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**EFFECTIVENESS OF CONTINUING MEDICAL EDUCATION:  
UPDATED SYNTHESIS OF SYSTEMATIC REVIEWS**

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## EXECUTIVE SUMMARY

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### EFFECTIVENESS OF CONTINUING MEDICAL EDUCATION: UPDATED SYNTHESIS OF SYSTEMATIC REVIEWS

RONALD M. CERVERO AND JULIE K. GAINES

JULY 2014

The medical profession has experimented with a practice-based model of continuing education since the 1960s. The succeeding decades have seen an expansive elaboration and extension of this educational model and have led to hundreds of research studies that sought to understand the link between continuing education and physician performance and patient health outcomes. From 1977 to 2002, there had been 31 published systematic reviews of these individual research studies that could inform the design of effective continuing medical education (CME). Since the publication of Robertson, Umble, and Cervero (2003), additional systematic reviews have been published and in tandem with this new research, the movement to reform continuing medical education has accelerated. In the context of this expanding and increasingly sophisticated literature base, the overall purpose of this report is to understand the relationship between the substantial evidence base about the effectiveness of CME and the wider literature on reform in CME. We identified eight systematic reviews of CME effectiveness that were published since 2003, with the inclusion criteria: 1) primary research studies in CME were reviewed, 2) physicians' performance and/or patient health outcomes were included as outcome measures, and 3) the reports were published since 2003.

Five of the eight systematic reviews asked the question: "Does CME improve physician performance and patient health outcomes?" The reviews consistently reached the same conclusion as the previous synthesis (Robertson, Umble, & Cervero, 2003) of the systematic review literature: CME has a positive impact on physician performance and patient health outcomes. Consistent with the previous synthesis, the five reviews also conclude that CME has a more reliably positive impact on physician performance than on patient health outcomes. These eight systematic reviews also asked the question: "What types of CME are effective?" The reviews buttress previous research showing that CME leads to improvement in physician performance and positive patient health outcomes if it is more interactive, uses more methods, involves multiple exposures, is longer, and is focused on outcomes that are considered important by physicians. The authors of these studies argue that this research area is in the early stages and needs greater theoretical and methodological sophistication regarding the mechanisms of action by which CME produces these positive outcomes.

Although major national reports by the Macy Foundation and the IOM summarize the evidence base showing that CME is effective and supporting evidence-based principles for designing effective CME, the reports' overall conclusions are generally, and paradoxically, critical of CME. Articles in major medical journals reflect a range of alignment with the evidence base about CME effectiveness. There are viewpoints in the CME reform literature published in major medical journals that appear to be unaware of the evidence base related to CME effectiveness or that do not seem to accept the evidence base demonstrating CME effectiveness. In contrast, there are viewpoints published in the major medical journals that assume the question of CME effectiveness is settled and position CME in a larger system of influences on physician performance and patient health outcomes. The ABMS Evidence Library highlights "research studies and articles supporting the value of Board Certification and Maintenance of Certification. It reflects an effort to systematically present the empirical evidence in the current peer-reviewed literature." Of the 220 articles in the ABMS Evidence Library supporting the Maintenance of Certification, 129 demonstrate the positive impact of CME on physician performance and patient health outcomes.

## BACKGROUND AND PURPOSE

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The fundamental purpose of continuing education is to “facilitate the successful performance of practitioners in the diverse practice characteristic of professional work” (Houle, 1980, p. 12). This purpose has been the animating principle for scholars and leaders across the professions for several decades (Cervero, 1988; Cervero, 2011; Dryer, 1962; Houle, 1980; Nowlen, 1988). The medical profession, in particular, has experimented with a practice-based model of continuing education since the 1960s. With the article “*Continuing Education for What?*” (Miller, 1967) and many practical experiments in practice-based learning, a new era of continuing medical education (CME) was ushered in (Manning, 2003). For example, Storey (1966) reported on a project where physicians recorded the clinical problems they faced over a two-day period as a basis for understanding their educational needs. The succeeding decades have seen an expansive elaboration and extension of this educational model (Cervero, 2011). This emphasis on practice has led to many research studies that sought to understand the link between continuing education and physician performance and patient health outcomes. These studies, many of which were randomized controlled trials, have shown that educational interventions under the right conditions can make a difference in physician performance and patient health outcomes. Starting in 1977, there have been many systematic reviews of these individual research studies (Robertson, Umble, & Cervero, 2003; Umble & Cervero, 1996) that could inform the development of evidence-based principles for designing effective continuing education. These systematic reviews have asked two fundamental questions: 1) Does continuing education improve performance and patient health outcomes? and 2) What are the mechanisms of action that lead to positive changes in these outcomes?

