficits should have a stronger guiding force within the department of postgraduate medicine. Alternatively, distancing remediation of professional or behavioural weaknesses may be advantageous for the trainee because it allows for preservation of the candidate's confidentiality regarding these sensitive issues, and perhaps outsourcing remediation in this manner will allow for candidly addressing these weaknesses and remediating them.

V. CONCLUSIONS

Resident remediation is an increasingly important problem in medical education, particularly with the advent of competency-based medical education (CBME). With CBME, it is critical that we clearly define competency and measure resident performance against this, so that it is understandable where the gaps lie for a resident in difficulty. Based on these clearly defined weaknesses, a thoughtful remediation plan needs to be developed, with ongoing follow up and reevaluation. The creation and implementation of these plans should be informed by evidence and sound pedagogical principles. From a systems standpoint, we need to understand how remediation is done within our individual institutions, to ensure that improvements continue to be made to existing programs and to enable program development. In this regard, the approach and findings of this study are perhaps generalizable to other educational programs and institutions. Lastly, we should collect data within our programs to determine their effectiveness and perform internal program evaluation. Ultimately there is a significant responsibility with the educational institution to determine that medical trainees are prepared to apply for their specialty examinations, and subsequently move into independent practice and provide high quality care for patients.

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VII. FIGURES AND TABLES

Figure 1 – Glossary of Commonly Used Terms

Term	Definition
Behavioural weakness	A deficiency in a non-technical knowledge domain such as communication, professionalism and collaboration.
Educational Advisory Board (EAB)	An assembly of three faculty members and two postgraduate students who serve to consider the performance of any student who has been referred to the board, and provide guidance on remediation when required.
In-Training Evaluation Report (ITER)	A summative assessment of the postgraduate student's performance during a rotation which is often completed by the rotation supervisor or other faculty physician. An ITER typically evaluates several performance domains, such as medical knowledge, professionalism and communication, however the ITER may be more accurate for some domains than others.
In-Training Examination	A test that is typically administered to postgraduate students on an annual basis as a means of preparing them for their licensure examinations and providing a tool for self-assessment and identifying areas in which students need extra assistance. The exam is usually based on medical knowledge and has a question-answer format, and is often a written exam.
Knowledge weakness	A deficiency in medical technical knowledge, which may be in a realm of a technical skill such as suturing, or in a knowledge domain (e.g. knowing the criteria for diagnosing a particular disease, or how a given condition is treated).
Postgraduate Medicine Department	The organizational body within the university of educational institution that oversees training of resident physicians or graduates of medical school, prior to their licensure for independent practice.

