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Optimizing the Effectiveness of CME Program: NAMS Experience

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ABSTRACT

Planning organisation and delivery of educational program(s), culminating in purposeful learning require strong basis of principles of adult learning along with a sound knowledge and requisite skills in both psychology as well as technology of medical education. Assessing effectiveness of a CME program is as important as the organization of learning activities and delivery of academic program as these may provide further directions for enhancing the efficacy of the CME delivery system.

Objective: (i) The purpose of this study was to investigate the effectiveness of well planned and conducted CME program in terms of enhancing knowledge and competence of the participants. (ii) To explore if the gain in knowledge and competence, if any, can be attributed to the interactive design of the educational process.

Methods: The study was conducted during NAMS-AIIMS Regional Symposium on Sleep Medicine at AIIMS, Jodhpur as part of NAMSCON 2013. After explaining the objectives of the study to the participants and assurance of confidentiality, a validated and pre-tested questionnaire consisting of 30 multiple choice, single response questions, was administered to 103 participants. Following intervention consisting of didactic lectures by experts in different aspects of sleep medicine, interactive sessions and problem triggered sessions consisting of clinical data, participants were re-administered post test questions which were, however, different from pre-test but had similar difficulty level.

Result: The response rate of participants was 89%. Pre-intervention scores were 11.76 ± 4.4, with only 26 % of participants achieving an arbitrary pass score of 50 %. Comparison of paired score of participants who attempted both pre and post tests (n=59) showed improvement from 12.1 ±4.6 to 18.3 ± 3.8 which was significant ($p < 0.05$). 84.7 % of participants secured above pre decided 50% score. The mean increase in the score was 6.2 with 95% CIs 4.8; 7.5 ($P < 0.001$). Higher gain in

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knowledge and competencies is attributed to intense interactive involvement of participants during the problem triggered sessions, feedback provided during interaction and system of reward and incentive introduced at time of sessions. The study concludes that well designed educational intervention based on the principles of adult learning brings positive gain in the knowledge and enhances competence of the participants.

Key words : Pre-post test, retrospective post-pre test, program evaluation, evaluation of educational intervention.

Introduction:

Medical Education is a soft science and is continuously evolving with a paradigm shift mostly being brought about newer technological advances. As medical professionals it is our responsibility to the society that we keep on updating our knowledge, skills and attitude in accordance with the changing needs and corresponding newer developments in our field of practice. The task requires not only individual efforts and motivation but also relates to the way the information is presented. A meeting provides us an opportunity not only of gaining knowledge but also for sharing our experiences with others. Continuing Medical Education (CME) provides us such an opportunity to enhance our knowledge. A carefully designed and planned educational activity not only optimizes the resource utilization but can also be a cost-effective strategy to disseminate additional medical information to widely targeted group of Health Professionals. Any educational activity demands intrinsic adult learning principles and using critical triangle of educational objectives, learning activities and evaluation with learner as a central character (1). The most widely used model for evaluating any educational program is based on Kirkpatrick's four levels of learning evaluation (2).

The idea behind the model is for an organization to have meaningful evaluation of learning in the organization. The degree of difficulty increases as one move through the levels. These levels are: Level 1- Reaction, Level 2- Learning, Level 3- Behavior and Level 4 – Organizational results. The first two levels can be evaluated shortly after the program. There has been extensive research on using conventional pre-post test assessment versus post then pre evaluation (3, 4). However, a carefully designed pre test and post test can bring about more information both in enhanced cognition and acquisition of skills. In the present study, we share our experience of a CME program focused on Sleep Medicine as part of a National Conference. The study evaluates effectiveness of CME at Level 2 of Kirkpatrick's model of Learning.

Aims of the Study:

1. The purpose of this study was to

investigate the effectiveness of well planned, organized and conducted CME program in terms of enhancing knowledge and competence of the participants.
2. To explore if the gain in knowledge and competence, if any, can be attributed to the interactive design of the educational process.

