INTRODUCTION

Four major forces are converging to transform the mission of continuing medical education (CME) from primarily knowledge transmission to actually changing professional behavior to adopt best practices to enhance the health of patient populations [1]. These forces include pay for performance, which requires continual improvement in practice behaviors [2]. Related are quality ratings of practices of hospitals, clinics, and clinicians, which purchasers can use to decide on where to receive best practices [3]. Licensing and maintenance of certification standards are shifting from a basis of CME credit to a basis of increasing competency with evidence of behavior changes in clinical practices and performance improvement [4]. CME standards have also shifted from primarily knowledge-based to behavior change–based with evidence of progress toward best practices [1].

For CME programs to maximize opportunities to impact behavior change, optimal models and strategies are needed that can tailor CME activities to the needs of different segments of professional populations rather than relying on one-size-fits-all offerings.

A particularly promising approach is the integration of Roger’s diffusion of innovation theory and the transtheoretical model (TTM), both of which represent population approaches to behavior change [5,6]. Roger’s model segments populations into five groups: innovators, early adopters, early majority, late majority, and laggards. The TTM segments populations into five stages: pre-contemplation, contemplation, pre-implementation, action, and maintenance. Both models understand behavior change as a process that unfolds over time and involves progress through stages of diffusion.
or change. In both models, change equals progress. The models differ in that Roger’s segments are more dispositional in nature, with population segments behaving similarly across innovations. Innovators in a medical specialty, for example, are very likely to be the first to change and adopt new medications, technologies, or procedures. Laggards are likely to be the last.

Stages of change are construed as having characteristics of both dispositions and situations, traits and states. Stages have dispositional characteristics in that they can be quite stable over time and resistant to change. Stages also have state qualities in that they are open to change. Well-established behaviors that are over-learned, like many medical practices, are also highly stable and yet can also be open to change. Certain stages like pre-contemplation and maintenance are the most stable and more difficult to change. Others, like preparation and action, are less stable and most open to change.

Most health related behavior change programs, such as smoking cessation, rely primarily on progress through the stages of change [7]. Tailored communications for a population of patients who smoke are designed to help each individual progress from a current stage to the next stage of change. Unlike group counseling programs, individuals in these individually tailored programs are not expected to influence each other’s progress. For example, smokers living in the same geographical area who do not know each other and do not interact are not in a position to influence changes in each other. In contrast, medical professionals in the same geographical area, especially specialists, are likely to know each other, interact at professional meetings, and have the ability to influence each other. So, innovators and early adopters who are progressing relatively quickly through the stages of change for a recent innovation can serve as models for colleagues in later stages of change and phases of diffusion. CME programs can be tailored to professionals in each stage of change and can produce progress that can continue the change process within individuals after the program ends. The diffusion process can continue the change process between individuals after the program ends.

Although both models have been applied primarily at the individual level, they can also be applied to changes at the organizational level. Prochaska, for example, applied the TTM to changes in short-term therapy practices in a sample of 100 family service agencies who were responding to the innovations of managed care approaches [8]. Given that the center selected the activities for its staff, the present study applied the TTM at the organizational level to 65 transplantation centers that participated in a series of CME activities.

**METHOD**

The educational initiative, a national speaker program on renal transplantation titled “Refining Strategies for Better Outcomes” (2004) was designed based solely on an extensive needs assessment of the target audience. The initiative included five topics from which transplantation centers could choose. The topics were described in host brochures sent to transplantation centers as well as on the website dedicated to the project. The head of the transplant department and/or a coordinator within each transplantation center selected the topics that best met their organizational needs. Presentations were delivered in grand rounds to all physicians in the participating center.

The educational needs were the critical drivers of the program content. Educational planners were not aware of the TTM when the educational initiative was developed. It was not until after the initiative was completed that the TTM was examined. Indeed, the actual needs were reflective of the TTM, and the various topics identified addressed learners in each of the five stages of change. This realization led to the 24-month retrospective study. It is interesting to note that comprehensive needs assessment identified the varying learner needs coinciding with the TTM.

**Participants**

Participants included 65 transplantation centers across the United States, which represented a majority of such centers in the US.

**Design**

A 24-month retrospective design examined the progress of each center through a series of CME activities that were categorized according to the stage of change that the content of the activity best matched. Programs for pre-contemplation, for example, would emphasize the change processes of consciousness raising and would focus heavily on information and education. Programs for preparation, on the other hand, would emphasize processes of planning for implementation and increasing commitments to participate across the center. Programs for action would emphasize processes to prevent relapse back to old practices by providing support, reinforcement, and reduction of stress related to change.

The assumption was made that centers would choose CME activities that most closely corresponded to their stage of change. At baseline, centers in the pre-contemplation stage would choose CME activities that would emphasize processes of change most relevant in pre-contemplation, while those in the action stage would choose CME activities that included processes of change better matched to those in later stages. Thus, centers were classified into the stage of change that was represented by the content in the activity selected (ie, selecting an activity geared toward pre-contemplation resulted in a classification in pre-contemplation). Baseline stage assessments were also supported by interviews of key informants who described how ready the center was to adopt innovative best practices. Movement along the stage continuum was reflected by centers choosing CME activities appropriate to more advanced stages of change.

Centers were therefore ordered on two dimensions: 1) which stage-matched CME activity they chose to start with; and 2) the most advanced stage-matched program they completed over the 24 months.
Analyses

Descriptive analyses were used to graph behavior change over the 24 months based on each center’s specific requests for each type of stage-matched content and based on personal interviews of key informants in the centers. Multivariate analysis of variance (MANOVA) was conducted to determine if the mean number of stages progressed and the mean number of CME interventions selected over time differed based on the center’s current stage (six groups).

