Medical Teacher

ISSN: 0142-159X (Print) 1466-187X (Online) Journal homepage: www.tandfonline.com/journals/imte20

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To cite this article: I-Hui Chiang, Chi-Hsien Huang, Yu-Wei Hsieh, Yi-Feng Lin, Ru-Yi Huang & Chi-Wei Lin (2025) Evaluation of an Innovative Postgraduate Medical Education Model Incorporating Social Determinants of Health, Medical Teacher, 47:7, 1119-1125, DOI: 10.1080/0142159X.2024.2413022

To link to this article: https://doi.org/10.1080/0142159X.2024.2413022

Published online: 09 Oct 2024.

MEDICAL TEACHER
2025, VOL. 47, NO. 7, 1119–1125
https://doi.org/10.1080/0142159X.2024.2413022

Evaluation of an Innovative Postgraduate Medical Education Model Incorporating Social Determinants of Health

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ABSTRACT

Purpose: Incorporating social determinants of health (SDH) into medical education is crucial. However, there are limited data on standard education models and comprehensive SDH curricula in Taiwan are insufficient. This study presents a systematic SDH curriculum instructed primarily by social workers for postgraduate doctors and aims to examine the training outcomes of the innovative curriculum.

Method: This study assessed training outcomes using Kirkpatrick model levels 1 and 2 regarding trainees' satisfaction and improvement of their knowledge and skills in written and standardized patient (SP) pre- and posttests conducted between 1 August 2021 and 31 July 2022.

Results: A total of 28 trainees completed the training. The trainees' overall satisfaction score regarding the curriculum was high (4.6 out of 5). The median pretest scores for the written and SP tests were 66.25 ± 14.38 and 14.50 ± 5.13, respectively, whereas the median posttest scores were 80.00 ± 7.50 and 20.50 ± 6.13, respectively. Both written and SP posttest scores were significantly improved compared to the pretest scores ($p < .001$).

Conclusions: The presented education model significantly improved postgraduate doctors' SDH knowledge and biopsychosocial assessment skills, and received high satisfaction scores from the trainees. Adopting social workers as primary teachers may enhance interdisciplinary collaboration between social workers and trainee doctors.

ARTICLE HISTORY
Received 16 April 2024
Accepted 2 October 2024

KEYWORDS
Social determinants of health; biopsychosocial model; social worker; curriculum evaluation; postgraduate medical education

Introduction

The World Health Organization (WHO) declared that 'Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' [1]. Similarly, modern health care emphasizes the importance of the biopsychosocial model of illness [2–6], recommending that doctors evaluate patients' biomedical, psychological, and social conditions multidimensionally rather than solely focusing on organic diseases [7]. In addition, the WHO stated that 'social determinants of health (SDH) are the non-medical factors that influence health outcomes' [8]. Previous research [9] found that numerous premature deaths were attributable to social, environmental, and economic circumstances. In the literature review [10,11], many patients' voices indicated that social determinants of health have a significant impact on their lives and health. Furthermore, the WHO Commission on SDH proposed that medical education incorporate SDH curricula to ultimately help achieve health equity [12].

In clinical practice, social workers are professionals who are frequently consulted to assess and address patients' social issues. Enhancing physicians' understanding of social work may encourage the collaboration between physicians and social workers and improve the quality of patient care. Early literature [13] reported on the supervisory role of social workers in a medical school education program. Clarke et al. [14] reported that social workers in clinical practice play various roles, including that of physician educator. Another study [15] reported on an interdisciplinary

Practice points

- Integrating social determinants of health (SDH) into medical education is crucial and challenging.
- This study presented an education model for SDH and examined its training outcomes.
- The innovative education model significantly improved trainee doctors' SDH knowledge and biopsychosocial assessment skills.
- The trainees' high satisfaction and positive feedback reflect the applicability and acceptability of the education model.
- Adopting social workers as primary teachers may enhance the interdisciplinary collaboration between social workers and trainee doctors.

