Educational Outcomes Report

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Executive Summary and Program Description

Cognitive dysfunction affects a significant number of patients with multiple sclerosis (MS), and is now recognized as an important component of the disease at all stages. Cognitive impairment is a key predictor of health-related quality of life and can reduce physical independence, competence in activities of daily living, medication adherence, symptom management, and potential for rehabilitation. Magnetic resonance imaging (MRI) is the most commonly used paraclinical tool to evaluate MS pathology and to monitor disease evolution. Notably, MS is becoming increasingly recognized as a diffuse disease of the CNS rather than simply a demyelinating disorder. Recent studies suggest that both cortical (grey matter) and subcortical brain atrophy are more closely associated with cognitive impairment than other MRI measurements. This program series will use an interactive case-based approach to examine the impact of changes in cognition in patients with MS, to understand how cognitive impairment can be effectively evaluated, and to determine the potential effects of disease-modifying therapies for MS on cognitive function.

This report summarizes the educational outcomes of these meetings. The body of this report is organized by distinct levels of educational outcomes, with focused assessments of participant demographics; the effectiveness of the faculty and the quality of the learning experience; the acquisition of declarative and procedural knowledge; and activity-influenced gains in understanding, confidence, competence, and clinical performance. Explanations of these outcome domains, along with their evidence-based rationale, are presented in the appendix document titled Educational Needs Assessment, Activity Development, and Outcomes Assessment at PRIME®: Applications of Established Conceptual Frameworks and Principles of Adult Learning.
Program Title:
Cognitive Dysfunction, Brain Atrophy and Other Lessons from the Field: Improving MS Outcomes

Accreditation:
1.5 ACCME, AANP, ANCC

Program Dates and Locations:
September 8, 2011; Birmingham, AL
September 19, 2011; Jackson, MS
September 22, 2011; Lexington, KY
September 26, 2011; Cincinnati, OH
October 3, 2011; Nashville, TN
October 4, 2011; Memphis, TN
October 12, 2011; Knoxville, TN
October 24, 2011; Louisville, KY

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Level 1: Participant Demographics

227 Registered Attendees
167 Program Participants
117 Earning CME/CE Credit

By discipline, the distribution was as follows:

- 62 Physicians
- 51 Nurse Practitioners
- 2 Physician Assistants
- 52 Specialty Nurses

*The intended audience for this grant was 13-15 health care professionals at each CME activity. Therefore, the grant goals of intended audience mix and audience size were exceeded.

Prior to the educational activity, participants were asked the following question:

“How often are you currently assessing cognitive function in your patients with MS?”

As shown in Figure 1, 36% indicated they ask the patient at every visit, while 29% of participants indicated they only ask when the patient has an apparent complaint.
In our assessment of demographics we asked participants, “In a typical month, how many patients with multiple sclerosis do you currently treat, manage or provide counseling for?” As shown in Figure 2, 50% and 38% of participants indicated providing services for 1 - 15 patients and 15 - 30 patients over this time period, respectively.

Participants were also asked, “How much value do you see in increasing the frequency of testing for cognitive dysfunction in patients with MS?” As shown in Figure 3, the majority of participants, (63%), indicated the frequency of testing is “extremely important.”

**Level 2: Participants’ Assessments of the Educational Activity**

Following the educational activity, participants evaluated various aspects of its effectiveness and accessibility. PRIME® uses these outcomes to determine the extent to which its activities fill identified educational gaps and address critical learning objectives. In addition, participants’ assessments of educational activities inform our future needs assessments and curriculum development. Evaluations were completed by 167 participants.

**Effectiveness in Meeting Learning Objectives**

This educational activity was designed to support participants in achieving the following learning objectives.

1. Review recent data on cognitive dysfunction in patients with multiple sclerosis.
2. Assess the utility of MRI in the ongoing monitoring of patients with relapsing forms of multiple sclerosis.
3. Evaluate current and emerging medications for multiple sclerosis and their effects on MRI outcomes.
including reduction of brain atrophy.

