Original Research Article

Impact of Military Medicine Training on the Perception and Future Performance of Graduates from National Defence University of Malaysia: A questionnaire study

ABSTRACT

Background: The integration of Military Medicine into medical undergraduate programme in National Defence University of Malaysia {NDUM)has shaped the landscape of the formal existing framework of medical education, creating a platform to enhance feasibility of doctors to work effectively in austere environment and towards interagency collaboration between military and civilian.

Objectives: This study aims to explore the impact of Military Medicinetraining onNDUM medical graduate'sperception and their futureperformance in the categories of (i) personal and professional development, (ii) as a platform for future military-civilian cooperation, (iii) readiness to participate in future military-civilian cooperation: Knowledge, Skills and Attitude.

Methods: This is a quantitative research design, conducted among six batches of graduates to explore the impact of Military Medicine trainingontheir perception and future performance. Thenon-probability purposive sampling method was used, andmedical graduates have responded tothe online structured questionnaire.The questionnaire was distributed using snow ball techniques through online Google form. Informed consent was taken from the responders.

Results:A total of 90 medical graduates responded to the study. The participation pool included military doctors (44, 48.9%) and civilian doctors (46, 51.1%). The study feedback shows that most graduates viewed that their participation in the Military Medicine courses has positively affected their personal development (84, 93.3%),work performance (84, 93.3%) and personality (77, 85.6%); and84(93.3%) opined that Military Medicine courses is useful for their career progression. The participants' feedback highlighted that the training has enhanced their perceptions (89, 98.9%)and is a very useful platform for future military-civilian cooperation in Malaysia (72,80%). Amongst important values that graduates have gained from their participation in Military Medicine training are teamwork, esprit de corps and cooperation, perseverance and mental readiness and new experiences in providing care beyond comfort zone of hospital settings.

Conclusion:NDUMmedical graduates have benefited positively from the Military Medicine module and enhanced their perception toward military-civilian cooperation.

Keywords:Military Medicine training; medical graduates; impact on perception; impact on future performance; military-civilian cooperation.

Introduction

National Defence University of Malaysia–NDUM (also known as Universiti Pertahanan Nasional Malaysia-UPNM) is the only higher learning institution in Malaysia that offers Military Medicine training to medical students. The Faculty of Medicine and Defence Health (FMDH) atNDUM adopts a hybrid medical curriculum; a curriculum that combines the best aspects of both the modern and the conventional medical curricula with emphasis on a subject-based, system-synchronized preclinical curriculum, complemented by problem-based learning and early clinical exposure. In-line with the university's mission and vision, the unique composition of students and the support from the Malaysian Armed Forces (MAF), FMDH has been able to integrate Military Medicine into the formal existing framework of clinical setting. The added value of Military Medicine module is designed with the aim to complement medical knowledge with vital military soft skills so that they become competent doctors with the ability to manage the medical demands of various contingencies[**1**].

In NDUM, all medical students must undergo the Military Medicinemodulewhich comprises of Military Trauma Life Support(year-1), Army Medicine(year-2), Aviation Medicine, and Naval and Underwater Medicine(year-3), Advanced Cardiac Life Support and Battlefield Medicine(year-5)[**1**].During the courses, students are given the opportunity to experience field training with the MAF, namely the Malaysian Army, Royal Malaysian Navy,Royal Malaysian Air Force, Royal Medical Corp, and to some extent; training with thecivilian agencies such as the Malaysian Civil Defence Department, Malaysian Maritime Enforcement Agency, and the Fire and Rescue Department of Malaysia. To date, the university has produced over 300medical graduates and most of them serve in the Malaysian Armed Forces, Malaysia Ministry of Health and some have ventured into private practice.

Numerous studies have been conducted to address the effectiveness of Military Medicine in augmenting medical students' learning[**2- 9**].As a follow-up study of our paper published on Military Medicine training to undergraduates in NDUM [**1**], the findings of this study are reported.

Objectives: This study aims to explore the impact of Military Medicinetraining onNDUMmedical graduates' perception and their futureperformance in the categories of (i) personal and professional development, (ii) as a platform for future military-civilian cooperation, (iii) readiness to participate in future military-civilian cooperation: Knowledge, Skills and Attitude.

