Factors Influencing Physicians' Selection of Continuous Professional Development Activities: A Cross-Specialty National Survey

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Introduction: We sought to understand what influences physicians' decisions about participation in continuous professional development (CPD) activities, and how often physicians engage in specific CPD activities.

Methods: From September 2015 to April 2016, we administered a survey to 4648 randomly sampled licensed US physicians. Survey items addressed perceived barriers to CPD, factors that might influence participation in four prototypical CPD activities (reading an article, or completing a local activity, online course, or far-away course), and frequency of CPD engagement.

Results: Nine hundred eighty-eight (21.6%) physicians responded. The most important barriers were time (mean [SD] 3.5 [1.3], 1 = not important, 5 = extremely important) and cost (2.9 [1.3]). In prioritizing factors influencing participation in four prototypical CPD activities, topical relevance consistently had the highest average rank. Quality of content and time to complete the activity were also frequently selected. Over the past 3 years, most physicians reported having participated in patient-focused learning and self-directed learning on a weekly basis; quality improvement and local continuing medical education (CME) activities several times per year; online learning, on-site courses, and national board-related activities a few times per year; and interprofessional learning less than once per year. Physicians believed that they ought to engage more often in all of these activities except board-related activities. They would like CME credit for these activities much more often than currently obtained.

Discussion: The reasons physicians select a given CPD activity vary by activity, but invariably include topic and quality of content. Physicians want CME credit for the CPD activities they are already doing.

Keywords: education, medical, continuing, credentialing, licensure, medical, clinical competence, learning, workplace learning, gap analysis/needs assessment, program planning/curriculum development

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Physicians and other health professionals engage throughout their careers in continuous professional development (CPD), defined as "all activities intended to improve professional knowledge, skills, or performance."[1] Although much CPD occurs spontaneously, most US physicians must demonstrate evidence of CPD by regularly participating in continuing medical education (CME), which is a subset of CPD for which formal credit is awarded. CPD and CME are supported by a large network of accrediting bodies, professional societies, nonprofit institutions, and for-profit companies, yet expert panels in past years have noted "major flaws in the way [continuing education] is conducted, financed, regulated, and evaluated"[2] and that "current systems of [continuing education] do not meet the needs of health professionals as well as they should."[3] In response to these concerns, both CPD and CME have been the objects of ongoing strategic evolution.[4–6] There is a risk, however, that these changes will not be well received by the end-user physician. To effectively implement change, a deeper understanding of physician beliefs is needed. In particular, we need more information about the factors that influence physician decisions about participation in specific CPD and CME activities.

Qualitative research studies have inductively identified influential factors such as topic, time, distance, scheduling, quality content, peer interactions, and control of learning pace.[7–9] However, only a handful of surveys have asked physicians to rate such factors.[10–16] Moreover, the factors that motivate or deter participation in one activity (such as an online course completed at home) might be very different from factors governing participation in another (such as a live course at a distant location). Yet, surveys to-date have solicited ratings of potentially influential factors for CPD generally or in the context of one specific CPD activity, which does not permit understanding of activity-specific influences or comparisons across activities. Finally, for-credit CME activities likely

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constitute only a fraction of the CPD activities engaged in. The relationship between CPD activities (for learning) and the desire for CME credit for participating in such activities is incompletely understood.

Using data from a national survey of US physicians about various CPD issues, our group has published findings related to physicians' beliefs regarding identification of learning needs,[1] maintenance of certification,[17] and educational technologies.[18] The present study uses this data set to answer:

1. What factors most commonly influence physician decisions about participation in CPD activities?
2. How do these factors vary for four prototypical CPD activities?
3. How often do physicians engage in specific CPD activities, and how often do they obtain CME credit for these activities?

METHODS

Our survey methods have been described in detail previously.[1,17,19] To summarize briefly, from September 2015 to April 2016 we surveyed practicing US physicians using a self-administered Internet and paper questionnaire. We randomly selected 4648 licensed US physicians without regard to specialty from the LexisNexis Provider Data Management and Services database (LexisNexis Risk Solutions, Alpharetta, GA). We offered all respondents a nominal gift (a book valued approximately $12). The Mayo Clinic Institutional Review Board deemed the study exempt.