4. Discuss the ongoing clinical course of multiple sclerosis patients through case-based and interactive small group discussion.

Participants assessed the educational activity’s effectiveness in meeting the learning objectives. On a 5-point scale (with 5 indicating the highest ranking), the combined mean average was 4.7 (Figure 4).

**Participant Ratings of Faculty & Program**

Figure 5 presents participants’ ratings of the knowledge, expertise, and presentation skills of the faculty. On a 5-point scale (with 5 indicating the highest rating), the average rating for these measures of faculty teaching effectiveness was 4.8.

As illustrated in Figure 6, participants gave high ratings of the educational activity’s accessibility, time allotment, rigor, and adherence to adult learning principles.

**Faculty Rating of Program Experience**

The 13 faculty (see faculty listing on Page 4-5) completed surveys pertaining to their experience in working with PRIME®. Results are provided in Figure 7. Open-ended responses to questions about their experience are presented as follows.

1. How would you rate the overall audience response to the program?
   - Excellent
   - Very good questions were asked
   - Audience seemed to be engaged
   - Audience was very interactive
   - Good
   - Moderate to good
2. What were some of the more interesting questions/issues asked by the audience?

- Discussion regarding cognitive dysfunction medications and whether OMTs have any effect on cognition.
- What are the different types of MS?
- Discussion regarding cognitive decline
- Discussion regarding utility of drugs for cognitive impairment
- Discussion regarding cognitive alerts and treatment
- Is statistical benefit in studies always equivalent to clinical benefits in practice enough to justify expenses?
- What is the relationship of MRI findings to cognitive complaints?
- Discussion on interventions
- Discussion regarding tests to be performed for cognition
- What is the value of MRIs and brain atrophy for Alzheimer’s disease identification?
Participants’ Open-Ended Comments

In an online survey delivered following the educational activity, participants were given the opportunity to comment freely on its strengths and weaknesses. Representative comments are reproduced as follows.

Overall, the program was excellent! Both presenters were great! It was extremely well organized. An indication of the high quality of the program was the large number of questions asked and audience participation. We were all engaged! — Specialty Nurse

This was an excellent presentation, and one which I would like to repeat. — Physician

I enjoyed this so much, and this will help with the MS patients I see in my practice. — Nurse Practitioner

I appreciate this topic much more since attending this dinner meeting. Hopefully, I will have the chance to attend a similar program in the future. — Physician

This was one of the better programs I have attended in terms of my learning experience. — Nurse Practitioner

An excellent speaker! I learned so much about the disease and the management strategies. — Specialty Nurse

The program itself was great and the information provided was great. However, the room was very small and noise could be heard from the next room. — Specialty Nurse

An excellent program; very helpful clinically. — Physician

I do like interactive sessions, so some type of wireless questioning would have been neat to include. — Physician

The program was well put together and I enjoyed the speaker. — Nurse Practitioner

I thought the lecture was very informative and I have learned a lot about MS since attending these lectures. — Physician Assistant

I thought the program and the speakers were excellent. There was a lot of audience participation. — Nurse Practitioner

I appreciate the opportunity to learn more about this common disorder in MS patients. — Specialty Nurse

An excellent program and extremely informative. The only issue was the small venue and the group in the adjoining area was extremely loud. The speaker was great! — Nurse Practitioner

I enjoyed and learned from this presentation and hope we can have further programs like these in future. — Physician

This was a very good venue for a meeting. — Specialty Nurse

I really enjoyed the speakers as well as the setting. — Specialty Nurse

A good program. — Physician
Level 3: Knowledge Outcomes

Before and after the educational activity, participants answered a series of multiple-choice questions designed to evaluate gap-targeted knowledge outcomes. These assessments focused on activity-influenced changes in declarative knowledge, procedural knowledge, and learning insights, values, and behaviors.

