ORIGINAL ARTICLE

Effectiveness of topic briefing followed by field visit in improvement of academic performance of medical students: A pre-post quasi-experimental study

Chandrachood Mandar V, Chavhan Snehal P
Department of Community Medicine, BKL Walawalkar Rural Medical College, Sawarde, Chiplun, Maharashtra

CORRESPONDING AUTHOR
Snehal P Chavhan, Scientist E, Health Technology Assessment Group, ICMR-NIV, Pune
Email: snchavan14787@gmail.com

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Abstract
Background: In preventive medicine, although field visits are vital, they are conducted without topic briefing. **Aim & Objective:** To evaluate effectiveness of topic briefing followed by field visit in improvement of academic performance. **Methods**: Using Pre-post quasi experimental study design. Two interventions were imparted, 1st- topic briefing followed by 2nd - field visit. **Results**: Significant improvement was seen in mean total score from 9.14±2.46 at baseline to 14.46±2.01 post briefing to 16.21±1.57 after field visit; (RAMNOVA F-195.6, p<0.0001) and in mean practical score from 5.00±1.81 at baseline to 6.64±1.49 post briefing to 7.91±1.18 after field visit; (RAMNOVA F-64.31, p<0.0001). Post-hoc analysis was also significant. Although, mean theory score improved significantly from 4.14±1.70 at baseline to 7.81±1.36 post briefing to 8.31±0.77 post field visit (RAMNOVA F-172.8, p<0.0001), Post hoc analysis showed significance only after post briefing. **Conclusions**: The pre briefed field visits significantly improved the academic performance in both, theoretical & practical aspects.

Keywords
Effectiveness, Field visit, Topic briefing, Academic performance

Introduction
The major objective of medical schools is to prepare the students to solve the problems at the level of individuals, families, and community.(1) In preventive medicine, it is assumed that field visits by providing a grass root level scenario will impart problem solving capabilities along with improvement of theoretical concepts.(2) A newly introduced Competency Based Medical Education (CBME) Curriculum in India in 2019 also puts higher impetus on field visits.(3) Integrated Child Development Services Scheme (ICDS) is a social welfare scheme functioning through 'Anganwadi Center' at village level and is an important part of the preventive medicine curricula.

Field visits to 'Anganwadi Centers' are usually planned in 3rd MBBS without briefing the students. It is also uncertain, whether field visit helps in the improvement of academic performance of the students. The introduction of field visits in the foundation course itself gave us a unique opportunity to scientifically

evaluate effectiveness of topic briefing followed by field visit in improvement of academic performance in the freshly inducted 1st batch of Indian medical graduates, who were never exposed to ICDS scheme.

Material & Methods

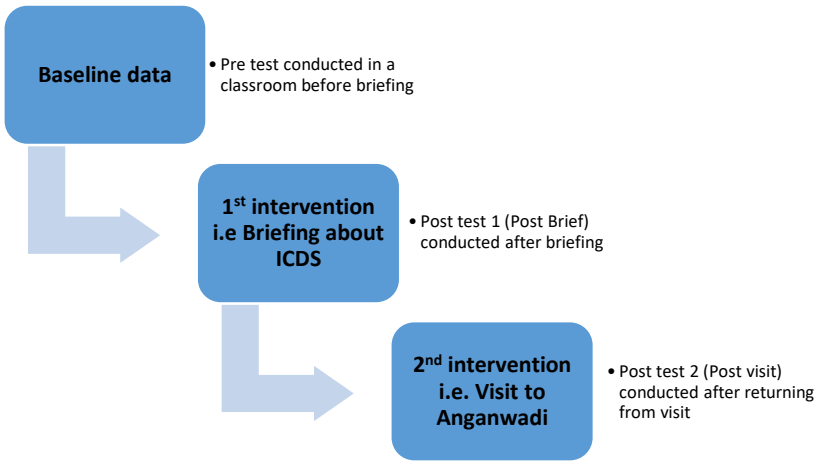
A quasi experimental study was conducted among the 1st MBBS undergraduate students of the Private Medical College in '*Konkan*' region of the Maharashtra state of India in February 2020. Our college had an intake capacity of 100 students per year and for the sake of convenience, they were divided into two batches of 50 students each. On a scheduled day of visit to Anganwadi Center, we conducted this study only on one batch as carrying both batches to the field was impossible considering limited transportation resources. Two students were absent on the day, so our sample consisted of 48 students who were selected by purposive sampling.