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collaboration project conducted by medical and social work students that aimed to improve the care of homeless patients. García-Huidobro et al. [16] proposed an interprofessional education program that utilized a social worker as the supervisor for medical, nursing, and psychology students. Duong et al. [17] found that social workers can effectively teach behavioral intervention skills necessary to reduce alcohol and drug abuse in an emergency medicine residency training program. Chernin [18] reported that social work educators could assist family practice residents in addressing the psychosocial problems of patients. Zayas and Dyche [19] reported on the essential psychosocial principles taught by social workers in a residency program for primary care physicians. This article presents a new curriculum that adopts social workers as primary teachers for instructing essential social care and SDH knowledge.

Many countries have developed SDH curricula; for example, numerous postgraduate medical education programs in the United States cover SDH topics [20]. Furthermore, the Liaison Committee on Medical Education requires health inequities that are significantly influenced by SDH to be included in medical school curricula [21]. Nonetheless, barriers to implementing SDH curricula exist [22,23], and there are limited data on standard education models for instructing SDH [20]. Furthermore, in the current medical school and postgraduate medical education programs in Taiwan, curricula concerning social care and SDH remain considerably less comprehensive than those focusing on biomedical or psychological aspects. This study addresses this gap by detailing the implementation and outcome assessment of a 40-hour curriculum taught primarily by social workers for postgraduate trainee doctors at E-Da Hospital in Taiwan. This innovative curriculum aims to improve trainees' knowledge and competencies in addressing SDH within the biopsychosocial model of patient care. The primary objective of this study is to assess the training outcomes of this innovative SDH curriculum.

Method

Setting and participants

Trainees who were rotating through the Family Medicine Department of E-Da Hospital, one of the major teaching hospitals in Taiwan, between 1 August 2021, and 31 July 2022 were recruited after acquiring their agreements. Trainees comprised family medicine residents, one-year-PGY (Postgraduate Year) doctors, as well as two-year-PGY doctors, including PGY1 and PGY2 doctors.

In Taiwan, one-year-PGY doctors refers to those who started their medical school education before 2013 and completed their seven-year education and subsequent one-year postgraduate training before residency. Two-year-PGY doctors refers to those who started their medical school education after September 2013 and completed their six-year education and subsequent two-year postgraduate training before residency. PGY1 and PGY2 refer to the first and second year of the two-year-PGY training, respectively.

Innovative education model

This new education model consists of a 40-hour curriculum covered over 5 days. Ten topics covering medical issues that focus on social care and SDH were chosen and consolidated by a panel of specialists, including senior family physicians and social workers. Those SDH topics that are essential to clinical practice and not emphasized in Taiwanese medical education were incorporated, such as psychosocial assessment of patients, identifying socioeconomic risks, addressing SDH, violence, injuries, etc. (Topic 1-3, 6, 8-10 in Table 1). In addition, we also included topics concerning practical skills required while addressing SDH and common clinical situations, such as communication skills, discontent management, emotional support, and hospital volunteer work experience (Topic 1, 4, 5, 7 in Table 1). In real clinical practice, social workers are typically consulted to help manage those circumstances that correspond to the ten topics applicable to many hospital organizations including E-Da hospital; therefore, the social workers in this education model have professional experience with regards to the curricular topics.

The presented education model adopts medical social workers and senior family physicians as clinical teachers to instruct and conduct discussions with the trainees. The social workers in this study, acting as primary educators, had a minimum of two years of related medical social work experience and had undergone faculty-development classes.

First, the social workers presented summarized lessons on the ten topics and fostered interactions with the trainees. The learning arrangement for each topic included a related clinical patient visit while accompanied by a social worker; thereby, allowing trainees to acquire the social care knowledge and evaluation skills related to different topics within real clinical scenarios. Through the interactions and discussions between the social workers and trainee doctors, the two groups of professionals were able to impart knowledge to each other.

Furthermore, we routinely held exclusive interdisciplinary case conferences to promote mutual learning. The social workers and other case-related discipline experts illustrated the cases, after which the supervising physician would integrate the recommendations and resources to help the patient. The supervising physician guided the trainee doctors through the case's key points, such as the

Table 1. The ten topics covering medical issues in the presented education model.

