

Table S5. Handsearching and Consultation

The handsearching process involves four steps. First, scanning the references section of the articles that have been included in the scoping review. Second, Google scholar has been used to track literature that was cited in each document. Using Google scholar, each document's title has been entered in the search terms in quotation marks, and under each article, click on the link "Cited by (number)" to retrieve a list of those who have cited the work. The last search was done on January 6th to March 10th 2022. Third, handsearching each journal issue based on the titles that have been included. If a journal does not have issues, so volume is selected. PubMed was consulted by using advanced search and its boxes (Journal, Volume and issues)

The last step, searching reviews about teaching leadership across medical education. The first table presents each article with the first, second and third step. The second table displays reviews that study leadership and medical education.

References would be analysed by title, abstract and full reading. Inclusion criteria are the same throughout the review, and the exclusion criteria include i) articles that have already been included in the manuscript and have been identified in the handsearching and ii) articles that do not fulfil the quality criteria, and iii) articles that fulfil exclusion criteria (presented above).

Table 1. Handsearching, first, second, and third step.

#	Article's title	1st step	2nd step	3rd step
1	Leadership and Academic Medicine: Preparing Medical Students and Residents to Be Effective Leaders for the 21st Century.	24	17	PubMed advanced search("MedEdPORTAL"[Journal]) AND (14[Volume]) (125 titles)
2	A first-year leadership programme for medical students.	10	6	((("Clin Teach"[Journal]) AND (16[Volume])) AND (6[Issue]))16, Issue 6 (25 titles)
3	Medical Student Consulting: Providing Students Leadership and Business Opportunities While Positively Impacting the Community.	19	4	("MedEdPORTAL"[Journal]) AND (15[Volume]) (82 titles)
4	Medical Student Leader Performance in an Applied Medical Field Practicum.	54	6	((("Mil Med"[Journal]) AND (184[Volume])) AND (11-12[Issue]) (65 titles)
5	Preparing Medical Students to Be Physician Leaders: A Leadership Training Program for Students Designed and Led by Students.	19	6	("MedEdPORTAL"[Journal]) AND (13[Volume]) (82 titles)

6	A medical student leadership course led to teamwork, advocacy, and mindfulness.	25	38	(("Fam Med"[Journal]) AND (46[Volume])) AND (6[Issue]) (14 titles).
7	In search for a public health leadership competency framework to support leadership curriculum-a consensus study.	35	66	(("Eur J Public Health"[Journal]) AND (24[Volume])) AND (5[Issue]) (29 titles)
8	Leadership curricula and assessment in Australian and New Zealand medical schools.	36	2	(("BMC Med Educ "[Journal]) AND (21[Volume])) AND (1[Issue]) (626 titles)
9	On the road to becoming a responsible leader: A simulation-based training approach for final year medical students.	39	6	(("GMS J Med Educ "[Journal]) AND (34[Volume])) AND (3[Issue]) (8 titles).
10	Leadership curriculum in undergraduate medical education: a study of student and faculty perspectives.	29	126	(("Med Teach"[Journal]) AND (31[Volume])) AND (3[Issue]) (24 titles)
11	Promoting medical students' reflection on competencies to advance a global health equities curriculum.	24	12	(("BMC Med Educ "[Journal]) AND (14[Volume])) (296 titles)

12	Preparing students to be academicians: a national student-led summer program in teaching, leadership, scholarship, and academic medical career-building.	19	20	("Acad Med"[Journal]) AND (87[Volume])) AND (12[Issue]) (31 titles)
13	Contextual Analysis of Stakeholder Opinion on Management and Leadership Competencies for Undergraduate Medical Education: Informing Course Design.	48	1	("J Med Educ Curric Dev"[Journal]) AND (7[Volume]) (127 titles.)
14	Health Systems Science Curricula in Undergraduate Medical Education: Identifying and Defining a Potential Curricular Framework.	70	98	("Acad Med"[Journal]) AND (92[Volume])) AND (1[Issue]) (34 titles)
15	The Health Professions Education Pathway: Preparing Students, Residents, and Fellows to Become Future Educators.	44	64	("Teach Learn Med "[Journal]) AND (29[Volume])) AND (2[Issue]) (12 titles).
16	A student-led curriculum framework for homeless and vulnerably housed populations.	8	2	("BMC Med Educ "[Journal]) AND (20[Volume])) AND (1[Issue]) (499 titles).
17	Identification and evaluation of the core elements of	18	3	("J Educ Eval Health Prof "[Journal]) AND (16[Volume])) (41 titles)

