

# Preliminary results and future directions of gathered pre-deployment training for Level 2 medical facility of peacekeeping operations in a training base

## Résultats préliminaires et orientations futures de la formation pré-déploiement regroupée pour la formation médicale de niveau 2 des opérations de maintien de la paix dans une base d'entraînement

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### Abstract

**Objectives:** To establish a gathered pre-deployment training procedure in a training base for Level 2 medical treatment facilities (MTFs) of the United Nations (UN) peacekeeping operations (PKO) and to observe the effectiveness of the established training procedure.

**Methods:** The training contents were established first on the basis of the requirements of the UN and the epidemiology of injury and illness in the field mission of PKO by referring to the literature. Then, two-round Delphi consultation was used to validate the constructed training procedure. The established training procedure was conducted in four MTFs in 2022, and the effectiveness of the training procedure was observed by assessment of battlefield first aid skills and two simulated scenarios, i.e., simulated reception of outpatients and simulated damage control surgery in animals. After the assessment, the trainees were asked to rate their agreement to a series of survey items on a 7-point Likert scale, and a free discussion between the trainees and the trainers was convened after the test.

**Results:** A gathered pre-deployment training procedure in a training base for Level 2 MTFs of the UN PKO was successfully established, which consisted of 3 modules and 18 items. During the consultation, the experts rated a mean score of 7 in 10 listed items and a mean score of 6 in 7 listed items. After the training, all trainees passed the assessment, and the ratio of excellence was 45.8%. The average scores in the simulated reception of outpatients of the MTFs were  $79.3 \pm 2.56$ ,  $83.3 \pm 3.58$ ,  $77.8 \pm 3.58$ , and  $81.3 \pm 3.16$ , respectively, and the average scores in the simulated damage control surgery were  $79.3 \pm 2.56$ ,  $83.3 \pm 3.58$ ,  $77.8 \pm 3.58$ , and  $81.3 \pm 3.16$ , respectively. In addition, there was no statistical difference among the four MTFs. Post-testing survey revealed that the trainees agreed with most of the surveyed items, except for the item: "The total training time and the time for each training content are reasonable." They believed that some of the training contents could be learned through self-training before the gathered training.

**Conclusion:** A training base-based pre-deployment training procedure for Level 2 MTFs was established, and it was found to be effective in improving the ability of the trainees and helping the trainees to fulfill the requirements of the UN. However, the training procedure does have certain aspects that need to be further developed to further improve the training effectiveness.

**Keywords:** pre-deployment; level 2, peacekeeping, training base

### Résumé

**Objectif :** L'établissement d'une procédure de formation préalable au déploiement de structures de traitement médical (STM) de niveau 2 dans le cadre d'opérations de maintien de la paix des Nations Unies (OMP) et l'évaluation de son efficacité.

**Méthodes :** Le contenu de la formation a été établi en fonction des exigences de l'ONU ainsi que de la prise en compte des données épidémiologiques issues de la littérature à propos des blessures et des maladies observées dans le cadre des opérations de maintien de la paix. L'utilisation de la méthode DELPHI à deux tours a ensuite été utilisée pour valider la procédure de formation.

Celle-ci a été mise en œuvre dans quatre STM en 2022, et son efficacité a été évaluée sur les compétences observées en matière de premiers secours sur le champ de bataille mais aussi à partir de deux scénarios simulés, l'un portant sur l'accueil de patients ambulatoires et l'autre sur une chirurgie de damage contrôle sur des animaux.

Après évaluation de cette formation, les stagiaires ont été invités à donner leur avis sur une série de questions renseignées grâce à une échelle de Likert en 7 points, et au cours d'une discussion libre entre stagiaires et formateurs organisée après le test.

**Résultats :** La procédure de formation pré-déploiement effectuée dans une base de formation pour STM de niveau 2 des OMP des Nations unies a été mise en place avec succès ; elle comprenait 3 modules et 18 points. Lors de l'évaluation, les experts ont attribué une note moyenne de 7 à 10 items et une note moyenne de 6 à 7 autres items.

Suite à cette formation pour laquelle tous les stagiaires ont réussi les évaluations, le taux d'excellence était de 45,8 %. Les scores

moyens dans la simulation de l'accueil des patients ambulatoires des STM étaient respectivement de  $79,3 \pm 2,56$ ,  $83,3 \pm 3,58$ ,  $77,8 \pm 3,58$  et  $81,3 \pm 3,16$ , et les scores moyens dans la simulation de la chirurgie de contrôle des dommages étaient respectivement de  $79,3 \pm 2,56$ ,  $83,3 \pm 3,58$ ,  $77,8 \pm 3,58$  et  $81,3 \pm 3,16$ . Par ailleurs, aucune différence statistique n'a été constatée entre les quatre STM.

