A systematic review of leadership training for medical students

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ABSTRACT

BACKGROUND: Leadership is increasingly being recognised as an essential requirement for doctors. Many medical schools are in the process of developing formal leadership training programmes, but it remains to be elucidated what characteristics make such programmes effective, and to what extent current programmes are effective, beyond merely positive learner reactions. This review's objective was to investigate the effectiveness of undergraduate medical leadership curricula and to explore common features of effective curricula.

METHODS: A systematic literature search was conducted. Articles describing and evaluating undergraduate medical leadership curricula were included. Outcomes were stratified and analysed according to a modified Kirkpatrick's model for evaluating educational outcomes.

RESULTS: Eleven studies met inclusion criteria. Leadership curricula evaluated were markedly heterogeneous in their duration and composition. The majority of studies utilised pre- and post- intervention questionnaires for evaluation. Two studies described randomised controlled trials with objective measures. Outcomes were broadly positive. Only one study reported neutral outcomes.

CONCLUSIONS: A wide range of leadership curricula have shown subjective effectiveness, including short interventions. There is limited objective evidence however, and few studies have measured effectiveness at the system and patient levels. Further research is needed investigating objective and downstream outcomes, and use of standard frameworks for evaluation will facilitate effective comparison of initiatives.

Effective leadership is vital in implementing health improvements at both clinical and system levels. In health, effective leadership involves utilising social influence and advocacy to anticipate and act on health challenges for a positive outcome.[1,2] Ineffective leadership has been shown to have an adverse effect on team performance and patient outcomes.[3,4] Effective leadership, however, significantly improves these outcomes[5–7] and therefore many major health institutions have incorporated effective leadership as a core competency skill expected of health professionals.[8–16]

To address this demand, leadership training has since been implemented within medical school curricula, from pre-clinical[17–25] to clinical,[17–19,22,23,26–28] and later through to residency and beyond.[29,30] Although leadership programmes have been well received by both medical students and faculty, little objective data is available to analyse outcomes, and little is known of how such skills translate beyond medical school.[17] Further, determining the optimum time to implement such courses remains unclear. This systematic literature review therefore aims to collate studies that have incorporated leadership courses within medical school curricula, and have evaluated their effectiveness in an objective manner.

Methods

Search strategy and information sources

This systematic review was performed in accordance to the PRISMA statement (Preferred Reporting Items for Systematic Reviews and Meta-analysis).[31] Five databases were systematically searched: Excerpta Medica database (EMBASE); Education Resources Information Centre (ERIC);

Medline; PsychINFO; and PubMed (National Library of Medicine). Keywords were "leadership", "medical student" and "education", and were also mapped to medical subject headings (MeSH terms) and exploded. The initial search was completed on 20 May 2016 by OL and ML. Reference lists of articles that were selected for full text review were manually searched for additional studies.

Article selection

The title and abstract screen was performed independently by two authors (OL, ML). All articles concerning leadership training and medical students were selected for full text review. Full text reviews were performed (OL, BS). The Kirkpatrick model for assessment of training outcomes with the BEME modification[32] was applied to studies measuring level 2 or higher, as shown in Table 1. This selection criteria allows for objective outcomes to be analysed.

Inclusion and exclusion criteria

Studies where a leadership training intervention was described and implemented within a medical students' population, and having outcomes reported at Kirkpatrick's level 2 or higher were included in this review. Studies without a full text available, and not in English were excluded.

Data abstraction

Data from included studies were abstracted into a Microsoft ® Excel® (2013) spreadsheet using a modified BEME coding sheet by two authors (OL, BS). Any uncertainties were resolved by consensus.

Data analysis

Study outcomes were categorised according to the BEME modification to Kirkpatrick's model for evaluation of effectiveness of teaching. This model has been used by several BEME collaborations and was recently adapted by Steinert et al for leadership initiatives in medicine.[32]

Risk of bias

Risk of bias was evaluated according to the Cochrane Handbook for Systematic Reviews of Interventions.[33] This tool assesses bias through seven areas: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting and other sources of bias. Each study was given an overall quality rating (1=low; 5=high) and reviewers were asked to comment on strengths and weaknesses.

