

Implementing a Military-Specific Hematology/Oncology Curriculum: A Multi-Institutional Assessment of Fellow-Reported Preparedness

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ABSTRACT

Background: More than 800 active-duty service members (ADSMs) are diagnosed with cancer annually, making cancer a major cause of morbidity and mortality in the force. Military Hematology/Oncology (Heme/Onc) physicians must therefore integrate subspecialty training with military-specific responsibilities that affect patient care, including duty limitations, retention standards, and operational readiness. These competencies are not captured within standard Heme/Onc fellowship training, creating a quality-relevant training gap.

Methods: Two Defense Health Agency fellowship programs implemented a joint virtual military-unique curriculum delivered quarterly from July 2023 to December 2025. Fellows completed a 13-item pragmatic survey prior to each session assessing preparedness across leadership, operational readiness, and military-specific clinical domains. Preparedness scores were compared between early-year (PGY-4-5) and final-year (PGY-6) fellows using nonparametric tests.

Results: Twenty-four fellows contributed 92 survey responses, and the survey completion rate was estimated at 48%. Final-year fellows

reported unadjusted significantly higher preparedness in three domains: operational readiness for conflict ($p=0.0326$), indications for whole blood versus component therapy ($p=0.0290$), and adolescent and young adult survivorship ($p=0.0010$). No significant differences were observed in the remaining ten domains.

Conclusions: A joint virtual curriculum is feasible and addresses a critical training gap in preparing Heme/Onc physicians to care for ADSMs. Final-year fellows reported higher preparedness in adolescent and young adult oncology, consistent with expected progression through fellowship training. Leadership and administrative competencies showed limited progression, suggesting the need for simulation, mentorship, and scenario-based training. Incorporating graduate feedback and mixed-methods evaluation may strengthen future iterations of our joint military unique curriculum.

INTRODUCTION

More than 800 active-duty service members (ADSMs) are diagnosed with cancer each year[1], and cancer remains the leading cause of natural deaths among ADSMs and Veterans[2,3]. This burden requires Hematology/Oncology

(Heme/Onc) physicians who can deliver high-quality cancer care while navigating military-specific responsibilities that influence treatment decisions, survivorship, and return-to-duty outcomes.

Military Heme/Onc practice includes competencies not routinely addressed in civilian training, such as applying duty limitations, interpreting retention standards, preparing patients for deployment or medical separation, and managing operational exposures[4-6]. Military oncologists also contribute expertise in transfusion medicine and hematologic support after radiation injury, skills essential in deployed and contingency environments. Despite their relevance to force readiness, these competencies are not standardized across training programs.

The U.S. military operates two Hematology/Oncology fellowship programs at major military medical centers, yet no standardized military-specific curriculum has previously been implemented or evaluated. To address this gap, we developed a joint virtual curriculum focused on leadership, operational readiness, and military-relevant clinical responsibilities. The objective of this study was to evaluate whether fellow-reported preparedness in these military-specific competencies differed between early-year and final-year trainees during the initial implementation of the curriculum, and to identify domains requiring further refinement.

METHODS

This repeated cross-sectional descriptive study used quarterly surveys of fellows participating in a joint virtual military-specific Heme/Onc curriculum delivered at two military training sites from July 2023 to December 2025. All fellows during the study period were eligible and were invited to complete an anonymous, voluntary survey prior to each quarterly session.

The curriculum included didactic sessions on leadership, conflict management, operational medicine, massive transfusion protocols, radiation injury, and military retention standards (Table 1). Sessions were delivered virtually, were one hour in duration, and were mandatory at both fellowship programs. Content was developed through faculty consensus and review of operational requirements. Operational requirements refer to military directives and clinical responsibilities that influence patient readiness, including duty-limiting profiles, retention standards, deployment preparation, and transfusion support in contingency environments. Training year was used as an indirect proxy for curriculum exposure because individual attendance could not be tracked.