	character education for medical students in Korea.			
18	Leadership and management in UK medical school curricula.	26	24	((("J Health Organ Manag "[Journal]) AND (30[Volume])) AND (7[Issue]) (7 titles)
19	Aspects of development of leader creative thinking of medical student at the undergraduate level of medical education.	5	2	((("Wiad Lek "[Journal]) AND (69[Volume])) AND (6[Issue]) (27 titles)
20	Defining the structure of undergraduate medical leadership and management teaching and assessment in the UK.	27	30	((("Med Teach"[Journal]) AND (37[Volume])) AND (8[Issue]) (23 titles)
21	Leadership and management in the undergraduate medical curriculum: a qualitative study of students' attitudes and opinions at one UK medical school.	29	60	((("BMJ Open "[Journal]) AND (4[Volume])) AND (6[Issue]) (107 titles)
TOTAL: step 1,2 and 3= 3485		608	593	2284

Two articles were selected (22nd and 23rd).

22	An Undergraduate Medical Education Framework for Refugee and Migrant Health:	67	0	The document did not have volume or issue. "Preprints are preliminary
----	--	----	---	---

Curriculum Development and Conceptual Approaches.			reports that have not undergone peer review”.
			(0 titles)
23. The Pandemic Leadership Model: A Study of Medical Student Values During COVID-19.	30	1	International Journal of Medical Students.Vol. 9 No. 4 (2021). Available from Vol. 9 No. 4 (2021) International Journal of Medical Students (ijms.info).
			(15 titles)
TOTAL: step 1,2 and 3= 3598	705	594	

Other documents were included in this scoping review, but authors did not perform a handsearching.

#	Article's title	Main reference (the handsearching was done in this article)
24.	Barry, E. S.; Grunberg, N. E.; Kleber, H. G.; McManigle, J. E.; Schoomaker, E. B. A four-year medical school leader and leadership education and development program. <i>Int J Med Educ</i> 2018 , 9, 99-100. DOI: 10.5116/ijme.5abe.12d2.	Barry, E. S.; Dong, T.; Durning, S. J.; Schreiber-Gregory, D.; Torre, D.; Grunberg, N. E. Medical Student Leader Performance in an Applied Medical Field Practicum. <i>Mil Med</i> 2019 , 184 (11-12), 653-660. DOI: 10.1093/milmed/usz121.

25. Grunberg, N. E.; Barry, E. S.; Callahan, C. W.; Barry, E. S.; Dong, T.; Durning, S. J.; Kleber, H. G.; McManigle, J. E.; Schoomaker, Schreiber-Gregory, D.; Torre, D.; Grunberg, N. E. B. A conceptual framework for leader and E. Medical Student Leader Performance in an leadership education and Applied Medical Field Practicum. *Mil Med* development. *International Journal of* **2019**, *184* (11-12), 653-660. DOI: *Leadership in Education* **2019**, *22*(5), 644–650. 10.1093/milmed/usz121. <https://doi.org/10.1080/13603124.2018.1492026>
-

Consultation process to the corresponding author of the 23 first articles. Authors did not perform a handsearching.

#	Article's title	Main reference (the handsearching was done in this article)
26.	Australian Medical Council Limited. Standards for Assessment and Accreditation of Primary Medical Programs by the Australian Medical Council 2012. 2012 . Standards-for-Assessment-and-Accreditation-of-Primary-Medical-Programs-by-the-Australian-Medical-Council-2012.pdf (amc.org.au) (achieved on 1 st February 2023)	Ross, S. J.; Sen Gupta, T.; Johnson, P. Leadership curricula and assessment in Australian and New Zealand medical schools. <i>BMC Med Educ</i> 2021 , <i>21</i> (1), 28. DOI: 10.1186/s12909-020-02456-z.
27.	Frank, J.R.; Snell, L.; Sherbino J.Can Meds 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada. 2015 .CanMEDS Role:	Gruner, D.; Feinberg, Y.; Venables, M. J.; Shanza Hashmi, S.; Saad, A.; Archibald, D.; Pottie, K. An undergraduate medical education framework for refugee and