Two articles have synthesized these systematic reviews by way of showing the consensus of evidence in response to these two questions. Umble and Cervero (1996) synthesized 16 reviews of continuing education for health professionals that were published between 1977 and 1993. They identified two waves of systematic reviews that asked whether continuing education (CE) can have an impact on performance and patient health outcomes. The first wave of eight publications asking the question, “Does CE have an impact?” found that CE can more reliably change health professionals’ knowledge and competence than their performance and patient health outcomes. The second wave of eight publications (4 of which were statistical meta-analyses) found the primary influences on change were: Having conducted a needs-assessment for performance change, program intensity, including learners from the same practice setting, and administrative support and policy incentives for practice changes. They recommended that new research should focus on the question of why, not if, CE has an impact on performance and patient health outcomes. Robertson, Umble, and Cervero (2003) published an update seven years later of 15 new systematic reviews that had been published between 1994 through 2002. This article reinforced the central conclusions of the 1996 synthesis, showing that CE does have an impact, with knowledge and competence easier to change than performance and patient outcomes. The primary influencers of improved outcomes were that CE: a) is based on practice-based needs-assessment, b) is ongoing, c) uses interactive learning methods, and d) is contextually relevant.

Since the publication of Robertson, Umble, and Cervero (2003), additional systematic reviews have been published about the effectiveness (Bluestone, et al., 2013; Brandt, et al., 2014; Brennan & Mattick, 2013; Rosen, et al., 2012) and evaluation approaches (Curran & Fleet, 2005; Mazmanian, et al., 2012; Ratanawongsa, et al., 2008; Tian, Atkinson, Portnoy & Gold, 2007) in health professions

continuing education. In tandem with this focus, the movement to reform CME has accelerated (Balmer, 2013; Mazmanian, 2009; Moore, Green, & Gallis, 2009). In the context of this expanding and increasingly sophisticated literature base, the overall purpose of this report is to understand the relationship between the substantial evidence base about the effectiveness of CME and the wider literature on reform in CME. Specifically, the report: 1) Synthesizes the systematic review literature about the effectiveness of CME since the publication of Robertson, Umble, and Cervero (2003), and 2) Analyzes how the CME reform literature integrates the evidence presented in the systematic reviews discussed in this report.

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## METHODS

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We identified eight systematic reviews of CME effectiveness that were published since 2003, which are summarized in Table 1. We searched MEDLINE, CINAHL, Academic Search Complete, and Education Research Complete using the process described in the Appendix. Inclusion criteria were: 1) primary research studies in CME were reviewed, 2) physicians' performance and/or patient health outcomes were included as outcome measures, and 3) the reports were published since 2003. The inclusion criteria were more restrictive than those used for Umble and Cervero (1996) and Robertson, Umble, and Cervero (2003). Those two articles used studies that included the impact of continuing education for the health professions, while this report includes primarily studies of CME effectiveness. In comparison with the number of reviews (N=8) included in this report, nine of the articles in Robertson, Umble, and Cervero (2003) focused on CME.

The systematic reviews published since 2003 show a greater level of sophistication in terms of the research questions and research methods used. In 16 articles used in the Umble and Cervero review (1996), eight (50%) only asked the general question: "Is CE Effective?" and the remaining eight studies focused on the more sophisticated question of what mechanisms of action related to CE influence physician performance and patient health outcomes. In the 2003 article, three (20%) of the 15 systematic reviews asked only "Is CE Effective?" while the other 12 focused on the mechanisms of action. In contrast, all eight of the systematic reviews in this report focused on the mechanisms of action. Five of these articles, in addition, provide an answer to the global question, "Is CME Effective?" This trend shows that the literature has followed the recommendation in Robertson, Umble, and Cervero (2003) that: "...primary studies and syntheses no longer need to ask if CE, in general, improves practice or other outcomes because there is so much evidence that many kinds and combinations of CE do so" (p. 154). In terms of research methods, the eight systematic reviews have included only those primary studies that used randomized controlled trials (RCT) or quasi-experimental designs; in comparison, the 2003 article used six systematic reviews that had no inclusion criteria, four that graded primary studies, and only five that limited the primary studies to RCT or quasi-experimental designs.

Since 2008 there have been viewpoints published in major medical journals (e.g., *JAMA*, *BMJ*) and national reports (Hager, Russell, & Fletcher, 2008; Institute of Medicine, 2010) focused on CME effectiveness. In addition, the ABMS maintains an Evidence Library, which is online database that highlights research studies and articles supporting the value of Board Certification and Maintenance of Certification. It reflects an effort to systematically present the empirical evidence in the current peer-reviewed literature, including the impact of accredited CME. We undertook an analysis of how the evidence used in these publications and in the Evidence Library integrated the evidence from the systematic reviews discussed in this report.