Table 1: Description of Kirkpatrick's levels for evaluating educational outcomes and levels.

Level	Description	Number	
Level 2A *Change in attitudes*	Changes in the attitudes or perceptions among participant groups towards leadership, management and/or administration.	10 (91%)	10 (91%)
Level 2B *Change in knowledge or skills*	For knowledge, this relates to the acquisition of concepts, procedures and principles; for skills, this relates to the acquisition of thinking/problem-solving, psychomotor and social skills.	5 (45%)	
Level 3A *Behavioural change (self-reported)*	Documents the transfer of learning to the workplace and changes to professional practice, as noted by participants.	9 (82%)	10 (91%)
Level 3B *Behavioural change (observed)*	Documents the transfer of learning to the workplace and changes to professional practice, as noted by a third party.	7 (64%)	
Level 4 *Results*	Change in the system/organisational practice refers to wider changes in the organisation, attributable to the educational programme.	4 (36%)	

Number refers to the studies which demonstrated outcomes at each level, and percentages (out of 11 studies) are included. For level 2a/b and 3a/b, an additional combined number has been added. Level 1 was not included in this review, as discussed in the text.

Figure 1: PRISMA Flow diagram.
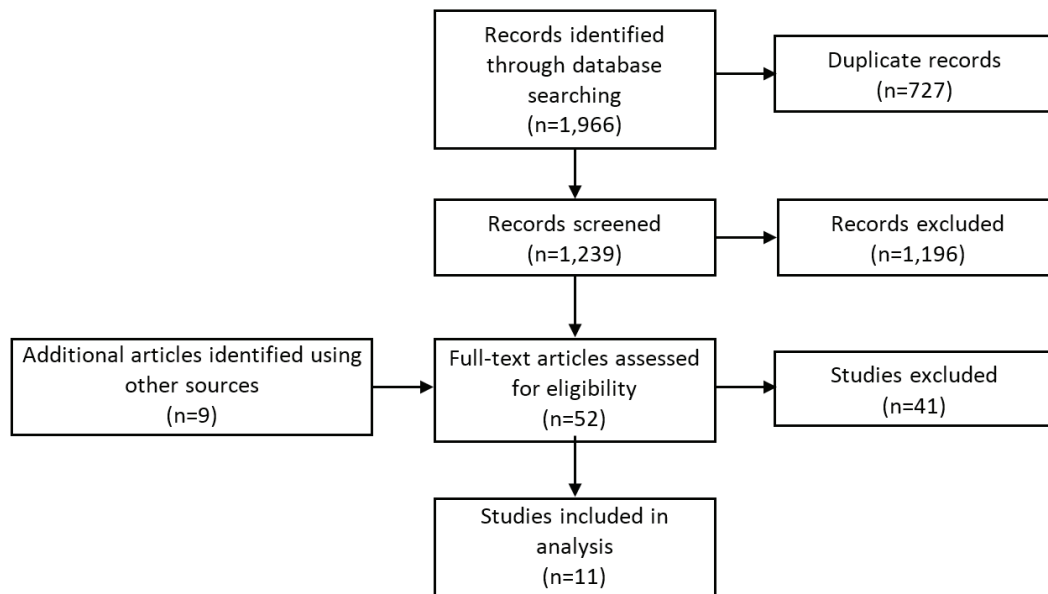
Results

In total, 1,248 unique papers were identified and screened, of which 11 studies were included in review (Figure 1). Ten of the studies reported positive outcomes while one reported a neutral outcome. A summary of included studies is shown in Table 2. The majority of the included studies were quasi-experimental, with two randomised controlled trials[21,25] and two observational studies.[18,22]

Table 2: Summary of included studies.