Method

The study was conducted during a Regional Symposium on Sleep Medicine at a Medical institute in Western India. Symposium consisted of 12 didactic lectures by most of them being well recognized experts in sleep Medicine. Opportunity was also provided to the newly initiated experts also. Following intervention consisting of the didactic lectures by experts in different aspects of sleep medicine, interactive sessions and problem triggered sessions consisting of clinical data, participants were re-administered post-test multiple choice single response questions taken from question bank ensuring similar difficulty level. Each participant was given a randomized code number through lottery, they were given liberty to identify themselves, if they so desire.

The questionnaire which was pre-structured and pretested consisting of 30 test items was filled by the participants before the start of the study.

The intervention was in the form of well planned and jointly discussed didactic lectures with audio-visual aids as a part of sleep symposium (nine hours) delivered by experts in the field of Sleep medicine. The objectives of this sleep symposium were outlined to the participants.

The participants were actively involved through interactive sessions, problem triggers and incentives for best participant.

A post test consisting of 30 test items of different questions with four options but of similar difficulty levels were re-administered to the participants at the end of the symposium.

The primary outcome of this study was improvement in the score obtained by the participants and secondary outcome measure was increase in the number of participants passing the post intervention questionnaire with an arbitrary cut-off score of 50%.

Statistical analysis was carried out using SPSS ver 17.0. Descriptive frequencies were used to describe the data; Paired t test was used for quantitative data while McNemar's test was used to compare the paired categorical data. P value < 0.05 was considered as significant. Participants were explained the purpose of study and were assured of confidentiality of the data and their identification by coding the entire questionnaire. The entire CME program including interactive sessions was captured through high definition video coverage.

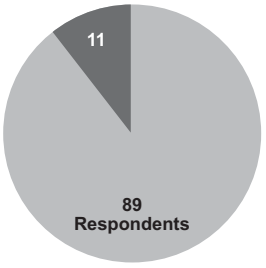

Figure 1: Pie Distribution of responses (Pre Intervention)

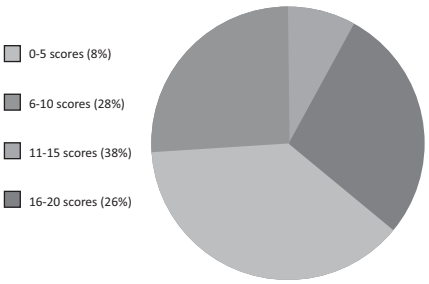

Figure 2: Pie Distribution of Scores Obtained (Pre Intervention)

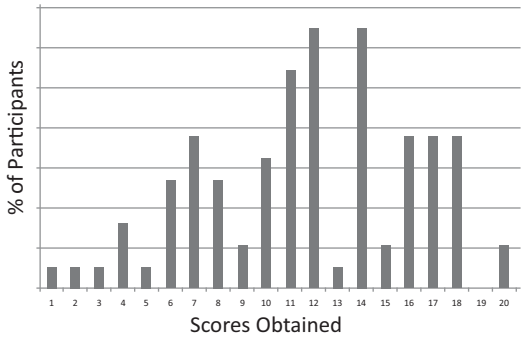

Figure 3:
Frequencies of scores distribution

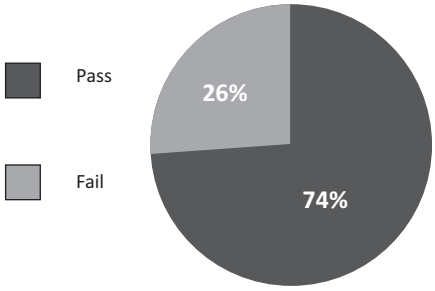

Figure 5:
Pass percentage of students (pre-intervention)

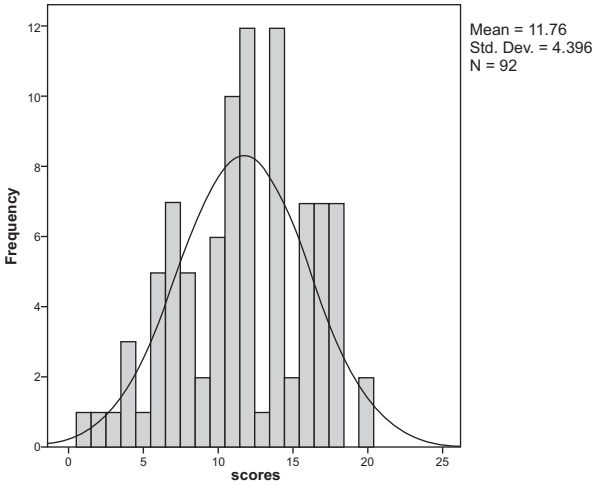

Figure 4:
Frequency distribution curve of scores (pre-intervention)