Topic 1	Psychosocial assessment of patients and the communication skills
Topic 2	Connecting social welfare resources to assist patient health care
Topic 3	Ethical principles of social work (including principles of justice, equality and inequality, etc.)
Topic 4	Dealing with discontent and the resentful emotions of patients or their families
Topic 5	Placating grieving families and providing emotional support
Topic 6	Psychosocial issues of terminal patients and their families
Topic 7	Hospital volunteer experience and offering services
Topic 8	Issues relating to children and juvenile protection
Topic 9	Psychosocial issues relating to organ donation and recruitment
Topic 10	Psychosocial issues relating to domestic violence and sexual assault

roles and responsibilities of a physician and other disciplines within the team and additional interventions that the medical team could apply. The purpose of the case conferences was to optimize patient care by discussing complicated cases from a biopsychosocial perspective, enhancing collaboration among the various disciplines, and guiding trainee doctors toward delivering holistic care *via* the integrated interprofessional practice model. The family physician supervisor demonstrated the biopsychosocial model of health care and teamwork practice to trainee doctors *via* the exclusive interdisciplinary case conferences.

Evaluating training outcomes

This study assessed training outcomes of the innovative curriculum by applying level 1 and 2 of Kirkpatrick's evaluation framework. The Kirkpatrick Model is widely used to assess the impact of education training [24,25]. The model includes four levels of evaluation: level 1 (Reaction), trainees' satisfaction or reaction to the training; level 2 (Learning), changes in trainees' knowledge and skills; level 3 (Behavior), behavior changes of trainees in the workplace; level 4 (Results), the overall impact of training at organizational level.

For the evaluation of Level 1, the trainees' satisfaction with the curriculum, including the course settings and the aid to work, was assessed after completing the training using the Likert scale (score 1 – strongly disagree, score 2 – disagree, score 3 – neutral, score 4 – agree, and score 5 – strongly agree). To evaluate the second level of the Kirkpatrick model, written and standardized patient (SP) pre- and posttests were conducted to measure the trainees' change in knowledge and skills. Moreover, we conducted analyses to examine whether sex or training-level factors affected the trainees' test performances. Both the written pre- and posttests consisting of forty multiple-choice questions with a maximum score of 100 were administered to assess the trainees' relative knowledge level before and after attending the curriculum. Furthermore, we conducted SP pre- and posttests to evaluate the trainees' competency in dealing with clinical situations. Domestic violence was chosen as the clinical situation in the SP test. The evaluation items on the SP test checklist, with a maximum score of 30, comprised history taking, physical examination, psychological and social evaluations of patients, communication skills, and management plans. After completing the SP posttest, the family physician and social work teachers, as well as the standardized patient, provided individualized feedback to each trainee doctor. The feedback from the SP represented the authentic perceptions of the SP during the interactions with trainee doctors in the examination. A panel of fourteen experts, including medical social workers and senior experienced physicians in the related fields, designed and revised the written and SP examination questions.

Statistical analysis

We analyzed both the written and SP test scores using the Wilcoxon Singed-Rank test to determine the differences between the pre- and posttest scores for all trainees. We used the Mann-Whitney U test to compare the scores of the female and male trainees in both written and SP tests. The Kruskal-Wallis test was used to assess whether the level of training of the trainee doctors had an impact on their performances in the written and SP tests. We used IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY) for the statistical analyses. This study was approved by the Institutional Review Board of the E-Da hospital in Taiwan (IRB No: EMRP-110-050).

Results

We recruited 29 trainees that were rotating through the Family Medicine Department of the E-Da hospital during the study period. We excluded the data of one trainee because the SP test was not completed. Therefore, the data of 28 trainees, including 7 one-year-PGY doctors, 6 PGY1 doctors, 12 PGY2 doctors, and 3 junior family medicine residents who had completed the curriculum and tests, were analyzed. The 28 trainees comprised 15 male and 13 female doctors who had graduated from ten different medical schools, representing a diverse education background rather than confining the study to a particular medical school.

Kirkpatrick level 1: Reaction

We evaluated the trainees' satisfaction with the curriculum using the Likert scale after completing the training (Table 2). The average overall satisfaction score was 4.6 out of 5. The average satisfaction score for the learning time arrangement was 4.5, and most trainees thought 40 h an appropriate duration for the curriculum. Learning from clinical patients scored 4.8, and the SP test scored 4.7 on average. The average satisfaction score for the instruction of background knowledge was 4.6. Regarding the aid to practicing medicine and the personal knowledge and skill improvement, the average satisfaction scores were 4.7 and 4.6, respectively.