- Leader :: The Royal College of Physicians and Surgeons of Canada (achieved on 1st February 2023)
- 28 Wagenschutz, H. (University of Michigan, Ann Arbor, Michigan, USA).Personal communication Word document: Medical School: Improving healthcare systems 1, 2, and 3 (MEDADM 5160))
- 29 Wagenschutz, H. (University of Michigan, Ann Arbor, Michigan, USA).Personal communication Word document: Medical School University of Michigan 2021 to 22 competencies)
- 30 Barry, E. S. (Department of Military & Emergency Medicine, F. Edward Hébert School of Medicine, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Rd, Bethesda, USA).Personal communication, Word document: Bushmaster Core Learning Objectives.)
- 31 Barry, E. S. (Department of Military & Emergency Medicine, F. Edward Hébert School of Medicine, Uniformed Services
- migrant health: Curriculum development and conceptual approaches. *BMC Med Educ* **2022**, 22 (1), 374. DOI: 10.1186/s12909-022-03413-8.
- Wagenschutz, H.; McKean, E. L.; Mangrulkar, R.; Zuraes, K.; Santen, S. A first-year leadership programme for medical students. *Clin Teach* **2019**, 16 (6), 623-629. DOI: 10.1111/tct.13005.
- Wagenschutz, H.; McKean, E. L.; Mangrulkar, R.; Zuraes, K.; Santen, S. A first-year leadership programme for medical students. *Clin Teach* **2019**, 16 (6), 623-629. DOI: 10.1111/tct.13005.
- Barry, E. S.; Dong, T.; Durning, S. J.; Schreiber-Gregory, D.; Torre, D.; Grunberg, N. E. Medical Student Leader Performance in an Applied Medical Field Practicum. *Mil Med* **2019**, 184 (11-12), 653-660. DOI: 10.1093/milmed/usz121.
- Barry, E. S.; Dong, T.; Durning, S. J.; Schreiber-Gregory, D.; Torre, D.; Grunberg, N. E. Medical Student Leader Performance

- University of the Health Sciences, 4301 Jones Bridge Rd, Bethesda, USA) Personal communication, Word document: Word document: LEAD Pre-Clerkship/B3 Curriculum
- in an Applied Medical Field Practicum. *Mil Med* **2019**, *184* (11-12), 653-660. DOI: 10.1093/milmed/usz121.
- 32 Barry, E. S. (Department of Military & Emergency Medicine, F. Edward Hébert School of Medicine, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Rd, Bethesda, USA) Personal communication, Word document: Busmaster Faculty.info. 2021)
- Barry, E. S.; Dong, T.; Durning, S. J.; Schreiber-Gregory, D.; Torre, D.; Grunberg, N. E. Medical Student Leader Performance in an Applied Medical Field Practicum. *Mil Med* **2019**, *184* (11-12), 653-660. DOI: 10.1093/milmed/usz121.
- 33 Srinivasan, M.; Li, S. T.; Meyers, F. J.; Pratt, D. D.; Collins, J. B.; Braddock, C.; Skeff, K. M.; West, D. C.; Henderson, M.; Hales, R. E.; et al. "Teaching as a Competency": competencies for medical educators. *Acad Med* **2011**, *86* (10), 1211-1220. DOI: 10.1097/ACM.0b013e31822c5b9a.
- Chen, H. C.; Wamsley, M. A.; Azzam, A.; Julian, K.; Irby, D. M.; O'Sullivan, P. S. The Health Professions Education Pathway: Preparing Students, Residents, and Fellows to Become Future Educators. *Teach Learn Med* **2017**, *29* (2), 216-227. DOI: 10.1080/10401334.2016.1230500.
- 34 Czabanowska, K. (Department of International Health, CAPHRI, Faculty of Health, Medicine and Life Sciences, Maastricht University, Maastricht, The Netherlands) (Personal communication, Education, Audiovisual & Culture Executive
- Czabanowska, K.; Smith, T.; Könings, K. D.; Sumskas, L.; Otok, R.; Bjegovic-Mikanovic, V.; Brand, H.; Health, L. f. E. P. In search for a public health leadership competency framework to support leadership curriculum-a consensus study. *Eur J Public Health* **2014**,

