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Introduction

The American Association of Medical Colleges (AAMC) has identified leadership as, "the most critical component of success," for future medical professionals and describes various leadership skills in the Entrustable Professional Activities, a set of proficiencies medical students are expected to be able to perform upon entering residency.[1-2] The Liaison Committee on Medical Education (LCME) makes references to leadership skills in multiple competencies that MD granting schools must fulfill in order to maintain accreditation.[3]

Aims and Objectives

The purpose of this systematic review is to describe current leadership education interventions staged at LCME-accredited medical schools and classify interventions based on quality of evidence and impact on participants. Extracted data will help identify best practices for developing effective leadership education curricula that can be utilized by other schools while developing their own interventions.

Methods

Protocols for this review was developed utilizing the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) statement.[4] Comprehensive searches of literature (published between 2014-2021) were conducted with databases: PubMed (MEDLINE), Embase, ERIC, PsychINFO, and Web of Sciences, and studies were evaluated against predetermined inclusion and exclusion criteria. Selected articles underwent data extraction for various features such as size of cohort and length of intervention, leadership competencies covered using the Mangrulkar et al framework, and interventions were scored for effectiveness and data quality using validated tools.[5-7]

Results

Figure 1. PRISMA Diagram of Article Selection Process
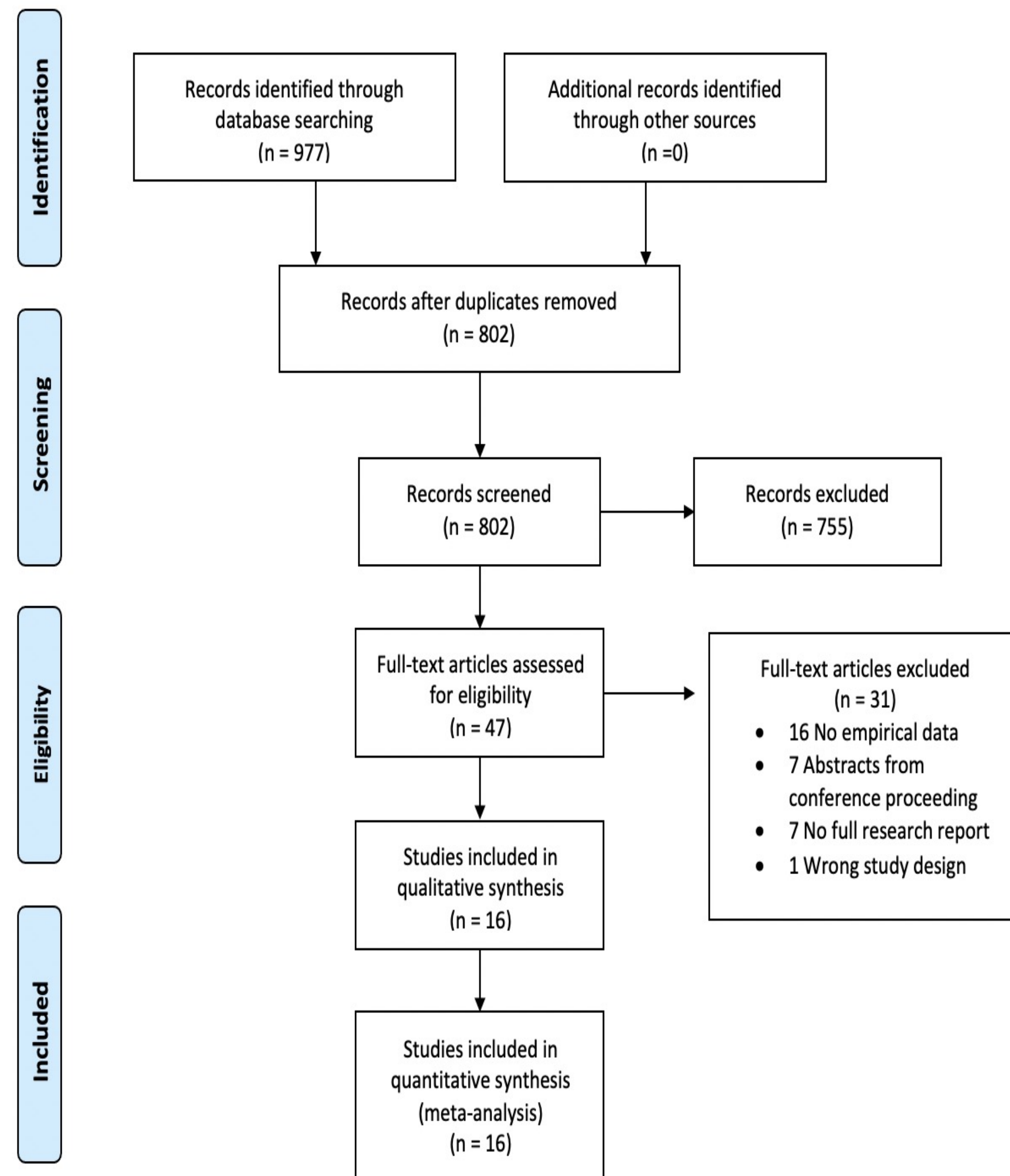
Discussion

Creating a standardized, competency-based framework would aid schools in the development of meaningful curricula, as well having a validated, substantive evaluation tool for students and instructors to provide mutual feedback would also benefit medical schools. Further research studying non-LCME accredited medical schools and ACGME-accredited residency programs would be valuable next steps to better understanding best practices for leadership education.

