

PROJECT REPORT

Blended distance education program for junior doctors working in rural hospitals in India

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ABSTRACT

Context: Distance learning, supported with supervised clinical work, has been successful in helping doctors located in remote rural areas to practice effectively. Graduates of Christian Medical College (CMC), Vellore, India, have a 2-year service obligation to work in small hospitals mainly located in rural areas. The Fellowship in Secondary Hospital Medicine (FSHM) program is a year-long blended on-site and distance learning program, designed by CMC to support and provide education opportunities for its recent graduates working in small hospitals in rural areas. The FSHM program was designed to help junior doctors develop the knowledge and skills to practice effectively in rural hospitals.

Issues: The FSHM program consists of 15 paper-based distance learning modules focused on helping to develop knowledge to practice in rural hospitals; three contact sessions at CMC, which focused on developing the necessary skills; project work focused on improving local health services; and networking between peers and with faculty. Two years after implementation of the FSHM program in 2007, the vast majority of students (81%) and faculty (80%) rated the distance learning modules as very good or excellent in helping students develop the knowledge to practice in secondary hospitals. Also, most of the students (88%) and faculty (87%) rated the contact sessions as good or very good in helping students to apply what they had learned in secondary hospitals. Focus group discussions revealed that all of the program participants recognized that the distance learning modules and contact sessions helped them in providing patient care in rural hospitals.

Lessons learned: Well-designed distance learning modules, supported with contact sessions by medical school faculty members, help junior doctors to practice effectively in rural hospitals and reduce their isolation.

Key words: blended distance education, contact sessions, distance learning, junior doctors, qualitative research, rural practitioners.



Context

Globally, educators in higher education are using distance education more and more as an education approach¹⁻⁴. The advantages of distance education are that it makes education available to students in remote areas and to those with family or work commitments that prohibit attendance at extended on-site education programs^{2,3,5,6}.

Graduates of Christian Medical College (CMC), Vellore, India, have a 2-year service obligation to work in small hospitals mainly located in rural areas. The Fellowship in Secondary Hospital Medicine (FSHM) program is a year-long blended on-site and distance learning program, designed by CMC to support its graduates working in such hospitals⁷. CMC aspired through the FSHM program, designed as a blend of distance learning modules, contact sessions, project work and networking, to provide educational opportunities for these junior doctors working in geographically remote areas.

The purpose of this paper is to present a description and evaluation of the combined role in the program of the distance learning modules, structured for active learning, and the contact sessions, to develop knowledge and skills for these junior doctors to practice effectively in rural hospitals in India. The role of project work and networking is important and will be addressed in another publication^{7,8}.

Issues

FSHM setting and description

Medical graduates in India: Medical graduates in India obtain the MBBS degree (equivalent to a US MD degree) after five and a half years of medical training, which includes a 1-year rotating internship. These MBBS graduates would be a junior doctor in India. They can practice as a general practitioner after registration with the Medical Council of India⁹.

Secondary hospitals: Graduates of CMC, a tertiary care center, have a 2-year service obligation to work in secondary hospitals, which are small hospitals mainly located in rural areas⁷. These hospitals have between 20 and 200 beds, with a generalist practice of medicine, surgery, pediatrics, and obstetrics and gynecology; limited laboratory support; and local community-based programs such as antenatal care and tuberculosis programs. These graduates face many challenges while working in these hospitals, such as lack of academic and social support and academic isolation^{7,10}. Other challenging factors include the type of knowledge and skills required to practice at secondary hospitals (eg providing effective patient management with limited laboratory support); the type of cases seen in secondary hospitals which depends on the prevalence of disease patterns in the area where the secondary hospital was located, (eg *kala-azar* (leishmaniasis) in Bihar, falciparum malaria in the east and north-east, and sickle cell disease in the tribal belts¹¹⁻¹³). Graduates also faced difficulties in following standard guidelines for treatment because of limited patient economic resources, limited lab support, and limited/lack of referral support. Most of these graduates choose not to work in these smaller hospitals after their service obligation. Many such hospitals are closing because of lack of staff^{10,14}. This is affecting the health care of the nation, especially in rural areas where these hospitals are located.