L'enquête post-test a révélé que les stagiaires portaient un avis positif à la plupart des éléments de l'enquête, à l'exception cependant du point suivant : "La durée totale de la formation et la durée de chaque contenu de formation sont raisonnables". Ils ont exprimé à ce propos le fait que certains des contenus de la formation pouvaient être acquis par auto-apprentissage avant la formation collective.

**Conclusion :** La procédure de formation pré-déploiement effectuée sur la base de formation pour les STM de niveau 2 s'est avérée efficace pour améliorer les compétences des stagiaires et les aider à répondre aux exigences de l'ONU. Certains aspects cependant méritent d'être développés davantage pour améliorer l'efficacité de la formation.

**Mots-clés :** pré-déploiement, structures sanitaires de niveau 2, opérations de maintien de la paix, base de formation.

## Introduction

The United Nations (UN) peacekeeping operations (PKO) refer to a military operation that, under the authorization of the UN Security Council, utilizes non-force means to help the conflicting parties to maintain peace, restore peace, and finally achieve peace. An essential element of the UN PKO is the provision of healthcare services in support of mission personnel in fields of operations [1]. The medical system in UN field missions comprises a five-level framework, of which Level 2 medical treatment facilities (MTFs) provide surgical and life-saving capabilities and common hospital services. It is where the wounded and ill patients are gathered, stabilized, and treated prior to return to duty or evacuation [1], and it is therefore one of the most important levels for the survival of severely injured patients.

The UN PKO mission mandate requires that missions be self-reliant as far as their medical care is concerned. Therefore, it is expected that all the personnel needed in Level 2 MTFs are well-trained before deployment [2]. The training contents and training standards are provided clearly by the UN [2]. However, the UN is not responsible for the training. Instead, the contributing countries are responsible for their training process and training quality. In China, usually, the hospitals send Level 2 MTFs to

organize the pre-deployment training themselves [3-4]. The training time, training equipment, trainers, training quality, and assessment standard vary among the contributing hospitals, which might result in poor training outcomes, which consequently affects the medical service during missions [3-4]. The present study aims to establish a gathered pre-deployment training procedure in a training base and to observe the effectiveness of the established training procedure. In addition, the future directions are summarized on the basis of the post-assessment questionnaire and trainer-trainee discussion.

## Methods

### Construction and validation of training procedure

The training contents were established first on the basis of the requirements of the UN [2] and the epidemiology of injury and illness in the field mission of PKO by referring to the literature. An extensive literature review was performed to identify the epidemiology with keywords including "UN," "PKO," "epidemiology," "injury," "illness," and "field of mission." Published studies directly related to the epidemiology of injury and illness during PKO were specifically selected. On the basis of the requirements of the UN and literature review, the training contents were established by discussion within the research group, followed by which the training lists were constructed, and then the training time was allocated to each listed training content after discussion within the research group.

The two-round Delphi method was used to validate the constructed training procedure [5]. A total of 10 military experts were invited to participate in the consultation. They are all active in the field of healthcare service or combat casualty care, and five of them have experience in PKO.

In the first round of consultation, the original training lists were provided to the experts, and they were asked to select the items that need to be deleted or added on the basis of their professional judgment and to comment on each item if they deem it necessary. After the first round of consultation, experts' suggestions and recommendations were collected, based on which the original lists were adjusted and used for the second round of consultation. In the second round of consultation, the same experts in the first round of consultation rated the lists to indicate their agreement on a 7-point Likert scale (1 = fully disagree, 2 = disagree, 3 = mildly disagree, 4 = neutral, 5 = mildly agree, 6 = agree, and 7 = fully agree) [6-7].

The ratings were then collected and analyzed. The mean score was calculated to reveal the experts' agreement on the lists. The score was rounded to the first digit after the decimal point of an expert's score. For example, if the average score is 1.4, the final score will be recorded as 1, indicating full disagreement. If the score is 4.6, the final score will be recorded as 5, indicating mild agreement. In addition, the coefficient of variation (CV) was calculated to evaluate the consistency among the experts. The smaller the CV value, the higher the degree that the experts agreed with each other. A CV value less than 25% was considered to be significant [6-7]. The CV values of the score on each listed item were calculated as previously reported [8].