Declarative Knowledge

Based on the program’s learning objectives, the following questions were asked to assess participant’s gains in declarative and procedural knowledge (correct answers are indicated by asterisks).

1. All of the following statements regarding changes in cognitive function in patients with MS are correct EXCEPT:
   a. Cognitive impairment may affect as many as 65% of patients with MS.
   b. Cognitive dysfunction occurs in all MS subtypes and at any stage in the disease, even in patients with early MS or clinically isolated syndrome.
   c. Changes in cognitive function have been an endpoint in nearly all pivotal trials of disease-modifying therapies for relapsing forms of MS.
   d. Cognitive dysfunction is often first recognized by caregivers rather than patients themselves.

2. Which of the following tools does not measure cognitive impairment?
   a. Expanded Disability Status Scale (EDSS)
   b. Paced Auditory Serial Addition Test (PASAT)
   c. Brief Visuospatial Memory Test (BVMT-R)
   d. Rao’s Brief Repeatable Battery (BRB)

3. Cognitive performance in patients with MS appears to be correlated with which MRI parameter?
   a. Total cerebral lesion area
   b. Number of gadolinium(Gd)-enhancing lesions
   c. Extent of brain atrophy
   *c. All of the above

4. In the recent COGIMUS analysis of the effect of IFNβ-1a on cognitive function in patients with relapsing MS, the risk of developing cognitive impairment was ______ after 3 years in patients receiving the higher dose (44 mcg) compared with the lower dose (22 mcg).
   a. Similar
   b. Increased by 50%
   *c. Reduced by 32%
   d. Reduced by 10%

Figure 8 presents the percentages of participants who answered the declarative and procedural knowledge questions correctly before and after the educational activity. Across the 4 questions, the average number of correct answers increased by 12%.
Learning Insights, Values, and Intentions to Change Practices

As reflected by the following pre-activity/post-activity questions, this sub-level of knowledge outcomes addresses the influences of educational interventions on participants’ self-reported understanding of essential topics and their confidence in performing key clinical skills. In addition, at this sub-level of knowledge outcomes, we assess learners’ activity-influenced intentions to change clinical and/or management practices.

1. How would you describe your understanding of the relationship between MRI parameters and cognitive function in patients with MS?
   a. Limited  
   b. Adequate  
   c. Good  
   d. Excellent

   Figure 9 presents the percentages of participants reporting different levels of understanding regarding the relationship between MRI parameters and cognitive function in patients with MS. The greatest magnitudes of pre-activity to post-activity change were reported for “limited”, which decreased from 66% to 27% of participants and “good”, which increased from 15% to 37% of participants.

2. How would you describe your current knowledge of the effects of disease-modifying therapies for MS on cognitive function?
   a. Limited  
   b. Adequate  
   c. Good  
   d. Excellent

   Figure 10 presents the percentages of participants reporting different levels of knowledge regarding the effects of disease-modifying therapies for MS on cognitive function. The greatest magnitudes of pre-activity to post-activity change were reported for “limited”, which decreased from 70% to 29% of participants and “good”,

![Figure 9. Participants’ self-reported understanding regarding the relationship between MRI parameters & cognitive function in MS patients.](image)

![Figure 10. Participants’ self-reported knowledge regarding the effects of disease-modifying therapies for MS on cognitive function.](image)
which increased from 10% to 31% of participants.

3. With regard to discussing cognitive impairment with MS patients or their caregivers, how would you rate your current level of confidence?
   a. Limited  b. Adequate  
   c. Good  d. Excellent

Figure 11 presents the percentages of participants reporting different levels of confidence regarding discussing cognitive impairment with MS patients or their caregivers. The greatest magnitudes of pre-activity to post-activity change were reported for “limited”, which decreased from 45% to 11% of participants and “good”, which increased from 16% to 31% of participants.