Methods and Data collection

This is a quantitative research design as its aim is to explore the impact of Military Medicine trainingonNDUMmedical graduate's perception andtheir

futureperformance. The studywasconducted among sixbatchesof graduates of years 2016to 2021)who completedthe Military Medicine module face-to-faceduring their undergraduate study. Out of 274 graduates in these six years, 142 were military cadetsand 132 were civil students.

Thenon-probability purposive sampling method was used and a total of 90 medical graduates have responded tothe online questionnaire. Data was collected using a structured questionnaire. The questionnaire was prepared by going through paper published earlier from UPNM [**1**] and modification was made to suit Military Medicine curriculum. It was pretested on 10 students before collecting from responders.However, the data collected from these students was not included in the analysis of results of this study. The questionnaire was in English language as it is the medium for teaching and learning for NDUM medical programme.

The questionnaire (Google form) was distributed using snow ball techniques through online Google form as most of the medical graduates are serving nationwide.In data collection and analysis, the "snowball technique" refers to a non-probability sampling method where existing research participants recruit new participants from their network, essentially growing the sample size like a rolling snowball by asking each participant to refer others with similar characteristics, making it particularly useful for studying hard-to-reach populations.This process continues until you reach the desired sample, or a saturation point.

Consent from the participants

A written online-consent was included in the questionnaire. The purpose of the study was explained to the responders and was included in the questionnaire. The responders were informed that completed questionnaires and computer data were kept confidential and all data collected were used for academic purposes only. The consent form indicated that participationwas voluntary and by returning the answered questionnaire, they gave their consent to participate.To ensure confidentiality is maintained, participants were assigned randomized identification numbers to track their data for analysis.

Results

Out of 274 graduates in six years (2016 to 2021), 142 were military cadetsand 132 were civil students.A total of 90 medical graduates responded to the study. 65.6% (n=59)of them were males and majority of the responders were Malay (n=57, 63.3%).48.9% (n=44) of the respondents were military cadets during their undergraduate education (Table-1).They were commissioned into the Royal Medical and Dental Corp.The other 50% (n=45)of the responders are medical officers who are employed by the Malaysian Ministry of Health while one respondent has ventured into private practice. It is worth highlighting that 12.2% civil medical

graduates(n=11) joined the PasukanLatihanPasukanSimpanan - PALAPES (also known as Reserve Officer Training Unit) as part of their undergraduate co-curriculum activities. However, to join as full-time military officers in the MAF, they have to enroll in the *KursusPegawaiKadetGraduan*(Graduate Officer Cadet Course).

Table 1. **Demographic Profile of Respondents(n=90)**

Variables		Number	Percentage
Age:	23-25 years old	44	48.9%
	26-28 years old	31	34.4%
	above 29 years old	15	16.7%
Gender:	Male	59	65.6%
	Female	31	34.4%
Race:	Malay	57	63.3%
	Chinese	7	7.8%
	Indian	25	27.8%
	Pribumi (Aboriginal)	1	1.1%
Status During Undergraduate:	Military cadet	44	48.9%
	Ordinary civilian students	29	32.2%
	Civilian students who joined the military reserve training	11	12.2%
	Cadet-turned-civilian student	6	6.7%
Current Status:	Military Doctor	44	48.9%
	Medical Officer	45	50.0%
	Private Practice Doctor	1	1.1%

The graduates' responses on the impact of Military Medicine training on their Personal and professional developmentisshownin Table-2.93.3% (n=84) of the graduatesresponded that the Military Medicine training has positive impact on their personal development,work performance and career progression, while 6 (6.7%)responders were neutral. Seventy-seven (85.6%) graduatesresponded that the Military Medicine training has positive impact on their personality.No responder reported that the military training hasimpacted them negatively on any of the above.Although it is not measurable on paper, "personal development as person" can be observed when students are actively in action such as field training, practice session and field assessment.During the intensive field training, proficiency of leadership, teamwork, time management, problem solving, and likely medical management of casualty are assessed using rubric. All students are on a rotating leadership cycle with each student having at least 1 field experience to serve as a team leader. As they need to forge effective teamwork,students learn to steer their differences of various types of personality into operating on a shared "norm". It is essential that everyone feels they can rely on each other to accomplish the given task.