Figure 2 – EAB Resident Exclusions from Study

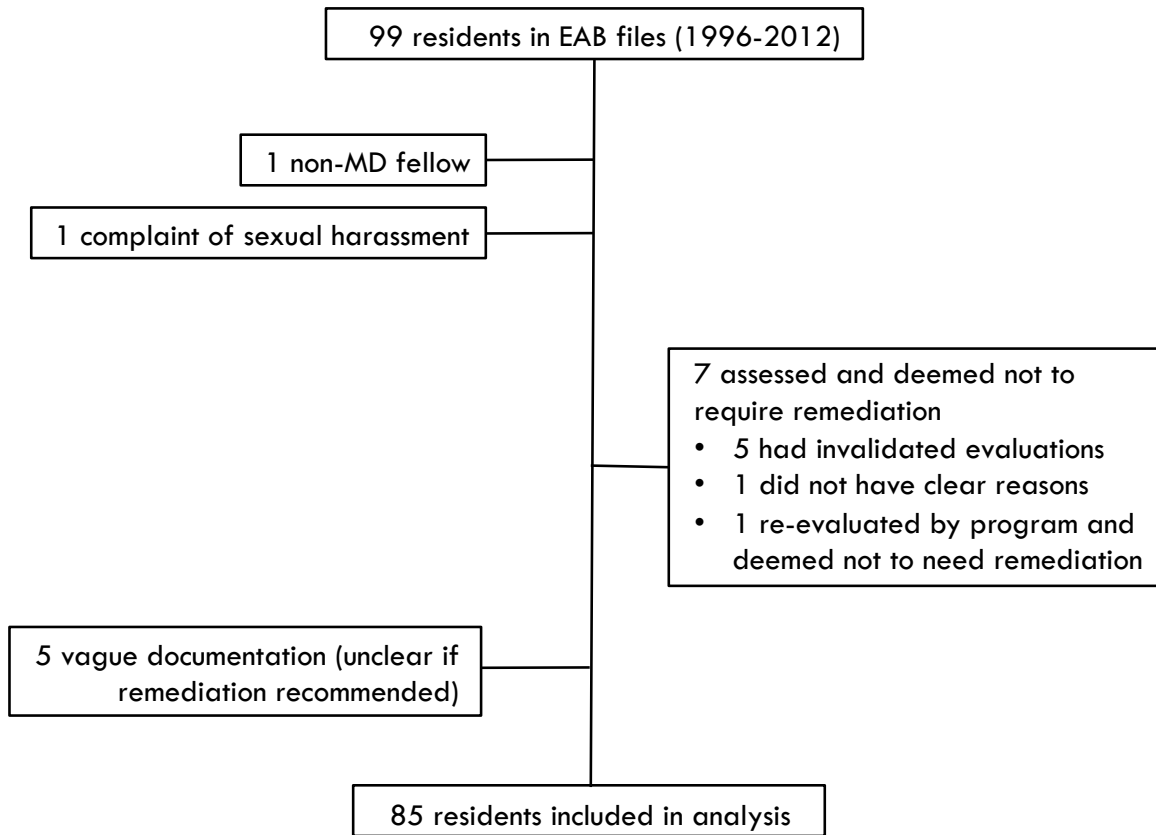


Figure 3 – Frequencies of types of weaknesses in the remediation residents

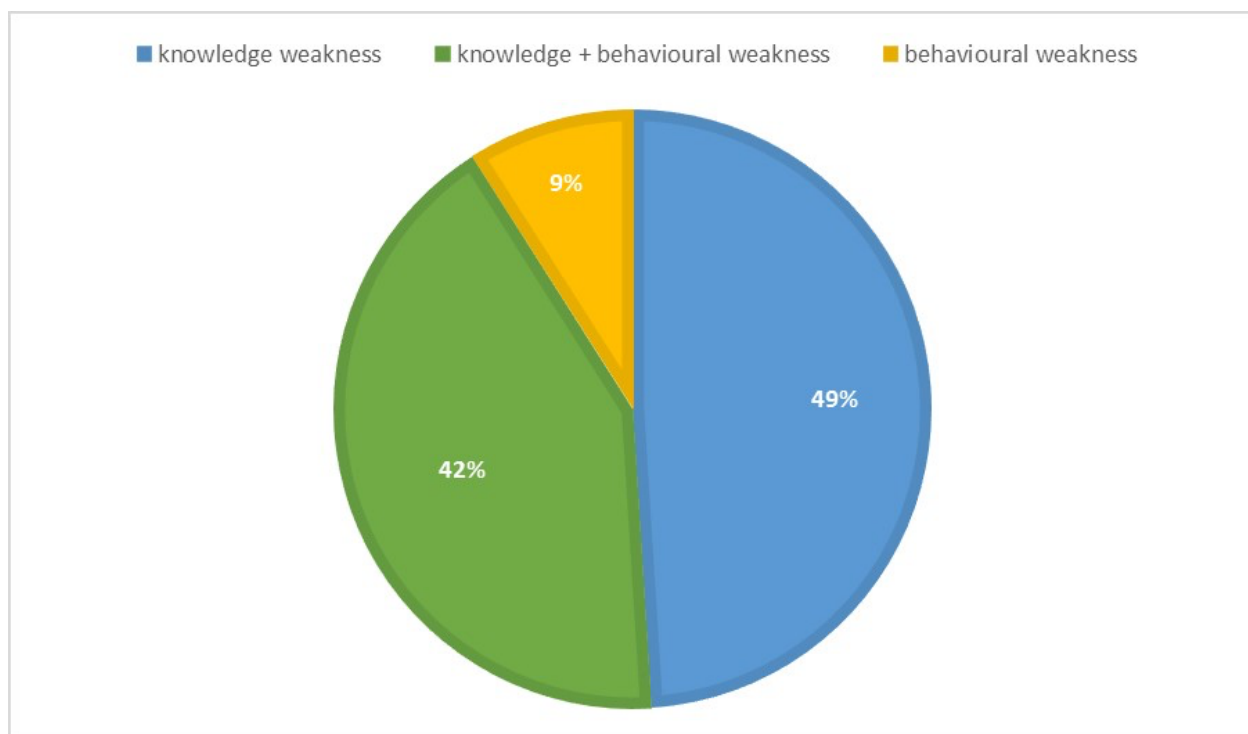


Table 1 – Demographic/descriptive variables for the remediation resident study population (n = 85)

Quality	Category 1 (No. of residents)	Category 2 (No. of residents)	Category 3 (No. of residents)
Medical School Type	Canadian (32)	Other (53)	-----
Funding Source	MOH* (65)	Other (20)	-----
Number of remediation residents according to specialty program	Highest contributing program (25 residents; Family Medicine)	5-10 residents (Orthopedics, Pediatrics, Anesthesia)	< 5 residents**

*Ministry of Health;

**See chapter on Results for full details on specialty programs

Table 2 – Resident Weaknesses according to CanMEDS Competencies

CanMEDS Competency	Number of Residents with Weakness	Percentage of Affected Residents
Medical Expert	78	92%
Communicator	46	54%
Collaborator	36	42%
Professional	26	31%
Manager	8	9%
Scholar	3	4%
Health Advocate	0	0%

Table 3 – Contributing Causes for Remediation Outside of Medical Competencies

Category	Specific Cause	Number of Affected Trainees
Psychological or Psychiatric Problem	Anxiety	4
	Social Anxiety or Phobia	3
	Depression or Mood Disorder	2
	Obsessive Compulsive Disorder	1
	Attention Deficit Hyperactivity Disorder	1
	Psychiatric Disorder NOS – Suspected, not diagnosed	2
Medical Problem	Benign Essential Tremor	1
	Celiac Disease	1
	Learning Disability	1
	Sleep Disorder	1
	Headaches	1
	Medical Illness NOS	2
Psychosocial Problem	Severe illness in close relative	1
	Personal Issues NOS	1

Table 4 – Most commonly used remediation strategies for Residents with Knowledge Weaknesses

Remediation Strategy	Number of Residents	Percentage of Residents
