

## Systematic review of coaching to enhance surgeons' operative performance

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**Background.** There is increasing attention on the coaching of surgeons and trainees to improve performance but no comprehensive review on this topic. The purpose of this review is to summarize the quantity and the quality of studies involving surgical coaching methods and their effectiveness.

**Methods.** We performed a systematic literature search through PubMed and PsychINFO by using predefined inclusion criteria. Evidence for main outcome categories was evaluated with the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system and the Medical Education Research Study Quality Instrument (MERSQI).

**Results.** Of a total 3,063 articles, 23 met our inclusion criteria; 4 randomized controlled trials and 19 observational studies. We categorized the articles into 4 groups on the basis of the outcome studied: perception, attitude and opinion; technical skills; nontechnical skills; and performance measures.

Overall strength of evidence for each outcome groups was as follows: Perception, attitude, and opinion (Grading of Recommendations Assessment, Development, and Evaluation: Very Low, Medical Education Research Study Quality Instrument [MERSQI]: 10); technical skills (randomized controlled trials: High, 13.1; Observation studies: Very Low, 11.5); nontechnical skills (Very Low, 12.4) and performance measures (Very Low, 13.6). Simulation was the most used setting for coaching; more than half of the studies deployed an experienced surgeon as a coach and showed that coaching was effective.

**Conclusion.** Surgical coaching interventions have a positive impact on learners' perception and attitudes, their technical and nontechnical skills, and performance measures. Evidence of impact on patient outcomes was limited, and the quality of research studies was variable. Despite this, our systematic review of different coaching interventions will benefit future coaching strategies and implementation to enhance operative performance. (Surgery 2015;158:1168-91.)

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COACHING IS A WELL-ACCEPTED EDUCATIONAL METHOD in fields such as sports, music, and business. Although there recently has been a great interest in coaching applied to surgery, the need for surgical coaching, in our experience, has been far from universally accepted. The purpose of this paper is to critically

review the best papers in surgical coaching, to identify the level of evidence supporting surgical coaching and to describe areas of investigation in which the level of evidence could be improved. With increased focus on improving quality of care in surgery, surgical coaching may provide a viable mechanism for both technical and nontechnical skill (NTS) improvements in surgery.

For decades, surgical training has followed the apprenticeship model. Considered a type of coach, a surgeon-teacher taught and assessed an individual trainee's surgical skills. However, this method has been criticized because the traditional assessment of surgical skills is commonly associated with competency determination based on inadequate metrics.<sup>1,2</sup> Moreover, the traditional apprenticeship

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model focuses on technical skills at an individual level without much emphasis on NTS. This is now changing as a number of groups, including the Accreditation Council for Graduate Medical Education, the American College of Surgeons, and the Surgical Council on Resident Education, have included NTS as part of the required core competencies<sup>3</sup> and training curricula for surgeons. This inclusion is based on the increasing evidence that team training interventions in NTS suggest a reduction in communication failures<sup>4</sup> and measurable decreases in surgical morbidity and mortality.<sup>5,6</sup>

Apart from teaching trainees, there is a current lack of coaching for practicing surgeons and thus potential benefit in assessing performance improvement.<sup>7,8</sup> Hu et al<sup>9</sup> showed that video-based coaching was valuable for surgeons at all stages of their career. Coaching as a method of enhancing performance is not a new phenomenon and is in fact commonly encountered in many other professional fields such as sports, music, education, and business.<sup>8,10</sup>

Regardless of the level of expertise of the person being coached, some experts argue that coaching in surgery is necessary because surgeons require deliberate practice to master tasks.<sup>11</sup> A critical component of achieving this mastery is constructive feedback provided by an expert coach to mediate self-directed development.<sup>12</sup> Coaches may behave differently depending on whom they are coaching. For example, a coach may act more as a partner and a collaborator for practicing surgeons and more as a teacher and an instructor for trainees. Tailoring the style of coaching would allow trainees a smoother transition into independent practice and practicing surgeons to reach and/or maintain expertise.<sup>7</sup>

As professional surgical societies begin to recognize the need for surgical coaching at all levels, we will need to expand beyond the traditional apprenticeship paradigm to fit today's surgical culture and needs. We found an increasing number of studies seeking to present different coaching methods in surgery, but found no published systematic review of the coaching methods employed. The purpose of this review is to summarize the quantity and the quality of studies that implement coaching methods to enhance surgical performance in both surgeons and surgical trainees. We sought to determine the main outcomes and strength of evidence for each intervention in order to provide a reference for the development of impactful coaching strategies to improve valued skills and enhance safe practices in the operating room.

## METHODS

**Search strategy.** A systematic literature search was conducted using the databases PubMed (1809 to 11/18/2013—note that records are selective from 1809 to 1965; from 1966 to present, records are comprehensive), and PsychINFO (1597 to 11/18/2013—note that comprehensive coverage starts from the 1880s). Search terms “coaching,” “mentoring,” “debriefing,” “non-technical skills,” “leadership,” “decision making,” “situation awareness,” “learning,” “communication,” “teamwork,” “technique,” “technical skills,” “performance,” “review,” and “improvement” were linked with the medical subject heading “surgery” using the Boolean operator AND. At the initial search stage, no restrictions were applied to retrieve a comprehensive set of articles. In addition to these database searches, a search by hand for articles on coaching was conducted based on the references from recent articles, and contents pages of specific journals. Two authors (H.M. and D.R.M.) identified the relevant articles for full-text review by reviewing the titles and abstracts and reaching a mutual consensus.

**Definition of coaching.** For the purpose of the literature search and data extraction, we defined coaching as “a form of inquiry-based learning characterized by collaboration between individuals or groups and more accomplished peers.”<sup>13</sup>

**Inclusion/exclusion criteria.** Studies were included in the review if they involved coaching of surgeons and/or surgical trainees in the operating room or simulated operating room. Only original articles, published in English language in peer-reviewed journals were included. We included original research, review, or commentary articles. Studies were excluded if they deviated overtly from the study topic or if the study group included only nonsurgical health professionals, had no surgical intervention, had no measured outcome, or had the sole outcome of knowledge or participant satisfaction.

**Data extraction and synthesis.** Three authors (H.M., D.R.M., S.Y.) independently reviewed the full texts of the relevant articles in a systematic fashion by using a predetermined data extraction form developed for this review. The fields on the form included author, year, country, target group, study design, study format, study content, learner assessment, coach assessment, outcome, main findings, coaching target, and intervention timing (data available upon request).

**Data analysis and grading of evidence.** Three of the authors (H.M., D.R.M., S.Y.) independently assessed the quality of the extracted studies by using 2 different modes of evaluation: the Grading of Recommendations Assessment, Development

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