According to the trainees' feedback, most trainees had not previously studied the major content of the curriculum and considered all topics to be closely associated with a

Table 2. Trainees' satisfaction with regards to the education model.

Question number	Questions	Strongly agree n (%)	Agree	Neutral	Disagree	Strongly disagree	Average score
1	Instruction of background knowledge	17 (60.7)	10 (35.7)	1 (3.6)	0 (0.0)	0 (0.0)	4.6
2	Learning from clinical patients	23 (82.1)	3 (10.7)	2 (7.1)	0 (0.0)	0 (0.0)	4.8
3	Standardized patient test	19 (67.9)	9 (32.1)	0 (0.0)	0 (0.0)	0 (0.0)	4.7
4	Personal knowledge and skill improvement	19 (67.9)	7 (25.0)	2 (7.1)	0 (0.0)	0 (0.0)	4.6
5	The aid to practicing medicine	21 (75.0)	6 (21.4)	1 (3.6)	0 (0.0)	0 (0.0)	4.7
6	Time arrangements	18 (64.3)	7 (25.0)	2 (7.1)	1 (3.6)	0 (0.0)	4.5
7	Overall satisfaction with the education model	19 (67.9)	7 (25.0)	2 (7.1)	0 (0.0)	0 (0.0)	4.6

$n = 28$.

physician' clinical practice and a necessary aspect of a doctor's training. They expressed that this forty-hour learning experience was quite distinct from their experiences in the wards or clinics. Many trainees reflected that the SP test mimicked real clinical situations and they highly appreciated the subsequent individualized feedback from the family physician and social work teachers, as well as the standardized patient. Furthermore, they were able to develop an understanding of the challenges faced by patients and their families from a biopsychosocial perspective after undergoing the training in this curriculum. From the curriculum, the trainee doctors acquired the knowledge and communication skills required for patient care and grasped the appropriate time for social worker consultation, when needed, according to the feedback received. In addition, most trainees thought this education model was more suitable for postgraduate learning rather than at the medical school stage. Adopting social workers as primary clinical teachers in the curriculum was thought to be applicable. Moreover, according to trainees' feedback, this new education model fostered trainee doctors' understanding and respect for social work professionals.

Kirkpatrick level 2: Learning

The median pretest scores of the written and SP test were 66.25 ± 14.38 and 14.50 ± 5.13, respectively, and the median posttest scores were 80.00 ± 7.50 and 20.50 ± 6.13, respectively. We observed significant improvements from the pre- to posttests in both the written and SP tests (both *ps* < .001) (Table 3).

Concerning the sex factor, the SP pretest scores for the female trainee doctors were significantly higher than those of the male doctors ($p < .01$). However, no significant differences were found between the male and female trainees in the SP posttests, written pre- and posttests, and change scores of both the written and SP tests (all *ps* > .05) (Table 4).

Regarding the different training levels of the trainees, the results showed no significant differences among the different training levels of the trainee doctors in the pretest, posttest, and change scores for both the written and SP tests (all *ps* > .05) (Table 5).

Table 3. Comparison between the pre- and posttest scores for the written and SP tests.

Test item	Pretest ($n = 28$)	Posttest ($n = 28$)	*p* value
Written test	66.25 (14.38)	80.00 (7.50)	<.001*
SP test	14.50 (5.13)	20.50 (6.13)	<.001*

Values are presented as median (interquartile range).
*$p<.05$.

Table 4. Comparison between male and female trainee doctors in the pretest, posttest, and change scores for the written and SP tests.

Test items	Scores	Male ($n = 15$)	Female ($n = 13$)	*p* value
Written test	Pretest	62.50 (17.50)	67.50 (8.75)	.266
	Posttest	80.00 (15.00)	80.00 (6.25)	.530
	Change	12.50 (12.50)	12.50 (7.50)	.926
SP test	Pretest	12.00 (7.50)	15.50 (3.50)	.006*
	Posttest	20.00 (5.00)	21.50 (6.00)	.355
	Change	7.50 (7.50)	4.50 (7.00)	.092

Values are presented as median (interquartile range).
*$p<.05$.

