Supplemental Digital Table 1

Results of a Scoping Review, Conducted Between July 2016 and January 2017, of Articles on the Remediation of Practicing Physicians Struggling with Clinical Competence Issues

			Remediation practicing physicians					
Document	Type	Cited	Defined	Program description	Characteristics of physicians requiring remediation	Incidence	Outcomes	Comments
Cerda JJ, Van Susteren TJ, Hatch R, Herkov M. Remedial education: can this doctor be saved? Transactions of the American Clinical and Climatological Association. 2000;111:188-195; discussion 196-187.	Descriptive			Yes	Describe specialties of first 30 candidates	No	No	
Clark MR, MacIntyre KA. Patient care appraisal as a guide for the design of continuing medical education: 10 years' experience in the Maritime	Descriptive							Authors describe learning principles for a peer review program which include "*corrective action.*"

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provinces. Canadian Medical Association Journal. 1978;118(2):131-138								
Cohen D, Rhydderch M, Cooper I. Managing Remediation. In: Swanwick T, ed. Understanding Medical Education: Evidence, Theory, and Practice. UK: The Association for the Study of Medical Education; 2010:366-378.	Book chapter							Describe how to manage a program for practicing physicians but note that the same principles apply to medical students.
DeMaria Jr S, Levine AI, Bryson EO. The use of multi-modality simulation in the retraining of the physician for							N = 1. Program obviated the need for person to repeat residency	Describes the use of simulation to assess and develop a remediation program for "*an anesthesiologist deemed not*

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medical licensure. Journal of Clinical Anesthesia. 2010;22(4):294-299								*competent to practice medicine*"
Ferguson J, Wakeling J, Bowie P. Factors influencing the effectiveness of multisource feedback in improving the professional practice of medical doctors: a systematic review. BMC medical education. 2014;14:76.	Review						Yes; see comment	Meets criteria for inclusion if consider MSF as a remedial intervention, which, according to a recent article, some program directors do.

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Goulet F, Gagnon R, Gingras ME. Influence of remedial professional development programs for poorly performing physicians. The Journal of continuing education in the health professions. 2007;27(1):42-48.	Research	Yes		Yes	207 physicians between 1993 and 2004; excluded physicians with mental illness, those who hadn't done either pre and post assessment, and those with an interval > 2 years between pre and post assessments			*"Statistically significant improvements ($p < .05$) were observed for a proportion of physicians ($n = 51$) with satisfactory ratings with regard to record keeping (20% before and 54% after remediation), the clinical investigation plan (13% before and 59% after remediation), diagnostic accuracy (32% before and 61% after remediation), and patient treatment and follow-up (31% before and 67% after remediation)."*
Goulet F, Jacques A, Gagnon R. An innovative approach to remedial	Research	Yes		Yes	305 physicians (216 FPs, 89 specialists).	1.9% of Quebec physicians "*excluding candidates who were*	"*70% of the retraining programs succeeded, 15% were partially*	They excluded physicians with substance abuse problems, those with mental illness; and older physicians

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continuing medical education, 1992-2002. Academic Medicine 2005;80(6):533-540.					81% men. "*The following difficulties were identified: therapeutic knowledge (37%), diagnostic knowledge (32%), record-keeping (14%), technical skills (10%), clinical judgment (5%), and communication skills (2%).*"	*incapable of retraining*"	*successful and only 13% had failed. The remaining 2% involved missing data or withdrawal.*"	(did not define older). Latter were given option of limiting practice or retiring
Grant WD. An individualized educational model for the remediation of physicians. Archives of family medicine. 1995;4(9):767-772; discussion 773.	Descriptive			Yes	28 physicians who had completed assessment Mean age 51 (38-66) 75% male		At time of writing 5 had completed educational programs, others in various stages	Article is more focused on showing that a comprehensive evaluation program could identify "*areas amenable to education*"
Guerrasio J, Garrity MJ, Aagaard EM.	Research			Yes	Did not distinguish between Fellows	No	Of the 14, 4 graduated (2 after transferring)	Only 14 of the 151 referred learners were post-residency

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Learner deficits and academic outcomes of medical students, residents, fellows, and attending physicians referred to a remediation program, 2006-2012. Academic Medicine 2014;89(2):352-358.					and attending physicians		7 were in good standing or practicing; 2 remained on probation or restricted practice; 1 withdrew	(included Fellows and attending physicians) Prevalence of professionalism deficits increased with level of training
Hanna E, Premi J, Turnbull J. Results of Remedial Continuing Medical Education in Dyscompetent Physicians. Academic Medicine. 2000;75(2):174-176.	Descriptive			Yes	5 "*moderately to severely incompetent physicians*" ages 50-72 who participated in an intensive 3 year remedial CME program		1 improved (the "*youngest and most engaged*"; I had no change, and 3 declined	
Hauer K, Ciccone A, Henzel T, al e.	Review	Yes						Noted that only 4 articles had been published on