Author	Study design	Intervention (follow-up)	Learners (n)	Outcome summary
Bergman[28] (2008)	Quasi-experimental repeated measures	Short course (no long-term follow-up)	Clinical (160)	Level 2a Increased openness to learning about healthcare team members. Subgroup changes: increased "attitudes to openness and group dynamics" and "openness in the professional role" Level 2b Increased awareness of importance of variable leadership styles
Carufel-Wert[20] (2007)	Observational	Longitudinal (no long-term follow-up)	Both (50)	Level 2a Increased interest in taking leadership positions; increased desire to remain in medical school Level 2b Increased perceived ability to be an effective leader Level 3a Increased interactions with those in the leadership group

Table 2: Summary of included studies (continued).

Coleman[21] (2012)	Quasi-experimental repeated measures	Short course *(followed up at 8 months and 18 months)*	Both (11)	Level 2a Increased confidence to execute projects, increased leadership self-efficacy Level 3a 7/11 students executed their projects Level 3b Increased OSTE test scores
Goldstein[22] (2009)	Quasi-experimental repeated measures	Short course *(no long-term follow-up)*	Pre-clinical (>24)	Level 2a Increased confidence levels in leadership activities Level 2b Increase in leadership competencies, knowledge of leadership styles Level 3a Reported utilisation of learned skills in student organisations Level 3b Fifteen completed community service projects run by participants Level 4 Increased pedestrian safety measures on campus as a result of student project
Hunziker[23] (2010)	Randomised controlled superiority trial	Workshop *(followed up at four months)*	Pre-clinical (237)	Level 3b Increased leadership utterances (from 5 (2–8) to 7 (4–10), p=.02) Level 4 Increased hands-on time Decreased time to initiate CPR Lower technical effectiveness vs technical instruction group
Meier[29] (2012)	Quasi-experimental repeated measures	Short course *(no long-term follow-up)*	Clinical (17)	Level 2a Self-evaluation scores increased p<.001 Level 2b Average MCQ test score increased from 84.9% to 94.1% (p<.01) Level 3a Self-evaluation scores increased for 16, remained constant for 1 Level 3b Both TeamSTEPPS and NOTECHS scores increased. Three of five NOTECHS domains were individually significant, all TeamSTEPPS domains were significant

Table 2: Summary of included studies (continued).

Meurling[30] (2013)	Quasi-experimental repeated measures	Workshop *(no long-term follow-up)*	Clinical (54)	Level 2a No change in mental strain or concentration Level 3a Increased self-efficacy scores Level 3b No significant changes except increased frequency of sum-ups Level 4 No change (no groups achieved this in any scenario)
Sherrill[24] (2000)	Observational	Longitudinal *(no long-term follow-up)*	Both (153)	Level 2a More likely to desire business-type careers, administrative duties Level 3a More confident in all aspects of clinical and administrative duties More likely to seek administrative rather than clinical duties
Smith[25] (2007)	Quasi-experimental repeated measures	Short course *(11 months)*	Both (23)	Level 2a Improved attitude towards leadership behaviours Level 2b Increased skills (self-reported, not tested) Level 3a Higher exhibition of leadership behaviours Level 3b Completion of project in 13/23 students Level 4 Projects reached >600 students at 11 institutions (self-reported)
Warde[26] (2014)	Quasi-experimental repeated measures	Short course *(no long-term follow-up)*	Pre-clinical (20)	Level 2a No change in Relational Coordination Scale scores Level 3a No change in Leadership Practices Inventory scores
Wayne[27] (2010)	Randomised controlled superiority trial	Tutorial *(no long-term follow-up)*	Pre-clinical (158)	Level 2a Interviewees indicated more positive attitude towards leadership Level 3a Interviewees indicated acting as leader as a result of the instruction Level 3b Percentage female leaders increased from 27% to 47%

Intervention specifically addresses the length of intervention rather than curriculum content, which is described in the text. Outcome summaries are stratified according to the modified Kirkpatrick framework as described in Table 1.