Discussion

The implemented SDH curriculum adopted social workers as primary instructors to teach social care knowledge and evaluation skills. In addition, we held exclusive interdisciplinary case conferences to promote mutual learning and to demonstrate the biopsychosocial model of health care and teamwork practice to trainee doctors. This study appraises the curriculum using level 1 and 2 of Kirkpatrick's evaluation model. Level 1 evaluation indicated that the trainee doctors were satisfied with the curriculum. Evaluation of the second level demonstrated significant improvements in both the written and SP posttests, revealing their effectiveness.

Regarding the Kirkpatrick level 1 evaluation, the high average scores of the trainees' satisfaction revealed that the design of the education model was practical in terms of curricular content, time arrangement, teaching and evaluation models, trainees' personal knowledge and skill improvement, and the aid to practicing medicine. The trainees' feedback, as described in the result, suggested that adopting social workers as primary teachers may enhance the interdisciplinary collaboration between social workers and trainee doctors.

The literature [13–19] involving social workers in medical education focused on different specific topics, as discussed in the introduction, while this innovative education model further aimed to present an integrated curriculum containing common psychosocial issues and SDH in physicians' daily practices (Table 1). The ten topics cover a wide range of medical social issues and may be suitable for postgraduate doctors before specialization and for general practitioners such as family medicine residents. In addition, the clinical scenarios covered by the ten topics could be adopted as the examination questions in the SP test, wherein domestic violence may be the most suitable topic owing to the higher possibility that each trainee doctor will confront this or a similar situation in the future, despite different specialties or practice settings. Irrespective of the topic chosen for the SP test, trainee doctors' biopsychosocial care abilities could be evaluated under a sound examination model design. Based on the result of Kirkpatrick level 1 evaluation in this study, the high satisfaction of

Table 5. Comparison among the four different training levels in the pretest, posttest, and change scores for the written and SP tests.

Test items	Scores	One-year-PGY ($n = 7$)	PGY1 ($n = 6$)	PGY2 ($n = 12$)	Resident ($n = 3$)	*p* value
Written test	Pretest	55.00 (17.50)	65.00 (15.00)	68.75 (11.88)	67.50 (12.50)†	.129
	Posttest	75.00 (10.00)	78.75 (7.50)	82.50 (9.38)	80.00 (5.00)†	.164
	Change	15.00 (15.00)	13.75 (12.50)	12.50 (11.25)	12.50 (17.50)†	.703
SP test	Pretest	13.50 (9.00)	13.00 (7.63)	14.75 (5.88)	15.50 (4.50)†	.562
	Posttest	20.50 (7.00)	18.75 (9.13)	20.25 (3.75)	21.50 (12.50)†	.654
	Change	8.50 (6.00)	4.25 (6.75)	5.75 (9.00)	6.00 (8.00)†	.484

Values are presented as median (interquartile range).
†Values are presented as median (range) owing to there being only 3 trainees in the resident group ($n = 3$).

trainee doctors with the curricular content and design, including the SP test, supports the opinions.

According to the literature review, some education programs involving social workers have been conducted at the medical school stage [13,15,16], while others have been conducted after graduation [14,17–19]. In the United States, SDH-related topics have been incorporated into medical school curricula [21] and postgraduate medical education programs [20]. The presented education model enrolled postgraduate junior doctors. According to the trainees' feedback in this study, most thought this education model appropriate for postgraduate training because postgraduate doctors provide medical care to patients in real-life contexts and have more clinical experience to comprehensively comprehend the topics and importance of the curricular content. Furthermore, postgraduate trainees may have experienced clinical situations similar to the curricular topics; therefore, the curriculum may help resolve their clinical problems. In addition, most trainees thought that medical students may not be able to understand the complex nature of the social topics owing to lack of related clinical experience; although, no medical students were enrolled in the study to verify this opinion.

In the review of literature [13–19] involving social workers in medical education, one study used a standard checklist to evaluate residents' related capability levels [17], whereas others did not report evaluations of the trainees' related knowledge and skills [13–16,18,19]. To assess the trainees' related erudition and competencies, this study applied Kirkpatrick level 2 evaluation to examine the outcomes of the innovative education model using the objective written and SP tests. The primary outcomes demonstrated significant improvements from pre- to posttests in both the written and SP tests, suggesting that the trainee doctors achieved significant progress in the related SDH knowledge and biopsychosocial assessment skills after completing the curriculum.