Lack of rural physicians is a global problem^{15,16}. Providing rural physicians with academic and social support has been suggested as a measure for retention of a rural health workforce^{15,17,18}. CMC aspired, through the FSHM program, to provide support to these junior doctors working in rural hospitals and help them develop the knowledge and skills to practice effectively in their hospitals. What these junior doctors learned through the FSHM program could be applicable to rural hospitals similar to the ones in which they were placed for their service obligation.

FSHM program: Distance education has been successful in providing such educational opportunities to students located in geographically remote areas³. However, distance learning needs to be adequately supported with supervised clinical work for knowledge to be translated into practice¹⁹. Other



challenges of distance learning are providing adequate interaction among students and between faculty and students; and the high dropout rate^{20,21}. Thus, the FSHM program was designed by CMC as a blend of 15 paper-based distance learning modules focused on providing the academic resources to develop knowledge to practice in rural hospitals; three contact sessions at CMC, which focused on developing the necessary skills; project work focused on improving local health services; and networking between peers and with faculty to provide academic and social support and reduce potential isolation.

Distance learning modules: The purpose of the 15 modules was to help students develop the knowledge to practice at secondary hospitals in the following areas: anesthesia for obstetric emergencies; ear, nose and throat problems; infectious diseases, neonatology; nephrology; neurology; obstetric ambulatory care; obstetric emergency care; ophthalmology; orthopedics; pediatrics; primary trauma care; respiratory/tuberculosis; surgery; and toxicology.

Each module included an introduction, learning activities with feedback, readings, tutor graded assignments, references and a feedback form to be completed by the student. The modules also provided patient management protocols, algorithms, relevant X-rays and other appropriate images such as CT scan. Modules were designed to promote active learning by students reflecting on practice, with support and feedback by tutors. The time required for each module was 4 hours per week for 2 weeks. The distance learning modules were developed using the Open University (OU) UK distance learning approach, which emphasizes active learning and feedback²². An example of a module on infectious disease is provided in Appendix I. These were paper-based printed modules sent to the junior doctors at their rural hospitals by postal service.

Contact sessions: The purpose of the contact sessions was skills building, student support and networking. Clinical skill development was in the following areas: acute trauma care; critical care; dermatology; ear, nose and throat; general medicine; microbiology; neonatology; obstetrics and gynecology; orthopedics; pathology; pediatrics; plastic

surgery; rheumatology; radiology; and surgery. The first contact session was at the beginning of the FSHM program, the second was in the middle and the third was at the end. The first two contact sessions were 1 week in duration, while the third was 3 days long.

The FSHM students were graduates with MBBS degrees and were thus licensed to practice. They were already trained in certain skills to enable them to practice. However, based on the needs assessment for the FSHM program, certain specific skills were identified to be important, some of which needed reinforcement, such as cardiopulmonary resuscitation, while other skills such as neonatology resuscitation needed to be taught. These skills were addressed in the contact sessions. Students were assessed in the FSHM program on the tutor-graded assignment at the end of each module and with a final examination, which included multiple-choice questions and an objective structured clinical examination.

Faculty development was integral for development of distance learning modules and for teaching in the contact sessions. Evaluation of the distance learning modules and contact sessions was conducted both for accountability and improvement²³.

Evaluation methods

Evaluation of the distance learning modules, supported with contact sessions, was done using mixed methods, a combination of qualitative and quantitative approaches with a major focus on the qualitative approach, using two written surveys with students and faculty and one focus group discussion with students. The FSHM students for 2007–2008 and 2008–2009, and faculty members for the FSHM program, were included in the evaluation study. The evaluation was done after 2 years of implementation of the year-long FSHM program.

Written surveys: Two written surveys were administered, one to all FSHM students ($n=16$) for 2008–2009 after they were awarded the fellowship and one to faculty (from CMC and secondary hospitals) ($n=34$). The surveys included structured questions that yielded quantitative data as well as open-ended questions that yielded comments. The structured questions



focused on rating the effectiveness of the distance learning modules and contact sessions in developing the knowledge and skills to practice in secondary hospitals. The open-ended questions were used to obtain views of students and faculty regarding strengths of the distance learning modules and contact sessions, and recommendations for improvement.

Focus group: One focus group was conducted with 2008–2009 students ($n=7$) at the end of the program. The students were selected by the authors to represent genders, different secondary hospitals and different states of the country. The purpose of the focus group was to explore, through open-ended questions, the effectiveness of the distance learning modules and contact sessions and to collect qualitative data to provide a rich portrayal of the benefits of the program and recommendations for change.