We created the survey questionnaire to address diverse issues related to CPD. The present report focuses on factors influencing decisions about CPD and CME activities, and past and ideal frequencies of such activities. After generating an initial item set, we asked four CME experts from other institutions to review these items for completeness. Mayo Clinic Survey Research Center personnel with expertise in questionnaire development reviewed items for structure and wording. We piloted the questionnaire among 17 physicians representing anesthesiology, dermatology, emergency medicine, family medicine, internal medicine, neurology, pathology, psychiatry, and surgery. To encourage participation, we divided the questionnaire into two sections of approximately equal length and gave respondents the option of submitting the survey after completing the first section ("primary items") or continuing on to the second section ("secondary items"). We identified five primary items as "key items" (ie, representative of the main issues to be assessed) to be used in evaluating for potential response bias. These key items comprised three barriers (time, finding high-quality activities, and getting CME credit) and two frequencies of engagement (local and on-site CPD activities).

We administered the Internet survey using Qualtrics (www.qualtrics.com). Response was tracked, but responses were anonymized upon receipt. Physicians who did not respond to the Internet survey within 3 months received a paper questionnaire. The paper questionnaire had no identifying information, such that responses could not be tracked.

Analyses

We calculated response rate using American Association for Public Opinion Research (AAPOR) formula RR2,[20] namely the number answering at least one survey question divided by the number of surveys sent less than those returned as undeliverable. We looked for response bias (ie, the possibility that respondents and nonrespondents were systematically different) in two ways. First, we compared demographics available in the LexisNexis data set (specialty, practice location, and gender) among respondents and nonrespondents using the chi-squared test. Second, because some literature suggests that the opinions of late responders approximate the opinions of never-responders,[21] we used the Wilcoxon rank sum test to compare responses on the five "key items" from those responding near the end of the survey (the last 15% of respondents) against those responding earlier. We also compared the distribution of respondents' specialties against the national distribution published in the Association of American Medical Colleges 2014 Physician Specialty Data Book.[22] We used the same statistical tests to compare demographics and responses for those who did versus who did not complete secondary items.

We reported means and SDs for survey item responses on perceived barriers to CPD. We also reported the proportion of respondents ranking each influential factor, past and ideal frequency of engagement in specific CPD activities, and past and ideal frequency of obtaining CME credit for participation in CPD activities. We used the Wilcoxon signed rank test to compare actual and ideal frequencies of engagement in CPD activities and obtainment of CME credit. We explored associations between barriers and engagement by classifying respondents as desiring more of a given CPD activity (ideal greater than past frequency) or not (ideal the same or less than past frequency), and then using Spearman rho to evaluate the correlation with selected barriers.

Because of the large sample size, we used an alpha of 0.01 to define statistical significance. We used SAS version 9.4 (SAS Institute Inc, Cary, NC).

RESULTS

Survey Response and Sample Characteristics

From 4648 survey invitations, we received 988 responses. After excluding 65 invitations undeliverable by either email or paper (leaving 4583 potential respondents), our overall response rate was 21.6%. Of these, 424 (43%) opted to complete the secondary items. Respondent demographics are reported in Table 1 and in previous publications.[1,17]

Respondents and nonrespondents were similar for all available demographics except for pediatric subspecialists, who responded proportionately more often (data reported previously[1]). Respondents' specialties closely mirror published data for all US physicians[22] ($P > .06$), except that the respondents in our study reflected slightly fewer general internal medicine and family medicine physicians (absolute difference about 4% for both, $P < .001$). We found no statistically significant differences for the five key items when comparing early responders and late responders. Because many of the data reported in this paper were derived from the secondary items, we compared those who did versus who did not complete the secondary items in terms of their demographics and in their responses to the key items, and found no statistically significant differences.

