A randomized controlled trial of behavior change counseling education for medical students

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Abstract

Background: Educating medical students about how to effectively counsel patients with negative health behaviors (i.e., lack of exercise, smoking) is vitally important. Behavior change counseling is a promising method that can be used by physicians to encourage positive changes in health behaviors.

Purpose: To examine the effectiveness of a 2 h workshop in behavior change counseling for medical students.

Methods: This study used a pre–post control group design with 35 second-year medical students who were randomly assigned to participate in a behavior change counseling intervention or wait-list control group. Student knowledge and attitudes were assessed using multiple choice items and open-ended question prompts. Student skills were assessed via performance in a standardized patient encounter rated using the Behavior Change Counseling Index (BECCI).

Results: Student attitudes toward behavior change counseling were positive at both pre- and post-test assessment in both groups. Knowledge scores and BECCI total scores showed significantly greater improvement in the intervention group compared to the wait-list control group.

Conclusions: This study found that a brief educational intervention had a positive impact on medical students' knowledge and skills in behavior change counseling, and that student attitudes about the counseling method were very positive.

Introduction

Clinicians face a daunting task in helping their patients make lifestyle modifications to address negative health behaviors such as poor nutrition, lack of exercise, excessive alcohol use, and smoking (Miller & Rollnick 2002; Rollnick et al. 2008; Sargeant et al. 2008). Research has shown that simply giving advice or recommendations does not necessarily translate into improved health behavior (Bazata et al. 2008). Educating medical students about how to effectively facilitate such consultations with patients is vitally important, but traditional medical school curricula may lack sufficient opportunities to help students acquire communication skills to address these clinical challenges.

One evidence-based method for counseling patients about health behavior change is Motivational Interviewing (MI; Miller & Rollnick 2002). Originally developed for working with patients with substance abuse, MI has been adapted for use in the management of a variety of medical conditions. In this context, MI is 'a skillful clinical style for eliciting from patients their own good motivations for making behavior changes in the interest of their health' and involves 'guiding more than directing, dancing rather than wrestling, listening at least as much as telling (Rollnick et al. 2008).' This 'medicalized'

> ### Practice points
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> - Behavior change counseling is a patient-centered approach that can be used in a variety of clinical encounters to help clinicians navigate discussions with patients about changing healthcare behaviors.
> - Medical students appear to prefer a patient-centered and collaborative style to health behavior consultations over more traditional directive advice-giving methods.
> - A 2-h workshop on behavior change counseling can lead to measurable improvements in knowledge and skills in second year medical students.

version of MI is often referred to as 'brief motivational interviewing' or, more clearly, 'behavior change counseling.'

Several studies concerning medical student education in MI and behavioral change counseling strategies have been published (Brown & Oriel 1998; Poirier et al. 2004; Mounsey et al. 2006; Martino et al. 2007; White et al. 2007; Bell & Cole 2008). Poirier et al. (2004) evaluated the effectiveness of a 10-h course for first-year medical students that included lectures, student role-plays, and simulated patient exercises. Results showed improvements in students' confidence and knowledge

of providing counseling to patients regarding health behavior change, but no data was presented on skills assessment. White et al. (2007) assessed a MI curriculum, which included 3 h of lectures and additional small groups in the first year with additional training during the family medicine clerkship in the third year. They evaluated students' performance at the end of the clerkship in interviews with standardized patients (SPs) and rated their skills using the Motivational Interviewing Treatment Integrity (MITI) scoring tool (Moyers et al. 2005). While students only reached the predefined proficiency level for the rate of reflections, the authors noted the students 'tend more toward behaviors that are consistent' with MI. There were no pre-intervention assessments.

Martino et al. (2007) examined the effects of a 2-h 'brief motivational interviewing' training conducted during the psychiatry clerkship and observed immediate improvements in students' knowledge and attitudes at post-test, and sustained improvement in these areas 4 weeks later. Skills acquisition was measured using the 'Helpful Responses Questionnaire' (Miller et al. 2006) which presents six hypothetical patient statements to which students write responses. They found significant pre–post improvements in MI consistent skills; however, these skill improvements were not sustained at the 4-week follow-up assessment. Bell and Cole (2008) assessed the effects of four 2-h training sessions on MI during the internal medicine clerkship and found significant pre–post improvements in knowledge and skills. The skills assessment used a portion of the Video Assessment of Simulated Encounters-Revised (VASE-R; Rosengren et al. 2005), which uses video vignettes followed by six questions asking students to generate a response that is consistent with MI. Students showed significant improvements in almost every MI area with moderate to large effect sizes. However, no control group was used in either of the studies by Martino et al. (2007) or Bell and Cole (2008).