Data analysis

Quantitative data analysis was done using the Statistical Package for the Social Sciences v11 (SPSS; <http://www.spss.com>) and is reported as frequency distributions. Qualitative data analysis was done through inductive content analysis as described earlier⁷.

Evidence for validity of surveys was gathered as described in an earlier paper²⁴. To help ensure validity of the qualitative data analysis, triangulation, member check, thick description and audit trail, as recommended by Barzansky et al²⁵, was used as previously described⁷.

Ethics approval

Institutional approval was obtained from the Christian Medical College-Vellore, for design and evaluation of a curriculum, consistent with CMC policies. Institutional Review Board approval was also obtained from the review board at the University of Illinois-Chicago (UIC), where the first author did this project, in partial completion of her Masters of Health Professions Education (MHPE) leadership degree. The approval number was 2009-0579 from the Office for the Protection of Research Subjects, UIC, Chicago.

Results

All 16 students of the 2008–2009 class completed the survey. Of 45 faculty involved with the program, 34 completed the survey (response rate, 76%). After discussion between reviewers, 100% agreement was reached for themes, and comments were assigned to themes for all data.

The quantitative and qualitative data reported below is summarized in Table 1 and Table 2 respectively.

Distance learning modules

The vast majority of students (81%) and faculty (80%) rated the distance learning modules as 'very good'/'excellent' in helping students develop the knowledge to practice in secondary hospitals.

Major themes identified in student and faculty responses to the open-ended questions about strengths of the distance learning modules, from greatest to least frequency, were *instructional design, which was interactive, user friendly and made students think; useful content with practical applicability in secondary hospitals; and distance learning format providing flexibility and accessibility*. Recommendations for improvement were to modify the content of modules to provide a deeper review; add new modules such as a module on dermatology; make modules available online; and use multiple-choice questions for assessment rather than essay questions.

All seven focus group members commented that the distance learning modules helped them in providing patient care in their day-to-day practice. One student commented, 'We would have read something in the module; then you see cases and can remember what you need'. Focus group participants gave various examples of cases they could manage because of what they learned in the distance learning modules, such as providing cost-effective management of patients with dog bite and typhoid, pediatric nephrotic syndrome, tetanus, organophosphorus poisoning and HIV; management of patients presenting with ectopic pregnancy; and giving anesthesia for cesarean sections.



Table 1: Quantitative data of student and faculty responses to survey questions regarding effectiveness of distance learning modules and contact sessions

I. Effectiveness of distance learning modules (students n=16; faculty n=15)												
Item	Student response % (n)						Faculty response % (n)					
	1 [†]	2	3	4	5	MS +SD	1	2	3	4	5	MS +SD
As an instructional method for the FSHM course	–	–	13% (2)	38% (6)	50% (8)	4.4 +0.7	–	7% (1)	20% (3)	67% (10)	7% (1)	3.7 +0.7
In helping students to develop knowledge about practicing at secondary hospital	–	–	19% (3)	56% (9)	25% (4)	4.1 +0.6	–	–	20% (3)	67% (10)	13% (2)	3.9 +0.6
In helping students apply what they have learned in the secondary hospital	–	6% (1)	19% (3)	56% (9)	19% (3)	3.9 +0.8	–	1% (7)	33% (5)	53% (8)	7% (1)	3.6 +0.7
In helping students to develop appropriate attitudes towards practicing at secondary hospitals e.g. the importance of cost effective patient management	–	6% (1)	38% (6)	38% (6)	19% (3)	3.7 +0.9	–	33% (5)	27% (4)	27% (4)	13% (2)	3.2 +1.1
II. Effectiveness of contact courses (students n=16; faculty n=23)												
Item	Student response % (n)						Faculty response % (n)					
	1	2	3	4	5	MS +SD	1	2	3	4	5	MS +SD
As an instructional method for the FSHM course	–	6% (1)	13% (2)	56% (9)	25% (4)	4.0 +0.8	–	4% (1)	39% (9)	44% (10)	13% (3)	3.7 +0.8
In helping students develop knowledge about practicing at secondary hospitals	–	6% (1)	19% (3)	56% (9)	19% (3)	3.9 +0.8	–	9% (2)	35% (8)	48% (11)	9% (2)	3.6 +0.8
In helping students to apply what they have learned in the secondary hospital	–	–	19% (3)	69% (11)	13% (2)	3.9 +0.6	–	4% (1)	39% (9)	48% (11)	9% (2)	3.6 +0.7
In helping students develop appropriate attitudes towards practicing at secondary hospitals e.g. the importance of cost effective patient management	–	6% (1)	31% (5)	38% (6)	25% (4)	3.8 +0.9	–	13% (3)	26% (6)	52% (12)	9% (2)	3.6 +0.8