Perceived Barriers and Influential Factors

Among the primary survey items, we asked physicians to rate the importance of various potential barriers to CPD

TABLE 1.
Demographics of Respondents

Domain	Response	Respondents, % (n); N = 988*
Specialty	Anesthesiology	5.4 (53)
	Diagnostic Subspecialties	5.5 (54)
	Family Medicine	10.0 (98)
	Internal Medicine, General	11.0 (108)
	Internal Medicine Subspecialties	14.8 (145)
	Obstetrics-Gynecology	5.6 (55)
	Pediatrics	7.8 (76)
	Pediatric Subspecialties	4.5 (44)
	Surgery and Surgical Subspecialties	15.1 (148)
	Other Clinical Specialties	20.1 (197)
Sex	Male	66.2 (590)
	Female	33.8 (301)
Region	Northeast	20.6 (199)
	Midwest	22.8 (221)
	South	33.7 (326)
	West	22.9 (222)
Community size†	Rural	7.0 (43)
	Urban	93.0 (571)
Practice type	Self-employed	24.8 (243)
	Medical group or hospital	47.5 (465)
	Academic	18.3 (179)
	Government	5.2 (51)
	Other	4.1 (40)
Years since training	1–10	18.8 (181)
	11–20	29.0 (280)
	21–30	29.6 (285)
	>30	22.6 (218)
Practice size	1 physician	13.6 (133)
	2–5	23.1 (226)
	6–25	29.7 (290)
	>25	33.6 (328)
Compensation model	Salary (fixed)	35.3 (345)
	Salary with incentives	31.3 (305)
	Productivity	33.4 (326)
Race	American Indian	0.7 (6)
	Asian	15.2 (131)
	Black	2.6 (22)
	Pacific Islander	0.2 (2)
	White	81.3 (701)
Ethnicity	Hispanic	5.9 (49)

*Numbers may not sum to 988 because of missing data. Percentages are calculated using all available data. Additional information on the entire invited sample was published previously.[17]

†Community size only available for those completing the Internet survey.

(N respondents ranged 879–883). The most important barriers were time (mean [SD] 3.5 [1.3], with 1 = not important at all, 3 = moderately important, and 5 = extremely important) and cost (2.9 [1.3]). Finding high-quality, relevant activities (2.4 [1.2]), knowing what is important to learn about (2.2 [1.1]), accessing information when needed (2.2 [1.1]), and getting CME credit (2.2 [1.2]) were less important.

In the secondary survey items, we asked physicians (N respondents ranged 401–405) to review a list of 12 factors that might influence their participation in CPD activities, and then select and rank the four most influential factors for each of four prototypical activities. Table 2 presents the frequency with which each factor was selected, and the Figure shows the top four factors for each activity. Across all four activities, topical relevance consistently had the highest average rank, and the quality or effectiveness of the content had an average rank in the top four (Fig. 1). The average rank of the other influential factors varied by activity. For example, time to complete the activity was one of the top four factors for reading an article, local activities, and online courses, but not for attending a far-away course. Scheduling was important for local courses and far-away courses, and cost was important for far-away courses and online courses.

Participation in Specific Professional Development Activities

Over the past 3 years, most physicians reported having participated in patient-focused learning and self-directed learning on at least a weekly basis; quality improvement and local CME activities several times per year; online learning, on-site courses, and national board preparation activities a few times per year; and interprofessional learning less than once per year (Figure 2 and see **Supplemental Table 1, Supplemental Digital Content 1**, http://links.lww.com/JCEHP/A28).

We also asked physicians how often they ought to engage in such activities. This "ideal" frequency was significantly higher than the "actual" frequency over the past 3 years ($P < .0001$ using the Wilcoxon signed rank test) for all activities except board preparation ($P = .16$). Interprofessional education demonstrated the greatest change from actual to ideal frequency, with only 39% of physicians reporting past participation at least once per year but 61% believing such training ought to occur with that frequency; however, this still reflected the lowest ideal frequency. Self-directed learning, local CME activities, and quality improvement activities showed absolute increases ≥8% in ideal frequency compared with current frequency for at least one response option (eg, self-directed learning responses indicated 41% actual and 51% ideal engagement at least once weekly [absolute difference 10%]).

In an exploratory analysis, we evaluated associations between the two most important barriers (time and cost) and the gap between ideal and actual frequency for each CPD activity. We found only weak correlations explaining at most 1.4% of the variance in scores ($R^2 \leq 0.014$). Of the 16 analyses, only two were statistically significant, namely the correlations between time and self-directed learning (rho = 0.12; $P = .0002$) and between time and quality improvement activities (rho = 0.09, $P = .004$).