Mounsey et al. (2006) conducted a randomized trial of third-year medical students that evaluated skills using the MITI, with one group practicing MI with fellow students and another group with SPs. There were no significant differences in measures of skills between the two groups, indicating that the interventions (peer role-play and SP encounters) were similar in effectiveness. However, both groups in the Mounsey study received the training so there was no control group that would allow evaluation of the effect size of the training. To date, no studies have been published on MI or behavior change counseling in medical school curricula using a randomized design with pre–post assessments and a control group.

The purpose of this study was to evaluate the impact of a 2-h workshop on (1) medical students' knowledge of behavioral change counseling principles (Miller & Rollnick 2002; Rollnick et al. 2008), (2) their attitudes about this method compared to traditional 'advice-giving' communication styles, and (3) their application of behavioral change counseling skills in a simulated patient encounter. We hypothesized that students who participated in the workshop would demonstrate greater pre–post improvements in these domains as compared to a control group who received training only after the pre and post assessments were completed. In this article, we briefly describe the behavioral change counseling workshop and present analyses to evaluate its effectiveness.

Methods

Participants

The study was approved by our local institutional review board. An invitation to participate in the study was extended to second-year medical students at our institution, and the first 40 volunteers were enrolled and received $50 (USD) for their time to participate in the study and complete the assessments. Of the 35 study participants who completed the assessments, all were Caucasian ethnicity except for one Asian student. The average age of the study participants was 28.1 years (ranging from 23 to 43); 63% were male and 37% were female. The gender of students in the control group was 61% male ($n = 11$) and 39% female ($n = 7$); the intervention group was 65% male ($n = 11$) and 35% female ($n = 6$). This is roughly similar to the overall gender distribution for the class which was 57% male and 43% female.

Instruments

Attitudes toward behavior change counseling. Students' attitudes were assessed by having them view two sets of video vignettes designed by the authors, and then respond to two questions in a paper and pencil format regarding their preferences and opinions about the interviewing styles. Students were asked: (1) to rate which style they preferred, and (2) to describe why they preferred one style over the other. Of the vignettes viewed by students, one vignette in each set showed a friendly but directive 'usual care' approach to a patient encounter in which the provider used 'traditional advice giving' communication strategies; while the other demonstrated behavioral change counseling communication strategies in a similar encounter of approximately equal duration. Care was taken to develop the vignettes to be identical in most ways, including physician demeanor, patient–physician alliance, and time spent with the patient. The main difference between the vignettes was the patient-centered and collaborative aspect of the behavioral change counseling approach. To minimize potential order effects, the vignettes were presented in a counterbalanced order.

Knowledge of behavior change counseling principles. Knowledge was assessed with six multiple-choice items developed by the authors (Table 1). Correct scores were summed to create a total score ranging from 0 to 6. The knowledge test demonstrated moderately high reliability at pre-test (Kuder Richardson 21 Formula, KR-21 = 0.73) and lower reliability at post-test administration (KR-21 = 0.45) most likely due the greater variation in scores at post-test.

Behavior change counseling skills. Skills were assessed using the Behavior Change Counseling Index (BECCI; Lane 2002; Lane et al. 2005) to rate students' performance on a standardized patient evaluation (SPE) at pre-test and at post-test. The BECCI is an 11-item checklist designed to be

Table 1. Multiple choice questions used to assess knowledge of behavior change counselling.

