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Developing a Consensus-Based Optometry Residency Military Unique Curriculum

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Abstract
Military optometry residencies currently do not adequately address the unique eyecare challenges faced by military optometrists. This study addresses the need for military-specific optometric education within residencies by identifying elements of an optometry Military Unique Curriculum (MUC). A modified nominal group technique was utilized involving Kern's Six-Step Approach to Curriculum Development for Medical Education. The expert panel determined a curriculum goal, MUC topics, an ideal MUC learning environment and optimal MUC capacity. Implementing this curriculum within military optometry residency programs could improve vision readiness and care within the Military Health System.

Key Words: *optometry residency curriculum, Military Unique Curriculum, curriculum development, nominal group technique*

Background

The Defense Health Agency (DHA) supports medical readiness in two aspects: It promotes a *ready medical force*, which is the preparedness of military health personnel to care for the warfighter, and it promotes a *medically ready force*, which is the preparedness of the warfighter against health threats.[1] Vision readiness is one of the key components of medical readiness.[2] It is defined as the visual ability required of military personnel to perform their mission safely and efficiently.[3] Military optometrists serve at the forefront of vision readiness as the primary eyecare providers for the nation's service members. Like their civilian counterparts, they perform eye examinations, prescribe glasses and contact lenses, and diagnose and treat ocular conditions. However, due to their status as service members and the special population they serve, they perform duties that differentiate them from civilian optometrists when they address ocular and visual issues unique to the warfighter. Because military optometry is crucial for vision readiness, a curriculum tailored specifically for the armed forces is necessary. To ensure this, military optometrists need to be able to address military-specific issues. Examples of such issues include triaging/treating combat ocular trauma, managing visual complications of traumatic brain injury (TBI), examining patients in austere deployed environments, and performing military vision readiness physicals.

Currently, there are five optometry residency programs in U.S. military facilities. The Army has two Primary Care Optometry residencies and one Vision Rehabilitation (Brain Injury Rehabilitation) Optometry residency. The Navy has one Primary Care/Ocular Disease Optometry residency. Lastly, there is one Tri-Service Vision Rehabilitation residency program. Currently, there is no optometry residency specific to the Air Force. Given the vast resources available in their respective facilities, each of these residency programs is fully capable of providing military-specific optometric training. However, this military-specific training is either significantly underdeveloped or completely absent within these military optometry residency programs. Without such training, the programs risk residents being

unprepared to face the challenges unique to military optometry. Consequently, military vision readiness will be at stake.

Military optometry residencies can implement a Military Unique Curriculum (MUC) to address this issue. The DHA defines MUC as "the integrated educational activities for trainees to learn and apply their specialty expertise to the scope of practice required for expeditionary medicine and unique issues of the MHS [Military Health System] patient population."[4] In fact, the DHA has mandated the implementation of MUCs within all military graduate medical education (GME) programs.[4] The Uniformed Services University of the Health Sciences (USUHS) has championed the concept of MUCs.[5] Further, during the 16th Annual Conference on Military Medicine at USUHS, a group of experts developed a model to identify and prioritize MUC content for GME programs within the military.[5] De Lorenzo emphasized that MUC implementation is important because solely developing clinical skills and medical knowledge during training is not enough to prepare learners to face military-specific operational challenges.[6] As a result, MUCs have been implemented in various medical programs throughout the military, including anesthesia, internal medicine, emergency medicine and infectious disease.[7-11] Of these MUCs mentioned in the literature, a wide range of military-specific topics are described, including tactical combat casualty care, combat stress, military occupational health, and force health protection. Studies of MUC effectiveness demonstrated greater perceived readiness for post-residency military operational assignments and improved deployment medicine knowledge.[8,9,11] These studies demonstrate practical benefits of implementing a MUC within military medical training programs.

