

Development of Training the Trainers' (TTT) Workshop and Evaluation of the Effectiveness before and after setting up a Teaching Ward

*Chiu-Ping Kuo^{1,2,3}, Chia-Yuan Liu^{1,2,3}, Yih-Jer Wu^{1,2,3},
Hung-I Yeh^{1,2,3} & Ching-Chung Lin^{1,2,3}*

Setting up a new medical teaching ward represent the supportive policy of a hospital for teaching and learning. A teaching ward equipped with trained teaching faculty and designed teaching programs might provide better learning environment and enhance educational quality. A workshop composing some essential subjects to train the teaching faculty may improve setting up of a teaching ward. **Purpose:** The aim of this study is to evaluate the effectiveness of training the trainers' workshop in improving teaching ability, development of teaching programs and student engagement before and after setting up a medical teaching ward. **Methods:** Internal medicine and Obstetrics-Gynecology teaching wards were set up in MacKay Memorial Hospital since March 2018, and a training the trainers' (TTT) workshop was created for faculty development. Self-evaluation questionnaires which consist of impact on teaching concept, acquisition from the course and overall satisfaction were collected right before and after the training as well as 3 months later. **Results:** There were 14 teachers participated in the workshop. The overall satisfaction is 4.6/5.0, teaching ability improvement is 4.7/5.0. The participants' abilities associated with these 6 subjects were all improved right after the workshop by self-evaluation of the participants. However, the ability sustained 3 months later was "team management" only. **Conclusions:** A TTT workshop can improve the faculty's short term teaching skills and development of curriculum. The trained teaching faculty and designed teaching programs improve student engagement, provide better learning environment, and enhance educational quality. However, continuous education for teaching faculty is required.

**Key words: train the trainers, workshop, teaching program, teaching ward
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¹ MacKay Medical College, New Taipei City, Taiwan; ² Department of Medical Education, MacKay Memorial Hospital, Taipei, Taiwan;

³ Department of Internal Medicine, MacKay Memorial Hospital, Taipei, Taiwan

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Correspondence to: Ching-Chung Lin, Department of Medical Education, MacKay Memorial Hospital, No. 92, Sec 2, Chung Shan N Rd., Taipei 10449, Taipei, Taiwan.

E-mail: sunny.lin56@msa.hinet.net

INTRODUCTION

The hospital ward is a good place for medical students to learn from patients, and clinical teachers could include them into their clinical teams and being the role models, but in the real world, it is not easy to accomplish because the clinical teachers need to be trained and the hospital is willing to support the environment. A teaching ward equipped with trained teaching faculty and designed teaching programs might provide better learning atmosphere and enhance educational effectiveness. Should we train the clinical teachers? Murphy MA. et al. reported that instructing trainers in a cognitive training method results in a significant improvement in training outcomes, and most of the participants reported more feedback from students and enhancement of student-faculty interaction in their experience.^[1] Do teaching courses develop the clinical teachers' teaching skills? Godfrey J. et al. said that the training the trainers (TTT) teaching course is an effective vehicle for increasing consultants' teaching skills.^[2]

In fact, the experience of clinical practice does not promise teaching skills, so the faculty development program in teaching skills is important. Yolsal N. et al. reported that training of trainers' courses indeed motivates the teaching staff and provide them with tools and opportunities for more effective teaching and appear to have a lasting impact.^[3] Different kinds of training courses including short and long period of time have been conducted previously. Cole KA. et al. at Johns Hopkins developed a longitudinal teaching program in teaching skill model for faculty development of clinician-educators and demonstrate a positive impact on clinician-educator perceptions of their attitudes and behaviors towards learners and colleagues.^[4] Sune Rubak. et al. said

that a three-day residential training for trainers' course has a significant impact in terms of gains of knowledge concerning teaching skills, teaching behavior, and learning climate after six months.^[5] Notzer N. demonstrated that a brief workshop can improve clinical instruction, and the meaningful improvement in instructor availability to students is associated with the workshops' emphasis on a learner-centered approach and the need to provide continuous feedback.^[6]