### Pre-deployment training

On May and August 2022, two Level 2 MTFs ( $n = 30$ ,  $n = 28$ ,  $n = 31$ , and  $n = 42$ ) that would be assigned to fields of PKO missions soon were trained in a training base with the established training procedure. The training lasted for 3 weeks. During the training process, experts were invited to teach, and those with experience in PKO

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were specifically selected. Because of the COVID-19 pandemic, some of the lectures were presented through real-time online distance learning. All the trainers were required to deliver the lecture in English.

### Assessment

After the training, the four trained MTFs were assessed. All trainees accepted the test for battlefield first aid (BFA) skills. The test standard for BFA refers to that used by the UN [9]. The doctors in the MTFs accepted the assessment of a simulated reception of outpatients. Simulated patients with cough, fever, broken legs, or headache were randomly assigned to a doctor, and the doctor was asked to provide a proper reception, examination, and correct diagnosis. Effective communication, proper examination, correct diagnosis, and correct treatment were given 25 points each with a total score of 100. The surgical teams in the MTFs accepted the assessment of damage control surgery and resuscitation (DCS and DCR) with a previously established method and test standard [8]. Briefly, explosion and thoracoabdominal injuries in live porcine were produced by a real explosion, and the surgical team was tasked to perform DCS and DCR. Then, the team's score was based on the previously established standard [8]. In each test part, a total score greater than 60 was considered to be satisfactory, and a score greater than 90 was considered to be excellent.

### Post-assessment questionnaire and discussion

After the training and testing, all the trainees rated agreement to a series of survey items on a 7-point Likert scale as mentioned earlier. The questions are presented in Table 1. Four doctors, four nurses, and two administrative officers were randomly selected for the questionnaire survey. In addition, a free discussion between the trainees and the trainers was convened af-

ter the test. Any suggestions, criticisms, and proposals related to the training and test procedure were encouraged and then were all collected, analyzed, and used for future improvement. The trainees who participated in the discussion were the same as those who participated in the post-assessment survey.

### Statistical analysis

All data are expressed as the mean  $\pm$  standard deviations, and statistical analysis was performed using SPSS Statistics software, version 17.0 (SPSS Inc., Chicago, IL, USA). The Kolmogorov-Smirnov test was used to determine the normality of the data distribution. Multigroup comparison tests were conducted using a one-way analysis of variance. The confidence interval was set at 95%. A value of  $p < 0.05$  was considered statistically significant.

## Results

### Construction and validation of training procedure

As prescribed by the *Medical Support Manual for United Nations Field Missions*, Level 2 MTFs are required to master the following knowledge or skills [1-2]. (1) For all members: regulations and policies of PKO, which include field mission organization, UN headquarters medical organizational structure, healthcare policies and procedures, medical survey, medical records and reporting, and security issues. (2) For all members: first aid skills. (3) For medical professionals: advanced life support, advanced trauma life support, evacuation of injured and ill patients, and DCS and DCR. (4) Post-related skills for medical professionals: intensive care-resuscitation, in-patient services, basic imaging services, and laboratory, pharmaceutical, preventive medicine, and dental services. The post-related medical skills are supposed to be mastered in daily medical service in the

hospital. Thus, only the first three categories were included in the training lists.

The *Medical Support Manual for United Nations Field Missions* was released in 2015, and the epidemiology of diseases or trauma in the fields of PKO missions might change much. Thus, an extensive literature review was conducted. It was found that the needs for training were expanded in the following areas: (1) preventive medicine and disease contagion prevention, especially after the outbreak and worldwide spread of COVID-19 in recent years [10-11]; (2) enhanced need of the DCS for explosion injuries [12-14]; and (3) interventions designed to reduce psychological morbidity [10, 11, 15, 16]. It was found that peacekeepers had a significantly higher 12-month prevalence of psychological morbidities such as post-traumatic stress disorder, major depressive episode, and anxiety disorder when compared with their civilian counterparts [17]. In addition, the propensity to psychological morbidity during missions increased significantly in recent years, especially during the COVID-19 pandemic [10-11].

By combining the requirements of the UN and the results of the literature review, the original training contents and lists were constructed, and the training time for each training content is presented in Table 2. In the first round of consultation, the experts did not delete any item from the lists. However, two experts suggested adding "introduction of the assigned mission," four experts suggested adding "verification of the equipment" and "management of mass casualty," and three experts suggested adding "comprehensive rehearsal" to the training lists. No suggestion was proposed for the teaching time. One expert suggested that the training contents should be divided into several modules, with each module containing related training contents.

We accepted all the suggestions and re-constructed the training lists (Table 3), which were then used for the second round of consultation. There were three modules in the revised training lists, i.e., basic knowledge and background of PKO, medical skills, and comprehensive rehearsal (Table 3).