**Table 1. Systematic Reviews of CME Effectiveness Published Since 2003**

Author	Title	Year	# of Studies	Years of Studies	Type of Studies
Al-Azri & Ratnapalan	Problem-based learning in continuing medical education: Review of randomized controlled trials	2014	15	2002 – 2009	RCT/Quasi-Experimental
Bloom	Effects of continuing medical education on improving physician clinical care and patient health	2005	26	1984 – 2001	Systematic Reviews
Davis & Galbraith	Continuing medical education effect on practice performance	2009	105	1981 – 2006	RCT/Quasi-Experimental
Forsetlund, et al.	Continuing education meetings and workshops: Effects on professional practice and health care outcomes	2009	81	1983 – 2006	RCT
Lowe, Bennett, & Aparacio	The role of audience characteristics and external factors in continuing medical education and physician change	2009	13 (internal) 6 (external)	1981 – 2006	RCT/Quasi-Experimental
Mansouri & Lockyer	A meta-analysis of continuing medical education effectiveness	2007	31	1984 – 2004	RCT/Quasi-Experimental
Marinopoulos, et al.	Effectiveness of continuing medical education	2007	136	1981 – 2006	RCT/Quasi-Experimental
Mazmanian, Davis, & Galbraith	Continuing medical education effect on clinical outcomes	2009	37	1981 – 2006	RCT/Quasi-Experimental

### **Does CME Improve Physician Performance and Patient Health Outcomes?**

Five of the systematic reviews addressed the question of the impact of CME, in general, on performance and patient health outcomes (Davis & Galbraith, 2009; Forsetlund, et al., 2009; Mansouri & Lockyer, 2007; Marinopoulos, et al., 2007; Mazmanian, Davis, & Galbraith, 2009). A systematic review was completed by the Agency for Health Research and Quality (Marinopoulos, et al., 2007) that used 136 individual articles and 9 systematic reviews published from 1981 to 2006 to determine the “Effectiveness of Continuing Medical Education.” The report used a broad definition of CME that included delivery formats as diverse as lectures, problem-based learning, and point of care learning. The overall conclusion is that: “CME appears to be effective at the acquisition and retention of knowledge, attitudes, skills, behaviors and clinical outcomes” (p. v). However, CME’s impact was less consistent as outcomes moved from knowledge to patient outcomes: Knowledge (22 of 28, 79% of studies), attitudes (22 of 26, 85%), skills (12 of 15, 80%), practice behavior (61 of 105, 58%), clinical practice outcomes (14 of 33, 42%).

The American College of Chest Physicians used the AHRQ study’s database of articles to develop evidence-based educational guidelines, organizing its recommendations for CME intended to improve physician performance (Davis & Galbraith, 2009) and clinical outcomes (Mazmanian, Davis, & Galbraith, 2009). Davis and Galbraith (2009) found that the majority of studies (61, 58%) showed that CME improved physician performance across a range of practices, including prescribing, screening, counseling about smoking cessation, diet, sexual practices, and guideline adherence. Long-term effectiveness was demonstrated in 47 studies, ranging from 30 days to six months (17 studies) to one year or longer (30 studies). While the majority of studies reported positive outcomes, slightly less than 30% did not, and 24 of those studies analyzed outcomes for long-term effectiveness after 30 or more days. Based on this evidence, the paper concludes that: “CME interventions be used to improve physician performance” (p. 42S). Mazmanian, Davis, and Galbraith (2009) found that of the 33 studies that measured clinical outcomes, only 13 showed a beneficial effect of CME. Although this represents a minority of studies, the authors explain that “the potential for a beneficial effect of CME on clinical outcomes outweighed the perceived risks”

(p. 51S). With less evidence to support the impact of CME on clinical outcomes than on physician performance, the authors conclude: “We suggest that CME activities be used to improve clinical practice outcomes” (p. 51S). Using “suggests” in the recommendation is consistent with the evidence that shows less certainty about CME’s impact on patient health outcomes.

Forsetlund, et al.’s (2009) study was conducted as a Cochrane systematic review, updating previous studies (Davis, et al., 1999; O’Brien, et al. 2001). Although this review includes studies from roughly the same timeframe (1983 to 2006) as Marinopoulos, et al. (2007), their definition of CME is more restrictive. The Cochrane review used synchronous group learning “meetings” defined as courses, conferences, lectures, workshops, seminars, and symposia. This update included 49 new studies since 2001 that were added to the 32 studies from the previous reviews, making a total of 81 RCTs. These studies reported an objective measure of either performance (58, 72%), patient health outcomes (9, 11%), or both (14, 17%). The follow up on outcomes ranged from 14 days to two years, with a median follow up of six months. The report concludes that “educational meetings alone or combined with other interventions can improve professional practice and the achievement of treatment goals by patients” (p. 2). This conclusion is consistent with previous versions of the reviews but with twice as many studies included, showing that CME does result in small to moderate improvements in performance, and “as would be expected (Umble, 1996), smaller improvements in patient outcomes” (Forsetlund, et al., 2009, p. 14).