How to design a faculty development program of teaching skills at a teaching ward? Green ML. et al. reported that integrating clinical content with clinical teaching in a faculty development workshop is feasible, which can not only improve clinical and teaching skills, but also facilitate behavior change.^[7] A theory-based faculty development program at Cleveland Clinic shows significant improvement in teaching skills as measured by both participants' self-assessments and independent ratings by participants' trainees.^[8] The frameworks for effective training for clinical teachers including understandings about learning processes and define important competences for different categories of teachers.^[9,10]

The objective of this study is to present our experience of conducting a TTT workshop before setting up a teaching ward in a university teaching hospital and evaluate the effectiveness of improving teaching ability and student engagement.

METHODS

Problem identification and target needs assessment

We set up teaching wards in Departments of Internal Medicine and Department of Obstetrics & Gynecology in 2018 and 2020 in order to raise the teaching atmosphere at Tamshui branch of MacKay Memorial Hospital. There are 5 teaching

teams (Chest, Cardiovascular, Gastroenterology, Nephrology and Infection) in the internal medicine teaching ward and 2 teaching teams including obstetrics team and gynecology team in the Obs-Gyn teaching ward. We recruited the clinical teachers with enthusiasms for teaching. We started with reasonable teaching rewards and created a faculty development workshop for them. The Medical Education Department designed a "Resident as a Teacher" program for clinical teachers to teach the senior residents to run case discussion in the morning meeting. Other training courses for teaching skills included bedside teaching, outpatient clinic teaching, medical record writing, ultrasonography teaching and Obs-Gyn surgery teaching in the operating room. At the teaching ward, each assigned team includes a clinical teacher and trainees (senior residents, PGY and medical students) on a monthly rotation basis. The establishment of a teaching ward represent the supportive determination of the hospital for teaching and learning.

Train the trainer (TTT) workshop and educational goals

We held an integrated TTT program at MacKay Memorial Hospital before setting up the two teaching wards. We invited senior educators from Medical Education Department, Internal Medicine Department and Obstetrics and Gynecology Department to constitute the teaching faculty of TTT.

An integrated 320-minute TTT training program was conducted and was approved by the Institutional Review Board. Fourteen clinical teachers attended the workshop. This TTT workshop composing of six subjects (team management, curriculum development, teaching and learning practices, assessment practices, clinical reasoning & medical record writing, and

how to create an ultrasound teaching program) was conducted for the clinical teachers two weeks before a new teaching ward was set up. The educational goals included 1) To define a clinical teachers' rights and obligations, teaching goals and teaching schedule; 2) To learn how to create a teaching program and propose a project budget; 3) To practice teaching strategies including one-minute-preceptor, teaching-on-the-run and morning meeting; 4) To learn competency-based medical education, entrustable professional activities and assessment methods; 5) To practice how to assess medical record writing and skills of clinical reasoning education; 6) To share teaching experience in abdominal echography and cardiac echography (Table 1).

Assessment and feedback

Following the TTT workshop, we had a 30-minute panel discussion and reflection. Then, the attendees had to answer a post-workshop feedback questionnaire including degree of satisfaction with the workshop, overall content, length of sessions, teachers' eligibility, and usefulness in the future. Three months after the TTT, we repeated the questionnaire for the clinical teachers' self-ability-evaluation to detect the competence maintenance. Both the rubrics and questionnaire were based on a five-point Likert scale for level of satisfaction. Degree of satisfaction with interactive learning class was measured according to the items "very satisfied" (5); "satisfied" (4); "unsure" (3); "dissatisfied" (2); and "very dissatisfied" (1); while self-evaluation ability in self-ability-evaluation by level of quality was measured according to the items "excellent" (5); "very good" (4); "good" (3); "fair" (2); and "poor" (1) (Supplement 1).

Table 1. Schedule of teaching ward train the trainers workshop.