Obtaining CME Credit for Specific Professional Development Activities

In a series of secondary items, we asked physicians how often they did obtain and would want to obtain CME credit for specific activities (Figure 3 and see **Supplemental Table 2, Supplemental Digital Content 1**, http://links.lww.com/JCEHP/A28). The pattern for obtaining CME credit differed in important ways from the analogous questions regarding professional development (ie, with or without credit). First, many of the most frequently-used professional development approaches were infrequently claimed for CME credit. For example, fewer than half of the respondents had sought CME credit more than once per year for patient-focused or quality improvement activities, despite these

TABLE 2.

Factors Influencing Participation in Prototypical CPD Activities

Factor	CPD Activity, % (n) Selecting			
	Article N = 403	Local N = 401	Travel N = 405	Online N = 403
Time to complete activity	65.8 (265)	40.6 (163)	18.8 (76)	71.0 (286)
Cost of activity	31.8 (128)	14.2 (57)	71.6 (290)	46.2 (186)
Scheduling/coordinating with practice needs	27.5 (111)	63.1 (253)	51.1 (207)	19.9 (80)
Distance from home/practice	10.7 (43)	39.9 (160)	27.7 (112)	1.0 (4)
Topic (relevance)	83.6 (337)	76.8 (308)	62.0 (251)	84.4 (340)
Content (quality and effectiveness)	66.0 (266)	53.9 (216)	46.4 (188)	65.5 (264)
Faculty/sponsoring organization (known expertise or instructional quality)	20.6 (83)	28.9 (116)	31.4 (127)	22.3 (90)
Location (including venue and nearby attractions)	6.9 (28)	20.4 (82)	40.5 (164)	1.0 (4)
Opportunity to discuss topics with other participants	6.7 (27)	15.5 (62)	6.7 (27)	3.5 (14)
Control over pace of learning and convenience	23.3 (94)	4.0 (16)	1.5 (6)	28.3 (114)
Recommendation from peer	12.2 (49)	6.0 (24)	1.5 (6)	6.5 (26)
CME or maintenance of certification (MOC) credit available	40.4 (163)	32.2 (129)	36.8 (149)	45.9 (185)

Participants were asked to select the "top four factors that influence your decisions to engage or not engage in professional development activities similar to these." Shaded cells indicate the top four factors for each activity.

Article = "Reading a review article or clinical guideline on a topic of interest."

Local = "Participating in a locally organized activity (eg, journal club or grand rounds)."

Travel = "Attending a course in a location far from home (eg, professional society meeting and CME course at fun/exotic location)."

Online = "Completing an online tutorial or virtual patient case."

CPD = continuous professional development.

activities being pursued for professional development on at least a monthly basis by 87% and 39% of physicians, respectively. Similar but less pronounced differences were found for self-directed learning. By contrast, the use of activities for professional development and for CME credit was roughly similar for local activities (eg, grand rounds), online CME, and live on-site CME.

Second, the gap between past and ideal practices differed more substantially for CME credit than for professional development, with an absolute increase of 30% in the number of physicians desiring weekly credit for patient-focused activities and a 20% increase in those desiring monthly credit for self-directed activities.

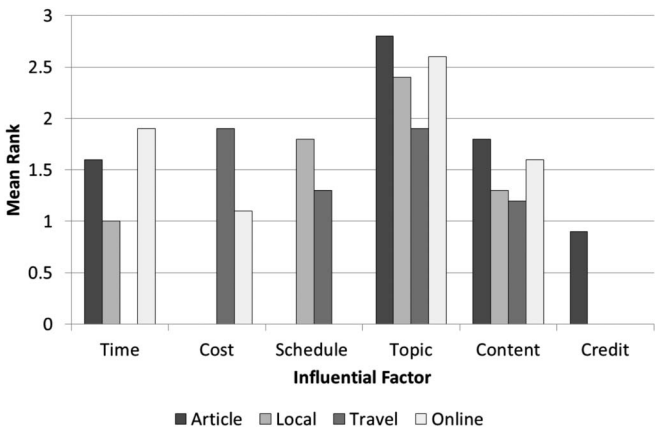

FIGURE 1. Top-ranked factors influencing participation in four prototypical continuous professional development activities. Participants were asked to rank the "top four factors that influence your decisions to engage or not engage in professional development activities similar to these." Each bar shade reflects a different activity (article, local, etc.); see Table 2 for activity definitions and for more detailed numeric results. Only the top four factors for each activity are shown in this figure; missing bars indicate that a factor was not ranked highly for that activity (eg, time was not a top four factor for travel).