Table 2. Graduates' responses on the impact of Military Medicine training on their personal and professional development (n=90)

Questions and Responses	Number	Percentage
1. on personal development as a person		
Positive impact	84	93.3%
Neutral	6	6.7%
Negative impact	0	0%
2. on your work performance		
Positive impact	84	93.3%
Neutral	6	6.7%
Negative impact	0	0%
3. on your personality		
Positive impact	77	85.6%
Neutral	13	14.4%
Negative impact	0	0%
4. on usefulness for career progression		
Yes	84	93.3%
No	6	6.7%

When asked about their opinion on the Military Medicine module as a platform for future military-civilian cooperation (Table-3),72(80%)graduates rated it as "very useful",17(18.9%) as "moderately useful" while 1(1.1%)rated itas "not useful at all".Eighty-nine respondents (98.9%) rated that Military Medicine training has enhanced their perception towards working effectively in a "military-civilian cooperation" in Malaysia while one respondent rated that he/she did not perceive the training as enhancing the military-civilian cooperation.These findings highlighted the graduate's opinion on the Military Medicine module as a platform for future military-civilian cooperation.

Table 3. Graduate's opinion on the Military Medicine module as a platform for future military-civilian cooperation (n=90)

Questions and Responses	Number	Percentage
1. as a platform for future military-civilian cooperation?		
Very Useful	72	80%
Moderately useful	17	18.9%
Not useful at all	1	1.1%
2. enhances your perception towards working effectively in military-civilian cooperation in Malaysia		
Yes	89	98.9%
No	1	1.1%

Table-4 highlighted graduate's opinion on the impact of Military Medicine towards their readiness to participate in future military-civilian cooperation: Knowledge, Skills and Attitude.On the aspect of knowledge, 69 (76.7%) graduates believed that the training has improved their knowledge on military-civilian cooperation/collaboration; 64(71.7%) graduates believed that the training enhanced their understanding on the roles of other agencies in providing healthcare; and 54 (60%) believed that the training has served as a platform for comprehensive delivery system in providing medical care in various environment.

On the aspect of skill, 72 (80%) graduatesbelieved that the training has enhanced their ability to practice decision-making in complex and dynamic environment; 71 (78.9%) believed that the training has enhanced their ability to work as a team in any military-civilian collaboration; and50 (55.6%) believed that the training has enhanced their ability to perform collaborative practiceand their readiness for future acquaintance and collaborative practice.

On the aspect of attitude, 66 (73.3%)graduates believed that the training instilled awareness on the culture of other profession such as the Army, Navy, Air Force, Civil Defence and theMalaysia Maritime Enforcement; 54 (60%) believed that the training improved their perceptions toward civilian and military engagement/participation/work ethics; and 53 (58.9%) believed that the training has enhanced trust (trust building) among civilian and military personnel.

Table 4. Graduate's opinion on the impact of Military Medicinetowardstheirreadiness to participate in future military-civilian cooperation: Knowledge, Skills and Attitude (n=90).

Questions and Responses	Number	Percentage
1.On the aspect of knowledge, the Military Medicine training has:		
• enhanced my understanding on the roles of other agencies (NGO)/healthcare profession and their support in providing healthcare	64	71.7%
• improved knowledge on military-civilian cooperation/collaboration	69	76.7%
• improved patient's care and planning (e.g. procedure to request for TUDM mercy flight as in Aviation Medicine course)	37	41.1%
• served as a platform for comprehensive delivery system in providing medical care in various environment	54	60.0%
• enhanced my knowledge on care coordination efforts and functions	47	52.2%
2. On the aspect of skills, the Military Medicine training has:		
• enhanced my ability to work as a team in any military-	71	78.9%

civilian collaboration		
• enhanced my ability to perform collaborative practice	50	55.6%
• enhanced my ability to practice decision-making in complex and dynamic environment	72	80.0%
• enables me to bridge gaps that could have arisen in military-civilian cooperation	30	33.3%
• enhanced my readiness for future acquaintance and collaborative practice	50	55.6%
3. On the aspect of attitude, the Military Medicine training has:		
• improved my perceptions toward civilian and military engagement/participation/work ethics	54	60.0%
• instilled awareness on the culture of other profession (Army, Navy, Air Force, CivilDefence, MalaysiaMaritime Agencyetc.)	66	73.3%
• enhanced trust (trust building) among civilian and military	53	58.9%
• foster teamwork	49	54.4%
• developed mutual beneficial relationship & respect	51	56.7%

In an open-ended question, responders were asked to list the most important values that they have benefited from their participation in the Military Medicine training as shown in Table-5.Forty-seven (52.2%) graduates listed teamwork, esprit de corps and working with other agencies while 20 (22.2%)opined that exposure to healthcare management in various environments beyond their comfort zone as the most important value that they have benefited during their undergraduate Military Medicine training; and10(11.2%) listed the benefits as perseverance, positive mind, mental readiness, compassion and flexibility.Other beneficial responseslisted werediscipline, communication, leadership and patriotism.