Currently, all military optometry residencies do not have well-defined MUCs. It is also noteworthy that the Association of Schools and Colleges of Optometry currently does not define a residency category or emphasis area related to military practice.[12] The Accreditation Council for Optometric Education (ACOE) states that all optometric residencies should define specific goals and outline curricular content.[13] A MUC could be implemented within the goals and curricular content of an optometric residency. Thus, a needs assessment was conducted in this study to define the elements of a military-specific optometry curriculum that can serve as the first steps for military optometric residencies to fulfill the DHA mandate of MUC implementation.

This study aims to answer the question: What elements should be integrated into an optometry residency MUC to address the unique challenges that military optometrists encounter?

Methods

Methodological framework

To develop the MUC, a modified nominal group technique (NGT) was implemented. This technique effectively reaches consensus through collaboration and prioritizes information discussion.[14] The NGT process generally involves five steps: (1) introduction, (2) silent generation of ideas, (3) sharing of ideas, (4) group discussion and (5) voting. The modified NGT process was modeled after the peer coaching NGT study by Bell et al. and the military refractive surgery curriculum NGT study by Evangelista et al.[15,16] The NGT was selected to answer the research question because it enables equal representation of expert voices and has been successfully utilized for curriculum development.[16-19]

Kern's Six-Step Approach to Curriculum Development for Medical Education provided the conceptual framework for this study.[20] The six steps are: (1) problem identification and general needs assessment, (2) targeted needs assessment, (3) goals and objectives, (4) educational strategies, (5) implementation and (6) evaluation and feedback. Because this study was primarily a needs assessment, steps 1-3 were the focus of this study. Step 1 involves problem identification, where a healthcare need or problem is identified, and general needs assessment, which is an evaluation of the ideal approach vs. the current approach of the curriculum. Step 2 assesses the needs of the curriculum's targeted learners and their

learning environment. Step 3 defines the curriculum's broader goals and the specific objectives that would achieve the goals.

This study was submitted to the institutional Human Research Protections Office, which determined that Institutional Review Board review was not required.

Study sample

To determine the elements of the optometry residency MUC, an expert panel was identified. The panel consisted of four military optometry residency program directors and the three optometry service branch leaders (the Army Optometry Consultant, the Air Force Optometry Consultant and the Navy Optometry Specialty Leader) for a total of seven panelists. These panelists were selected based on their extensive teaching and/or military optometric expertise. The majority of the panelists had military operational or deployment experience. Furthermore, the service branch leaders were included due to their seniority and broad, strategic overview of military optometry in their respective branches. Panelists consented to participate in the NGT through email response, but they could also opt out of the study at any time before or during the session. All seven invited panelists agreed to and participated in the NGT. **Table 1** provides a summary of the panelist demographics.

Data collection and analysis



Figure 1. Click to enlarge

Data collection involved three phases **(Figure 1 and Appendix A)**. The first phase was a six-question questionnaire emailed to the panelists. This questionnaire was guided by Kern's Six-Step Approach to Curriculum Development for Medical Education.[20] A list of 18 military optometry-related topics was derived from the USUHS Ocular Trauma Skills Laboratory (Jackson KM. Uniformed Services University of the Health Sciences Ocular Trauma Skills Laboratory, Military Optometry Education Assessment Presentation. May 2021) and panelists were invited to suggest additional topics **(Table 2)**. The questionnaire sent to the panelists is included in Appendix A.

The second phase was the synchronous live NGT session conducted via online video conferencing and recorded for data analysis. The session consisted of five steps (Figure 1, Phase II). Panelists were provided an outline of the session and then given the de-identified panelist responses from the questionnaire in Phase I. Afterwards, the panelists silently generated ideas after reviewing the results. Next, the panelists individually held the floor and shared their ideas on the responses in a round-robin format. Responses were then discussed among the panelists. Lastly, the panelists anonymously voted on a consensus response for each question. Consensus was defined as the result with the most votes. This process was repeated for each of the six questions from the questionnaire.