DISCUSSION

In this survey of US physicians, we found that time and to a lesser extent cost are the main barriers to CPD, although even these were only rated as moderately important. Finding CME activities was not a significant barrier. In choosing specific CPD activities, topic was the most influential factor across all activities. Other highly ranked factors included the quality or effectiveness of content, time (duration), scheduling, and cost. These rankings varied by activity.

We found large gaps between actual and ideal frequency of CPD using interprofessional education, self-directed learning, local activities, and quality improvement activities. We also found gaps between the current frequency of CPD activities and the frequency of obtaining CME credit for these activities. Physicians would especially like to obtain CME credit more often for patient-focused learning, self-directed learning, quality improvement activities, and interprofessional education.

Limitations and Strengths

If physicians who opted not to respond, or did not complete the secondary items, differed from those who did respond, our findings may not reflect the beliefs of the larger population. However, respondents and nonrespondents were similar in available demographic features, and respondents' specialties aligned reasonably well with the national distribution of physician specialties. Moreover, those who responded near the end of the survey period had attitudes similar to those who responded early. If those who responded only after repeated requests have attitudes similar to those who never respond, as has been proposed,[21] our findings may not greatly misrepresent nonrespondents. Finally, those who completed the entire survey were similar

Activity	Never	<1/yr	1-2/yr	Several/yr	>monthly	>weekly	Daily
Patient-focused learning (specific patient)	1 [1]	1 [0]	2 [2]	9 [8]	18 *[15]*	43 ***[43]***	26 ***[31]***
Self-directed learning (general reading)	0 [0]	0 [1]	4 [2]	14 [9]	28 *[24]*	41 ***[51]***	12 [14]
Quality improvement	5 [3]	10 [6]	21 *[18]*	26 ***[27]***	23 ***[31]***	13 [13]	3 [2]
Local activities (rounds, journal club)	15 [7]	14 [7]	14 [13]	23 ***[30]***	20 ***[30]***	14 [13]	1 [0]
National board modules, exam preparation	18 *[17]*	21 *[21]*	24 *[22]*	22 ***[25]***	9 [11]	5 [4]	1 [0]
Online/distance learning CME	15 [8]	19 [14]	22 ***[26]***	25 ***[31]***	14 [14]	5 [5]	1 [1]
Live on-site CME	15 [10]	20 [14]	35 ***[39]***	21 ***[27]***	5 [6]	4 [3]	0 [0]
Interprofessional education	34 [14]	27 ***[26]***	15 *[27]*	3 *[21]*	6 [8]	4 [3]	1 [2]

FIGURE 2. Frequency of Engagement in Specific Professional Development Activities. Cell shading reflects differences between actual ("did you") and ideal ("ought to") engagement: clear = increase ≤4% or decline; light grey = 5–7% increase; medium grey = 8–10% increase; dark grey = >10% increase. Analyses comparing the distribution of actual versus ideal engagement were statistically significant ($P < .0001$) for each activity, except for except board preparation ($P = .16$). Font styles highlight ideal ("ought to") engagement: italics = ≥15%; bold = ≥25%. Numbers indicate the percentage of responses to questions: "Over the past 3 y, how often did you engage in each of the following learning activities?" (response on left) and "How often do you think you *ought to engage* in each of the following learning activities?" (response on right, in [brackets]). N respondents ranged 869–887. Numbers may not sum to 100% because of rounding. See **Supplemental Digital Content 1** (**Supplemental Table 1**, http://links.lww.com/JCEHP/A28) for more detailed results.

to those who completed only the primary items both in demographics and in responses to key items.