1. Which of the following strategies is most consistent with behavioral change counseling?
   a. Providing expert information to guide the patient in forming an action plan
   b. Labeling the diagnosis and problem behavior for the patient
   c. Asking the patient to rate their confidence in enacting an action plan
   d. Prescribing an action plan for the patient
2. Which of the following responses to resistance is most consistent with behavioral change counseling?
   a. 'If your blood sugar doesn't improve, this can lead to serious problems for your eyes, kidneys, and heart'
   b. 'So there's not really a problem in your blood sugar being high?'
   c. 'I am worried about your blood sugar being so high, so let us go over the diet plan again'
   d. 'Your blood sugar ought to be a lot lower if you want to feel better'
3. If a patient makes an inappropriate plan of action, which of the following responses would be most consistent with behavioral change counseling?
   a. 'I think you're moving too quickly; you ought to consider taking smaller steps'
   b. 'Sounds like you've come up with a plan. Would it be okay if we discussed some possible concerns?'
   c. 'That sounds like a good plan for working on your weight, but we need to focus on your blood sugar first'
   d. 'A lot of other people have not succeeded in taking those steps. Would you be willing to consider doing something else?'
4. Which of the following concepts is central to behavioral change counseling?
   a. Presenting reasons for change
   b. Challenging resistance to change
   c. Enhancing motivation for change
   d. Directing change efforts
5. Which of the following examples of feedback and advice to give to patients would be most consistent with behavioral change counseling?
   a. 'You should probably stop smoking, and I recommend our smoking cessation group'
   b. 'Other patients have said that our smoking cessation group was helpful, so that might be something to consider'
   c. 'Experts have found that quitting smoking is best done in a structured program, so you should go to our smoking cessation group'
   d. 'Would it be okay with you if I told you why our smoking cessation group would be good for you'
   e. 'Other patients have said that our smoking cessation group was helpful, so you ought to give it a try'
6. Which of the following is most consistent with behavior change counseling principles?
   a. Providing neutral feedback, such as 'experts have found…'
   b. Using clear diagnostic terms with patients, such as 'alcohol dependence'
   c. Encouraging the patient to follow his/her own plan, even if it doesn't sound reasonable
   d. Waiting for patients to 'hit rock bottom' before they are ready to change
   e. Addressing patient resistance with confrontation of maladaptive behaviors

completed by trained raters to assess competence in behavior change counseling skills. Each item on the BECCI is scored using a five-point Likert-type scale, where $0 =$ not at all, $1 =$ minimally, $2 =$ to some extent, $3 =$ a good deal, and $4 =$ a great extent. Mean total scores, also known as Practitioner BECCI scores, are calculated as the mean across all items (Lane 2002). Although no literature reports use of the BECCI in an undergraduate medical population, reliability as well as content and construct validity of the measure have been described in previous research, using simulated consultations to train practicing healthcare providers (Lane et al. 2005). Inter-rater reliability, intra-rater reliability and sensitivity to detect change of the BECCI have been previously reported as acceptable (Lane et al. 2005). Internal reliability of the BECCI in previous research was $\alpha = 0.71$ in baseline assessments and $\alpha = 0.63$ in post-test assessments. In this study, internal reliability of the BECCI, as assessed by Cronbach's alpha, was 0.82 at pre-test and 0.77 at post-test.

Procedures

Figure 1 illustrates the study design which used an experimental pre–post approach in which participants were randomly assigned to either the control or intervention group. The two groups received identical assessments and attended the behavioral change counseling workshop. The only difference between the two groups was the timing of the assessments; the control group received the post-assessments the day before the workshop, whereas the intervention group received the

post-assessments after the workshop. Because the 2-h workshop was offered as part of the standard curriculum, students who were not enrolled in the trial also attended the workshop but did not complete any of the assessments.

Of the 40 students who agreed to participate, 3 did not complete any assessments, and 2 were excluded from analyses due to incomplete data, leaving 18 participants for the control group and 17 for the intervention group (Figure 1). The randomization of participants to the groups was stratified by gender. The randomization was successful in creating equivalent groups at pre-test, in terms of students' prior academic performance. One-way ANOVAs on two domains of prior academic performance (cumulative grade point average, US Medical Licensing Examination Step 1 scores) were calculated, and showed no significant differences on these measures between the control and intervention groups or between study participants and nonparticipants of the same medical school class (p-values > 0.45).