Time	Subject	Elements
45 mins	Team Management: To Build a Team	Set up a teaching team's right and obligation, teaching goals and ward teaching time schedule
45 mins	Curriculum Development: A Six-Step Approach	Learned how to create a teaching program and propose a budget
10 mins	Break	
45 mins	Teaching and Learning Practice: Teaching Run, Morning Meeting	Practice teaching strategies including one minute preceptor, teaching in the run and morning meeting
45 mins	Assessment Practice: Mini-CEX, DOPS, Milestones	Learned competency-based medical education, entrustable professional activities and assessment methods
10 mins	Break	
45 mins	Clinical Reasoning and Medical Record Writing Education Practice	Practice how to assess medial record writing and learned clinical reasoning education skills
45 mins	How to Create an Ultrasound Teaching Program in a Teaching Ward	Share teaching experience in abdominal echo and heart echo in a teaching ward
30 mins	Panel Discussion, Reflection and Post-workshop Feedback Questionnaire	

Statistical analysis

Data from the TTT feedback questionnaire were shown as mean \pm standard deviation (SD). The correlations observed between the before-training and after-training questionnaire scores were used in the Wilcoxon signed-rank test. The statistical analyses were performed using the SPSS 23.0 statistical package (SPSS, Chicago, IL). All statistical analyses were based on two-sided hypothesis tests with a significance level of $p < 0.05$. The reliability analysis was performed using SPSS version 23 (SPSS, Chicago, IL). Reliability (internal consistency) of post-course feedback questionnaire derived from 14 clinical teachers was measured with Cronbach's alpha, and $\alpha \geq 0.7$ was acceptable.

RESULTS

There were totally 14 participants (5 male and

9 female) and 6 teachers participated in the two TTT workshops. The average clinical experience of the participants' were 10 years. The overall satisfaction of the TTT workshop is 4.64/5.0 (Table 2). According to the post TTT workshop feedback questionnaire, the highest score in program content and future usefulness is ultrasound teaching program (4.9/5.0), the curriculum development subject had the lowest score in control of session length (4.2/5.0) and the teachers' eligibility is about 4.6~4.9/5.0 (Table 3).

The score of participants' self-evaluation pre- and post-workshop showed that the abilities of all five subjects were improved right after the workshop (Table 4A, $p < 0.01$). However, the ability sustained for 3 months was only "team management" (Table 4B, $p = 0.016$). The medical students rotating monthly to the teaching wards completed questionnaires of teaching quality showed that the teaching programs score 4.92/5.0,

Table 2. The participant's characteristics and the satisfaction of the train the trainers' workshop (n = 14).

Characteristics	Scores
Male / Female	5 / 9
Clinical experience (year)	10.1 ± 4.2
Overall satisfaction	4.64 ± 0.63
Help teaching in the future	4.79 ± 0.58
Each team's (1A, 1 Resident or PGY, 1UGY) patient numbers	10.0 ± 1.2

A, attending physician; PGY, post-graduate year training doctor; UGY, under-graduate year training student.

Table 3. Post train the trainers workshop feedback questionnaire (n = 14).

Subject	Overall Content	Session Length	Teachers' Eligibility	Supplementary materials
Team Management	4.3 ± 0.8	4.3 ± 0.9	4.7 ± 0.5	4.4 ± 0.7
Curriculum D	4.4 ± 0.7	4.2 ± 0.8	4.7 ± 0.5	4.4 ± 0.5
Teaching/Learning	4.3 ± 0.7	4.4 ± 0.6	4.7 ± 0.5	4.4 ± 0.6
Assessment	4.3 ± 0.6	4.4 ± 0.6	4.6 ± 0.6	4.3 ± 0.7
CR and MRW	4.4 ± 0.6	4.4 ± 0.6	4.6 ± 0.6	4.3 ± 0.7
Ultrasound	4.9 ± 0.4	4.7 ± 0.5	4.9 ± 0.4	4.9 ± 0.4

Curriculum D, curriculum development; CR, clinical reasoning; MRW, medical record writing; Ultrasound, ultrasound teaching program.

The rubrics and questionnaire were based on the Likert scale for Level of Agreement: strongly agree (5); agree (4); neither agree or disagree (3); disagree (2); strongly disagree (1).

faculty's teaching skills 4.92/5.0 and overall clinical learning environment 4.90/5.0 (Table 5).