The study objective was to compare fellow-reported preparedness in military-specific Heme/Onc competencies between early-year (PGY4–5) and final-year (PGY6) trainees. Preparedness across 13 domains was measured using a standardized survey instrument (Table 2), which remained unchanged throughout the study. These 13 domains were selected to reflect competencies relevant to military Heme/Onc practice in both routine outpatient care at military treatment facilities and in deployment or contingency environments. The instrument was designed to measure fellow-reported preparedness across military-specific competencies. The survey was developed de novo by the program directors and associate program directors at both fellowship programs. Items were generated through faculty consensus to reflect core military-specific competencies identified during curriculum planning, and content experts in military medical operations, transfusion medicine, and graduate medical education reviewed the items for relevance and clarity. Two response scales were used to align with the underlying constructs: a 0–5 unipolar scale for knowledge-based and role-readiness

items, and a -2 to +2 bipolar scale for leadership preparedness items. The instrument did not undergo formal pilot testing, cognitive interviewing, or psychometric validation. Survey responses were automatically tagged by training level. PGY4 and PGY5 fellows were combined a priori due to similar clinical exposure. The survey was administered by the chief fellows using a QR code and web link distributed before scheduled curriculum sessions.

Preparedness scores were treated as ordinal variables. Responses were summarized using medians and interquartile ranges (IQR), and differences between early-year and final-year fellows were assessed for each question using Wilcoxon tests. Missing data were handled by analyzing all available responses. A two-sided $p < 0.05$ was considered statistically significant. Given the descriptive nature of this study, formal nonparametric effect size calculations were not performed. To mitigate the risk of a type 1 error, a False Discovery Rate (FDR) adjustment was implemented. Analyses were performed using SAS version 9.4. This project was reviewed by the institution's Human Research Protection Program Office and determined to constitute program evaluation under 32 CFR 219.102; therefore, IRB review was not required.

RESULTS

At each quarterly administration, approximately 24 fellows (12 from each site) were eligible to complete the survey. After applying a 20 percent attrition adjustment for clinical duties, leave, and outside rotations, an estimated 19 fellows were available per administration, yielding 192 possible survey opportunities. A total of 92 surveys were completed, corresponding to a 48 percent participation rate. One training site contributed more responses ($n=56$, 61%) than the other training site ($n=36$, 39%). Respondents included 61 early-year and 31 final-year fellows.

No surveys were excluded. Because the survey was anonymous and individual attendance was not tracked, exact item-level denominators could not be calculated. All available responses were analyzed for each question.

Preparedness scores reflected the distribution of responses across the 13 survey items. Items assessing understanding of leadership styles (median 4, IQR 3-4) and unique aspects of practicing within the Military Health System (median 4, IQR 3-5) showed the highest mean values within their respective 0–5 scale items. Among the two bipolar preparedness items, implementing change while in a leadership position demonstrated the lowest mean value within that scale (median 1, IQR 0-1).

Final year fellows reported significantly higher preparedness in three questions: operational readiness for conflict (median 3, IQR 2-4 vs. median 3, IQR 3-4, $p=0.0326$, FDR-adjusted $p=0.1523$), indications for whole blood versus component therapy (median 3, IQR 2-4 vs. median 4, IQR 3-4, $p=0.0290$, FDR-adjusted $p=0.1523$), and adolescent and young adult survivorship (median 3, IQR 2-3 vs. median 4, IQR 3-4, $p=0.0010$, FDR-adjusted $p=0.0135$). After FDR adjustment, only adolescent and young adult survivorship remained statistically significant. No significant differences were observed in the remaining ten questions.

DISCUSSION

Military Heme/Onc practice requires competencies not routinely addressed in civilian fellowship training, and this study demonstrates that a joint curriculum can begin to fill that gap across two military training sites. In keeping with the study objectives, fellows reported higher preparedness in several domains relevant to military practice, and the curriculum was feasible to deliver in a virtual, joint format. Questions

showing the greatest differences between early-year and final-year fellows were those commonly reinforced through clinical encounters. Higher self-reported preparedness among senior fellows in adolescent and young adult oncology likely reflects cumulative clinical exposure rather than curriculum-specific effects. Because the study compared fellows at different training levels rather than measuring individual change over time, observed differences should be interpreted as associations with fellowship progression rather than effects attributable to the curriculum.