Assignment of a specific faculty mentor or rotation location	58	81%
Additional examinations or assessments	41	58%
Increased number of teaching sessions	33	46%
Devising a formal study plan	25	35%
Assessment for learning disability	6	8%

Table 5 – Most commonly used remediation strategies for Residents with Behavioural Weaknesses

Remediation Strategy	Number of Residents	Percentage of Residents
Services external to the postgraduate medicine program (services listed in Table 5)	21	70%
Assignment of a specific faculty member to oversee remediation or to provide mentorship (usually within the residency training program)	16	53%
Closer monitoring or supervision during clinical rotations	16	53%
Gradation of responsibility	6	20%
Neuropsychiatric assessment	5	17%

Table 6 – External Resources utilized for the remediation of Behavioural Weaknesses

Oriented to Professionalism	Oriented to Communication	Non-specific orientation
<ul style="list-style-type: none"> • Counseling on Professionalism** • Review of CPSO Taskforce Report on the Sexual Abuse of Patients • Counseling for Personal and Professional Skills Optimization • Professionalism Advisor at the Human Rights and Equity Office** 	<ul style="list-style-type: none"> • English as a Second Language Course • Communication Skills Course • Communication Skills Specialist Consultation • Toastmasters Sessions 	<ul style="list-style-type: none"> • Coaching from the Centre for Student Development • Meeting with PAIRO* • Social Work Consultation • Crisis Management Training

*PAIRO – Professional Association of Interns and Residents of Ontario

** Counseling on Professionalism is provided by any of a variety of individuals (e.g. social worker) where the Professionalism Advisor is typically more experienced or specializes in issues surrounding professionalism.