Strengths include a rigorous approach to survey development and implementation; use of a dedicated Survey Research Center; and a cross-specialty sample that closely reflects US physician demographics.[22]

Integration With Prior Work

Similar to our study, previous surveys have identified time and cost as the chief barriers to CPD[7,10,12,23] and have consistently identified topic as the primary factor in selecting a specific CPD activity.[10,12–14,16] However, such studies[10–16] show little consensus on other influential factors, most likely because (as our findings illustrate) these factors are activity-specific.

This paper focuses on physicians' selection of and engagement in CPD and CME activities. We addressed how physicians select specific CPD topics in a previous publication,[1] reporting that physicians generally preferred to self-assess their CPD needs and rated topics of medical

Activity	Never	<1/yr	1-2/yr	Several/yr	>monthly	>weekly	Daily
Patient-focused learning (specific patient)	43 [3]	8 [2]	7 [6]	*11 [16]*	**14 *[26]***	**17 *[47]***	0 [0]
Self-directed learning (general reading)	22 [2]	7 [1]	13 [5]	*23 [20]*	**21 *[41]***	**14 *[30]***	0 [0]
Quality improvement	30 [6]	21 [12]	**20 *[26]***	**17 *[28]***	9 *[23]*	3 [5]	0 [0]
Local activities (rounds, journal club)	22 [7]	17 [7]	15 *[19]*	**20 *[28]***	**16 *[30]***	11 [9]	0 [0]
National board modules, exam preparation	23 *[18]*	*23 [21]*	**23 *[25]***	22 *[24]*	7 [9]	2 [4]	0 [0]
Online/distance learning CME	16 [8]	18 [13]	**25 *[29]***	**24 *[28]***	13 *[18]*	4 [5]	0 [0]
Live on-site CME	14 [7]	18 [10]	**36 *[47]***	**23 *[25]***	6 [9]	4 [3]	0 [0]
Interprofessional education	44 *[17]*	**31 *[29]***	**15 *[31]***	6 *[18]*	2 [4]	2 [1]	0 [0]

FIGURE 3. Past and Ideal Frequency of Obtaining CME Credit for Participation in CPD Activities. Cell shading reflects differences between actual ("did you") and ideal ("want to") obtainment of credit: clear = increase ≤4% or decline; light grey = 5–7% increase; medium grey = 8–10% increase; dark grey = >10% increase. Font styles highlight ideal ("want to") obtainment: italics = ≥15%; bold = ≥25%. Numbers indicate the percentage of responses to questions: "Over the past 3 years, how often did you obtain CME credits for engaging in each of the following learning activities?" (response on left) and "In an ideal world, how often would you want to obtain CME credits for engaging in each of the following learning activities?" (response on right, in [brackets]). N respondents ranged 408–419. Numbers may not sum to 100% because of rounding. See **Supplemental Digital Content 1** (**Supplemental Table 2**, http://links.lww.com/JCEHP/A28) for more detailed results.

knowledge/skills, wellness, informatics, and practice/systems improvement as the highest priority. These findings contrast with our understanding of the limitations of self-assessment,[24–26] and with widely accepted frameworks that highlight competencies such as professionalism, communication skills, and leadership.[27–29] We also found that physicians did not perceive difficulty in finding or accumulating needed CME credits.[1]

Implications

The reasons physicians select a given CPD activity vary by activity, but invariably included topic (relevance) and quality of content. As noted above and in previous studies,[1,4,6,26,30] physicians may need more help than they realize in prioritizing and selecting topics. It is also likely that neither CPD providers nor physician consumers can, in many instances, judge the quality of content relative to its grounding in current education science. Indeed, many approaches known to enhance effectiveness—such as mixed practice, assessment for learning, and learning from errors[31,32]—require more effort, initially introduce a sense of failure, and will likely be interpreted as less effective. Providers and consumers of CPD may need support and training to develop and select content of truly high quality.