To do a formative assessment of students on ICDS, a multiple choice questions (MCQs) based pretested structured questionnaire was used. Questionnaire contained 20 specific MCQs on knowledge related to must know areas of the ICDS of which 10 questions were related to assessment of theoretical knowledge and 10 were related to practical aspects. The content validity of the questionnaire was assessed through the inputs from experts in the field.

Just before the briefing session pre-test questionnaire was administered under the supervision of the faculty to the participants in a class room, which formed our baseline.

Two interventions were administered in a sequential manner. The first intervention consisted of a briefing session, which lasted for 30 min followed by the second intervention of a field visit to the Anganwadi Center, which lasted for about an hour. After the briefing session, post-test was conducted using the same questionnaire. The field visit to *the* Anganwadi Center in the field practice area of the medical college was conducted on the same day after the first post-test, where students learned about ground implementation of the program through demonstrations given by Anganwadi worker and Anganwadi helper who are the functionaries at the Anganwadi center. After the visit, one more *i.e.*, second post-test was conducted using the same questionnaire 30 min after returning to the college (Figure 1)

Figure -1-Flow of conduct of study



Answer sheets were evaluated for the total score and for theoretical and practical knowledge scores independently. Each correct answer was scored '1' and wrong answer and un-attempted question was given '0' score. The maximum total score (theoretical and practical knowledge combined) was 20 while the minimum score was 0. Similarly, the maximum score was 10 and the minimum score was 0 for theory and practical knowledge independently. Negative marking was not done.

Statistical analysis: All the quantitative variables were summarized using descriptive

statistics such as mean and standard deviation (SD) and frequencies in proportions. Mean scores were compared for statistical significance using the Repeated Measures ANOVA (RAMNOVA) test and Post-hoc Bonferronie's Multiple Comparison test, while proportions were compared using the Chi Square Test. $p<0.05$ was considered as statistically significant. Statistical analysis was performed using the Prism 8.0 trial version.

Ethical Clearance: As we conducted this study as a part of formative assessment of students, we did not take written informed consent from study participants. Explaining the purpose of study could have altered the behavior of students in study settings. Interventions and their evaluation were part of routine curricular activity which caused no harm according to Helsinki declaration, hence we rescued ourselves from taking formal ethical approval from Institutional Ethics Committee.

RESULTS

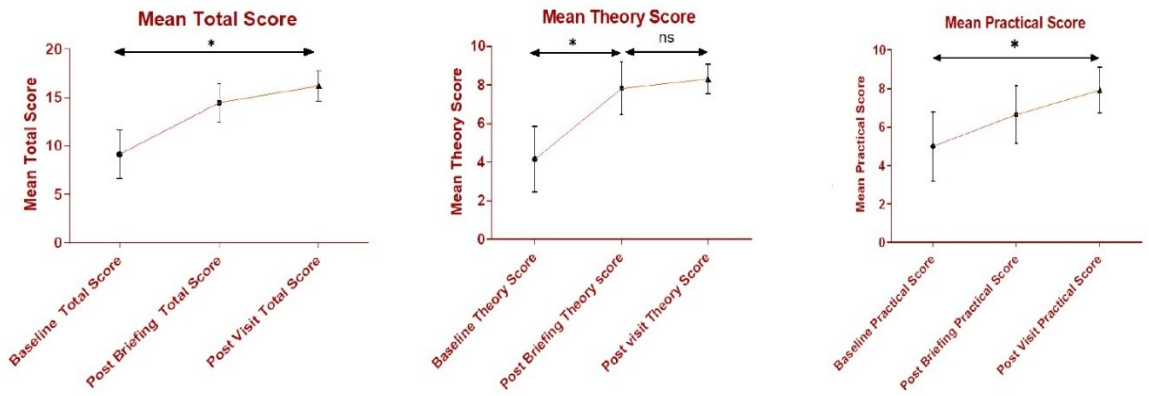
Among 48 students who formed our study population, 30 (62.50%) were males and 18 (37.50%) were females. All were from age group of 18-19 years.