Table 7 – Variance in Program Completion by Factor Analysis Strategy

Factor Type	Percent of Variance Explained
Factor 1	26.9%
Factor 2	25.4%
Factor 3	24.6%
All	76.9%

NB: Factor 1 reflects the type of weakness (knowledge or behaviour); Factor 2 reflects the duration of remediation (number of months of remediation and number of remedial periods) and Factor 3 considers the resident’s demographic profile (funding source, type of medical school and presence of other reason for remediation).

VIII. APPENDICES

Appendix A – Data Collection Form

Demographic Data

Remediation Case Number _____ Residency program _____

Funding: _____ Ministry of Health _____ Foreign

Medical School: _____ Canadian _____ Other

Case management:

EAB meeting held _____ Yes _____ No

If yes, answer below:

Remediation strategies recommended by EAB _____ Yes _____ No

Date of first EAB meeting (day/month/year) _____ PGY Level _____

Number of EAB meetings for case review _____

Unsatisfactory/borderline evaluations invalidated by EAB due to procedural issues within residency program

_____ Yes _____ No

Date of case identification (day/month/year) _____ PGY Level _____

Date of case closure (day/month/year) _____ PGY Level _____

Duration of program-directed remediation prior to EAB meeting _____ months _____ years

Total duration of remediation _____ months _____ years

Number of remediation periods _____

Remediation Data

Reasons for remediation (check all that apply):

_____ Knowledge/content problem. Specifics (if available):

_____ Behavioural/professional problem. Specifics (if available):

_____ Other cause for remediation (e.g. medical or personal problem). Specifics:

CanMEDS deficiency leading to remediation (check all that apply):

___ Medical expert

___ Health Advocate

___ Professional

___ Scholar

___ Communicator

___ Manager

___ Collaborator

Remediation strategy:

KNOWLEDGE PROBLEM	RECOMMENDED	COMPLETED
Formal study plan		
Additional examinations/assessments		
Increased teaching sessions with faculty		
Formal assessment for learning disability		
Assignment of specific faculty as teachers/supervisors/evaluators		

Other recommended and completed strategies for a knowledge problem:

BEHAVIOURAL PROBLEM	RECOMMENDED	COMPLETED
Further gradation of responsibility		
Closer monitoring		
Neuropsychiatric assessment		
Counseling by an external support person*		
Mentoring by an internal support person*		
Assignment of specific faculty as teachers/supervisors/evaluators		

*NB: external/internal refers to out-of-program versus within program faculty

Other recommended and completed strategies for a behavioural problem:

Other components of the remediation strategy (e.g. routine follow-up with family physician):

Outcomes

Completion of residency program: ___ Yes ___ No

 If no, was the resident terminated from the program? ___ Yes ___ No

Specialty Exam First Attempt: ___ Passed ___ Did not pass No. of attempts to pass _____

Validated medical-legal claims against physician: ___ Yes ___ No

If yes, number of claims: _____ Years in practice (up to Dec. 31 2012) _____

Medical Council of Canada (MCC) Exams – First Attempt		
	MCC Part I	MCC Part II
Pass/Fail		
Global Score (resident's score/max score)		
Component Scores - Medical Knowledge Total (resident's score/max score)		
Component Scores – Professionalism Total (resident's score/max score)		

NB: Medical knowledge total on MCC I consists of Medicine + Obs/Gyne + Peds + Psychiatry + Surgery + Family Medicine + Clinical Decision Making, and on MCC II consists of Problem Solving + Data Acquisition scores. Professionalism on MCC I consists of the CLEO score, while on the MCC II it consists of Patient/Physician Interaction + C2LEO.