Leadership-related competencies showed limited progression. Lecture-based approaches alone may not provide the depth needed to build confidence in conflict resolution, implementing change, or assuming administrative roles[7-9]. Evidence from graduate medical education suggests that mentorship, coached practice, and scenario-based learning may better support leadership skills[10,11]. Additional topics such as massive transfusion protocols, retention standards, duty limiting profiles, and radiation injury may also benefit from simulation or small group exercises.

This study has strengths, including the first implementation of a joint curriculum across two military training facilities and the use of a consistent survey instrument over 2.5 years. Limitations include the small sample size for final-year responses and the voluntary nature of survey participation, which may introduce both response bias and non-response bias. Differential response rates across training sites introduce non-response bias, and because respondents may differ systematically from non-respondents, the missing-data mechanism is likely Missing Not At Random (MNAR). Additionally, the cross-sectional design cannot separate curriculum effects from natural progression through fellowship. Because the survey was

anonymous, individual responses could not be linked across administrations, and therefore we could not use repeated-measures methods (e.g., mixed-effects models) to account for within-subject correlation. This may underestimate variance and may inflate statistical significance. Because the survey used both unipolar and bipolar scales, comparisons across items are not appropriate, and the findings should be interpreted within each question rather than across domains. Further, the survey instrument was developed de novo and lacks formal validity and reliability testing, as no validated instruments exist for assessing military-unique Heme/Onc competencies. Preparedness was assessed through self-reported measures, which may not reflect objective competence. Additionally, curriculum attendance and exposure could not be tracked because surveys were anonymous, and training year served only as an indirect proxy for exposure.

CONCLUSION

This early evaluation demonstrates that a joint curriculum is feasible to deliver and that fellows reported differing levels of preparedness across military-specific domains. These findings reflect associations with training level rather than curriculum-specific effects. Future longitudinal work incorporating direct measures of curriculum exposure is needed to determine educational impact. In particular, targeted development and evaluation of structured leadership training represents an important next step for strengthening military Heme/Onc preparedness.

ARTICLE INFORMATION

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REFERENCES

1. Lovejoy, L.A.; Shriver, C.D.; Ellsworth, R.E. Cancer Incidence and Etiology in the Active Duty Population of U.S. Military. *Mil Med* 2024, 189, e58–e65. 10.1093/milmed/usac297
2. Stahlman, S.L.; Rupp, B.L.; Nieh, C.; Walsh, J.C.; Balcena, P.P.; Wells, N.Y. Mortality rates among U.S. service members, 2010–2020. *MSMR* 2026, 33, 3–9.
3. Zhu, Y.; Hall, C.; Sharifian, N.; Boparai, S.; Carey, F.R.; Boyko, E.J.; Dursa, E.K.; Rull, R.P. Cause-specific mortality among U.S. service members and veterans (2001–2018): comparison to the U.S. general population. *BMC Public Health* 2025, 26, 385. 10.1186/s12889-025-25507-w
4. Morris, M.J.; Walter, R.J.; McCann, E.T.; Sherner, J.H.; Murillo, C.G.; Barber, B.S.; Hunninghake, J.C.; Holley, A.B. Clinical Evaluation of Deployed Military Personnel With Chronic Respiratory Symptoms: Study of Active Duty Military for Pulmonary Disease Related to Environmental Deployment Exposures (STAMPEDE) III. *Chest* 2020, 157, 1559–1567. 10.1016/j.chest.2020.01.024
5. Webber, B.J.; Tacke, C.D.; Wolff, G.G.; Rutherford, A.E.; Erwin, W.J.; Escobar, J.D.; Simon, A.A.; Reed, B.H.; Whitaker, J.G.; Gambino-Shirley, K.J.; et al. Cancer Incidence and Mortality Among Fighter Aviators in the United States Air Force. *J Occup Environ Med* 2022, 64, 71–78. 10.1097/JOM.0000000000002353
6. Mullany LC, Emmert AD, Ramirez SH, Babin SM,