Table 5. **Graduate's opinion on the most important value that they have benefited from their participation in the Military Medicine training(n=90)**

Question and responses	Number	Percentage
The most important value that you benefited from participations in Military Medicine training:		
• teamwork, esprit de corps, cooperation and *working* relationship with other agencies	47	52.2%
• exposure to new experiences beyond comfort zone (health hazard and healthcare management in various disaster environment)	20	22.2%
• perseverance, positive mind, mental readiness, compassion and flexibility	10	11.2%
• discipline	9	10.0%
• communication	2	2.2%
• leadership	1	1.1%
• patriotism	1	1.1%

Discussion

This study sought to explore the impact of Military Medicinemodule on NDUM medical graduate's performance; and the findings confirmed that NDUMmedical graduate have benefited positively from the Military Medicine module. The opportunity to participate in the field training among medical cadets and civilian students has enabled them to develop *kinship* (bonding). The exposure to "stressful environment" provided a priceless experience for medical students to weave together, creating teamwork and esprit de corps that can drive intellectual and profession excellence in providing healthcare under austere environment. It also instilled awareness, reduced misconception and enhanced understanding towards the military profession which in turn, can build trust, inculcate respect and solidify teamwork. Feedback from medical graduate also revealed that they have gained important values such as teamwork, esprit de corps, cooperation and working relationship with other agencies,exposure to new experiences beyond comfort zone, perseverance, positive mind, mental readiness, compassion and flexibility, communication, discipline and patriotism.

The findings of this studyareconsistent with many research on the inclusion of Military Medicine into the medical curriculum[**3-9**].The US Department of Defence acknowledges the importance of competencies and soft skills such as cultural adaptability and sensitivity to local priorities to enable successful global health engagement [**2**].In 1998, US Uniformed Services University of the Health Science (USUHS) a pragmatic approach to include military-relevant topics in its graduate medical education training programmes [**3**].Anticipated benefits from the inclusion are the improvement the ability of military physician to address administrative issues such as medical boards, physical profiles, and duty limitations in their active-duty patients as well as the provision of clinical care for soldiers in the field and for civilian patients during humanitarian missions and disaster relief operations[**3**]. In 2017, San Antonio Uniformed Services Health Education Consortium conducted a pilot leadership training programme to its military internal medicine residents [**4**]. The programme was designed in succession after the USUHS Leader and Leadership Education and Development Program which teaches and develops knowledge, skills, and attitudes to help students become effective uniformed healthcare leaders.As such, USUHShas continuously developing programmes and offers graduate-level education and courses that incorporated the tiered education that transforms global health education desired outcomes, such as interoperability, from a concept into attainable and sustainable goals.

Samuel et al.[**5**]conducted a pilot study to investigate the effectiveness of a six-week online course on the fundamentals of Military Medicine in USUH. The course is an initiation to bridge the gap in the fundamental knowledge of Military Medicine for

military physicians who are recruited through the Health Professions Scholarship Program (HPSP). The module feedback survey revealed that most participants spent 1 to 3 hours on each of the modules and there was nodifference between the overall quality of the three modules (Introduction, Roles and Responsibility andPsychological Well-being). Overall, the pilot study showed that thecoursehas provided the required fundamentals of Military Medicine that is important to HPSP students to perform effectively and efficiently as a military physician.

After identifying the difficulties that were encountered by the newly commission military doctor, Lallet al.[**6**] conducted qualitative research over a periodoftwo yearsto develop and implement a structured Military Medicinemodule for the Indian Armed Forces. The feedback from the first and second batches of the young military doctors on the inclusion of Military Medicinemoduleinto the medical curriculum has revealed a need for multidisciplinary curriculum integration for doctors-to-be military officers to perform efficiently as medical caregiver in times of war and natural disasters.Important skills and abilities for military doctors such as leadership, communication skills, ability to handle stress, decision making skills and critical thinking, were not part of the medical education curriculum in India.