Other rankings of influential factors provide additional insights for CPD/CME planners. Activity cost was among the top five influential factors for all but local activities. We note that many online courses[33,34] and journals offer free CME. Although never in the top four overall, physicians consistently identified the provider's reputation as influential (>20% for all activities). Finally, we note that peer recommendations and participant discussions were infrequently selected as influencing CPD choice, although our previous work suggests that physicians value peer discussions when participating in an activity.[1]

Physicians report that time is the most important barrier to their CPD, and that in an ideal world they would engage more often than they presently do in essentially all CPD activities (excepting board-related activities). Time was also one of the top factors influencing decisions to participate in three of the four prototypical activities. CPD organizers typically cannot affect physicians' schedules, but can maximize learning per unit time (learning efficiency) using engaging and highly effective instructional strategies. Educators and researchers might work to translate emerging insights from research investigating undergraduate and postgraduate education to optimize instructional design for practicing physicians.[35–40]

Finally, although accruing CME credit does not seem to be problematic,[1] physicians want more credit for the work they are already doing. For example, twice as many physicians (>70%) indicated that they want CME credits at least monthly for patient-focused and self-directed learning, relative to those who obtained such credit (≤35%) monthly in the past. Even if physicians are currently able to obtain enough CME credit, it still makes sense to reduce burden and redundancy as much as possible. The 2015 Accreditation Council for Continuing Medical Education annual report indicates that the learning physicians do during their daily work, such as point of care learning and quality improvement activities, accounts for less than 2% of CME activity.[41] Streamlining the credit-granting process for such activities would ease physicians' workload, and encourage more physicians to claim deserved credit. We urge professional societies, accrediting organizations, and individual providers to join forces to optimize CPD, and to create systems that formally recognize learning in its various forms.

Lessons for Practice

- Time is the most important barrier to physician CPD.
- The reasons physicians select a given CPD activity vary by activity, but invariably include topic (relevance) and quality of content.
- Physicians believe that they ought to engage more often in most available CPD activities.
- Physicians want CME credit for the CPD activities they are already doing.

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REFERENCES

1. Cook DA, Blachman MJ, Price DW, et al. Professional development perceptions and practices among US physicians: a cross-specialty national survey. *Acad Med*. 2017; doi: 10.1097/ACM.0000000000001624. published online ahead of print, Feb 21, 2017.
2. Institute of Medicine. *Redesigning Continuing Education in the Health Professions*. Washington, DC: The National Academies Press; 2010.
3. Hager M, Russell S, Fletcher SW, eds. *Continuing Education in the Health Professions: Improving Healthcare through Lifelong Learning*. New York, NY: Josiah Macy, Jr. Foundation; 2007.
4. McMahon GT. What do I need to learn Today?–the evolution of CME. *N Engl J Med*. 2016;374:1403–1406.
5. Nissen SE. Reforming the continuing medical education system. *JAMA*. 2015;313:1813–1814.
6. Davis DA, Prescott J, Fordis CM Jr, et al. Rethinking CME: an imperative for academic medicine and faculty development. *Acad Med*. 2011;86:468–473.
7. Goodyear-Smith F, Whitehorn M, McCormick R. Experiences and preferences of general practitioners regarding continuing medical education: a qualitative study. *N Z Med J*. 2003;116:U399.
8. Young KJ, Kim JJ, Yeung G, et al. Physician preferences for accredited online continuing medical education. *J Contin Educ Health Prof*. 2011; 31:241–246.
9. Sargeant J, Curran V, Jarvis-Selinger S, et al. Interactive on-line continuing medical education: physicians' perceptions and experiences. *J Contin Educ Health Prof*. 2004;24:227–236.