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Remediation of the Deficiencies of Physicians Across the Continuum from Medical School to Practice: A thematic Review of the Literature. Academic Medicine. 2009;84(12):1822-1832.								remediation in practice
Humphrey C. Assessment and remediation for physicians with suspected performance problems: an international survey. The Journal of continuing education in the health professions.30(1):26-36.	Survey	Yes		Yes				Survey of members of IPAC and CPE. Author noted that: *"The assessment programs and remediation activities identified were small in scale…. Although progress through remediation was carefully monitored, none of the programs undertook regular systematic follow-up to ascertain the success of their interventions in the*

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								longer term…. This field of activity is characterized by the use of sophisticated methods for measuring performance/ competence, but provision of remediation is more patchy and variable."
Kalet A, Chou C. Eds. Remediation in Medical Education: A Mid-Course Correction. New York: Springer; 2014	Book	Yes						
Leape LL, Fromson JA. Problem doctors: is there a system-level solution? Annals of internal medicine. 2006;144(2):107-115.	Review/ Commentary	Yes				*"When all conditions are considered, at least one third of all physicians will experience, at some*		Describes barriers to developing successful remediation programs: -lack of expertise -lack of funds -reluctance of hospitals and docs to get involved i.e.

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						time in their career, a period during which they have a condition that impairs their ability to practice medicine safely; for a hospital with a staff of 100 physicians, this translates to an average of 1 to 2 physicians per year."		guide, mentor, monitor
Lillis S, Takai N, Francis S. Long-Term Outcomes of a Remedial Education	Research	Yes		Yes	N = 24 New Zealand doctors with a variety of concerns; all had more than one concern	No	5/24 withdrew from clinical work. 19/24 completed a 12-month remediation program.	Misleading title: under limitations, authors note that long-term outcomes were not part of the study

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Program for Doctors With Clinical Performance Deficits. Journal of Continuing Education in the Health Professions. 2014;34(2):96-101.							14/19 were ultimately successful.	
LoboPrabhu SM, Molinari VAP, Hamilton JD, Lomax JW. The Aging Physician With Cognitive Impairment: Approaches to Oversight, Prevention, and Remediation. American Journal of Geriatric Psychiatry. 2009;17(6):445-454.	Discussion paper							Goal of the article was to review the issue of cognitive impairment in older physicians and suggest management strategies. They note that assessment tools can't predict how cognitive impairment will affect performance. Authors make a case for the need for more remediation centres.
Miller F, Jacques A, Brailovsky C,	Research							Compulsory CME appears to be

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Sindon A, Bordage G. When to recommend compulsory versus optional CME programs? A study to establish criteria. Academic Medicine. 1997;72(9):760-764.								another term for remediation. Main factors judges used to recommend remediation were overall strengths, clinical reasoning, level of insight, how physician handled referrals and prescribing habits.
Norcross WA, Henzel T, Freeman KM, Milner-Mares JM, Hawkins RE. Toward Meeting the Challenge of Physician Competence Assessment: The University of California, San Diego Physician Assessment and Clinical Education	Descriptive	Yes		Yes	Compared their participants to all California physicians: 87.5% male vs 72.4% Mean age 54.4 vs 51 yrs 42.4% IMGs vs 23.5% 59.7% board certified vs 81.2% 16.4% vs 46.9% in a group practice			Studied 298 physicians referred to PACE between July 2002 and December 2005 Describe remediation options but no data on remediation itself. They note that assessment without opportunities for remediation is problematic.

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(PACE) Program. Academic Medicine. 2009;84(8):1008-1014.								
Norton PG, Ginsburg LS, Dunn E, Beckett R, Faulkner D. Educational interventions to improve practice of nonspecialty physicians who are identified in need by peer review. The Journal of continuing education in the health professions. 2004;24(4):244-252.	Descriptive	Yes		Yes		~10% of non-specialists needed "*significant assistance*" with their practice: 7 % of those 30-39, 18% for those > 70	6 years after an educational intervention, 81 physicians were practicing at least as well as their peers who had not required the intervention	Review/summary of their previous publications regarding assessment of non-specialist physicians between 1980 and 1998. 109 physicians over 70 who had had 2 assessments >10 years apart: 64. 2% worse 32.1% same 3.75 better Concluded that performance changes with age
Pierson RMD. Competence, recredentialing, and remedial medical education. Journal of	Commentary							*Describes ways in which 'remedial education" differs from CME:* *"a) It must be prescribed by an outside authority*

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Continuing Education in the Health Professions. 1988;8(4):321-325.								*rather than by self selection; (b) It must be individualized; (c) It is unlikely to come "off the shelf," although its components will often include existing modules. (d) It will require follow-up evaluation, to assure that behavior change has occurred in a measurable way; (e) Especially, it will require sensitive, persuasive teachers and preceptors capable of teaching without humiliating, and able to deal with past failure without perpetuating the behaviours that led to failure."*
Rhydderch M, Matthews P, Beech M. The	Descriptive			Yes	15 GPs in Wales from 2003-2007; of which	Under-performers "typically	14/15 including all 5 under-performers, met	Wales Deanery; 12 multi-physician practices who take

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advanced training practice network: providing prescribed further training for general practitioners in Wales. Education for Primary Care. 2007;18(5):572-581.					5 were under-performers i.e. requiring remediation.	in their 50s and 60s working in single or duo practices.	their learning objectives	on GPs requiring (re) training, including IMGs, return-to practice and what they termed underperformers Noted that the same people could train/support IMGs and those requiring remediation.
Rosenblatt MA, Abrams KJ, the New York State Society of Anesthesiologists I, Committee on Continuing Medical Education, Remediation RS-C. The Use of a Human Patient Simulator in the Evaluation of and Development of a Remedial Prescription for	Descriptive							Article describes a single case. Using the simulator helped evaluate technical skills as well as knowledge and to determine that it was possible to design a specific remediation program in a limited time for this physician.