3. In the overall management of patients with MS, how would you rate the importance of ongoing evaluation of cognitive function?
   a. Not important  
   b. Minimally important  
   c. Important  d. Extremely important

As shown in Figure 12, the majority of participants, (74%) and (78%) respectively, indicated both prior to the educational activity and immediately following the educational activity that ongoing evaluation of cognitive function in MS patients is “extremely important.”

To assess expectations for performance improvement, we asked participants how much they anticipated that, over the next 6 months, the knowledge gained from the educational activity would improve their ability to manage patients with MS, particularly those with cognitive function impairment. As illustrated in Figure 13, 59% of participants indicated that they expected “satisfactory” improvement.
Continuous Needs Assessment

Our continuous needs assessment is also based on questions that participants asked the expert faculty presenters during and after their presentations. Representative questions are listed as follows:

What is the prevalence of cognitive dysfunction in MS patients you manage?

Are there any effective medications specifically for improving cognitive medication?

Do MS patients have a lower life expectancy?

What is the suicide rate in patients with MS?

Is there any difference in various ethnic groups regarding cognition in MS?

Can you comment more on the various MRI correlates with cognitive dysfunction – which is strongest?

How do you follow patients over time regarding development of brain atrophy?

What is the best tool to evaluate cognition?

What is the relationship between the different subtypes of MS and the development of cognitive dysfunction?

Can you comment on the key challenges with administering the neuropsychological exam?

How are depression and alcoholism related to cognitive dysfunction?

What is the incidence of dementia in patients with MS?

Can you comment on primary subcortical lesions vs. gray matter atrophy with respect to cognitive function?

Discussion regarding different parts of cognitive dysfunction, the verbal vs. the logical reasoning

Would you change therapy based only on cognitive function?

Do you use fingolimod as first-line therapy?

Do you use stimulants in your MS patients? Do they help cognitive function?

Is cognitive dysfunction ever reported to employers?

Can you explain in more detail the cognitive domain “verbal intelligence”?

What imaging technique do you use to look at cortical lesion volume?

What does MRI at 3 Tesla (T) show you that the 1.5 T machine doesn’t, and is there any correlation to cognition?

Are MS patients typically aware of their cognitive deficiencies? Do some patients try to “mask” them?

What is the role of the neuropsychologist in evaluation of MS patients?

Can you comment on the concept of “cognitive reserve”?

Does cognitive function change in the setting of a relapse?

Does any MS therapy stand out, in your opinion, to prevent cognitive decline?

What is diffusion tensor imaging (DTI) and how does it work?

What screening method to you typically use for cognitive assessment?

If you had a patient with dementia, what tool would you use for cognitive assessment?

How long do you keep your patients on donepezil?

What happens when you take your patients off of donepezil?
Summary, Conclusions, and Future Directions

This CME/CE activity was successfully provided to health care professionals involved in the management of patients with MS. The main outcomes of the educational activity are summarized as follows:

• The participants gave high ratings for the educational activity’s accessibility, time allotment, rigor, and adherence to adult learning principles, and also indicated the material was objective and unbiased.

• Participants commented that the speakers were excellent and knowledgeable about the topic.

• Participants demonstrated appropriate declarative knowledge among some of the key topics in the program, as reflected in pre-test to post-test scores (Figure 8). However, when participants were surveyed about their understanding regarding the relationship between MRI parameters and cognitive function in MS patients, 56% reported with limited or adequate understanding, versus 44% reporting “good” or “excellent” understanding (Figure 9). This suggests an educational gap and an opportunity for further education. Likewise, 61% of participants reported a “limited” or “adequate” knowledge regarding the effects of disease-modifying therapies for MS (Figure 10), versus only 39% reporting “good” and “excellent” knowledge in differentiating effects of disease-modifying therapy on cognitive function.

• Participants placed great emphasis on the need to provide ongoing evaluation of patients’ cognitive function. However, their confidence in discussing cognitive impairment with their MS patients and caregivers was lacking, with only 41% of participants self-rating their confidence as “good” or “excellent”. This suggests an educational gap in the ability to perform the necessary patient evaluations for cognition.