[†] 1 = 'poor', 2 = 'fair', 3 = 'good', 4 = 'very good', 5 = 'excellent'

FSHM, Fellowship in Secondary Hospital Medicine. MS+SD, mean score + standard deviation

Lessons learned

This evaluation study provides evidence that the distance learning modules, supported by contact sessions, helped junior doctors develop the knowledge and skills to practice effectively in rural hospitals in India, based on the perspectives of the students and the faculty. The junior doctors felt that the blended program helped them to provide improved patient care and they gave specific examples of cases they could manage after going through the program.

Based on suggestions made, the distance learning modules have been reviewed and updated; new modules have been

included. In addition, the FSHM program has been created on CMC's learning management system, through which the students can access resource materials. This is currently being developed for mobile phone use and being pilot tested by FSHM students to enable them to access information in time and on the go²⁶.

A limitation of this study is that evaluation of outcomes is based on self-reports by students and faculty. Nevertheless, this study reflects the perspectives of two groups, students and faculty, using multiple methods of data collection, with consistent results among the two groups and data collection methods.



Table 2: Qualitative data analysis of comments from students and faculty to open-ended questions in survey and focus group discussion

I. DISTANCE LEARNING MODULES			
1. Major strengths of distance learning modules			
Theme	Examples of comments		
	Student survey	Student focus group discussion	Faculty survey
Instructional design of modules	(8/16) 'It is interactive and makes us think.'	(2/7) 'Interactive with problem based approach.'	(10/13) 'It is very interactive and user friendly.'
Useful content for study	(9/16) 'Good evidence based study material.'	(6/7) 'Algorithm on ventilator in respiratory module and the cases for ventilation were really useful for studying.'	(2/13) 'The clinical presentations and the flowcharts are oriented to the treatment of patients and useful for studying.'
Practical applicability in secondary hospital practice	(6/16) 'Helps us practically when we handle patients.'	(4/7) 'Gives practical information which is necessary for practice in a small setup.'	(6/13) 'Modules are relevant to the students' practice in the secondary hospital setup.'
Distance learning format	(4/16) 'Allows you to read during your own available time and is flexible.'	–	(3/13) 'The students can learn at their own pace and time.'
2. Recommendations for improving distance learning modules			
Modify content of the modules	(1/13) 'Some modules may need a little deeper review as to their applicability to secondary hospital practice in terms of investigation and treatment.'	(1/7) 'Some modules need better interpretation of text books.'	(6/11) 'Some modules require some changes in the emphasis on common conditions, update cost effective treatment strategies.'
Add new modules	(2/13) 'Include dermatology module.'	(3/7) 'Need dermatology module.'	(2/11) 'Include modules to cover additional common problems such as neuropathy rehabilitation.'
Make modules available online	(2/13) 'Can send it online also.'	(1/7) 'Give flexibility to the student which module should come first, all important points should be accessible through online material.'	(2/11) 'Modules should be available online also.'
Use multiple-choice questions for assessment	(4/13) 'Tutor marked assignments to be multiple choice questions.'	(3/7) 'Essay type assessment is time consuming, prefer multiple choice questions.'	–
II. CONTACT SESSIONS			
1. Major strengths of contact sessions			
Content of contact sessions	(6/14) 'Relevant topics were covered.'	(3/7) 'Some of the cases discussed, such as those for ventilation, were very useful and practical.'	(8/21) 'Learning occurred from each other's experiences and questions asked thus covering a wide variety of topics in a short time.'
Provided networking and support	(3/14) 'Coming back to CMC was a very nice thing as it provided an incentive and support.'	(4/7) 'As much as knowledge was gained, the strength was to meet up with friends and faculty which provided emotional connection.'	(5/21) 'It gave the students a chance to interact with each other and with the faculty. It also helped build relationships with the faculty.'
Faculty and the quality of teaching	(8/14) 'Being taught by faculty familiar with secondary hospital content made the teaching more useful.'	–	(7/21) 'Very interactive sessions.'