10. Price DW, Overton CC, Duncan JP, et al. Results of the first national Kaiser Permanente continuing medical education needs assessment survey. *Perm J*. 2002;6:76–84.
11. Salinas GD. Trends in physician preferences for and use of sources of medical information in response to questions arising at the point of care: 2009–2013. *J Contin Educ Health Prof*. 2014;34(suppl 1):S11–S16.
12. Stewart GD, Teoh KH, Pitts D, et al. Continuing professional development for surgeons. *Surgeon*. 2008;6:288–292.
13. Vollmar HC, Rieger MA, Butzlaff ME, et al. General Practitioners' preferences and use of educational media: a German perspective. *BMC Health Serv Res*. 2009;9:31.
14. McLeod PJ, McLeod AH. If formal CME is ineffective, why do physicians still participate? *Med Teach*. 2004;26:184–186.
15. Reddy H, Harris I, Galle B, et al. Continuing medical education. What do Minnesota physicians want? *Minn Med*. 2001;84:58–61.
16. Stancic N, Mullen PD, Prokhorov AV, et al. Continuing medical education: what delivery format do physicians prefer? *J Contin Educ Health Prof*. 2003;23:162–167.
17. Cook DA, Blachman MJ, West CP, et al. Physician attitudes about maintenance of certification: a cross-specialty national survey. *Mayo Clin Proc*. 2016;91:1336–1345.
18. Cook DA, Blachman MJ, Price DW, et al. Educational technologies for physician continuous professional development: a national survey. *Acad Med*. 2017; [in press].
19. Cook DA, Wittich CM, Daniels WL, et al To improve response rate for internet-based physician surveys: a randomized experiment. *J Med Internet Res*. 2016;18:e244.
20. American Association for Public Opinion Research. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*. 9th ed. Oakbrook Terrace, IL: AAPOR; 2016.
21. Miller LE, Smith KL. Handling nonresponse issues. *J Extension*. 1983;21: 45–50.
22. Association of American Medical Colleges. *Physician Specialty Data Book 2014*. Washington, DC: AAMC Center for Workforce Studies; 2014.
23. Stewart GD, Khadra MH. The continuing medical education activities and attitudes of Australian doctors working in different clinical specialties and practice locations. *Aust Health Rev*. 2009;33:47–56.
24. Davis DA, Mazmanian PE, Fordis M, et al. Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA*. 2006;296:1094–1102.
25. Eva KW, Regehr G. Self-assessment in the health professions: a reformulation and research agenda. *Acad Med*. 2005;80:S46–S54.
26. Eva KW, Bordage G, Campbell C, et al. Towards a program of assessment for health professionals: from training into practice. *Adv Health Sci Educ Theor Pract*. 2016;21:897–913.
27. Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press; 2001.
28. Green ML, Holmboe E. Perspective: the ACGME toolbox: half empty or half full? *Acad Med*. 2010;85:787–790.
29. Frank JR, Snell L, Sherbino J. *CanMEDS 2015 Physician Competency Framework*. Ottawa, Canada: Royal College of Physicians and Surgeons of Canada; 2015.
30. Sargeant J, Bruce D, Campbell CM. Practicing physicians' needs for assessment and feedback as part of professional development. *J Contin Educ Health Prof*. 2013;33(suppl 1):S54–S62.
31. Rohrer D, Pashler H. Recent research on human learning challenges conventional instructional strategies. *Educ Res*. 2010;39:406–412.
32. Dyre L, Tabor A, Ringsted C, et al. Imperfect practice makes perfect: error management training improves transfer of learning. *Med Educ*. 2017;51: 196–206.
33. Olivieri JJ, Knoll MB, Arn PH. Education format and resource preferences among registrants of a pediatric-focused CME website. *Med Teach*. 2009; 31:e333–e337.
34. Harris JM Jr, Sklar BM, Amend RW, et al. The growth, characteristics, and future of online CME. *J Contin Educ Health Prof*. 2010;30:3–10.
35. Vandewaetere M, Manhaeve D, Aertgeerts B, et al. 4C/ID in medical education: how to design an educational program based on whole-task learning: AMEE Guide No. 93. *Med Teach*. 2015;37:4–20.
36. Young JQ, Van Merrienboer J, Durning S, et al. Cognitive load theory: implications for medical education: AMEE Guide No. 86. *Med Teach*. 2014;36:371–384.
37. Larsen DP, Butler AC, Roediger Iii HL. Test-enhanced learning in medical education. *Med Educ*. 2008;42:959–966.
38. Norman GR, Monteiro SD, Sherbino J, et al. The causes of errors in clinical reasoning: cognitive biases, knowledge deficits, and dual process thinking. *Acad Med*. 2017;92:23–30.
39. Kerfoot BP. Adaptive spaced education improves learning efficiency: a randomized controlled trial. *J Urol*. 2010;183:678–681.
40. Cook DA, Brydges R, Zendejas B, et al. Mastery learning for health professionals using technology-enhanced simulation: a systematic review and meta-analysis. *Acad Med*. 2013;88:1178–1186.
41. Accreditation Council for Continuing Medical Education. *ACCME 2015 Annual Report*. Chicago, IL: Accreditation Council for Continuing Medical Education; 2015.