• Evaluation of gap-targeted knowledge outcomes reflected ongoing educational needs on the topic of changes in cognitive function in MS patients.

• Participants’ open ended comments and questions to the faculty presenters reflected ongoing educational needs in the areas of evaluation and testing for cognitive function in patients with MS and treatment therapies for cognitive impairment in MS patients.
Established in the 1970s, the field of continuing medical education (CME) addresses the concern that the last 30 to 40 years of physicians’ and other healthcare providers’ careers may occur without any formal course of study.1,2 This issue is currently compounded by several factors, including (1) ongoing advancements in biomedical science and technology; (2) the continual development of novel therapies for emerging diseases; (3) evolution of models for collaborative and interprofessional medical practices; and (4) major changes in the infrastructure of our healthcare system. Indeed, the knowledge and skills that healthcare professionals acquire during their formative education may be obsolete within a matter of years or, in some cases, even months. To ensure the most successful outcomes for their patients, healthcare professionals must therefore engage in progressive, high-quality, and career-long education and skill training. Thus, CME can be an important element in continuing professional development.

In serving the vital mission of continuing education (CE) and CME for healthcare professionals, PRIME Education, Inc. (PRIME®) operates on established conceptual frameworks and sound principles of adult learning. This article describes PRIME®’s theory-guided and evidence-based processes for educational needs assessment, activity development, and outcomes assessment. The processes are summarized in the schematic overview in Figure 1.

Educational Needs Assessment and Activity Development Informed by Gap Analysis

The success of any CME/CE activity depends on an initial comprehensive assessment of learners’ needs.3,4 A logical and productive approach to needs assessment is gap analysis, the systematic process of identifying differences between:

1. The healthcare professional’s current knowledge, competence, and performance skills; and
2. Established standards and criteria that must be achieved to promote the highest quality clinical performance and optimal patient outcomes.

As depicted in steps 1 and 2 of Figure 1, gap analysis directly informs the development of learning objectives for educational activities. Gap analysis is also fundamental to devising the methods and tools for outcomes assessment and for developing effective curricular strategies, media, and content. PRIME® operates on the principle that these two processes—the design of outcomes methodology and the development of educational activities—must be tightly integrated. This complementary approach, depicted in steps 3 and 4 of Figure 1, is essential for serving learners’ needs and ensuring successful outcomes of CME/CE activities.

Principled Approaches to Outcomes Assessment

Today’s leading approaches to outcomes assessment in CME/CE have been largely shaped by conceptual frameworks developed by Donald Kirkpatrick,5 George Miller,6 and Donald Moore and colleagues.7 Among other shared features these frameworks are based on the principle that the highest goals of adult education are achieved when learners successfully apply new knowledge to solve problems and master skills in their practice settings. Thus, outcomes assessment in CME/CE must account for the extent to which health professionals:

1. Acquire essential information, ideas, and procedural skills that target identified gaps and serve an educational activity’s learning objectives;
2. Demonstrate competent applications of the knowledge within the educational setting; and
3. Skillfully transfer the newly acquired knowledge to practical settings, effectively closing the gaps that initially motivated the educational intervention.

PRIME®’s pyramid model of outcomes assessment, adapted largely from the recently refined framework of Moore et al,7 is presented in Figure 2. The base of the pyramid represents outcomes of participant demographics (level 1) and participants’ assessments of the quality and effectiveness of educational activities (level 2). Level 2 assessments are implemented through post-activity questionnaires in which participants rate the effectiveness, scientific rigor, and objectivity of the curriculum as well as the knowledge, expertise, and presentation skills of the faculty. In PRIME®’s continuous assessment model, data derived from level 2...
Figure 1. An overview of PRIME®’s approach to needs assessment, educational activity development, and outcomes assessment. Post-activity assessments (steps 9 and 10) are conducted immediately following educational programs and up to 60–180 days later.
evaluations are essential for guiding future gap analyses and for informing the development of new educational activities that enable learners to achieve higher levels of knowledge, competence, and performance. These applications are reflected in the feedback loop from steps 9 and 10 to step 1 in Figure 1.