Table 1: Comparison of Pre and post test among participants (Only 59 participants completed both pre as well as post test).

	Pre intervention N (%)	Post intervention N (%)
Total participants	103	103
Respondents	92 (89)	61 (59)
Non Respondents	11 (11)	42 (41)

Table 2: Comparison of scores between pre and post intervention.

Scores	Pre intervention scores (n=59)	Post intervention scores (n=59)
Mean	12.1± 4.6	18.3± 3.8
Median	12 (9, 16)	18 (16, 20)
Range	1-20	11-26

Results:

A total of 103 participants were given pre-structured questionnaire (total score-30). Only 92 participants returned the questionnaire (response rate- 89%) (**Figure 1**). Pre-intervention scores were 11.76 ± 4.4, Median score: 12(8, 15.7) range: 1-20. The distribution of scores is shown in **Figure 2**. Frequency distribution of pre-intervention score is shown in **Figure 3 and 4**. Only 26 % of participants scored pass with an arbitrary cut-off of 50 % in pre-intervention group (**Figure 5**). Summary of the participants during pre & post test is depicted in **Table 1**. Comparison of scores of participants who attempted both pre and post tests showed improvement from 12.1 ±4.6 to 18.3 ± 3.8 **(Table 2)**.

All the 59 participants scored more than 11 with 80% of them securing arbitrary score of 50% **(Table 3 & Fig 6)**.

The difference between pre and post intervention was significant ($p < 0.05$). There was a statistical significant increase in the scores obtained in the post intervention questionnaire as compared to pre intervention questionnaire. The mean increase in the scores after the intervention was 6.2 with 95% CIs 4.8; 7.5 ($P<0.001$)

The study also showed, as secondary outcome, significant improvement in passing among the cohort of 59 participants from 33.9 % to 84.7 % ($p<0.001$) when arbitrary cut-off is set at 50 % which was highly significant.

The intensity of participation of students was evident by higher level of quality of questioning during the sessions.

Table 3: Posthoc analysis of scores

Score Distribution	Pre Intervention n(%)	Post Intervention n(%)	P value
1-10	20 (33.9%)	0	< 0.05
11-15	21 (35.6%)	12 (20.3%)	
16-20	18 (30.5%)	35 (57.4%)	
> 20	0	14 (23%)	

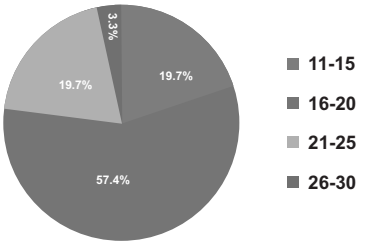

Figure 6: Pre-intervention scores

Discussion:

According to Kirkpatrick's model of evaluation for learning, level 1 and 2 can be carried out immediately after the educational activity (2). While level 1, i.e., reaction can be evaluated by taking feedback and survey, level 2 requires additional methods to explore participants gain in knowledge and comprehension.
There are various tools for assessing improvement in knowledge. While Rockwell has emphasized importance of post then pre evaluation for assessing such changes (3), Nimon *et al* debated the utility of such a tool (4). Pre-post test are a conventional tool and if carefully designed, can yield better results in cognitive improvement. It can also be used to assess improvement over a period

of time. Gallagher *et al* in their study using pre-post test found effectiveness of a brief intervention program on knowledge of nursing staff in critical care (5). Present study also showed significant improvement in passing among the cohort of 59 participants from 33.9 % to 84.7 % ($p<0.001$).