Table 1. Effectiveness of Interventions Using Kirkpatrick's Evaluation Model[6]

Score	Definition	No. (%) of Curricula
0	None: Outcomes not evaluated	0 (0)
1	Reaction: Change in learners' attitudes	3 (18.75)
2	Learning: Modification or knowledge and/or skills	2 (12.5)
3	Behavior: Change in behaviors as a result of learning	6 (37.5)
4	Results: Tangible, as observed by change in the system/organizational practice; reduced cost, improved quality, efficiency, etc.	5 (31.25)

Table 2. Quality of Evidence Using the Hammick et al Data Evaluation Model[7]

Score	Definition	No. (%) of Curricula
1	No clear conclusions can be drawn, not significant	1 (6.25)
2	Results ambiguous, but appears to be a trend	7 (43.75)
3	Conclusions can probably be based on the results	6 (37.5)
4	Results are clear and very likely to be true	2 (12.5)
5	Results are unequivocal	0 (0)

Figure 2. Summary of Leadership Content Using Mangrulkar et al Domains[5]

Figure 3. Summary of Program Durations

Figure 4. Summary of Learner Levels

*One intervention included resident physicians

Conclusions

Longitudinal programs (programs lasting longer than six months) that have a didactic and project-based or other application component received consistently high quality and effectiveness scores, as did programs with smaller cohort sizes that received more consistent mentorship and monetary investment from institutions. Utilizing a combination of didactics and application (projects, simulations, etc.) components is ideal to teach and reinforce leadership concepts.
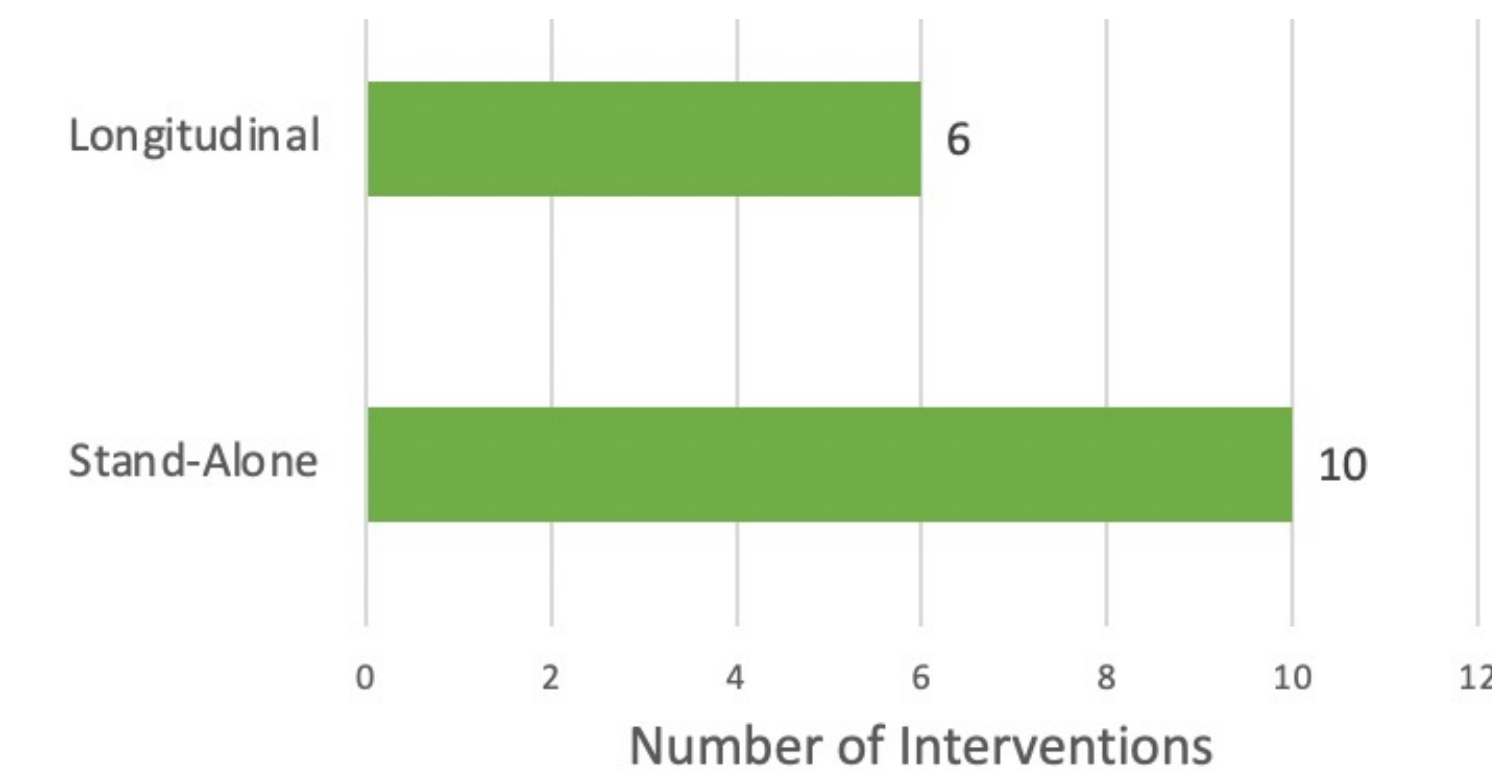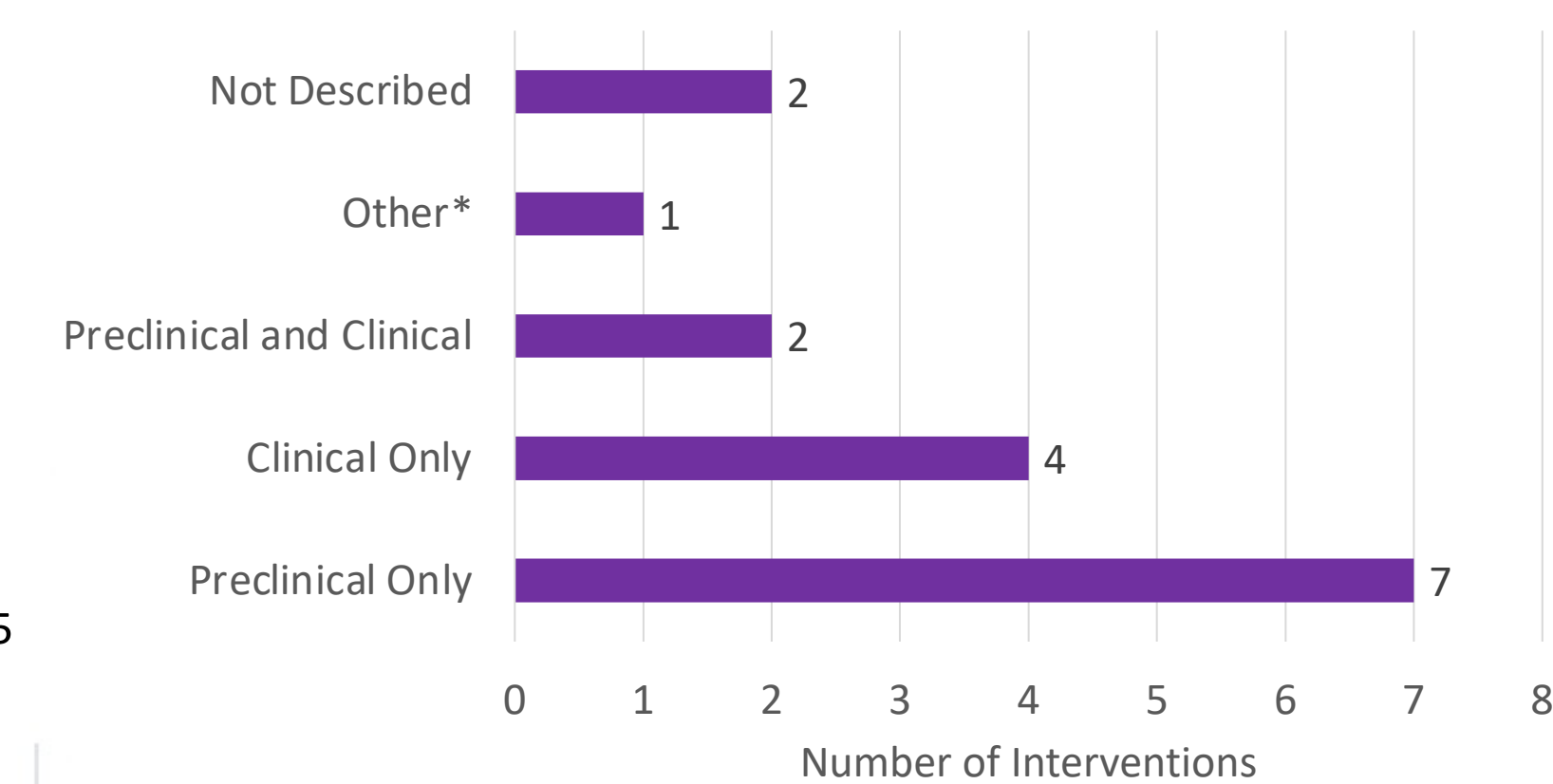
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