Concerning the sex factor, we found no significant differences between the female and male trainees in the written pretest scores, implying that they had similar baseline knowledge of social care and SDH. However, the SP pretest scores of the female trainee doctors were significantly higher than those of male doctors. A previous meta-analytic review revealed that female physicians had a higher level of psychosocial discussion and provided more patient-centered communication than male doctors [26]. In spite of these performance differences, no significant differences were found between the female and male trainees in the posttest and change scores for both the written and SP tests, suggesting that the performance discrepancies between the female and male trainees decreased. Both the female and male trainees could attain comparable improvements and reached similar performances after attending the curriculum.

Regarding the training-level factor, we found no significant differences among the four different training levels of the trainee doctors on the performances of both the written and SP pretests. This suggested that the trainees at these four different training levels were similarly unfamiliar with the involving SDH topics and biopsychosocial assessment before entering the curriculum. The result also implied that traditional medical education in Taiwan throughout each training level may not sufficiently develop trainees' competencies and knowledge in this field. Therefore, a systematic curriculum is required to enhance this critical aspect of the medical education. A previous Taiwanese study [27] compared different PGY programs and found no significant difference between the 6-month and 1-year PGY doctors on the written test and objective structured clinical examination performance; however, the content of the tests and training levels were distinct from this study. Nevertheless, our results reveal no significant differences among the four different training levels in the posttest and change scores of the written and SP tests, suggesting that incorporating the curriculum into either training level may induce similar advancement of trainees' related knowledge and skills.

This study has certain limitations. First, only 28 trainees completed the curriculum, and the small sample size may limit the interpretations of the study results, especially for the test performances among the different training levels of trainees. Second, this study adopted only one examination question owing to the considerable requirements for examiners, SP, and time requirements for the SP pre- and posttests, as well as the subsequent individualized feedback from examiners and SP. A more ideal option may be to cover more topics in the examination questions of the SP tests to assess the trainees' competencies more comprehensively and provide additional biopsychosocial assessment practices. Third, this study did not recruit medical students as trainees; therefore, the efficacy and feasibility of the curricular conduction for medical students were not assessed. In addition, further investigations are needed to comprehend the long-term impact on trainees' behavior changes in future clinical practices and the healthcare outcomes derived from the implementation of training using level 3 and 4 of Kirkpatrick's evaluation model.

Conclusions

The strengths of this study are to provide a systematic curricular model containing a series of SDH topics, to adopt social workers as primary teachers for postgraduate junior doctors, and to demonstrate its training effectiveness. The primary study finding revealed significant improvements in both the written and SP posttests among all trainees, suggesting that the curriculum aided the trainees in achieving significant advancement in their related SDH knowledge and biopsychosocial assessment skills, both critical aspects of holistic medicine, enabling them to provide more comprehensive health care in their future careers as physicians. The high average satisfaction scores from trainees reflect the practical and constructive design of the innovative education model that can be feasibly implemented. The interdisciplinary collaboration between social workers and trainee doctors could be strengthened by this new education model, which adopts social workers as primary teachers and promotes mutual learning through exclusive interdisciplinary case conferences.

Acknowledgements

The authors appreciate the work of the participating social workers, Ling-Jung Li et al. as clinical teachers in the study.

Author contributions

I-Hui Chiang: Conceptualization; methodology; writing—original draft; writing—review and editing; data curation; investigation; resources; funding acquisition. **Chi-Hsien Huang:** Conceptualization; writing—review and editing; methodology; formal analysis. **Yu-Wei Hsieh:** Writing—review and editing; methodology; formal analysis; validation. **Yi-Feng Lin:** Conceptualization; methodology; writing—review and editing; resources. **Ru-Yi Huang:** Conceptualization; methodology; writing—review and editing; formal analysis; validation. **Chi-Wei Lin:** Writing—review and editing; conceptualization; methodology; resources; supervision.

Ethics statement

The protocol used in the present study was approved by the E-Da Hospital Institutional Review Board (EMRP-110-050).

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The authors would like to thank the National Science and Technology Council of Taiwan (Grant ID: MOST 110-2511-H-650-001) and E-Da Hospital (Grant ID: EDPJ110073 and EDPJ110036) for funding the work.

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