Description of workshop

The behavioral change counseling workshop for this study was held midway through the second semester of the sophomore year in February 2006, after students had completed the vast majority of their communication skills curriculum as part of the second-year comprehensive Introduction to Clinical Medicine course. The 2-h workshop was taught by a psychiatrist trained in behavior change counseling methods and employed the use of both didactic
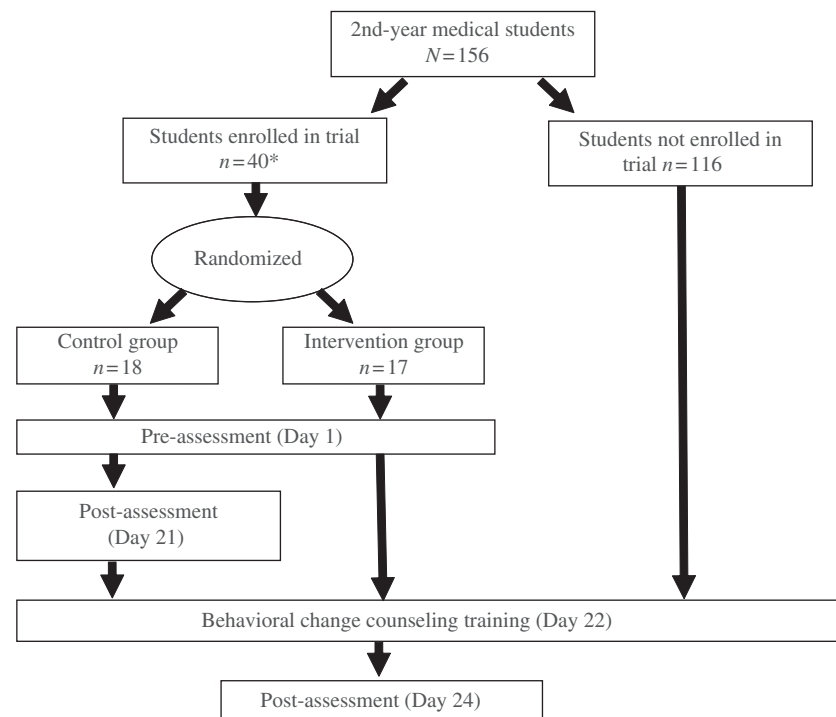
Figure 1. Overview of study design.

Note: *Three students never completed assessments, and two students were dropped from analyses due to incomplete data.

instruction and role-play (full curriculum available from authors).

At the start of the workshop, students were asked to divide into groups of two or three and complete a brief role-play exercise in 'how not to' perform behavior change counseling, using the 'Persuasion Exercise (http://motivationalinterview.org/training/tnt2004.pdf, p. 21).' Following this, students received a didactic presentation on the theory and practice of behavioral change counseling. Concepts were divided into three sections: 'Develop an Agenda,' 'Explore Behavior and Thoughts about Change,' and 'Negotiate a Change Plan.' After each section was reviewed, a brief role-play allowed the small group of students to their practice skills. 'Developing an Agenda' included inviting the patient to discuss a particular behavior while being open to addressing other areas the patient might feel are more important at that time. 'Explore Behavior and Thoughts about Change' encouraged the students to ask various evocative questions to elicit why or how the patient might change and was stressed as the heart of the process. Students were taught particular questions that could lead the discussion in the direction of change. 'Negotiate a Change Plan' included acknowledging challenges, providing information in a way that is sensitive to the patient's concerns and understanding, exchanging ideas of how the patient could change, using neutral feedback, and conveying respect for the patient's choice, even if it is to do nothing. This structure and content is consistent with more recent descriptions of MI in healthcare settings as a 'guiding style (Rollnick et al. 2005, 2008).' After completion of all three sections and accompanying role-plays, a complete behavioral change counseling role-play was performed by each of the students.

Standardized patient evaluation

To assess students' skills in behavior change counseling, a 7-min live SPE exercise was developed which simulated an encounter with a diabetic patient who had suboptimal glycemic and lipid control with possible areas for behavior change in diet, exercise, and tobacco use. Although behavior change counseling methods can be applied to a variety of conditions, the skills assessment for this study focused on the application of such methods for the management of diabetes. Diabetes was chosen because of its relevance to general practice and because it involves a number of potential behavior change areas. Medical history and laboratory values were provided to the students, and no physical exam was required. Students were instructed to engage the SP in a discussion about appropriate lifestyle modifications related to their healthcare. The SPs were experienced patient actors who had previously worked with the institution and who were blinded to the students' group assignments. In addition, SPEs are commonly developed and used in the medical school curriculum where this study was conducted using methods previously described (Heard et al. 1995), and the students had experienced approximately five different SPEs prior to their participation in this study. All SPEs were videotaped and transferred to a CD in randomized order. Three trained raters, who had minimal or no prior contact with students, and who were blinded to the group assignments and timing of the SPE (pre/post) used the BECCI form to rate each SP encounter for adherence to behavior change counseling methods. Consensus ratings for each item were given after raters discussed the encounter and reached agreement.