Mansouri and Lockyer’s review (2007) differs from the other four reports in that they used a statistical meta-analysis, calculating effect sizes for the outcomes. Their definition of CME was similar to the one used by Marinopoulos, et al. (2007), including not just educational meetings but also educational outreach, auditing and peer group discussion, online education, and written feedback. The timing of the outcomes measurement ranged from immediately following the CME activity to 108 weeks later. They used 31 studies including 61 interventions in the same general timeframe as the other reports (1984 to 2004). Of the 61 interventions, 57 showed a moderate to large positive effect size and four reported a negative effect size. The mean positive effect size was greatest for physician knowledge (15 studies,  $r = 0.22$ ), lower for physician performance (19 studies,  $r = 0.18$ ), and lowest for patient health outcomes (8 studies,  $r = 0.14$ ). CME’s overall lower impact on performance and patient health outcomes is consistent with the previous studies reported in this section.

These five systematic reviews used definitions of CME ranging from educational meetings (Forsetlund, et al., 2009) to more expansive learning activities (Davis & Galbraith, 2009; Mansouri & Lockyer, 2007; Marinopoulos, et al., 2007; Mazmanian, Davis, & Galbraith, 2009). The five reports were conducted with more rigorous scientific methods than the 31 systematic reviews used in the previous syntheses (Robertson, Umble, & Cervero, 2003; Umble & Cervero, 1996) by virtue of only including primary studies that used RCT or experimental design research methods. Nevertheless, all five reviews reached the same conclusion as the previous syntheses: CME has a positive impact on physician performance and patient health outcomes. Consistent with the previous syntheses, the five reports also conclude that CME has a more reliably positive impact on physician performance than on patient health outcomes.

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## WHAT TYPES OF CME ARE EFFECTIVE?

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As the question of the overall impact of CME has now been settled with 39 systematic reviews published between 1977 and 2014, these eight new reviews focused on furthering an evidence-based understanding of the types of CME that are effective and the conditions that influence the effectiveness of CME on physician performance and patient health outcomes. These eight reviews are discussed in their order of publication date, ranging from 2005 to 2014.

Bloom (2005) analyzed 26 systematic reviews for the impact of eight educational methods: didactic programs, printed materials, opinion leaders, clinical practice guidelines, interactive education, audit and feedback, academic detailing, and reminders. All 26 reviews tested the effects on physician performance and 16 tested effects on patient health outcomes. He found that interactive methods (audit/feedback, academic detailing, interactive education, and reminders) are the most effective at improving performance and patient health outcomes. Clinical practice guidelines and opinion leaders have a moderate effect while didactic presentations and printed materials alone have little or no beneficial effect on these outcomes. He concludes that we know what works: “it is apparent that insufficient information on the most-effective physician education is not the main problem” (p. 383). But he also cautions that “relying on effective education techniques alone is insufficient...[because] no single approach works best under all circumstances” (p. 383) because these educational techniques are used in specific social, political, and economic environments that influence the effectiveness of CME.

Marinopoulos, et al. (2007) concluded that: a) live media is more effective than print, b) multimedia is more effective than single media interventions, c) multiple exposures are more effective than a single exposure, d) interactive techniques are more effective than didactic techniques, and e) simulation methods are effective for improving psychomotor and procedural skills. They also found that the number of articles that addressed internal (e.g., physician age, gender, practice setting, years in practice) and external characteristics (e.g., CME credit, financial rewards) of CME activities was too small and that the studies were too heterogeneous to determine if any of these are crucial for CME effectiveness. The report concludes that “Future research on CME should be based on a sound conceptual model of what influences the effectiveness of CME” (p. 8).

Three other publications used this database to provide recommendations for evidence-based educational guidelines for CME. Davis and Galbraith (2009) analyzed 105 articles that focused on physician performance and found that the evidence was strong enough to recommend certain types of CME be used to improve physician performance. They concluded that single live and multiple media be used to improve performance and that print media alone should not be used to improve performance. Educational techniques studied included academic detailing, case-based learning, demonstrations, feedback, lectures, problem-based learning, point-of-care techniques, role play, and patient simulations. CME activities that use multiple educational techniques have a greater overall positive effect than those that use a single technique. Finally, the evidence is strong enough to recommend that multiple-exposure CME is more effective than single-exposure CME. The report concludes that more research is needed on the comparative effectiveness of different educational techniques and contextual influencers, such as learner motivation and setting and degree of change required.

Mazmanian and Davis (2009) analyzed 37 articles that focused on patient health outcomes. Consistent with their recommendation related to the overall impact of CME, the evidence was only

strong enough to “suggest” that certain types CME be used to improve patient outcomes. Similar to the types of CME that positively impact performance, they suggest using multiple media, multiple techniques of instruction, and multiple exposures to content to meet instructional objectives intended to improve clinical outcomes. As with Bloom’s recommendation to account for the broader context of patient care in future research on the effectiveness of CME, they conclude: “The evidence, although weak, supports the notion that CME activities should be used to improve clinical outcomes. It is currently impossible, however, to determine the extent to which the health-care system, the interdisciplinary health-care team, or the individual physician is responsible for the observed outcomes” (pp. 53S-54S). They recommend that future research should articulate the causal linkages among CME, physician performance, and clinical outcomes.