At level 3 of PRIME®’s pyramid model, pre-activity and post-activity tests are administered to assess changes in declarative (factual) knowledge and procedural knowledge, the latter of which is defined as an expressed understanding of the steps involved in carrying out healthcare practices. Learners’ gains in declarative and procedural knowledge are obviously prerequisites to improving performance skills and, ultimately, to ensuring successful patient health and community health outcomes. This pivotal role of core knowledge is especially pertinent for contemporary healthcare professionals, who continually face the challenges of grasping complex new information and techniques in the biomedical sciences. In addition to assessing learners’ declarative and procedural knowledge acquisition, PRIME® evaluates the extent to which CME/CE activities influence self-reported learning insights, values, and behaviors. Outcomes are assessed, for example, on the influences of CME/CE interventions on participants’ attitudes about educational topics, their intentions to change practices in ways that meet established standards, and their subsequent self-directed learning behaviors. Positive changes in these important subjective learning domains are very often correlated with improved clinical performance and a deeper engagement in lifelong education.8-10

In keeping with the recent outcomes framework developed by Moore et al,7 PRIME® defines competence (level 4) by how successfully learners apply knowledge within the context of an educational activity. For healthcare professionals, gains in competence are thus reflected by such actions as direct applications of knowledge to diagnosing disease; selecting, administering, and adjusting therapies; and counseling and monitoring patients to ensure medication adherence and to prevent medication-related problems. In live and web-based educational settings, PRIME® assesses learner competence through such educational design strategies as performance simulations, practice-feedback sessions involving patient encounters, peer-to-peer virtual town-hall symposia, and technology-driven (eg, Unique Critique®) programs in which expert faculty provide individualized, branching feedback.
to learners in a case-based question-and-answer format. PRIME® also applies elements of these strategies to assess outcomes at the level of performance (level 5).

The most pressing challenge for CME/CE providers is to support healthcare professionals in transferring newly acquired knowledge from educational contexts to practice settings, to promote improvement in performance. The extent to which CME/CE influences performance can be evaluated partly through subjective measures, including post-activity surveys. For example, in a questionnaire administered 60-180 days after an educational activity, PRIME® assesses participants as to how frequently they have applied gap-targeted knowledge in their recent practice, as well as what new actions and interventions they are regularly performing in the clinical setting that they were not performing prior to the CME/CE activity. Though subjective measures, these responses assist PRIME® in tracking the participant’s journey toward performance improvement and in identifying potential new barriers that may thwart the journey, lending important information in the gap analysis.

The ideal approaches to assessing performance outcomes demand direct and objective measures. However, CME/CE providers have traditionally faced many logistical barriers, including patient-privacy issues, in efforts to measure the effects of educational activities on clinical performance. A major initiative, called performance improvement CME (PI-CME), is currently underway to address this problem, engaging maintenance of certification programs. Through application of this technology, PRIME® is evaluating the extent to which performance can be measured and level 5 learning can be achieved. The ability to track patient health outcomes (level 6) is an intended result of this technology through patient registry data. The success of this technology will hinge on many factors, not the least of which is the significant time commitment required of learners to fully engage in the PI-CME activity. As a result, PRIME® is also establishing business partnerships with physician member societies and government organizations, where outcomes of patient health and community health may be identified and measured.

The ultimate goal of CME/CE is to support healthcare professionals in closing targeted learning gaps to improve patient health (level 6) and community health (level 7). At present, logistical matters usually prohibit objective assessments of outcomes at these highest levels. The potential impact of PI-CME in providing data to assess patient and community health outcomes remains to be determined through future applications and associated educational research.

References