Table 2: cont'd

II. CONTACT SESSIONS			
1. Major strengths of contact sessions			
Clarification of doubts about patient management issues in secondary hospital setting	(4/14) 'Helped in discussing and clearing doubts about certain aspects of patient management.'	–	(10/21) 'Having students back from their hospitals helps in clarifying questions and doubts which they have from the practical aspect of health care delivery.'
Provided clinical skills training	(6/14) 'Learned skills needed to work in secondary hospital.'	–	(7/21) 'Opportunities for hands on training for skills.'
2. Recommendations for improving contact sessions			
Increase use of student feedback	(1/15) 'Take suggestions from us regarding topics to be discussed before coming for the contact sessions.'	–	(4/16) 'Students can suggest what they want to learn and the problems they face which could then be included in the contact sessions.'
Continue and enhance networking	(1/15) 'Invite few senior doctors who work at secondary hospital setting for interactions and discussion with us.'	–	(3/16) 'Continue the interactions between faculty and students round the year through toll free numbers, emails, mobile phones etc.'

The advantages of distance learning are its accessibility, flexibility and availability as a lasting resource^{3,5}. This is reflected from this study in which the identified strengths of the distance learning modules were accessibility, flexibility and use as an academic resource. Active learning with feedback maximizes the learning experience^{27,28}, which is emphasized in these distance learning modules. Distance learning modules, combined with contact sessions, provide supervised skills training for providing effective patient care in hospitals¹⁹ and provides both academic and social support for the students⁵. This is reflected in this study's results, showing that the 15 paper-based distance learning modules, supported with three contact sessions, which provided academic and social support, enabled the students to provide effective patient care in their rural hospitals.

The next step in program evaluation would be to ask when the blended education works and when does it not. A scientifically rigorous evaluation research would be critical to

provide evidence for contribution of the blended education towards retention of doctors in rural hospitals and improved community health.

The authors would thus suggest using carefully prepared distance learning modules, supported with contact sessions, for supporting junior doctors and enabling them to practice effectively in rural hospitals.

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Appendix I: Sample of the distance learning module on infectious disease from the Fellowship in Secondary Hospital Medicine program.

OVERVIEW			
<p>During the past century, infections were the leading cause of death the world over. The scenario has changed over the past two decades. Nevertheless, in countries like ours, infectious diseases still remain one of foremost causes of mortality and morbidity. In a secondary care hospital, fever is still one of the commonest symptoms that patients present to the hospital with. Fever remains the most constant and most common symptom of an infection. Though the patient presents with a single symptom, the causes of this are varied. And it is up to the doctor to make the correct diagnosis and treat the patient optimally.</p> <p>It is in the secondary care hospital setting that the practice of medicine is most difficult and yet at the same time challenging, and most satisfying. It is in this setting with limited investigations and resources that one is called to depend upon one's clinical skills and acumen. The challenge lies therefore in adapting to the local situation and pushing yourself to the limits instead of blindly following protocols. This indeed is the satisfaction of working in the peripheral hospital. Properly practiced, this is evidence-based medicine at its best.</p> <p>This module gives you a bird's eye view of some of the common infections that are seen in India. Since this module is to be used by people in hospitals with a wide range of resources, it includes what can be done in larger hospitals and also gives practical suggestions in resolving the difficult symptom of fever in a secondary hospital setting.</p>			
OBJECTIVES			
<p>At the end of this module, the student should be able to</p> <ol style="list-style-type: none"> Evaluate patients with the following clinical syndromes and manage them efficiently in resource poor situations: <ol style="list-style-type: none"> Acute undifferentiated febrile illness. Fever of long duration Sepsis and septic shock HIV and associated opportunistic infections Common diseases (e.g. Kala azar, Tetanus, Rabies, Typhoid, Leptospirosis and Scrub typhus) Know when to refer the patient to a higher center. 			
CONTENT			
Title	Topic	Time (min)	Page
Activity 2.1	Acute undifferentiated febrile illness – I	10	7
Reading	Approach to a patient with febrile illness	10	63-74
	Typhoid	10	74-81
Activity 2.2	Acute undifferentiated febrile illness – II	10	11
Reading	Rickettsial infections	10	82-86
	Leptospirosis	10	86-96
Activity 2.3	Approach to prolonged fever – I	10	15
Reading	Approach to a patient with febrile illness	10	65-73
Activity 2.4	Approach to prolonged fever – II	10	19
Add'l reading	Kala azar	10	96-99
Activity 2.5	Tetanus	10	23
Reading	Tetanus	10	100-105
Add'l reading	Rabies	10	106-112
Activity 2.6	Approach to sepsis & septic shock	10	27
Reading	Sepsis	10	113-119
Activity 2.7	HIV & related opportunistic infections	10	31
	Initial OPD evaluation of HIV	10	120-123
	Initiating HAART in ART-naïve patients	10	123-126
Activity 2.8	HIV & fever	10	35
	App to fever in an HIV-infected patient	10	
Activity 2.9	HIV & respiratory disease	10	39
	App to an HIV patient with respiratory disease	10	135-142
Activity 2.10	HIV & CNS infection – I	10	43
Reading	App to CNS infection in an HIV patient	10	143-150