Lowe, Bennett, and Aparicio (2009) analyzed the impact of audience characteristics (13 studies) and external factors in the CME environment (6 studies) that influence physician performance. They concluded that there was not enough evidence to make recommendations for evidence-based educational guidelines. They observe that the search criteria were limited to the approach used for quantitative clinical research and this influenced the articles included in the review. They conclude that although the AHRQ Evidence Report provides no substantive findings about the influence of internal or external factors on the effectiveness of CME, “it represents the type of work that is needed to bring greater understanding of how physicians learn and change” (p. 59S).

Mansouri and Lockyer (2007) analyzed the effect sizes for 31 studies generating 61 CME interventions. Their examination of variables that moderate the impact of CME on physician performance and patient health outcomes found larger effect sizes when CME is interactive, uses multiple methods, is longer, and is designed for a small group of physicians from a single discipline. They conclude that although the study shows that the overall effect of CME on physician performance and patient health outcomes is “small and not always consistent, our examination of moderator variables suggests that the addition of specific known and proven moderator variables will improve the effects of CME” (p. 13).

Forsetlund, et al. (2009) analyzed 81 trials for the types of educational meetings that impact physician performance and patient health outcomes. They found that more positive outcomes were achieved if the educational meetings had a higher proportion of the intended audience, had at least some interactive activities, involved less complex behaviors, and targeted more serious outcomes. They also found that there was no significant difference between educational meetings alone and multifaceted interventions nor among settings in which the CME was conducted. Although there was a trend for more intense meetings to have positive effect, this was not statistically significant. The authors caution that the approach they used to categorize “intensity” was not adequate to detect relevant differences in the outcomes. The authors recommend that the research move beyond comparing educational meetings to no interventions and focus on direct comparisons of different types of education, different group sizes, and education of different intensities. Similar to Marinopolous, et al. (2007) and Mazmanian and Davis (2009), they argue there is a need for conceptual models to direct the research about what type of CME is effective: “Evaluations of conceptual models or theories to tailor continuing medical education in order to maximize its effectiveness are also needed” (p. 15).

Al-Azri and Ratnapalan (2014) reviewed 15 randomized controlled trials of the impact of problem-based learning (PBL) that included 13 studies with physician performance (N=10) and patient health outcomes (N=3). The CME intervention in 7 studies included case-based e-learning and eight other studies were live CME ranging in length from one hour to one-half day. They found that

physician performance showed a positive trend for groups participating in PBL, but there were no significant differences for the studies on patient health outcomes. The authors conclude that while PBL is perceived as effective, “there is limited evidence that PBL in continuing education enhances physicians’ performance or improves health outcomes” (p. 164). They recommend that educators should consider multiple factors, including cost effectiveness, when implementing PBL methodology in CME.

These eight systematic reviews provide additional support to the body of knowledge that is developing about the types of CME that lead to improved physician performance and patient health outcomes. The reviews buttress previous research showing CME that is more interactive, uses more methods, involves multiple exposures, is longer, and is focused on outcomes that are considered important by physicians lead to more positive outcomes. However, the authors of these studies make clear that the research in this area is in the early stages and needs greater theoretical and methodological sophistication regarding the mechanisms of action by which CME produces positive outcomes. Finally, several authors make the argument that future research must take account of the wider social, political, and organizational factors that play a role in physician performance and patient health outcomes.

## **RELATIONSHIP OF CME REFORM LITERATURE AND CME EFFECTIVENESS EVIDENCE**

The purpose of this section is to analyze how the CME reform literature integrates the evidence presented in the systematic reviews discussed in this report. Two major national reports on the reform of continuing education in the health professions, but with a specific focus on CME, were issued by the Macy Foundation (Hager, Russell, & Fletcher, 2008) and the Institute of Medicine (2010). There has also been significant discussion about reforming CME expressed through viewpoint articles in the major medical journals, which have made reference to the CME effectiveness literature. We have selected exemplar articles that show a range of alignment with the evidence base in order to provide insights into how the CME effectiveness literature is being used in reform efforts. Finally, the AMBS Evidence Library is analyzed with respect to alignment with the CME effectiveness evidence literature presented in the previous section.

### **NATIONAL REPORTS**

The Macy and IOM reports each draw on the CME effectiveness literature, with individual chapters claiming that the evidence supports the proposition the CME does have a positive impact on physician performance and patient health outcomes. Yet the overall conclusions and recommendations of both reports is that the system of CME is not effective for these same outcomes.