- Burkom HS, Aithinne QA, Chee BW, Patterson S, Wojcik RA, Feighner B, Obenauer-Motley J, Sorkin JD, Beamer BA, Lal BK, Schwartz BS, Carruth LM. Deployment to Karshi-Khanabad Air Base, Uzbekistan between 2001 and 2005 and subsequent risk of specific cancers among US service members. *J Natl Cancer Inst.* 2026 Jul 1;118(7):1238-1247. 10.1093/jnci/djag050
7. Hartzell, J.D.; Yu, C.E.; Cohee, B.M.; Nelson, M.R.; Wilson, R.L. Moving Beyond Accidental Leadership: A Graduate Medical Education Leadership Curriculum Needs Assessment. *Mil Med* 2017, 182, e1815–e1822. 10.7205/MILMED-D-16-00365
 8. Sadowski, B.; Cantrell, S.; Barelski, A.; O'Malley, P.G.; Hartzell, J.D. Leadership Training in Graduate Medical Education: A Systematic Review. *J Grad Med Educ* 2018, 10, 134–148. 10.4300/JGME-D-17-00194.1
 9. Sultan, N.; Torti, J.; Haddara, W.; Inayat, A.; Inayat, H.; Lingard, L. Leadership Development in Postgraduate Medical Education: A Systematic Review of the Literature. *Acad Med* 2019, 94, 440–449. 10.1097/ACM.0000000000002503
 10. Geerts, J.M.; Goodall, A.H.; Agius, S. Evidence-based leadership development for physicians: A systematic literature review. *Soc Sci Med* 2020, 246, 112709. 10.1016/j.socscimed.2019.112709
 11. Neuman, T.J.; Johnson, W.R.; Maciuba, J.M.; Andrews, M.; O'Malley, P.G.; Wilson, R.L.; Hartzell, J.D. Updating the Military Unique Curriculum for a Ready Medical Force. *Mil Med* 2024, 189, 1181–1189. 10.1093/milmed/usad099
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Figure 1. Survey response scores by training year