In year 2017, a qualitative study by Dana and MuhammadiMehr[**7**] using snowball sampling techniques to select sample for the study, revealed that most of the educational programmes in Tehran provided basic clinical skills that are needed by physician in hospital setting. However, to be able to perform effectively in unknown environments, physicians needed to possess a more complete set of soft skills. Amongst the utmost important and necessary skills are the crisis management, mental health management, emergency and pre-hospital skills such as field triage management, relief and transferring victims for treatment of military forces.

Following that, Dehganzadeh, and MuhammadiMehr[**8**] conducted mixed method research to identify the potentially suitablecharacteristics of Military Medicineto be added into the clinical expertisecurriculum (specialization) in Iran. They concluded that the inclusion of Military Medicine curricular into the general medicine curriculum has enhanced the Iranian military medical universities in training physicians to meet the needs in military operation of the Iranian Armed Forces.

Like NDUM, the Phramongkutklao College of Medicine (PCM), Thailand also include Military Medicine into its medical curriculum with the aim to prepare medical cadets to work in austere medical settings upon their graduation as military physician[**9**]. The PCM Military Medicine curriculum comprises of four modules which starts in the first semester of the second year. During the course, medical cadets are exposed to knowledge in Military Medicine and field training experiences to enable them to serve in the Thai Armed Forces with insight, morals and the professional attitudes of military doctors.

Thisstudyalsohighlighted the imperative roles of Military Medicine in NDUMmedicalprogrammeincreating a platform of field experiences to enhancedoctor's ability to provide and manage medical care invariousscenarios. Exposure and experiences in field training has necessitated a paradigm shift in nurturing the art of knowledge and skills of medical care provision in a setting that is beyond the comfort of hospital setting.MilitaryMedicine module is also about nurturingminds, igniting curiosity, and empowering NDUMmedical students to reach their full potential i.e.competent doctors with the ability to manage the medical demandsinvariouscontingenciessuchasnatural calamities (floods, earthquake, landslides) or in war scenarios –military doctors.Interagency collaboration is an important strategy to improve service delivery and healthcare resources. However, establishing collaborative interagency relationships is a challenging and complex process. The awareness and understanding of other organizational culturesare the basis to the development of future military and civilian collaboration.

The provision and sustainabilityofmedical and healthcare during disaster is complex and transcends beyond the Ministry of Health[**10**].Trust, understanding and respecting professional boundaries and teamwork are among the important foundations for achieving genuine collaboration strong collaboration between all agencies especially where resources are scarce and limited.

Significance of the study

Thisstudy provides insight into the opinions, experiences and perspectives of NDUM medical graduates on the educational experience that they have gained from their participation in Military Medicinetrainingand the impact of the experience towards working effectively in various environment and future military-civilian cooperation in Malaysia. The findings of thisstudyprovided evidence that the integration of Military Medicine into academic programme does contribute to the effort in nurturing an effective and efficient healthcare provision. The findings will serve as a baseline for educators ofthe medical faculty in NDUMto continue striving in its effort to spearhead thecollaboration between military and various agencies collaboration.

Limitations

This study has several limitations.The number of responders is small in this study.It is ideal to have a large number of responders to implement the findings of any study in the practice of education.To obtain more reliable and meaningful interpretation of the study, the authors plan to administer the same questionnaire every year at the end of training before student's graduate.As more and more civil students enroll in NDUM undergraduate medical programme, follow up study after 3 to 4 years is highly recommended to explore the civilian's perception towards working effectively in military-civilian cooperation in Malaysia.

Conclusion

The faculty of medicine of NDUMcontinuously strives to improve the Military Medicine module as comprehensive learning experience through lectures, visits and field training with theArmy, Air force and Navyfacilities of MAF and other enforcement agencies, which madeourmedical graduates as the ambassadors in bridging the gap between military-civilian collaboration in Malaysia especially in providing medical support during disasters. In addition to team building through field training, exposure to the role of other profession is the epitometofacilitationoftrust, teamwork, which subsequently enhances readiness to mutual beneficial relationship and more collaborate practice in the future.Two things for sure are that the Military Medicine training has positively impacted ourgraduates and the integration of Military Medicine into medical education has altered the landscape of the formal existingframework of medical education in Malaysia.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

Ethical Approval:
As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

Consent
As per international standards or university standards, Participants' written consent has been collected and preserved by the author(s).

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