Moore’s chapter in the Macy report (Moore, 2008) summarizes the evidence literature:

“For many years, however, people have expressed concerns about the effectiveness of CME. As a result, confidence in the ability of CME to address identified gaps in healthcare delivery was not high. But significant work over the past 20 years has demonstrated the effectiveness of CME, *if* [italics in original] it is planned and implemented according to approaches that have been shown to work. (p. 3)”

In reference to ‘approaches that have been shown to work,’ Moore cites two of the systematic reviews (Mansouri & Lockyer, 2007; Marinopoulos, et al., 2007) that are included in previous section. The remainder of his chapter reviews the evidence about how physicians learn and proposes six evidence-based principles that should be used to plan formal CME that will impact performance and patient health outcomes. Referencing the studies of CME effectiveness, the chapter by Davis and Loofbourrow (2008) shares the perspective of Moore’s chapter. They argue that formal conference-based CME should not cease to exist, but rather planners should recognize that it:

“..has a purpose (the dissemination of new information, for example) that would be useful at least to some clinicians but that must carefully tailored and matched to learning and course objectives and the practical and clinical learning needs of all professionals considered the target of an educational intervention. (p. 159)”

Although the review of evidence in these two chapters is in agreement with the systematic reviews in the previous section, the overall tenor and conclusion of the Macy report was generally, and paradoxically, critical of the effectiveness of CME as noted in the Chairman’s Summary of the Conference (2008): “CE, as currently practiced, does not focus adequately on improving clinician performance and patient health. There is too much emphasis on lectures and too little emphasis on helping health professionals enhance their competence and performance in their daily practice” (p. 13).

The IOM report demonstrated this same dynamic between the evidence cited and the overall assessment of CME. The report, *Redesigning Continuing Education in the Health Professions* (2010), opens with the following assessment of the impact of CME:

“Continuing education (CE) is the process by which health professionals keep up to date with the latest knowledge and advances in health care. However, the CE ‘system,’ as it is structured today, is so deeply flawed that it cannot properly support the development of health professionals. CE has become structured around health professional participation instead of performance improvement. This has left health professionals unprepared to perform at the highest levels consistently, putting into question whether the public is receiving care of the highest possible quality and safety. (Institute of Medicine, 2010, p. ix)”

However, the chapter on “Scientific Foundations of Continuing Education” reaches similar conclusions as this report about the questions, “Is CME Effective?” and “What Types of CME are Effective?” The IOM conclusions were based on an analysis of 62 studies and 20 systematic reviews, including several that were covered in the previous section of this report. The report concludes:

“...there is evidence that CE works, in some cases, to improve clinical practice and patient outcomes. ...CME was found, in general, to be effective for acquiring and sustaining knowledge, attitudes, and skills, for changing behaviors, and for improving clinical outcomes. (p. 39)”

In terms of the evidence about what types of CME are effective, the IOM report summarizes evidence in similar ways to the previous section of this report. The IOM report concluded that effective CE activities have the following features:

- Incorporate needs assessments to ensure that the activity is controlled by and meets the needs of health professionals;

- Are interactive;
- Employ ongoing feedback to engage health professionals in the learning process;
- Use multiple methods of learning and provide adequate time to digest and incorporate knowledge; and
- Simulate the clinical setting.

In sum, although major national reports by the Macy Foundation and the IOM summarize the evidence base showing that CME is effective and supporting evidence-based principles for designing effective CME, the reports' overall conclusions are generally, and paradoxically, critical of CME.

### *VIEWPOINTS IN MAJOR MEDICAL JOURNALS*

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The viewpoints in medical journals that address the effectiveness of CME demonstrate a range of alignment with the evidence presented in this report that concluded CME has a positive impact on physician performance and patient health outcomes. This section reviews three articles that exemplify the position that CME is not effective (in *JAMA* and *BMJ*) and two that express the viewpoint the CME is effective (in *Academic Medicine* and *Advances in Health Sciences Education: Theory and Practice*).

Woollard's editorial (2008) in *BMJ* reported favorably on the Macy report:

“The unwavering focus of professional continuing education should be to improve clinical performance and patients' health. The report begins by saying that at present continuing education will not achieve this aim. The failings include: the methods of education, the focus of education, systems of accreditation, commercial influence, lack of interprofessional continuing education, and limited use of datasets and information technology. ... The account of these failings is incisive and is supported by experience and evolving evidence [*italics added*]. (p. 470)”

No reference was made to the evidence base in the Macy report showing that CME is effective and that there are evidence-based principles for designing effective CME. He concludes with comparing the Macy report to the Flexner report, saying that: “Although the Macy report is neither as biting nor eloquent as Flexner's report, if the profession in the US and its partners respond effectively to its content, the impact of continuing education on clinical practice and patients' health will be profound” (p. 470).

In their Commentary in *JAMA*, Campbell and Rosenthal (2009) also reference the Flexner report, saying that “A century later, another component of the continuum of medical education requires equally sweeping reform—continuing medical education” (p. 1807). They argue that many of the criticisms that Flexner gave for undergraduate medical education in 1910 are true of CME now. One of these is the lack of an effect on patient care, as they argue: “Traditional CME is not adequately focused on improving patient outcomes. In fact, *there is scant evidence that CME actually improves patient outcomes* [*italics added*] (p. 1807). Curiously, the citation given for this point is the Marinopoulos, et al. (2007) systematic review that actually concluded that CME is effective for clinical outcomes.