We survey the feedbacks of medical students concerning student engagement which revealed 1) level of academic challenge: the UGY said that we took part in many teaching programs; we took care of patients and prescribed orders and follow up the patients' responses and review the relevant knowledge and evidence. We've learned much more than in ordinary wards. 2) active and collaborative learning: The residents always accompanied with us and instructed us. They led us by asking questions or showed us the practical knowledge, such as how to select antibiotics or how to control sugar and discussed the difficult cases we met with. 3) student-faculty interaction:

We have a two-hour teaching round. The attending doctor let us take turns to do a brief presentation and then point out the key problems of the patients. Then, we have a topic discussion after the ward round. 4) Deep educational experience: We have basic ultrasonography teaching programs and we practiced paracentesis and ascites analysis. In Obs-Gyn ward, we practiced pap smear, and participated in surgery teaching program at OR and Obstetric ultrasonography teaching program with primary care. The attending doctors develop different curriculums of clinical reasoning and medical record writing according to the different levels of students (UGY, PGY and Resident). 5) supportive ward atmosphere: The residents host morning meeting regularly. They lead us clinical

Table 4A. The score of participants' self-evaluations pre- and post-workshop (n = 14).

Subject	Pre-TTT, competency	Post-TTT, competency	<i>p</i> -value
Team Management	2.57 ± 0.65	3.69 ± 0.48	0.00
Curriculum D	2.29 ± 0.47	3.85 ± 0.38	0.00
Teaching/Learning	2.86 ± 0.66	4.07 ± 0.47	0.00
Assessment	2.71 ± 0.73	4.00 ± 0.55	0.00
CR and MRW	2.79 ± 0.89	4.29 ± 0.47	0.00

Curriculum D, curriculum development; CR, clinical reasoning; MRW, medical record writing; TTT, train the trainer.

The rubrics and questionnaire were based on the Likert scale for Level of Agreement: strongly agree (5); agree (4); neither agree nor disagree (3); disagree (2); strongly disagree (1).

Table 4B. The score of participants' self-evaluations pre- and post-workshop in internal medical ward (n = 7).

Subject	(a) Pre-TTT, competency	(b) Post-TTT, competency	(c) 3M post-TTT, competency	<i>p</i> -value
Team Management	2.86 ± 0.69	3.83 ± 1.41	3.80 ± 0.45	a vs. b 0.012 a vs. c 0.016
Curriculum D	2.57 ± 0.53	4.00 ± 0.00	3.20 ± 0.84	a vs. b 0.001 a vs. c 0.178
Teaching/Learning	3.14 ± 0.69	4.29 ± 0.49	3.80 ± 0.84	a vs. b 0.000 a vs. c 0.477
Assessment	2.86 ± 0.90	4.14 ± 0.69	3.60 ± 1.14	a vs. b 0.000 a vs. c 0.477
CR and MRW	3.00 ± 0.82	4.43 ± 0.53	3.40 ± 0.89	a vs. b 0.003 a vs. c 1.000

Abbreviations are as in Table 4A; M, months.

reasoning and medical record writing in face of a new patient. The training is also one part of resident as a teacher. The attending physician gave immediate backup to the residents. All the interviews with patients, physical examinations and orders were supervised. (Table 5).

In regard to the reliability and validity of the post-course feedback questionnaire, we had the feedback questionnaire after the workshop of 14 clinical teachers, and the internal reliability of these questions had good agreement (Cronbach's alpha = 0.826). The initial draft of the questionnaire was created by experts from clinically relevant professional fields, and then reviewed by the

Teaching Plan Panel of the Clinical Skills Center for test format and content. The experts in the relevant fields collectively reviewed all the test format and content in a committee meeting (supplement 2).

DISCUSSION

There are six key educational subjects integrated with an interactive learning model into the TTT workshop to improve clinical teachers' competence of teaching. Among these subjects, the most important competence is to design a teaching program. We introduce the curriculum

Table 5. Questionnaire of teaching quality from medical students (n = 40).