Setting

Eight of the 11 studies were conducted in the US, two in Sweden and one in Switzerland. The majority of these were in single centres. Two studies[19,23] selected participants from across the US and Canada, and one study included all eligible participants across six MD-MBA conjoint degree programmes in the US.[22]

Participant selection

Participant numbers ranged from 11 to 237 as shown in Table 2. Most studies included a subgroup of a medical school cohort,[18,20,21,24,26–28] with one including an entire cohort[25] and three including participants from multiple medical schools.[19,22,23] One study did not report the number of participants.[20]

There was significant variation in selection criteria and the number of participants. Three of the 11 studies evaluated a compulsory component of a course: two of these allowed students to opt out of the evaluation, though not the training itself;[26,28] one did not allow students to opt out of the evaluation.[25] Four studies offered open, optional training and evaluation to an entire cohort[20–22] or from the portion of a cohort enrolled in a particular elective.[27] The remaining four studies required participants to submit a written application, and chose a small number of students judged to already have significant leadership potential.[18,19,32,24]

Intervention

Interventions varied in the setting, materials, length of course and stage of the programmes evaluated.

Course implementation

Four studies focused on pre-clinical students, three on clinical students and four on both (see Table 2).

Course intervention setting

Most studies incorporated some component of experiential and reflective learning,[18–21,23,24,26,28] though the format of this was generally poorly reported. Three studies used a simulation centre for their study.[21,27,28] Two studies employed a practical community component,[18,20] and Wayne et al utilised a small-group tutorial for their study.[25] Methods of reported teaching included readings, discussions, simulation, community projects and video instructions, in various iterations.

Course duration

The durations of the intervention were markedly heterogeneous and ranged from the addition of two sentences to a standard instruction,[25] to implementing a longitudinal course over a degree.[18,22] Seven studies comprised workshops conducted either in a single day[21,28] or in short courses of one week[19,23] to one semester in duration.[20,24,27] Only one study delivered their initiative in more than one discrete course.[26]

Course programmes utilised

Carufel-Wert et al and Sherrill et al evaluated existing programmes,[18,22] whereas the other nine studies evaluated new or significantly altered programmes. Eight studies assessed outcomes immediately post-intervention only.[19,20,22,24–28] Longer-term outcomes were assessed in three studies only: at four months;[21] 11 months;[23] and separately at eight and 18 months.[19]

Course outcomes

Outcomes were assessed at Kirkpatrick level 2 in 10 studies,[18–20,22–28] at level 3 in 10 studies,[18–25,27,28] and at level 4 in four studies[20,21,23,28] (see Table 1). The majority of these outcomes were self-reported.

Included study goal

Included studies had varied aims and objectives. Eight studies broadly evaluated a new or existing leadership intervention for its utility in medical students.[18–21,23,24,26,27] The remaining three studies had main intentions to outline student characteristics,[22] determine whether gender bias in leadership could be reduced[25] and to explore individual experiences and behaviours of leaders and followers,[28] respectively.

Study design

Each quasi-experimental study utilised repeated measures without a control group. Two studies elected to conduct both the pre- and post-intervention surveys concurrently at the end of the intervention.[19,23]

Carufel-Wert et al and Sherrill et al conducted cross-sectional studies of participants post-intervention, and relied on participants to attribute outcomes to the intervention subjectively.[18,22]

Data collection methods

The most commonly used data collection tool was a self-reported written questionnaire, utilised in nine of the 11 studies.[18–20,22–24,26–28] Self-efficacy was used in six studies as a proxy for objective ability.[18,19,22,23,27,28] Video analysis was employed in three studies,[21,27,28] with the observers specifically blinded to participant status (pre- or post-intervention) in two studies.[27,28] Interviews were conducted as part of the evaluation in four studies.[18,20,22,25] Only one study used direct observation as the main evaluation tool.[25]

Study quality/overall risk of bias

The mean study quality score was 3.1 out of a possible five. Randomisation was used in two studies,[21,25] with participant blinding conducted in only one study.[25] Included participants were in several trials either an elite subgroup of medical students[19,23,24] or a small subgroup.[20,22,27,28]

Results were self-reported in the majority of studies.[18–20,22–24,26–28]

Discussion

This systematic review identified 11 studies investigating the effectiveness of leadership training programmes in medical school at outcome levels beyond Kirkpatrick level 1. There was a diversity of methods employed in these studies, in terms of length, type, materials, setting and stage of medical students. The reported results demonstrate that despite this diversity, programmes were broadly found to improve knowledge and skills of leadership, influence attitudes and promote leadership behaviour in medical students. There were indications that there may be positive downstream outcomes, though these were not well described.