Analyses

Content analysis methods were used to summarize the students' open-ended comments regarding their preferences for one interviewing style over the other. Specifically, the number of unique comments made about behavior change counseling and usual care methods were identified together by two of the co-authors who have extensive experience in content analysis methods, and then manually sorted into four overarching categories: positive about behavior change counseling, negative about behavior change counseling, negative about usual care, and positive about usual care. SPSS Text Analysis for Surveys was used to facilitate manual coding and sorting of the comments into 20 more specific categories. The highest frequency responses are presented in the results section. Also, to analyze the attitudes data between control and intervention groups, we calculated the proportion that preferred the behavior change counseling or usual care video vignettes and compared the two groups using χ^2 analysis.

SPSS (version 11.0) was used to analyze the data. Descriptive statistics were calculated for the knowledge total score, the BECCI mean total score, and BECCI individual items. Repeated measures ANOVAs (independent variables: pre/post, control/intervention group) were computed to examine effectiveness of the intervention on behavior change counseling knowledge scores, and on skills as assessed by the BECCI. To examine which specific areas of change in skills were impacted most by the intervention, we also computed repeated measures ANOVAs for each BECCI item, and a Bonferonni correction for multiple tests was applied. Preliminary checks were computed to ensure classic assumptions related to normality and homogeneity of variances and covariances were not violated. Effect size estimates were calculated using standardized mean pre-test–post-test differences in the control and intervention groups, following methods described for repeated measures designs (Hojat & Xu 2004).

Additional indicators of the meaningfulness of change on BECCI total scores were explored to examine the relative improvement in acquiring behavior change counseling skills between the control and intervention groups. First, we compared the percentage within each group who achieved a mean BECCI total score ≥ 2, using χ^2 analysis. As noted by authors of the BECCI scale, the mean total score on the BECCI corresponds to the Likert scale points on the checklist. For example, a score of 2.94 indicates 'a good deal' of behavior change counseling skills, or a score of 1.62 indicates skills somewhere between 'minimally' and 'to some extent.' We also computed an estimate of the 'number needed to teach' (Torgerson & Torgerson 2003) which is a measure of intervention impact for educational studies similar to the number needed to treat (NNT) metric which is commonly used in clinical studies. The calculation of the number needed to teach for our study was 1/(the differences in frequencies of achieving the level of competent between the two groups).

e174

Results

Attitudes

At pre-test, 97% of the students preferred the behavior change counseling interviewing style portrayed in the video vignettes and 3% preferred the usual care approach. At post-test, 93% preferred behavior change counseling and 7% preferred usual care. The most common responses in favor of behavioral change counseling were related to greater involvement of the patient in decision making (given by 34% of students), examining patients' willingness, and motivation to change (24%), that it was more interactive (19%) and seemed more likely to be effective (16%). Additionally, comments indicated usual care provided too much information or was 'overwhelming (19%).' While behavior change counseling was widely preferred, 12% of students commented that the usual care method provided the patient with valuable information compared to behavior change counseling. χ^2 analyses of the students' preferences showed there was no difference between the control and intervention groups at pre-test ($\chi^2 = 0.01$, df $= 1$, $p = 0.91$) or at post-test ($\chi^2 = 1.02$, df $= 1$, $p = 0.31$), and no significant pre- to post-test change overall in their preference for the interviewing styles ($\chi^2 = 2.11$, df $= 1$, $p = 0.15$).

Knowledge

At pre-test, there was no significant difference between the control and intervention groups with respect to knowledge about behavior change counseling ($p = 0.54$). Mean knowledge scores at pre-test were 2.4 ± 0.92 for the control group and 2.6 ± 1.0 for the intervention group. At post-test, they were 3.2 ± 0.86 for the control group and 4.8 ± 1.5 for the intervention group. The repeated measures ANOVA indicated a significant group × time interaction existed for knowledge total scores [$F(1,33) = 9.55$, $p = 0.004$; $d = 0.85$ control group, $d = 2.23$ intervention group].