Educationists have also used many modalities to optimize the learning during educational intervention. This may consists of using case scenarios; interactive sessions and problem based learning rather than only didactic teaching. In present study, apart from didactic sessions of 15- 25 minutes, questions were invited from participants and also 2 interactive sessions were used with problem triggers sessions for focusing on individual problems for lateral thinking. In a study by Bell *et al*, it was observed that reinforcement of knowledge gain is as important as learning activity (6). The improvement in knowledge of the study group may be related to these activities during the time specific educational intervention.

As part of the Accreditation Council for Continuing Medical Education (ACCME)'s new criteria which requires CME providers to assess the impact of their interventions, Weiner SJ *et al* conducted a pilot assessment of two workshops and one pre-course (7). They found positive change in knowledge of participants but concluded that effect size measurement of sessions provides quantitative information about their impact on learning. However, they were concerned about the methodological and logistical challenges that may preclude feasibility of tracking learning and retention following a national meeting. Davis *et al* observed several major issues in primary study design and in the systematic review process of CME studies and suggested a standard nomenclature, a rigorous process of searching, and a common format on which to base the development and description of future studies of CME interventions (8, 9). We observed that with careful planning and conduction, the problem of design may be obviated. With evolution of Medical Education technology and faculty development program, one may embark on standardized assessment of all of our educational programs and processes. Jerardi observed interactivity improves participants' learning (9). Limitation of our study was that it was restricted to one symposium only. But we have to maintain caution while conducting more such activities for longitudinal gain in knowledge and are also prepared for similar logistics challenges.

Acknowledgement:

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Contributions:

1. JSB- Conceptualized the theme for CME, defined specific learning

objectives, planned and organized the academic activity and initiated the discussion on problem triggers based on clinical and laboratory data.

2. KS- was involved in executive functions mostly focused at co-ordinating the symposium and participating in data analyses and its collective interpretation.

3. NG- was mostly responsible for tabulation of data and made purposeful suggestion for its expeditious analysis.

4. SM- coordinated team efforts, rendered critical and purposeful advise leading to meaningful conclusions.

Finally, each one of them critically read the manuscript and the final outcome is a result of their joint efforts.

References:

1. Kern DE, Thomas PA, Howard DM, Bass EB (1998). Curriculum Development for Medical Education: A Six-Step Approach. Johns Hopkins University Press: Baltimore, Maryland.

2. Kirkpatrick D L, Kirkpatrick JD (2006). Evaluating Training Programs: The four Levels, 3rd edition, Barrette and Koehler Publisher. Inc. San Francisco, CA.

3. Rockwell SK, Kohn H (1989). Post then Pre evaluation. *J Extension*. **27**(2): 1-5

4. Nimon K, Zigarmi D, Allen J (2011). Measures of program effectiveness based on retrospective Pretest data: Are all created equal? *Am J Eval*. **32**: 8-28

5. Gallagher R, Roach K, Belshaw J, Kirkness A, Sadler L, Warrington D (2013). A pre-test post-test study of a brief educational intervention demonstrates improved knowledge of potential acute myocardial infarction symptoms and appropriate responses in cardiac rehabilitation patients. *Aust Crit Care*. **26**(2):49-54

6. Bell D S, Harless C E, Higa J K, *et al* (2008). Knowledge Retention after an Online Tutorial: A Randomized Educational Experiment among Resident Physicians. *J Gen Intern Med.* **23**(8): 1164–1171

7. Weiner S J, Jackson J L, Garten S. Measuring Continuing Medical Education Outcomes: A Pilot Study of Effect Size of Three CME Interventions at an SGIM Annual Meeting (2009). *J Gen Intern Med.* **24**(5): 626–629.

8. Davis D, Bordage G, Moores CK, *et al* (2009). The Science of Continuing Medical Education: Terms, Tools, and Gaps: Effectiveness of Continuing Medical Education: American College of Chest Physicians Evidence-Based Educational Guidelines. *Chest*. **135** (3_suppl): 8S-16S

9. Jerardi K, Solan L, DeBlasio D, *et al* (2013). Evaluating the impact of interactive and entertaining educational conferences. *Perspect Med Educ*. **2**(5-6): 349–355.