Their mean total score was significantly improved post briefing and post visits (RAMNOVA F-195.6, $p<0.0001$) (Table 1, Figure 2). Post-hoc Bonferronie's multiple comparison test also revealed significant improvement occurring after briefing and post field visit (Difference between mean scores after briefing- 5.31 and post visit- 1.75, $p<0.05$). (Table 2). It is also evident from (Table 3) that the percentage improvement in the mean total score from baseline was 58.20% post briefing, while it was 77.35% post visit, between post briefing and post visit parentage improvement was 12.10%.

Table 1-Showing score parameters at Baseline, Post Briefing and Post Field Visit.

Score parameters	At Baseline	Post Briefing	Post Field Visit	Repeated ANOVA F	Measure	p value
Mean Total Score ± SD	9.14±2.46	14.46±2.01	16.21±1.57	195.6		p<0.0001
Mean Theory score ± SD	4.14±1.70	7.81±1.36	8.31±0.77	172.8		p<0.0001
Mean Practical score ±SD	5.00±1.81	6.64±1.49	7.91±1.18	64.31		p<0.0001

Figure 2- Depicting Mean Total score, Theory score, and Mean Practical score at Baseline, Post Briefing and Post Field Visit.



The mean theory score (out of 10) also showed a significant improvement both after briefing and visit (RAMNOVA F-172.8, $p<0.0001$) (Table 1, Figure 2). However, Post-hoc Bonferronie's multiple comparison test revealed that statistically significant improvement in mean theory score occurred post briefing (Difference between mean scores- 3.66, $p< 0.05$) but it was

insignificant post field visit (Difference between mean scores- 0.50, p> 0.05). (Table 2). Percentage improvement in the mean theory score from baseline was 88.64% post briefing, while it was 100.48 % post-visit, which meant that the theory score doubled after the field visit, However, between post briefing and post visit parentage improvement was only 6.40%. (Table 3)

Table 2-Showing results of Post Hoc Bonferroni's Multiple Comparison Test of Score parameters at Baseline, Post Briefing and Post Field Visit.

Paired observations	Mean diffrence Total Score	Mean diffrence Theory score	Mean diffrence Practical score
Baseline Score vs. Post-Briefing Score	5.31	3.66	1.64
Baseline Score vs. Post-Visit Score	7.06	4.16	2.91
Post-Briefing Score vs. Post-Visit Score	1.75	0.50	1.27
Post hoc bonferoni's multiple comapirsion test significance (p <0.05)	Yes	No	Yes

The mean practical score improved significantly after briefing and visit (RAMNOVA F-64.3, p<0.0001) (Table 1, Figure 2). Post-hoc analysis also confirmed same (Difference between mean scores after briefing- 1.64 and post visit- 1.27, p<0.05) (Table 2). Percentage improvement in the mean practical score from baseline was 32.8% post briefing while it was 19.12 % post visit. Highest increase was seen between post briefing and post visit percentage improvement was 58.20%. (Table 3)

Table 3- Showing results of percentage change in score parameters at Baseline, Post Briefing and Post Field Visit.

Percentage change in scores	Total Score	Theory score	Practical score
Baseline Score vs. Post-Briefing Score	58.20%	88.64%	32.8%
Baseline Score vs. Post-Visit Score	77.35%	100.48%	19.12%
Post Briefing Score vs. Post-Visit Score	12.10%	6.40%	58.20%

We tried gauging the proportions of students benefited by these interventions by calculating the frequencies of students showing a decrease in scores, no change in scores, and increase in scores after a brief and post visit.