Teaching quality		Score
Teaching programs		4.92
Faculty's teaching skills		4.92
Overall clinical learning environment		4.90
Survey items of student engagement	Feedbacks from medical students (UGY)	
1 Level of academic challenge (Primary care)	We took part in many teaching programs; we took care of patients and prescribed orders under supervision and follow up the patients' responses and review the relevant knowledge and evidence. We've learned much more than in ordinary wards.	
2 Active and collaborative learning (Team care)	The residents always accompanied with us and instructed us. They led us by asking questions or showed us the practical knowledge, such as how to select antibiotics or how to control sugar and discussed the difficult cases we met with.	
3 Student-Faculty interaction (Role model)	We have a two-hour teaching round in the morning. The attending doctor let us take turns to do a brief presentation and then point out the key problems of the patients. Then, we have a topic discussion after the ward round.	
4 Deep educational experience (Multiple teaching programs)	We have basic cardiac and abdominal ultrasonography teaching programs and we practiced paracentesis and ascites analysis. In Obs-Gyn ward, we practiced pap smear, and participated in surgery teaching program at OR and Obstetric ultrasonography teaching program with primary care. The attending doctors developed different curriculums of clinical reasoning and medical record writing according to the different levels of students (UGY, PGY and Resident).	
5 Supportive atmosphere in teaching ward (Student-centered)	The residents host morning meeting regularly. They lead us clinical reasoning and medical record writing in face of a new patient. The training is also one part of resident as a teacher. The attending physician gave immediate backup to the residents. All the interviews with patients, physical examination and orders were supervised.	

development process using a six-step approach for our faculties.^[11] After the workshop, the participants, as teaching faculty of a new teaching ward, could design teaching programs. They reached an agreement of developing teaching programs of bedside ultrasonography and clinical reasoning & medical record writing. The two teaching programs are distinguished features from other medical wards. According to the design of bedside sonography, the senior residents were

trained as teachers for the undergraduates. The teaching program of clinical reasoning & medical record writing was designed to carry out according to different levels of students (UGY, PGY1/PGY2 and senior residents) by different clinical teachers.

In a teaching hospital, peer teaching is a valuable methodology for medical students to engage in learners-as-teachers.^[12] At our teaching wards, the faculty reached a consensus to apply EPAs (entrustable professional activities) as one

of evaluation tools for the learners. Besides, senior residents were encouraged to assess undergraduates by EPAs (focused on physical examinations and some basic procedures). The seniors reflected that they must learn how to be a teacher before they start to assess and give feedback to the undergraduates. The undergraduates' written feedback showed that they were filled with curiosity, interest and passion for learning in such a teaching ward. The monthly fixed team members also provide good learning experience with peer learning and a highly supportive backup by supervisors. The trained faculty in a teaching ward ground the base of student engagement. The benefits could be found from the positive feedback of the students, clinical teachers, and patients.

Although faculty development can enhance teaching effectiveness, the long-term follow-up of a longitudinal faculty development program in teaching skills is important.^[13,14] In our study, within the subjects of TTT workshop, all the teaching abilities except "team management" were declined after 3 months by a self-assessed questionnaire. The other subjects (curriculum development, teaching and learning practices, assessment practices, and clinical reasoning & medical record writing) are more practical in teaching. The reason of decline might be the sense of inadequacy always comes from the need for more. Knight AM. said that longitudinal faculty development program can have broad and sustained positive effects on the professional and personal lives of participants.^[15] For this reason, we created a meeting for sharing teaching experience in the teaching wards every 6 months, and we got a lot of feedbacks from the clinical teachers. Our study had some strengths and limitations. First, it was a pilot test using training the trainers' workshop to help setting up a teaching ward, but the limitation was the extremely small sample size of teachers including 8 physicians and

6 Obs-Gyn doctors. Second, we have short-term (3 months) follow up data concerning the teachers' self-evaluated teaching ability, but no long-term data to evaluate.

CONCLUSIONS

In our study, setting up a teaching ward means supportive altitude of the hospital for teaching and learning. The supportive environment is a main way to increase faculty and student engagement. The results showed the workshop courses improved the teaching motivation and means of more effective teaching. However, running a TTT workshop does not have to pour the trainees with plentiful teaching knowledge but to arouse the reflection of being creative for teaching program development and role-modeling. A TTT workshop can improve the faculty's short term teaching skills and development of curriculum. However, the ability might decline gradually. Timely review, reassessment and continuous education are essential for teaching faculty.