Appendix B – Calculated Outcomes and Planned Comparisons

Outcome	Calculation
Program completion rate amongst residents requiring remediation	<p><u>Number of remediation residents who completed program</u> Total number of residents requiring remediation</p>
MCC part I failure rate	<p><u>Number of remediation residents who failed the MCC part I</u> Total number of remediation residents who wrote the MCC part I</p> <p>Compare this variable to the overall failure rate provided by the MCC for everyone who has written the exam to see if significantly more remediation residents failed this exam and if it might be a predictor of difficulty in residency. For the comparator overall failure rate, we would need to use an average failure rate over all of the years during which we are collecting MCC exam outcomes.</p>
MCC part I component failure rates	<p>E.g. calculation for the C2LEO component</p> <p><u>No. of remediation residents who failed the component</u> Total number of remediation residents who wrote the MCC part I</p> <p>We could compare this to the overall component pass rate, as above, if it can be provided by the MCC.</p>
MCC part II pass rate	Same calculation as the MCC part I pass rate
Specialty exam certification failure rate	<p><u>No. of remediation residents in a given specialty who failed their exams</u> Total no. of remediation residents in a given specialty who did their exams</p> <p>This can be compared to the failure rate of all specialty residents doing the exam (e.g. compare family med remediation residents' fail rate to the fail rate of all family med residents writing the exam). We can also compare the failure rate of the family med remediation residents to all McMaster family med residents doing the exam over the time window of the study (i.e. the last 10-15 years).</p>
Proportion of remediation residents with medical-legal difficulty	<p><u>Number of remediation residents who have had medical legal claims</u> Total number of remediation residents</p> <p>Compare this to the average claim rate for all practicing physicians in the province. Again, I think we would have to take an average of this number for all of the years during which we are collecting this data.</p>

Independent Variables (Predictors)

- Remediation status (i.e. remediation resident or not)
- Within the remediation group: Canadian Medical School or foreign
- Within the remediation group: Ministry of Health funded or other funding source
- Within the remediation group: Knowledge deficit (i.e. Medical Expert role) versus Behavioural/Professional deficit (Professional or Communicator role)

Dependent Variables (Outcomes)

- Pass/fail of MCC (for each of parts I and II)
- Total score on MCC (for each of parts I and II)
- Component scores on MCC parts I and II (on knowledge vs professionalism sections)
- Program completion (completed or did not complete program)
- Specialty exam certification (passed on first attempt or did not pass/achieve certification)
- Valid CPSO claims

Questions

Remediation residents and MCC exams

- 1) Do remediation residents have a higher failure rate on the MCC exams compared to all of the residents who have written this exam within the same time period? (Separate analyses for part I and part II MCC exam)
- 2) Are MCC part I scores significantly lower in remediation residents compared to all of the residents who have written this exam within the same time period? (i.e. Can the MCC I score be used as a predictor for which residents will need remediation?)
- 3) Do remediation residents have significantly lower scores on the MCC II compared to all residents who have written this exam within the same time period?
- 4) Do remediation residents with Canadian medical degrees do better on the MCCII than remediation residents with foreign medical degrees?
- 5) Do remediation residents with knowledge (medical expert) weaknesses have significantly lower MCC II medical content scores (data acquisition and problem solving components combined) compared to all of the residents who have written this exam within the same time period?
- 6) Do remediation residents with behavioural/professional weaknesses have significantly lower scores on the combined C2LEO + patient/physician interaction components on the MCC II compared to all of the residents who have written this exam within the same time period?

Program completion comparisons within the remedial resident group

- 7) Do remedial residents with knowledge weakness have lower program completion rates than residents with professional/behavioural weaknesses?
- 8) Do remedial residents with foreign MDs have lower program completion rates than those with Canadian MDs?

9) Do externally funded remedial residents have lower program completion rates than those funded by the Ministry of Health?

Specialty Certification

10) What proportion of remediation residents pass/fail their specialty certification exams on the first attempt?

11) Are remediation residents in Family Medicine, Orthopedics, or Pediatrics more likely to fail the specialty certification exam than the general pool of residents writing these exams?

Medical Legal Claims

12) Once in practice, do remediation residents have significantly more valid medical-legal complaints through the CPSO than the general rate for Canadian physicians in practice?

Other

Do residents with briefer remedial periods (e.g. less than 3 months) have better outcomes than those with longer remedial periods?

Appendix C – Chi-Square Calculations for Predictors of Program Completion Approaching Statistical Significance

Program Completion Status	Knowledge Problem		Total
	Yes (No. of trainees)	No (No. of trainees)	
Completed Program	57	3	60
Did not complete Program	10	3	13
Total	67	6	73
Fischer's Exact Test p value			0.057

NB: This calculation reflects the presence of a knowledge problem in trainees, with or without current behavioural or other contributors to remediation.