Skills

At pre-test, there was no significant difference between the control and intervention groups with respect to mean BECCI total scores ($p = 0.27$). Table 2 shows descriptive statistics for the BECCI items and total score. Mean BECCI total scores at pre-test were 1.00 ± 0.50 (95% CI $= 0.76$–1.24, Median $= 0.95$) for the control group and 1.19 ± 0.51 (95% CI $= 0.94$–1.44, Median $= 1.09$) for the intervention group. At post-test, they were 1.26 ± 0.44 (95% CI $= 1.1$–1.5, Median $= 1.23$) for the control group and 1.89 ± 0.35 (95% CI $= 1.7$–2.1, Median $= 2.00$) for the intervention group. The repeated measures ANOVA indicated a significant group by time interaction for BECCI total scores [$F(1,33) = 6.86$, $p = 0.013$; $d = 0.53$ control group, $d = 1.36$ intervention group). Repeated measures ANOVAs for each BECCI item (Bonferonni corrected), showed that students improved most in the areas captured by items 1, 4, and 11.

At post-test, only 2 of 18 (11%) students in the control group scored at or above a BECCI total score of 2, indicating they

Table 2. Behavior Change Counseling Index (BECCI) pre-test and post-test descriptive statistics.				
	Control group (*n* = 18)		Intervention group (*n* = 17)	
BECCI items	Pre-test	Post-test	Pre-test	Post-test
Practitioner ...	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
(1) ...invites patient to talk about behavior change	0.56 (0.70)	1.00 (0.77)	1.00 (0.79)	1.71 (0.69)[a]
(2) ...demonstrates sensitivity talking about other issues	0.89 (0.83)	1.22 (1.11)	0.82 (1.07)	2.06 (1.09)
(3) ...encourages patient to talk about current behavior or status quo	2.33 (0.59)	2.22 (0.73)	2.00 (0.50)	2.65 (0.49)
(4) ...encourages patient to talk about change	1.39 (0.98)	1.94 (0.94)	2.06 (0.97)	3.06 (0.56)[a]
(5) ...asks questions to elicit how patient thinks and feels about topic	0.83 (0.86)	1.11 (1.08)	1.00 (1.12)	2.29 (0.59)
(6) ...uses empathic listening statements	0.00 (0.00)	0.17 (0.51)	0.00 (0.00)	0.29 (0.59)
(7) ...uses summaries to bring together what patient says	0.78 (0.73)	1.00 (0.77)	1.00 (0.87)	1.71 (0.69)
(8) ...acknowledges challenges about behavior change that patient faces	0.56 (0.51)	1.11 (0.83)	1.00 (1.00)	1.65 (1.17)
(9) ...provides information sensitive to patient concerns and understanding	0.94 (1.35)	1.11 (1.37)	0.59 (1.06)	0.71 (1.05)
(10) ...actively conveys respect for patient choice about behavior change	1.28 (0.83)	1.44 (0.86)	1.65 (0.70)	2.29 (0.85)
(11) ...and patient exchange ideas about how patient could change current behavior	1.44 (0.86)	1.56 (0.70)	2.00 (0.87)	2.41 (0.62)[a]
BECCI practitioner total score	1.00 (0.50)	1.26 (0.44)	1.19 (0.51)	1.89 (0.35)

Notes: Mean scores can range from 0 (not at all) to 4 (a great extent). Group × time effect, $p < 0.05$, for BECCI total score and items 5, 7, 8, and 10. [a]Group × time effect, Bonferonni-corrected, $p < 0.005$.

exhibited behavior change counseling skills 'to some extent.' In contrast, 10 of the 17 (59%) intervention group students scored at or above a similar level at post-test. There was no difference in the distribution of students between the control and intervention groups who scored >2 at pre-test ($\chi^2 = 0.43$, df = 1, $p = 0.512$), whereas there was a significant difference at post-test ($\chi^2 = 8.83$, df = 1, $p = 0.003$). The number needed to teach was 2 (calculated as: $1/\{(10/17) - (2/18)\}$).