Despite heterogeneity, studies produced broadly positive results. This leads to some tentative suggestions for future design of leadership programmes. Interventions tended to utilise a combination of didactic learning, tutorials and reflective learning. The effectiveness of a programme within medical school did not seem to be influenced by preclinical or clinical implementation, suggesting that both may be effective. Furthermore, because all durations of intervention showed positive results, long

and complex courses may not be required to achieve positive change; short, punchy courses with clear objectives may well be as effective. Given already packed curricula and the financial benefit of running courses of short duration, this would be a valuable area to explore further.

This review differed from those previously published by focusing on outcomes at Kirkpatrick level 2 or higher. While this limited the number of studies eligible for inclusion, it enabled the authors to highlight more objective outcomes. The increase in studies reporting these higher-level outcomes is in line with recommendations from previous reviews,[17] and could indicate an increased awareness of researchers of the need to establish firm outcomes.

Over the last decade there has been a marked increase in the number of medical schools offering leadership curricula. A literature search by O'Connell and Pascoe in 2004 only returned 15 articles with any degree of relevance.[34] Ten years later, despite using more specific search terms, Webb et al found 45 articles, each describing a curriculum to teach leadership to under-graduate medical students.[17] While a significant proportion of medical knowledge is imparted didactically, role modelling and practical experience remain vital to medical education.[35,36] Given variation in clinical experiences and role models encountered by students,[36,37] and the increased importance placed internationally on development of clinical leadership abilities,[8–12,14–16,38] it is logical that medical programmes should move towards formal leadership training.

One of the clear limitations of the studies reviewed was a lack of objective measures of effectiveness of leadership training. There is an established connection between self-efficacy and leadership, but it remains a subjective measure of leadership effectiveness. Whereas clinical ability has been reliably assessed via an Objective Structured Clinical Examination (OSCE),[39] and teaching ability has been assessed via an Objective Structured Teaching Examination (OSTE),[19,40] there is not yet an established means of objectively measuring leadership effectiveness. In order for the quality of different interventions to be compared, it is important for a reliable measurement tool to be developed and accepted within

the literature. Furthermore, the use of a standardised framework for evaluation of training programmes (such as Kirkpatrick's model) and the reporting of results in a systematic manner based on such frameworks will enable future reviewers to more easily ascertain components and characteristics of leadership training curricula that determine their success.

The lack of a widely-accepted definition of clinical leadership and what it entails further complicates training, assessment and comparison of approaches. Definitions of leadership present a plethora of core attributes that may or may not have been covered by the curricula evaluated in the included studies. A consensus on the definition of clinical leadership may help streamline future courses and facilitate more robust and comparable evaluation based on an objective definition.

Despite a search strategy designed for high sensitivity, the lack of standardisation of medical education article databases necessitates parallel approaches to literature searching as employed in this review, and increases the risk of missing relevant publications.[43] The limited utilisation of established frameworks for evaluation of teaching required the researchers to categorise research outcomes manually and in some cases required consensus decisions. Heterogeneity of interventions and evaluations precluded meta-analysis, and reduced the external validity of conclusions made.

Conclusion

In summary, the evidence evaluated by this review supports further development and evaluation of leadership training programmes in medical schools. There is broad agreement in the studies reviewed that the programmes evaluated resulted in positive outcomes for learners. Objective measures of leadership training effectiveness need to be developed however, and an emphasis placed on evaluation of systemic and patient outcomes. The reviewers recommend that further research focuses on the use of recognised training evaluation frameworks for their research and reporting, and on the evaluation of objective and downstream outcomes. Further standardisation will afford increased applicability and comparability to studies. This will be an important step towards elucidating characteristics of programmes which are important for success.

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