A recent report of a conference sponsored by *BMJ* and the Association of the British Pharmaceutical Industry (Hawkes, 2013) summarized the keynote by Janet Grant. She said that even though CME is important, evidence on “how best it can be done is scarce and there is no adequate way of measuring its effectiveness” (p. 4255). Grant is quoted as saying:

“There are a lot of declamatory statements and a lot of assertions made about continuing medical education, but not a lot of evidence, no common rationale, no systematic relationship to need, and *no robust evidence of beneficial effects on a doctor’s practice* [italics added]. (p. 4255)”

Grant concluded that doctors learn in many ways and that “Educational events are not very important in the hierarchy of how doctors learn” (p. 4255).

In contrast to these three viewpoint articles, Dorman and Miller (2011) assume that the question of CME effectiveness has been settled. They argue that CME is in the midst of a great transformation from a purely educational paradigm to one that functions more broadly as a professional development paradigm and that: “CME today is not the CME of the past. *Its historical reputation for ineffectiveness has been dispelled* [italics added] (p. 1339). They believe that the current focus on performance-improvement CME will continue to accelerate, and that “the effectiveness of CME will be measured...by improved performance and meaningful patient outcomes” (p. 1339).

The most provocative viewpoint about CME effectiveness is reflected in the title of Olson and Tooman’s (2012) article: “Didactic CME and Practice Change: Don’t Throw that Baby Out Quite Yet.” They are critical of the current theoretical consensus about CME and performance change as well as the research methods used for effectiveness studies that valorize randomized controlled trials. In a well-argued viewpoint, they conclude that:

“We have come to believe that the prevailing view—that the value of didactic CME should rest on its capacity to directly influence practice—reflects an impoverished view of how change in clinical practice actually occurs and of the many important functions didactic CME can serve in the interest of improving practice. (p. 441)”

They believe that formal, didactic CME can play an important role in facilitating change in clinical practice, not as the dominant CME modality, but rather as an element in a strategic program of action, “in which a portfolio of methods and activities is deployed, each designed to serve specific purposes as part of a larger plan for improving clinical practice, patient outcomes, and population health” (p. 449).

These five articles in major medical journals reflect a range of alignment with the evidence base reviewed in the previous section. There is a thread in the CME reform literature that appears to be unaware of the evidence base related to CME effectiveness or that may not accept the evidence base as demonstrating CME effectiveness. In contrast, there are viewpoints that assume the question of CME effectiveness has been settled and position CME in a larger system of influences on physician performance and patient health outcomes.

In 2000, the 24 Member Boards of the American Board of Medical Specialties (ABMS) agreed to evolve their recertification programs to one of continuous professional development – ABMS Maintenance of Certification® (ABMS MOC®). In 2006, all 24 Member Boards received approval of their ABMS MOC program plans and the boards are now in the process of implementation. The four-part process for continuous learning includes licensure and professional standing, lifelong learning and self-assessment, cognitive expertise, and practice improvement assessment. Balmer (2013) explains that: “The ABMS MOC process is designed to document that physician specialists, certified by one of the ABMS member boards, engage in lifelong learning and demonstrate the necessary competencies essential to providing quality and safe patient care” (p. 176).

The ABMS Evidence Library (<http://www.abms.org/evidencelibrary/>) is designed to highlight “research studies and articles supporting the value of Board Certification and Maintenance of Certification. It reflects an effort to systematically present the empirical evidence in the current peer-reviewed literature.” Of the 220 articles in the Library, ABMS identifies 129 as showing the effectiveness of CME. These articles, which were published between 1981 and 2013, are mostly randomized controlled trials that demonstrate the impact of CME on physician performance and patient health outcomes. Of these 129 articles, two were systematic reviews (Mansouri & Lockyer, 2007; Mazmanian & Davis, 2002) and the remainder were individual studies, many of which were used in the systematic reviews referenced in this report.

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## SUMMARY AND CONCLUSIONS

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Beginning in the 1960s, there have been many research studies that sought to understand the link between continuing education and physician performance and patient health outcomes. Between 1977 and 2002, 31 systematic reviews of these individual research studies that could inform the design of effective CME had been published (Robertson, Umble, & Cervero, 2003; Umble & Cervero, 1996). Since the publication of Robertson, Umble, and Cervero (2003), eight additional systematic reviews have been published and in tandem with this new research, the movement to reform continuing medical education has accelerated. We synthesized the findings of the eight new systematic reviews, leading to the following conclusions:

- 1) CME does improve physician performance and patient health outcomes;
- 2) CME has a more reliably positive impact on physician performance than on patient health outcomes; and
- 3) CME leads to greater improvement in physician performance and patient health if it is more interactive, uses more methods, involves multiple exposures, is longer, and is focused on outcomes that are considered important by physicians.