Discussion

This study adds to the growing body of literature which shows that medical students can be effectively educated in behavior change counseling using fairly brief training methods to improve their knowledge and skills. Analyses examining the differences between the intervention and control groups indicated there was a statistically significant positive change in students' behavioral change counseling knowledge for the intervention group relative to the wait-list control group. In addition, students in the intervention group demonstrated significantly improved behavioral change counseling skills during a SP encounter. At post-test assessment, 59% of students in the intervention group scored a 2 or higher on the BECCI indicating they had demonstrated at least some skills in behavioral change counseling compared with only 11% of students in the control group. We chose a BECCI total score of ≥2 to be a reasonable threshold to use in comparative analyses examining improvement in medical students' behavior change counseling skills. With a 'number needed to teach' of 2 as we found, the results indicate that roughly half of the students undergoing similar training would achieve a level of proficiency 'to some extent' in acquiring behavior change counseling skills. The large effect sizes for both knowledge and skills in the intervention group also indicate that the intervention had practical benefits to justify its inclusion in the curriculum, which is encouraging considering the brief length of the workshop (2 h). When medical educators seek to add new material to an already dense curriculum, time is an important variable and brief additions to the curriculum

may be implemented more readily than other more time-intensive ones.

A strength of this study is the use of an experimental pre–post approach in which students were randomized to either the control or intervention group within the curriculum, a rare experimental feature in medical education. Another unique feature is the pre–post behavioral sampling of the students' behavior change counseling skills, which enabled us to measure changes in the students' skills. The skill areas that improved the most among students in the intervention group were related to inviting and encouraging the patient to talk about behavior change, and exchanging ideas with the patient about how they could change current behaviors. Modest but nonsignificant improvements (when Bonferonni-corrected) were also observed in areas that are more nuanced, while a few skill areas assessed by the BECCI were essentially unchanged (e.g., sensitivity in talking about other issues, encouraging patient to talk about current behaviors or status quo, using empathic listening statements, and providing information sensitive to patient concerns and level of understanding). It would be useful for future research to examine whether giving additional education across the curriculum would result in sustained proficiency and significant improvement of the more nuanced behavior change counseling communication skills.

Students' comments about the communication styles portrayed in the video vignettes indicated they preferred behavior change counseling over usual care advice-giving methods primarily due to greater involvement of the patient in decision making. Few students preferred the usual care advice-giving communication strategies. An important caveat to the interpretation of the attitude results, however, was the fact that students were aware the study was about behavior change counseling and could likely identify which video vignette modeled this style. Thus, although students' attitudes about behavior change counseling were overwhelmingly positive, the possibility of social desirability influencing the attitudes data cannot be excluded. In addition, we suspect that testing and maturation effects may also explain, at least partially, why

some students in the control group showed improvements in knowledge and skills at post-test even though they had not received any formal education on behavior change counseling. Because both groups viewed video vignettes depicting behavior change counseling methods as part of the pre-test assessment of attitudes, we suspect this brief exposure may have positively influenced their performance on the SPEs. Anecdotally, our *post hoc* review of the SPE encounters found that some students in the control group were clearly able to incorporate aspects of behavior change counseling methods in their SPE assessment, which indicates that some degree of observational learning occurred simply from viewing the video vignettes. This suggests that further refinements in the instructional design and planning of behavior change counseling curricula might benefit from including more video examples.

A limitation of this study is the relatively narrow scope of follow-up evaluation which focused mainly on short-term changes in knowledge, skills, and attitudes in a simulated patient encounter rather than a real-world patient encounter. Our SP evaluation was also limited to a single area of behavior change domain (diabetes). In considering Kirkpatrick's levels of evaluation (Kirkpatrick 1998), a more sophisticated evaluation of the workshop would include measures to assess whether the students' improvements in communication skills would transfer to actual clinical care (and for conditions other than diabetes), and whether this would affect patient outcomes; long-term effects beyond the scope of this article. This study is also limited in that BECCI ratings were derived by consensus among the raters instead of independent ratings with corresponding estimates of inter-rater reliability; and the sample is relatively small and limited to a single institution. Generalizability of the results might be limited. Even though the students were randomly assigned, they may also have been more motivated than those who did not volunteer to participate in the study.

Conclusions

This study indicates that a brief educational intervention to teach medical students about behavior change counseling led to measurable improvements in both knowledge and several basic patient communication skills areas. Also, students in this study appear to prefer a patient-centered and collaborative style to health behavior consultations over more traditional directive advice-giving methods. Behavior change counseling is a patient-centered approach that can be used in a variety of clinical encounters to help clinicians navigate discussions with patients about changing healthcare behaviors. Patient-centered care is recognized as important for contemporary practice, and brief educational interventions such as the one examined in this study may be particularly useful and readily incorporated in medical education curricula.

Acknowledgments

Notes on contributors

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