RESULTS

The figure presents the descriptive outcome data showing how far centers progressed through stage-matched CME activities. The 21% (n = 14) of centers that showed no change in stage over the 24 months all started with the pre-contemplation activities. The one exception was the center that regressed from action to pre-contemplation. Of the 21% of centers (n = 14) that progressed to maintenance in 24 months, all but three started in the action stage, with two in preparation and one in maintenance at the start. The general pattern was the further the centers were in the stages of change at the start, the further they progressed over the 24 months.

The table presents the number and percentage of centers in each stage at 24 months. Only 22% of the centers were in the pre-contemplation stage, and each had made no progress. Another 22% were in the maintenance stage. About 10% (n = 6) of the centers were in the contemplation stage, and the same percentage were in the preparation stage. Nearly one-third (n = 21) were in one of the two action groups. The MANOVA found medium to large effect sizes ($\eta^2 = .143$) between the 6 groups on their mean number of shifts in stage. Comparisons between pairs indicated that the biggest differences were between centers in pre-contemplation that had made zero shifts and centers in contemplation that made a mean of one stage shift. The centers in preparation through action stages made about .67 to .78 more stage shifts than those in contemplation. Because of the small sample sizes, even the medium to large effect sizes were not significant.

The table shows that centers in pre-contemplation who had made no changes had participated in only 3.15 CME interventions compared to 4.5 for the centers that had progressed to contemplation. All other centers had a mean of 3.44 CME offerings ranging between 3.16 and 3.64. There were no significant differences between the groups on this measure.
DISCUSSION

The results provide important support for applying the stages of change model to understand the choice of CME activities over time within transplantation centers. As expected, all but 1 of the 14 centers that showed no progress in their choices of CME activities were in the pre-contemplation stage at baseline. In contrast, of the 14 centers that progressed to maintenance, all but three started in the action stage, with two in preparation and one in maintenance at the start. These results were consistent with the stage effect in which the further along in the stages populations are at baseline, the further along they progress over future months [9].

These results have important implications for tailoring CME interventions to clinician readiness to change [10] and add to earlier studies supporting the application of the TTM to CME [11]. Participants in the pre-contemplation stage will need the most help if they are to progress toward adoption of innovative evidence-based practices. If CME interventions only focus on more traditional information and education content, participants are not likely to progress. Programs would need to include additional change processes that facilitate progress out of pre-contemplation, such as content that increases the appreciation of all of the pros of adopting the performance improvement and begins to increase confidence or self-efficacy that the center can adopt the innovations. For participants in more advanced stages, the content would need to include change processes that increase planning for implementation and commitments to continue to progress in the face of challenging situations, as well as modeling how to adopt or maintain the best practice even if the face of difficult situations.

In the present study, the center self-selected CME activities best matched to the readiness of their staff to adopt best practices over time, ensuring that the content was matched to the organization’s overall readiness. Because many CME activities for individual physicians cannot control what stage of change participants are in for each CME activity, the series of programs will need to be designed so that they include content that can match the needs of participants in each stage of change. This could mean that some components in a series may include more content for participants in pre-contemplation while other parts of the series may have greater emphasis on action-oriented content. Future studies should explore the effectiveness of matched CME content to individual clinician readiness to change.

Treatment centers may have an advantage in the evaluation of the effectiveness of targeted messages in that they can choose increasingly more advanced activities that can facilitate progress over longer periods of time, such as 24 months. CME activities for individual physicians typically do not have the luxury of assessing progress over longer periods of time. They will need to adopt similar measures that can reflect progress over periods as brief as 30 minutes. Such measures would include the pros of changing and self-efficacy or confidence about one’s ability to change in the face of challenging situations. These programs would also have to include content that is tailored to increase the pros of changing and self-efficacy.

One of the surprising, but encouraging, results of this study is that there were no significant differences in the number of CME activities that were chosen over time. There were medium to large effect sizes in the differences in the type of content that was chosen, with centers in pre-contemplation failing to progress in their choice of content from increasingly more advanced stages and centers in contemplation progressing only one stage on contents chosen compared to 1.67 for stages in preparation. The implication for intervention here is that the content of programs may be more critical than the number of programs delivered. This would be consistent with what has been found with interventions tailored for participants in each stage for changing health risk behaviors such as smoking. Participants who received more tailored content were more likely to progress to quitting smoking than participants who received minimal tailoring. But participants who received a series of six tailored interventions did not progress to quitting more than those who received only 3 tailored interventions [11]. The best practice for tailored communications for changing single and multiple health behavior risks have most often used a series of three interventions [12-17]. What is striking is that the transplantation centers chose a mean of 3.4 CME offerings over time, which is similar to the three sessions of a best practice for individual change progress [12].

The study was limited by the relatively small number of centers that participated. Future studies using somewhat larger samples would likely find significant differences by current stage of change, given the medium to large effect sizes that were found. This limitation is mitigated somewhat by the fact that the 65 transplantation centers represent a majority of the transplantation centers in the United States.

Another limitation is the methods that were used to stage centers at baseline and over time. Staging via the choice of CME content and the use of informal interviews with key informants do not have the established reliability and predictive validity of standard stage algorithms used with health related behaviors like smoking, diet, exercise, and medication adherence. This limitation is mitigated somewhat by the fact that the baseline staging of the transplantation centers was found to be predictive of stage progress over time. This supports the validity of this staging approach, but future research needs to include more established approaches for assessing stage of change.

More descriptive and predictive research is needed in applying the TTM to changes in behavioral practices over time. The current demands on CME programs to increase behavior change, as well as knowledge, require that the field progresses to more high-risk intervention research that applies innovative approaches that include change processes to help participants progress at each stage of change [10].
REFERENCES