Five of the systematic reviews addressed the question of “Is CME Effective?” and were conducted with more rigorous scientific methods than the 31 systematic reviews used in the previous syntheses by virtue of only including primary studies that used RCT or experimental design research methods. Nevertheless, all five reviews consistently reach the same conclusions as the previous two syntheses. These eight systematic reviews also provided additional support to the body of knowledge that is developing about the types of CME that lead to improved physician performance

and patient health outcomes. The reviews buttress previous research showing CME activities that are more interactive, use more methods, involve multiple exposures, are longer, and are focused on outcomes that are considered important by physicians lead to more positive outcomes.

The CME reform literature does not always integrate what is known from the published literature about CME effectiveness. Although major national reports by the Macy Foundation and the IOM summarize the evidence base showing that CME is effective and supporting evidence-based principles for designing effective CME, the reports' overall conclusions are generally, and paradoxically, critical of CME. Articles in major medical journals reflect a range of alignment with the evidence base about CME effectiveness. There are viewpoints in the CME reform literature published in major medical journals that appear to be unaware of the evidence base related to CME effectiveness or that do not seem to accept the evidence base demonstrating CME effectiveness. In contrast, there are viewpoints published in the major medical journals that assume that the question of CME effectiveness is settled and position CME in a larger system of influences on physician performance and patient health outcomes. The ABMS Evidence Library reflects an effort to systematically present the empirical evidence in the current peer-reviewed literature as it supports Maintenance of Certification. Nearly 60% of the 220 articles in the Library are randomized controlled trials or systematic reviews that demonstrate the positive impact of CME on physician performance and patient health outcomes.

The authors of the systematic reviews make clear that the research regarding mechanisms of action by which CME improves physician performance and patient health outcomes is in the early stages and needs greater theoretical and methodological sophistication. Several authors make the argument that future research must take account of the wider social, political, and organizational factors that play a role in physician performance and patient health outcomes. They also recommend using new methods of systematic reviews that have been developed for complex policy interventions (Craig, Dieppe, Macintyre, Mitchie, Nazreth, & Petticrew, 2008; Pawson, Greenhaigh, Harvey, & Walshe, 2005).

We now have 39 systematic reviews that present an evidence-based approach to designing CME so that it is more likely to achieve the outcomes of improved physician performance and patient health outcomes. With this significant scientific evidence base in tandem with numerous reports of practical strategies for effective CME (Mazmanian & Davis, 2002), reforming CME is less a knowledge problem than a political problem of changing the systems of which CME is an important constituent element (Balmer, 2013; Cervero & Moore, 2011). As this system continues to be negotiated amidst the struggle between the educational agendas and political-economic agendas, it will be important to incorporate the insights from the scientific study of CME effectiveness.

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## APPENDIX: SEARCH PROCESS

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### MEDLINE

[[("Education, Medical, Continuing"[Mesh] OR CME OR "continuing medical education")] AND [(effective\* OR impact\* OR outcome\*) OR ("patient care" OR "Physician Practice" OR "Physician Performance")]] AND ["systematic review"[Title/Abstract] OR Meta-Analysis[ptyp] OR Review[ptyp] OR systematic[sb] ] Used the Filters: 2004 – 2014; English Language

### Viewpoint Articles (search in MEDLINE)

("JAMA: the journal of the American Medical Association"[Jour]) AND ("Education, Medical, Continuing"[Mesh] OR CME OR "continuing medical education") Filters: 2004 - 2014; English

("The New England journal of medicine"[Jour]) AND ("Education, Medical, Continuing"[Mesh] OR CME OR "continuing medical education") Filters: 2004 - 2014; English

("BMJ"[Jour]) AND ("Education, Medical, Continuing"[Mesh] OR CME OR "continuing medical education") Filters: 2004 - 2014; English

("Academic medicine: journal of the Association of American Medical Colleges"[Jour]) AND ("Education, Medical, Continuing"[Mesh] OR CME OR "continuing medical education") Filters: 2004 - 2014; English

### CINAHL

[[MH "Education, Medical, Continuing" OR continuing medical education OR CME] AND [(effective\* OR impact\* OR outcome\*) OR ("patient care" OR "Physician Practice" OR "Physician Performance")]] AND [(MH "Systematic Review") OR Publication Type: Meta Analysis, Review, Systematic Reviews]] Filters: 2004-2014; English Language

### Academic Research Complete and Education Search Complete\*

[[SU medicine -- study & teaching (continuing education) OR continuing medical education OR CME] AND [(effective\* OR impact\* OR outcome\*) OR ("patient care" OR "Physician Practice" OR "Physician Performance")]] AND [(SU meta-analysis OR SU systematic review OR SU systematic reviews medical research OR SU reviews)] Filters: 2004-2014; English Language

The same search strategy was used in Academic Research Complete and Education Search Complete.