Taking the total score, this did not decrease post brief and post-visit, scores remained almost static for 2(4.16%) students after briefing while post-visit static scores were not seen. 46(95.83%) students showed an increased scores post brief compared to 48(100%) after visit, but this difference was not statistically significant (p=0.36). In theory score, score did not decrease post brief and post-visit, scores remained static for 5(10.41%) students after briefing while post-visit static scores were seen in 3(6.25%) students, and 43(89.58%) students showed increased in scores post briefing compared to 45(93.75%) after visit; but this difference was not statistically significant (p=0.76).In practical scores, 4(8.33%) students showed decreased practical score post brief and in 2(4.16%) students post visit decrease was noticed, practical scores remained static for 13(27.08%) students after briefing while post visit static scores were seen in 4(8.33%) students. Improvement in practical score was seen in 31(64.58%) students post brief compared to 42(87.5%) students after the visit. These differences in proportions were statistically significant (p=0.022) (Table 4)

Table 4- Showing changing dynamics of score parameters at Baseline, Post Briefing and Post Field Visit.

Change	Total Score			Theory Score			Practical Score		
in score	Decreased	Static	Increased	Decreased	Static	Increased	Decreased	Static	Increased
Post Briefing	0	2	46	0	5	43	4	13	31
Post Visit	0	0	48	0	3	45	2	4	42

Change in score	Total Score			Theory Score			Practical Score		
	Decreased	Static	Increased	Decreased	Static	Increased	Decreased	Static	Increased
Chi Square;df	2.043, 2			0.5455, 2			5.242, 2		
p value	0.3601			0.7613			0.0220		

DISCUSSION

The mission of preventive medicine teaching is to contribute to the development of a well-rounded (holistic) medical professional(4) and findings of our study reveal that, both briefing and field visits contribute equally for holistic development.

Rawal SV in his randomized control trial observed that a field visit to primary health centre helps improve theoretical and practical aspects of primary health care in a significantly better way compared to classroom teaching with lectures.(2) Our study also underscores the same.

An analysis of studies on field visits by Martha L Nabors et al. showed that field trips are a type of experiential learning & help students as a new mode of learning, which also makes students aware of the actual world in which they live.(5) D. Knapp has mentioned memorable experiences of a science field trip that potential immediate outcome of science field trip is the retention of knowledge, which was similar to our study observations where post-test was performed immediately after the intervention and significant gain was observed.(6)

Gopalakrishnan S et al. in their study on Community Medicine teaching and evaluation stated that field visits should be integrated with lecture class to have a positive impact on Cognitive, Affective & Psychomotor domains, same was carried out as a part of an intervention (Briefing in classrooms and field visit) in our study but only the cognitive domain was evaluated, which showed significant improvement.(7)

In a study done by Anderson and Lucas on a post-test of cognitive learning of concepts and principles associated with the exhibits showed that, those students who underwent novelty reducing pre-orientation to the physical environment and who had prior visitation experience learned more than their counterparts.(8) Our study also shows that pre orientation in the form of briefing before the actual visit improves the cognitive learning.

Rennie and McClafferty emphasized the importance of pre-visit preparation for both teachers and students, including making clear to students the nature and requirements of post-visit activities which can reinforce and extend the learning.(9) Our study findings also depict the same where, theory scores doubled after briefing and visit, which indicates reinforcement phenomena and knowledge extension.

Orion and Hoffstien in their study, divided students in OCP (Optimal Concrete Preparation) and TFP (Traditional Frontal Preparation) groups and their achievement scores suggested that preparation toward a field trip had a significant influence on students' learning ability.(10) Prior observational reports by the same author strongly supported this finding.(11,12,13) Our study findings are in consonance with them.

Falk and Adelman in their study in 100 NAIB Aquarium visitors observed different patterns of conservation-related knowledge. They reported, regardless of entering knowledge, individuals with the least knowledge and most knowledge, experienced significant changes in their knowledge of conservation. For reasons not entirely clear, visitors with moderate knowledge did not show significant improvement in their conservation knowledge.(14) Similar phenomena was observed in our study, where theoretical knowledge did not increase after the visit as students gained some knowledge after briefing itself but in relatively unknown area of practical knowledge, the students improved consistently even after visit in a significant manner.

Scott Freeman et al. in their meta-analysis of 225 studies on data of examination scores or failure rates, reported that the average examination scores improved by about 6% in active learning sections.(15) On similar lines, our study also showed 12.10%, 6.40%, and 19.12% improvement in total, theory and practical knowledge respectively after visit.