TABLE 1
Panelist Demographics

Military Status/ Branch	Current Position	Years of Optometric Practice in a Military Setting	Total Years of Optometric Practice	Years of Resident Teaching Experience
Air Force	Air Force Optometry Consultant	24	24	0
Army	Army Optometry Consultant	20	25	0
Army	Army Optometry Residency Program Director	11.5	11.5	4.5
Army	Army Optometry Residency Program Director	4.5	4.5	1.5
Civilian	Navy Optometry Residency Program Director	10	40	25
Civilian	Tri-Service Optometry Residency Program Director	12	15	3.5
Navy	Navy Optometry Specialty Leader	24	24	0

Table 1. Click to enlarge

TABLE 2
Military Unique Curriculum Topics Voting Result

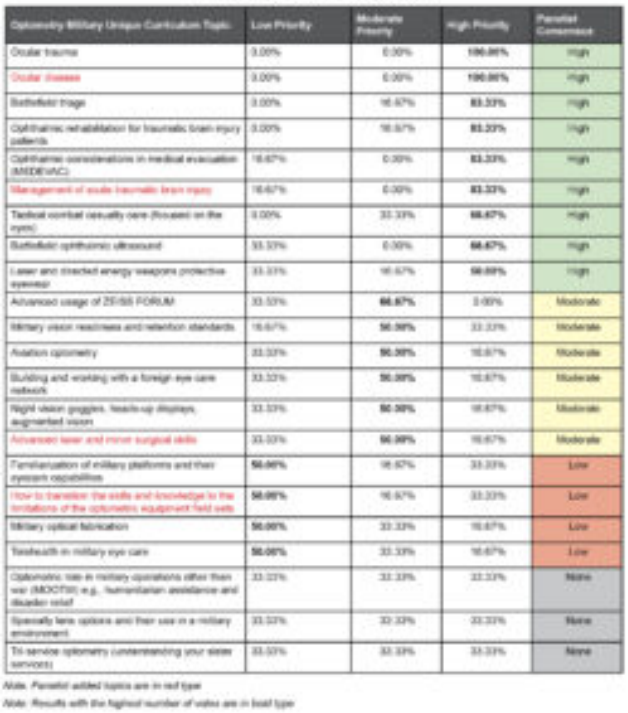


Table 2. Click to enlarge

The third phase involved member checking the voting results, which enabled the panelists to validate the votes and ensure the responses resonated with them (Figure 1, Phase III). After member checking, the NGT was determined to be complete and ready for data analysis. Data analysis involved both qualitative and quantitative methods. The votes were quantified to identify consensus responses. CA, HM and AS conducted a thematic analysis of the transcribed recording. They independently coded the data and met to discuss their findings. Through an iterative process of qualitative coding, themes and subthemes were identified, which allowed further contextual insight.[20]

Results

The synchronous live NGT session results are organized below by themes: MUC goal, MUC topics, learning environment and capacity.

Goal of an optometry residency Military Unique Curriculum

The group discussion on the goal of an optometry residency MUC raised three themes: visual rehabilitation, ocular disease and the need to be prepared for operational environments (i.e., combat deployment). The panelists agreed that visual rehabilitation should be integrated into residency training because TBI is a frequent warfighter injury. Ocular disease was directly related to operational environments because optometrists need the knowledge to independently manage ocular diseases in remote and under-resourced locations typical of wartime deployments. After the discussion, the following consensus MUC goal was identified: The goal of an optometry residency MUC should be to train military optometrists in advanced practice and procedures related to TBI/vision rehabilitation, ocular disease, as well as military-centric issues to increase KSAs (knowledge, skills and abilities) for wartime deployments. Note that for the purposes of this study, the term “military-centric” is synonymous with “military-specific.”