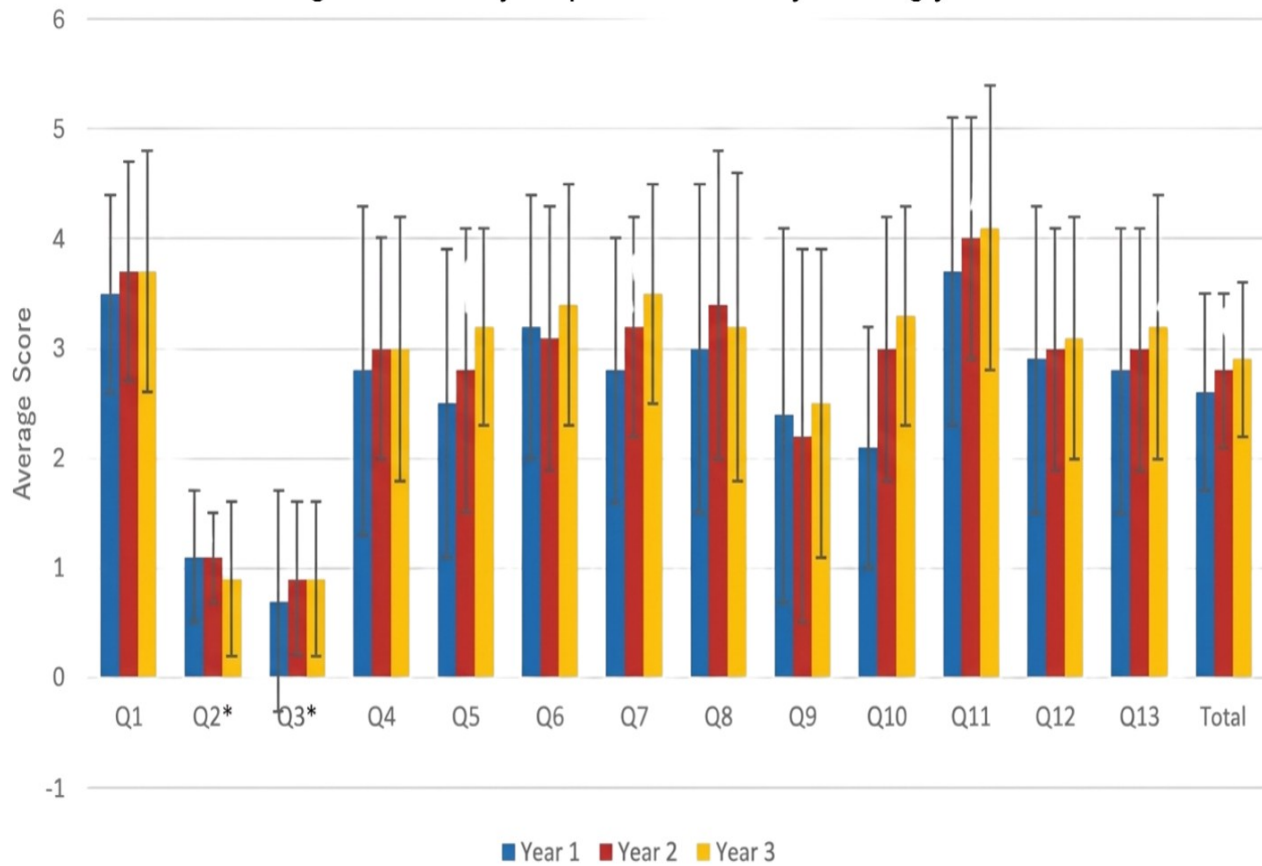


Figure 1. Survey response scores by training year. *Q2 and Q3 utilized bipolar scores, whereas Q1 & Q4-Q13 utilized unipolar score.

Table 1. Summary of curriculum lectures

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Lecture Topic	Objective(s)
Cancer in service members (2-part lecture)	To understand unique characteristics of active-duty service members, including cancer-related risk and protective factors, principles of cancer care in this population, criteria for worldwide deployability and retention, the disability evaluation system
Military retention standards	To understand which hematologic/oncologic conditions meet, and do not meet, the standards for continued military service
Leadership styles	Discuss leadership styles, and which styles to apply to various leadership scenarios
Conflict Management	Define conflict and types of conflict; discuss conflict management styles; take and review conflict management styles quiz
Transfusion Medicine	To discuss indications for a massive transfusion protocol, short- and long-term risks associated with massive transfusion, and understand the difference between whole blood and component products in a deployed setting
Radiation Injury	To understand pathophysiology and management of hematologic consequences of acute radiation syndrome and long-term cancer risk among survivors
Deployment preparation	Discuss personal deployment experience, emphasizing difficulties of providing isolated care; evaluation of mental health support resources in a deployed setting; discuss ways to affect culture change, discuss emotional intelligence and resilience
Operational Medicine	To review tenets of operational medicine in a deployed combat zone

Table 2. Joint Heme/Onc military unique curriculum survey.

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Number	Question	Scale
1	I understand different leadership styles	0=not at all, 5=complete understanding
2	How well-prepared do I feel to manage conflict resolution?	-2=very unprepared, -1=slightly unprepared, 0=neutral, +1=slightly prepared, +2= very prepared
3	In a leadership position, how well-prepared am I to implement change when necessary?	-2=very unprepared, -1=slightly unprepared, 0=neutral, +1=slightly prepared, +2= very prepared
4	I feel prepared to step into the role of an administrative leadership position	0=not at all, 5=complete understanding
5	As a hematologist/oncologist, I understand what it means to be operationally ready for a conflict	0=not at all, 5=complete understanding
6	I understand when to implement a massive transfusion protocol	0=not at all, 5=complete understanding
7	I understand the different indications for whole blood transfusion compared to component blood product replacement	0=not at all, 5=complete understanding
8	I know how to look up retention standards for service members with hematologic/oncologic conditions for each branch of service	0=not at all, 5=complete understanding
9	I understand when and how to create a profile/LIMDU for service members with certain hematologic/oncologic conditions	0=not at all, 5=complete understanding
10	I understand survivorship issues pertaining to adolescents and young adults with cancer	0=not at all, 5=complete understanding
11	I understand that cancer care received within the Military Health System is associated with a lower risk of race, gender, and socioeconomic healthcare disparities	0=not at all, 5=complete understanding
12	I understand short-term hematologic/oncologic consequences of high dose ionizing radiation exposure	0=not at all, 5=complete understanding
13	I understand long-term hematologic/oncologic consequences of high dose ionizing radiation exposure	0=not at all, 5=complete understanding