Paul Worley et al. in their cohort study on 371 medical students, subjected students to different academic settings and challenged the orthodoxy of tertiary hospital education being the gold standard.(16) Our findings of 77.35%, 100.48% and 58.20% increase in total score, theory score and practical score from baseline after interventions are underscoring this finding, also consistent improvement in practical score in our study findings are in agreement with view of the author and emphasizes that competencies will be best garnered in social contextual settings such as Anganwadi rather than classrooms.

Study conducted by Upadhyay N revealed that field activity education and training if done in early years of medical school leads to the development of critical thinking of students with their appreciation of strong links between field activity, clinical practice, and evidence-based medicine.(17) Resembling the approach of author, our study was conducted in the early years of medical education i.e. in the second term of graduation and substantial gain in knowledge was noticed.

Christopher B. White & Andria M. Thomas conducted retrospective comparative analysis of medical student's academic performance who completed their paediatric clerkship in CPS (Community Practice Sites) vs. students trained at an AMC (Academic Medical Centre). Result showed that the CPS-trained students performed as well or better on standardized written tests compared with AMC-trained students.(18) Our findings are in congruence with the study but depicts added advantage of field visit for improvement of practical scores as compared to theory score.

Stephanie K. Nothelle, Colleen Christmas, and Laura A. Hanyok in their interventional study among 16 First-year internal medicine residents, subjected them to an intervention where they completed a nonmedical home visit to an at-risk patient prior to seeing the patient in the office. They performed a thematic analysis of written narratives immediately following the visit and then again at the end of the year. Authors in the study concluded that a nonmedical home visit can be rewarding and formative for early resident physicians.(19) Although our study used quantitative methods of assessment, our results are in consonance with conclusion of authors, where we found pre-briefed field visits rewarded students in-terms of assessment scores.

Talking about strengths of study, we conducted both the interventions on same participants which gave an advantage of comparability at all stages of study. Further we could limit attrition by conducting study on same day. By conducting interventions on completely naive students and choosing a curricular topic of 3rd year we could eliminate carry over effect (20) of their previous curricula.

Our study findings clearly reiterate the importance of properly conducted field visits for improving the academic performance of medical students, also it makes a strong case for pre-visit briefing session which is sometimes neglected in medical colleges. The study also gives emphasis on the methodology of conducting the field visit, which can improve and reinforce the academic gains of medical students in a significant way.

CONCLUSION

The pre-briefed field visit helped significantly to improve, theoretical and practical aspects, which shows that field visits hold immense potential as an effective method of teaching in medical curricula. Briefing followed by field visit consistently increases the percentage improvement in the total score and theory score, which depicts reinforcement phenomena achieved by sequential application of these two methods. Hence, emphasis should be given on proper briefing sessions followed by the field visit.

RECOMMENDATION

Pre-briefed field visits should be integrated as a core teaching method in the undergraduate medical curriculum. This will help to develop future physicians who are clinically competent and possess a strong public health perspective to effectively address community health challenges.

Limitation of the study

Carry over bias/effect (20) - Defined as, if the effect of a treatment continues after the treatment is withdrawn then the response to a second treatment may well be due in part to the previous treatment. It occurs particularly when subjects are tested more than once. (21) In our study we conducted both the interventions without washing out period, hence we suspect that the effect of briefing could have carried over in field visit and post visit impact could be a cumulative effect.

In our study, we could have assessed the practical knowledge with the help of OSPE (Objective Structured Practical Examination), but we resorted to questionnaire based assessment to ensure comparability between both interventions.

Affective domain was not assessed in our study, which could have given a more comprehensive picture of overall improvement after a field visit in all domains vis Cognitive, Affective and Psychomotor.

Relevance of the study

This study provides significant evidence supporting the effectiveness of pre-briefed field visits as a valuable teaching tool in medical education. It adds to the current knowledge by demonstrating a statistically significant improvement in academic performance among students who participate in such visits.

Authors Contribution

Both authors contributed equally to the conception, design, writing, and editing of this paper and approved the final version for publication in the journal. Statistical analysis was performed by Chavhan Snehal P.

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Nil

Conflict of Interest

There are no conflicts of interest.

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Declaration Of Generative AI And AI Assisted Technologies In The Writing Process

Authors declare that AI tool/service was not used during the preparation of this article and take full responsibility for the content of the publication.

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