Military Unique Curriculum topics

In addition to the 18 MUC topics provided in the questionnaire, the panelists identified four topics: ocular disease, management of acute TBI, advanced laser and minor surgical skills, and how to transition the

skills and knowledge to the limitations of the optometric equipment field sets. During the synchronous NGT, these four options were added to the original list of topics; thus, the panelists voted on 22 topics (Table 2). Panelist consensus was based on the result with the highest number of votes (Table 2).

Nine topics were identified as high-priority. During the discussion, one of the panelists asserted that the Ocular Trauma Skills Laboratory at USUHS should be mandatory for residents. This comment was consistent with the panel's unanimous vote of ocular trauma and ocular disease as high-priority topics. Other high-priority topics included battlefield triage and ophthalmic rehabilitation for TBI patients. Six topics, including military vision readiness and retention standards and aviation optometry, were considered moderately important. The importance of understanding aviation optometry's dynamics, perceptions and misperceptions was mentioned during the discussion, but overall it was seen as a topic of moderate priority. Four topics were considered low priority, and three did not achieve consensus in the voting.

Learning environment

Panelists agreed that an optimal learning environment would provide opportunities for hands-on training with high volume and/or high complexity of patients. The panelists also emphasized the importance of exposure to austere or under-resourced environments to help prepare residents for deployment. Consequently, the panelists reached a consensus that an optometry residency MUC should "provide access to both field training and advanced clinical care for TBI (i.e., Centers of Excellence) and have high volume and/or high complexity of patients along with access to subspecialists."

Capacity

Residency programs have a finite time to accomplish their goals. Recognizing this constraint, participants were asked how many military-specific topics should be implemented in a MUC. The panelists selected three ranges to vote on: 1-3, 4-6 and 8-10. Considering only military context-specific topics, the consensus was that 4-6 topics (50%, n=3) would be optimal **(Table 3)**.

TABLE 3
Military Unique Curriculum Capacity

Number of MUC Topics*		Hours per Month Devoted to the MUC	
Number of Topics	Votes Received	Hours per Month	Votes Received
1-3	17%; n=1	3-4 hours per month	43%; n=3
4-6	50%; n=3	16 hours per month	57%; n=4
8-10	33%; n=2	80 hours per month	0%; n=0

**One panelist had to step away unexpectedly; therefore, only six of the seven panelists voted for this question*

MUC = Military Unique Curriculum

Table 3. Click to enlarge

The panelists also voted on the number of hours per month devoted to the MUC within an optometry military residency program. The panelists selected three voting choices for the number of hours per month: 3-4, 16 and 80. The panelists discussed that 16 hours is based on one-half day per week, and one of the panelists suggested 80 hours, arguing that half of the residents' total of 160 working hours per month should be dedicated towards MUC topics. The consensus was that 16 hours a month (57%; n=4) should be devoted to the MUC (Table 3).

Discussion

Military healthcare providers are in a unique position relative to their civilian counterparts because they must be both proficient in their medical specialty and knowledgeable in military-specific issues. Currently, military optometry residencies do not sufficiently address military-specific issues within their curricula.

Implementation of a MUC could serve as a means to address this gap. In this study, we utilized Kern's Six-Step Approach to Curriculum Development for Medical Education to help identify elements of the MUC.[20] The NGT was employed to address Kern's steps 1-3: (1) problem identification and general needs assessment, (2) targeted needs assessment and (3) goals and objectives.

The panelists in this study agreed that the MUC goal should be to "train military optometrists in advanced practice and procedures related to TBI/vision rehabilitation, ocular disease, as well as military-centric issues to increase KSAs (knowledge, skills and abilities) for wartime deployments." As with other MUCs, the panelists in this study focused on commonly encountered military-specific issues to maximize the effectiveness of the MUC. Nine topics were voted as high-priority, two of which were topics added by the panelists (ocular disease and management of acute TBI). The curricular limitations and time constraints of residency training as outlined by the ACOE residency standards were acknowledged in the suggestion for 4-6 military-specific topics covered over 16 hours.[13] The panelists also reinforced the need within residency programs for contextual training and advanced competency, also emphasized by the ACOE.[13]

This study focused on the creation of a curriculum designed for military optometry residency programs. However, the framework and findings have implications for civilian optometric educators as well. Methodologically, this study further supported utilizing the NGT as an effective strategy for consensus decisions. Also, the NGT can be conducted fully online, enabling access to geographically dispersed subject experts. Delphi studies and expert interviews have been used to formulate curricula.[22-25] However, these are resource intensive in time and money.[26-27] Optometric educators therefore may find value in utilizing the NGT when designing or revising curricula.