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an Anesthesiologist with Lapsed Medical Skills. Anesthesia & Analgesia. 2002;94(1):149-153.								
Rosner F, Balint JA, Stein RM. Remedial medical education. Arch Intern Med. 1994;154(3):274-279	Descriptive			Yes				Describe various American and Canadian assessment and remediation programs in existence at that time
Swanwick T, Whiteman J. Remediation: where does the responsibility lie? Postgrad Med J. 2013;89(1047):1-3.	Editorial		"*Remediation de-scribes the process through which doctors' performance concerns can be addressed to facilitate a return to safe practice*."	Yes				Describes responsibility as a three-way street between the individual physician, the employer, and the RO (Responsible Officer – in UK)
Whiteman J, Morris P, Halpern H. Professional Support,	Descriptive			Yes			Describe outcomes in terms of number of clinicians	Support unit for clinicians –registrars (residents) Provide *educational interventions*"

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London: the professional development unit supporting practitioner well-being, refreshment, remediation and revalidation. BMJ quality improvement reports. 2013;2(1):u201038. w201720							supported: > 1,300 in the first year	including on-line modules and in person support.
GREY LITERATURE								
A Pan-Canadian Inventory of Physician Assessment, Enhancement, and Remediation Activities. AFMC CPD Assessment Committee Final Report to Federation of Medical	Survey			Yes				

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Regulatory Authorities June 28, 2012								
FMRAC (Federation of Medical Regulatory Authorities of Canada) Physician Practice Improvement System http://fmrac.ca/wp-content/uploads/2016/04/PPI-System_ENG.pdf	White paper							States faculties of medicine are responsible to "*provide specific enhancement activities, including remediation*". Has a glossary, but latter does not define remediation.
FSMB (Federation of State Medical Boards) Directory of Physician Assessment and Remediation Programs https://www.fsmb.org/Media/Default/PDF/USML	Directory							

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E/RemEdProg.pdf								
Goulet, Francois. Remediation of Practicing Physicians. Conference Presentation 2014 Joint Conference of IPAC and CPE Druids Glenn Resort, Ireland	Conference presentation			Yes	408 physicians 87% male (vs 59% docs in province) 25%? 70 vs 6% 65% FPs vs 50%		75% success 4% partial 18% failure 3% other (illness, death, etc.) 97% under age 50 successful vs 61% >70 Long-term: 52/143 who had a successful remediation had an unsatisfactory follow up office assessment	Results from remediation candidates 2003-2013 Outlined factors in successful remediation
Kaigas T and Ferguson B Boosting Success at Remedial Education in Practicing Physicians Using Skilled Peer Preceptors Bulletin of the College of Physicians and	Research			Yes			90% of those with a preceptor improved on reassessment. Of those without an assigned preceptor, only 12.5% improved and 75% were worse.	Compared whether having an educational preceptor (vs self-guided remediation) resulted in better outcomes on reassessment after 12-18 months

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Surgeons of Ontario 1999								
NCAS (National Clinical Assessment Service) Casework The first eight years http://www.ncas.nhs.uk/archive-of-revision-project-jan-mar-2016/news/first-eight-years/	Government Report					Each year, 1 doctor in 190 referred to NCAS (So referral rate, not remediation rate	73 cases where remediation had been concluded: 48%: concerns fully addressed; 38% partially or not addressed; 10% - doc no longer working; 4% insufficient info	Detailed stats re referral, problems, etc.
Remediation Working Group Academy of Royal Medical Colleges Remediation Working Group Report http://www.gmc-uk.org/Item_6e__Annex_E_AoMRC_Remediation_Report.pdf_28987523.pdf	Government report	Yes						
The Back on Track Framework for	Government Report	Yes	*"The process of addressing concerns*					Describes a step-by-step process to

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Further Training. UK: National Clinical Assessment Service; 2010.			*about practice (knowledge, skills, and behaviours) that have been recognised, through assessment, investigation, review or appraisal, so that the practitioner has the opportunity to return to safe practice."*					develop a remediation plan. Includes 8 principles that should underlie re- training programs
Somerset Trust. Remediation, Re-skilling and Rehabilitation Policy for Medical Staff. UK: National Clinical Assessment Service; May 2012.	Policy	Yes	Remediation is *" the process of addressing performance concerns (knowledge, skills and behaviours) that have been recognised through assessment, investigation, review or*					

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			appraisal, so that the practitioner has the opportunity to practice safely. It is an umbrella for all activities, which provide help; from the simplest advice through mentoring, supervision, further training, re-skilling and rehabilitation. ”					