In the second round of consultation, the experts provided a mean score of 7 in 10 listed items, accounting for 55.6% of all surveyed items (Table 3); the experts provided a mean score of 6 in 7 listed items, accounting for 38.9% of all surveyed items (Table 3). These indicated that the experts were in full agreement or agreed with the listed

Table 1 Questions on the post-training survey

No.	Questions
1	The training contents and lists are reasonable.
2	The total training time and the time for each training content are reasonable.
3	The training methods and the apparatus selected for training are appropriate.
4	The trainers selected are qualified for the training.
5	I think the gathered training is better than self-training and that it can improve the comprehensive ability of Level 2 medical treatment facilities greatly.
6	I feel confident and competent in accomplishing the coming mission after the training.

Table 2 Original training list

Training list	Assigned time (h)
Organization of field mission and UN headquarters medical structure	2
Healthcare policies and procedures	2
Medical survey	2
Medical records and reporting	2
Security issues	2
First aid skills	8
Advanced life support, advanced trauma life support	8
Evacuation of injured and ill patients	4
Damage control surgery and resuscitation	8
Preventive medicine and disease contagion prevention	4
Prevention of psychological morbidity	4

Table 3 Revised training lists and rating of the experts

Training list	Assigned time (h)	Rating	CV (%)
<b>Part 1: basic knowledge and background of PKO</b>			
Organization of field mission and UN headquarters medical structure	2	6.5 ± 0.53	8.11
Healthcare policies and procedures	2	6.3 ± 0.68	10.71
Medical survey	2	5.6 ± 0.699	12.49
Medical records and reporting	2	6.7 ± 0.48	7.21
Security issues	2	5.3 ± 0.48	9.11
Verification of the equipment	4	5.8 ± 0.63	10.9
Introduction of the mission and the area of PKO	4	6.7 ± 0.48	7.21
<b>Part 2: medical skills</b>			
First aid skills	8	7 ± 0	0
Advanced life support, advanced trauma life support	8	7 ± 0	0
Evacuation of injured and ill patients	4	6.6 ± 0.52	7.82
Damage control surgery and resuscitation	8	6.2 ± 0.43	6.8
Management of mass casualty	4	6.5 ± 0.53	8.11
Preventive medicine and disease contagion prevention	4	6.8 ± 0.42	6.2
Prevention of psychological morbidity	4	6.2 ± 0.79	12.72
<b>Part 3: comprehensive rehearsal</b>			
Reception of outpatients	4	5.9 ± 0.74	12.51
Scenario-based battlefield first aid	4	7 ± 0	0
Damage control surgery and resuscitation for severely injured patients with simulated animals	8	6.5 ± 0.71	10.88
Evacuation of patients	4	5.8 ± 0.43	7.27

Note. CV, coefficient of variation; PKO, peacekeeping operations.

items. All CV values were lower than 15%, indicating high consistency among experts [7] (Table 3).

### Training process

The training was conducted as listed in Table 3. All the teachers were asked to deliver

the lectures in English. However, lectures were delivered in mixed Chinese and English either because the teachers were not proficient in English or because the trainees could not adequately understand the contents delivered in English.

To conduct the training, a simulated Level 2

field hospital similar to the hospital in the field area of PKO was constructed. In the simulated hospital, all necessary medical equipment was available (Figure 1).

### Results of assessment

As for the BFA skills, all trainees passed the assessment, and the ratio of excellence was 45.8%. The mean scores of the four MTFs were  $89.4 \pm 6.78$ ,  $85.6 \pm 9.56$ ,  $83.4 \pm 10.22$ , and  $90.5 \pm 12.4$ , respectively, indicating no statistical difference among the four MTFs. In the assessment of the simulated reception of outpatients, there were 12, 11, 9, and 13 doctors in the MTFs' accepted test. The average scores of the MTFs were  $79.3 \pm 2.56$ ,  $83.3 \pm 3.58$ ,  $77.8 \pm 3.58$ , and  $81.3 \pm 3.16$ , respectively. In addition, there was no statistical difference among the four MTFs. In the assessment of DCS and DCR, the MTFs had four, five, six, and four surgical teams. The average scores of the MTFs were  $76.3 \pm 3.30$ ,  $80.4 \pm 4.57$ ,  $82.2 \pm 3.49$ , and  $78.3 \pm 1.71$ , respectively, indicating that all of the teams passed the assessment, and there was no statistical difference among the four MTFs.

### Results of the post-assessment questionnaire and discussion

A total of 40 questionnaires were administered, and all of the questionnaires were collected. Table 4 presents the results of the post-training survey rating of the four MTFs. For Question 1, the trainees assigned a mean score of  $6.48 \pm 0.51$ , indicating that they fully agreed that the training contents and lists are reasonable.