This study also highlighted the effectiveness of using a curriculum development framework such as Kern's six-step model. The model provides a structured approach to designing curricula and ensures that all elements of curriculum design are considered. The Kern model has been used extensively in medical education. This study demonstrated that Kern's evidence-based curriculum development model can also be used in optometric education.

The limitations of this study included addressing only Kern's steps 1-3, leaving Kern's steps 4-6 (educational strategies, implementation, and evaluation and feedback) for future research. The notable time and resource commitments of Kern's curriculum development model precluded inclusion of all steps. Future studies to develop this optometry residency MUC could consider including the other elements of Kern's Six-Step Approach that were not included in this study, especially educational strategies and implementation. In addition to the consensus data from the NGT, epidemiological data from prior wars and conflicts would further augment the curriculum material. Lastly, the service branch leaders did not have resident teaching experience; however, their feedback was valuable, given their broader knowledge of military optometry at the strategic level.

Conclusion

Through the consensus of a military optometry expert panel, we developed a framework for a formalized Tri-Service optometry residency MUC. With this consensus curriculum, military optometry residency programs can prepare residents to become a *ready medical force*, from fixed-facility locations stateside to deployed locations worldwide. Consequently, the curriculum can promote a *medically ready force* by enhancing vision-saving eye care on the battlefield, improving visual rehabilitation of injured service members returning from combat, and ensuring vision readiness for deployable forces, fully leveraging the unique role of the military optometrist.

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APPENDIX A
Data Collection Phases

Phase I: Introduction to the study and questionnaire were sent via email to the panelists before the live nominal group technique session. Questions were as follows:

1. What should be the goal of the optometry residency Military Unique Curriculum? [Entered as free-text.]
2. Please rate the following Military Unique Curriculum topics [Table 2] as follows: high importance, moderate importance, low importance. [See topics in Table 2. Added topics generated from question 3 are labeled as noted.]
3. Are there additional Military Unique Curriculum topics you would like to suggest? [Entered as free-text.]
4. What is the ideal learning environment required for an optometry residency Military Unique Curriculum? [Entered as free-text.]
5. With the limits of curriculum time in mind, how many of these topics above should be implemented in the optometry residency Military Unique Curriculum? [Dropdown selection: 1-3 topics, 4-6 topics, 7-9 topics, 10-12 topics, 13+ topics]
6. How many hours per month should be devoted to the Military Unique Curriculum during the residency? [Entered as free-text.]

Phase II: Live nominal group technique session (2.5 hours); each step was utilized to answer the six questions from the pre-session questionnaire.

1. Introduction and response review: presented responses were not tied to the individual panelists.
2. Silent generation of ideas: Panelists were encouraged to silently reflect on the responses and think about what additional thoughts they would like to share that were not already generated from the questionnaire.
3. Sharing of ideas: Panelists were individually given the floor in a specific sequence to share their thoughts including which responses resonated with them. The sequence order was determined via a random sequence generator.
4. Group discussion: Allowed for open dialogue between panelists. The aim was to have at least 1-2 viable responses to vote on.
5. Voting: Consensus was the response with the greatest percentage of votes.

Phase III: Member checking

1. Results were sent to the panelists via email.
2. Panelists were requested to verify that the votes were consistent with the results of the nominal group technique and if the responses resonated with each of them.

Appendix A. Click to enlarge

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