- Agency. Leadership for European Public Health. 2008. 24 (5), 850-856. DOI: 10.1093/eurpub/ckt158.
- 35 de Jong, N.; Könings, K. D.; Czabanowska, K. The Development of Innovative Online Problem-Based Learning: A Leadership Course for Leaders in European Public Health. 2014. Czabanowska, K.; Smith, T.; Könings, K. D.; Sumskas, L.; Otok, R.; Bjegovic-Mikanovic, V.; Brand, H.; Health, L. f. E. P. In search for a public health leadership competency framework to support leadership curriculum-a consensus study. *Eur J Public Health* **2014**, 24 (5), 850-856. DOI: 10.1093/eurpub/ckt158.
- 36 Könings, K. D.; de Jong, N.; Lohrmann, C.; Czabanowska, K.; Smith, T.; Könings, K. D.; Sumskas, L.; Smith, T.; O'Connor, S. J.; Spanjers, I. A. E.; Van Merriënboer, J. J. G.; Czabanowska, K. Is blended learning and problem-based learning course design suited to develop future public health leaders? An explorative European study. *Public Health Rev* **2018**, 39, 13. DOI: 10.1186/s40985-018-0090-y. Czabanowska, K.; Smith, T.; Könings, K. D.; Sumskas, L.; Otok, R.; Bjegovic-Mikanovic, V.; Brand, H.; Health, L. f. E. P. In search for a public health leadership competency framework to support leadership curriculum-a consensus study. *Eur J Public Health* **2014**, 24 (5), 850-856. DOI: 10.1093/eurpub/ckt158.
- 37 Czabanowska, K.; Rethmeier, K. A.; Lueddeke, G.; Smith, T.; Malho, A.; Otok, R.; Stankunas, M. Public health in the 21st century: working differently means leading and learning differently. *European Journal of* Czabanowska, K.; Smith, T.; Könings, K. D.; Sumskas, L.; Otok, R.; Bjegovic-Mikanovic, V.; Brand, H.; Health, L. f. E. P. In search for a public health leadership competency framework to support leadership curriculum-a consensus study. *Eur J Public Health* **2014**,

Public Health **2014**, *24*(6), 1047–52.
<https://doi.org/10.1093/eurpub/cku043>

24 (5), 850-856. DOI:
 10.1093/eurpub/ckt158.

- 38 Czabanowska, K.; Malho, A.; Schröder-Bäck, P.; Popa, D.; Burazeri, G. Do we develop public health leaders?- association between public health competencies and emotional intelligence: a cross-sectional study. *Bmc Medical Education* **2014**, *14*, 83–83.
<https://doi.org/10.1186/1472-6920-14-83>
- Czabanowska, K.; Smith, T.; Könings, K. D.; Sumskas, L.; Otok, R.; Bjegovic-Mikanovic, V.; Brand, H.; Health, L. f. E. P. In search for a public health leadership competency framework to support leadership curriculum- a consensus study. *Eur J Public Health* **2014**, *24* (5), 850-856. DOI:
 10.1093/eurpub/ckt158.

Table 2. *Handsearching: reviews about leadership education in medical education.*

Number	Reviews' title	References
1	Leadership development programs for physicians: a systematic review.	76
2	Training of Leadership Skills in Medical Education	26
3	Faculty development initiatives designed to promote leadership in medical education. A BEME systematic review: BEME Guide No. 19.	94

4	Leadership Training and Undergraduate Medical Education: a Scoping Review	60
5	A systematic review of leadership training for medical students	43
6	A First Step Toward Understanding Best Practices in Leadership Training in Undergraduate Medical Education	34
Total = 333		

Total Handsearching: 3598+ 333=3931