Activity 2.11	HIV & CNS infection – II	10	47
Activity 2.12	HIV & the gastrointestinal system	10	51
Reading	App to an HIV patient with GI symptoms	10	151-156
Appendix	Antimicrobial therapy for common infections		157-171
	TUTOR MARKED ASSIGNMENT	60	57-59
	Total estimated study time	330	

INSTRUCTION: Let us start with an approach to a patient with undifferentiated fever. Read the sections: “Approach to a patient with febrile illness” (pgs.63-64) and “Typhoid” (pgs.74-81) before you proceed to the activity.



ACTIVITY 1.1 [TIME: 10 MIN]

ACUTE UNDIFFERENTIATED FEBRILE ILLNESS – I

Mr. J, a 28-year-old male patient from Bihar, presents to the OPD with history of high-grade fever for the past 14 days. There is no history of cough or cold, vomiting or abdominal pain. There is no history of any bowel or bladder symptoms. He complains of headache at the height of fever. He had taken a Widal test on the fourth day of his illness and based on these reports, he was started on Tab. Ciprofloxacin 750 mg twice daily. After 7 days of treatment, the fever has not settled.

Widal reports are given below:

STO: + 1: 20 dilution

STH: + 1: 80 dilution

STA: Negative

STB: + 1: 20 dilution

Examination is non-contributory.

What are the differential diagnoses you would consider in this patient?

What are the investigations you would ask for?

Investigations are as follows:

Hb: 12 gm% ; TC: 6400/ cmm; DC: N7+ L18 E2 M4; Platelets: 1,20,000/ cmm

MP (x3): Negative; Blood culture: Awaited

Widal: STO : +1: 80

STH: +1: 160

STA: Negative

STB: Negative

SGOT: 51 U/L

SGPT: 54 U/L

What is the likely diagnosis? What is the basis of your diagnosis?

Write out a prescription for this patient.

What are the complications of this condition?



FEEDBACK 1.1

What are the differential diagnoses you would consider in this patient?

- Enteric fever
- Malaria
- Dengue
- Scrub typhus
- Leptospirosis

What are the investigations you would ask for?

- Hemoglobin
- Total & differential WBC counts
- Platelet count
- Malarial smears (x 3)
- Blood culture (if available)
- Widal
- Liver function tests (enzymes at least)



What is the likely diagnosis? What is the basis of your diagnosis?

Enteric fever

STO: +1: 80 and STH: 1: 160 are diagnostic of typhoid. The failure to respond to one week of appropriate dose of quinoline therapy suggests antibiotic resistance.

Write out a prescription for this patient.

Inj. Ceftriaxone 1 gm IV twice daily for 10 – 14 days
Tab. Paracetamol 500 mg one tablet as required

What are the complications of this condition?

Intestinal perforation, gastrointestinal hemorrhage – usually in the third or fourth week of illness, especially if untreated. Rare complications include pancreatitis, pneumonia, hepatitis, nephritis, etc.