For Question 2, the trainees assigned a mean score of  $3.48 \pm 0.59$ , indicating that they somewhat disagreed with the total training time or that the time for each training content is reasonable. In the free discussion, a total of five trainees suggested that 3 weeks was somewhat lengthy and that some of the training contents could be produced as videos for self-training, such as some contents of the basic knowledge and background of PKO.

For Question 3, the trainees assigned a mean score of  $5.43 \pm 0.59$ . During the free discussion, the trainees were satisfied with the simulated training method for BFA, advanced trauma life support, and DCS but somehow not too satisfied with the "verification of the equipment" and the "prevention of psychological morbidity." Furthermore, five trainees were not satisfied with the remote online teaching due to the COVID-19 pandemic because their internet

speed was occasionally too slow that it blocked the lecture.

For Question 4, the trainees assigned a mean score of  $6.28 \pm 0.55$ . During the free discussion, the trainees stated that all the trainers have profound knowledge. However, some of the trainers were not professional teachers, and their teaching skills were not satisfactory. In addition, the trainees complained that two of the teachers' English language skills were inadequate.

For Questions 5 and 6, the trainees assigned mean scores of  $6.73 \pm 0.45$  and  $6.25 \pm 0.59$ , respectively, indicating that they highly agreed that the gathered training is better than self-training and that it can improve the comprehensive ability of Level 2 MTFs considerably. The trainees were very confident and competent in accomplishing the coming mission after the training. In the free discussion, the trainees talked about the advantages of the training base-gathered training over self-training.

## Discussion

In the present study, a gathered pre-deployment training procedure in a training base for Level 2 MTFs of UN PKO was constructed and validated, and it was found that the established training procedure could improve the ability of the trainees and fulfill the requirements of the UN. In addition, the post-assessment questionnaire revealed that the trainees felt that gathered training is better than self-training and that it could improve their comprehensive ability considerably. They were very confident and competent in accomplishing the coming mission after the training.

There are several advantages of gathered pre-deployment training in a training base. First, a standard pre-deployment training procedure was constructed on the basis of the requirements of the UN and the epidemiology of diseases or trauma in the fields of PKO missions, and then it was used to train four MTFs that were from different units, ensuring that the MTFs accomplish the mission in a unified standard. Previously, the MTFs organized the training themselves. The training standard and training contents are numerous among MTFs. This might lead to unsatisfactory training outcomes, consequently affecting the health care in the field of mission [3]. Second, the trainers delivering the lectures were all military experts, and most of them have extensive experience in PKO. In addition,

one of the trainers (Zhaowen Zong, one of the authors of this manuscript) was a UN-certified master trainer for BFA and a trainer for field medical assistants. In the self-training by MTFs, the MTFs do not have such qualified trainers, which might lead to lower training effectiveness [4]. Third, the training equipment in the Army Training Base for Health Care is much better than that in the MTFs.

However, the gathered training has certain aspects that need to be improved. First, the training time needs to be optimized. In the free discussion after the training and assessment, some of the trainees complained that a duration of 3 weeks is too long, and they suggested that some of the training contents could be learned through self-training. To ensure the training outcome, some of the required training contents such as basic knowledge and background of PKO could be produced as videos, which could be studied by MTFs before the gathered training. Once the gathered training begins, the MTFs should undergo a test on self-trained contents to assess whether they have mastered the related contents. Second, training of trainers should be enforced [18]. Although the trainers are military experts and many of them are experienced in PKO, they might not be skilled at teaching. In the free discussion after the training and assessment, some of the trainees suggested that the training methods of some trainers are not satisfactory, some key points were not specifically enforced, and even some lectures were monotonous and not engaging. In the future, the trainers should be trained in a unified standard before they conduct lectures. Third, the language ability of both the trainees and the trainers should be further enhanced. The trainees will soon be deployed to the mission area, and they need to communicate with people from different countries. Thus, they should have good English communication skills [4]. During the training process, it was found that although some of the trainees are proficient in speaking English, some are very poor at it, and some of the trainers are ill-equipped at giving lectures in English.

## Conclusions

In this study, a training base-based pre-deployment training procedure for Level 2 MTFs of UN PKO was established, and it was found to be effective in improving the ability of the trainees and in helping the train-

ees to fulfill the requirements of the UN. However, the training procedure does have certain aspects that need to be further improved, e.g., further optimization of the training time, training of the trainers, and enhancement of language ability. Future efforts should be focused on these aspects to further improve the training effectiveness.

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## Conflicts of interest

The authors declare no conflicts of interest.

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