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Appendix 1.

MMH train the trainer workshop post-course feedback questionnaire.

General data

Name: _____ Sex: _____ Age: _____

1. () In general, what is the overall satisfaction with this TTT workshop?
very satisfied (5); satisfied (4); unsure (3); dissatisfied (2); very dissatisfied (1)
2. () What is the degree of satisfaction concerning the six subjects of TTT training as below?
very satisfied (5); satisfied (4); unsure (3); dissatisfied (2); very dissatisfied (1)

Subjects		Educational Elements	
1. Team Management: To Build a Team (Score:)		To define a clinical teacher's rights and obligations, teaching goals and teaching schedule	
Overall Content	Session Length	Teachers' Eligibility	Supplementary materials
Score:	Score:	Score:	Score:
2. Curriculum Development: A Six-Step Approach (Score:)		To learn how to create a teaching program and propose a project budget	
Overall Content	Session Length	Teachers' Eligibility	Supplementary materials
Score:	Score:	Score:	Score:
3. Teaching and Learning Practice (Score:)		To Practice teaching strategies including one minute preceptor, teaching-on-the-run and morning meeting	
Overall Content	Session Length	Teachers' Eligibility	Supplementary materials
Score:	Score:	Score:	Score:
4. Assessment Practice: Mini-CEX, DOPS, Milestones (Score:)		To learn competency-based medical education, entrustable professional activities and assessment methods	
Overall Content	Session Length	Teachers' Eligibility	Supplementary materials
Score:	Score:	Score:	Score:
5. Clinical Reasoning and Medical Record Writing : Education Practice (Score:)		To practice how to assess medial record writing and skills of clinical reasoning education	
Overall Content	Session Length	Teachers' Eligibility	Supplementary materials
Score:	Score:	Score:	Score:
6. Ultrasound teaching program (Score:)		To share teaching experience in abdominal echography and cardiac echography	
Overall Content	Session Length	Teachers' Eligibility	Supplementary materials
Score:	Score:	Score:	Score:

3. () Before this TTT workshop, what do you feel about your competency to teach trainees at a teaching ward?
Level of difficulty: extremely difficult (5); very difficult (4); difficult (3); fair (2); not difficult (1)
4. () After this TTT workshop, what do you feel about your competency to teach trainees at a teaching ward?
Level of difficulty: extremely difficult (5); very difficult (4); difficult (3); fair (2); not difficult (1)
5. () Do you aware that the TTT workshop is useful in the future?
Level of Agreement: strongly agree (5); agree (4); neither agrees nor disagree (3); disagree (2); strongly disagree (1)

Appendix 2.

The reliability of the TTT post-course satisfactory questionnaire.

Q	Themes	Item-Total Correlation	Cronbach's Alpha if Item deleted
1.	In general, what is the overall satisfaction with this TTT workshop?	0.258	0.846
2.	What is the degree of satisfaction concerning the five subjects of TTT training as below? 1. Team Management	0.578	0.804
3.	What is the degree of satisfaction concerning the five subjects of TTT training as below? 2. Curriculum Development	0.566	0.809
4.	What is the degree of satisfaction concerning the five subjects of TTT training as below? 3. Teaching and Learning Practice	0.751	0.785
5.	What is the degree of satisfaction concerning the five subjects of TTT training as below? 4. Assessment Practice	0.621	0.797
6.	What is the degree of satisfaction concerning the five subjects of TTT training as below? 5. Clinical Reasoning and Medical Record Writing	0.441	0.818
7.	Before this workshop, what do you feel about your competency to teach the trainees at a teaching ward?	0.719	0.782
8.	After this workshop, what do you feel about your competency to teach the trainees at a teaching ward?	0.578	0.804
9.	Do you aware that this TTT workshop is useful in the future?	0.411	0.824

The reliability coefficients of the Cronbach's Alpha = 0.826; Q: question.