06 March 2024

MEMORANDUM FOR AFGSC/SG

FROM: USAFSAM/PHR

SUBJECT: Missile Community Cancer Study (MCCS) Epidemiology Study Brief Report (Phase 1A)

1. **SUMMARY:** At the request of Air Force Global Strike Command (AFGSC), the United States Air Force School of Aerospace Medicine (USAFSAM)/Defense Centers for Public Health-Dayton (DCPH-D) Epidemiology Consult Service (PHR) is evaluating the incidence of cancer among Department of the Air Force (DAF) service members in the missile community. Members of the missile community expressed concerns about elevated cancer rates, specifically Non-Hodgkin Lymphoma (NHL). After analyzing cancer cases in the missile community from the first dataset (the Military Medical Records), we recognize the anticipated gaps in this single dataset that prevent us from drawing any concrete conclusions. After the analysis of this single dataset, Phase 1A did not demonstrate an elevated rate of NHL in the missile community, however, in accordance with our study plan, we are moving on to the next phase of analysis (Phase 1B) incorporating three additional datasets.

2. **LIMITATIONS OF PHASE 1A DATASET:** There is no single source of data that contains all cases of cancer in all populations from all times. Each dataset starts at a certain time and is limited to a specific population.

   a. The Military Medical Record (electronic medical record) dataset spans from 2001-2021 for persons treated within the military healthcare system (MHS), including TRICARE purchased care. Thus, for Phase 1A, we were unable to determine cancer cases diagnosed prior to 2001 or outside of the MHS/TRICARE. **Attachment 1** shows the dates included in each dataset.

   b. In addition, we estimate that the Military Medical Record dataset by itself likely captures fewer than 25% of total cancer cases that may be identified once all data sources from Phase 1A, Phase 1B, and Phase 2 are combined. **Attachment 2** shows the overlapping nature of the data sets and highlights the limited capture of cases using only the Phase 1A dataset.

   c. We also anticipate that a large percentage (up to 40% or more) of cancer cases that we will ultimately find, may not be captured until Phase 2 of our study is completed, utilizing data from the Virtual Pooled Registry (VPR). The VPR has cancer data from 45 participating state and territory registries. This will augment the capture of cancer cases diagnosed outside of the Department of Defense (DoD) and Veterans Affairs (VA) systems. We have requested the VPR data but have not yet received it.

3. **RESULTS:** Phase 1A data found a total of 5,063 cases of cancer in the entire DAF cohort of 2+ million individuals. One-hundred and ninety-eight (198) cases were in the missile community and 4,865 were in the non-missile community. This is lower than what we would expect to find in a population this size based on national cancer rates. These lower than expected counts are most likely due to the incomplete capture of cancer cases using only DoD electronic military medical data.

Breast and prostate cancer are two of the most frequently diagnosed cancers in the United States. Phase 1A found 13 cases of female breast cancer in the missile community and 570 cases of female breast cancer in the non-missile community. There were 24 cases of prostate cancer in the missile community and 405 cases of prostate cancer in the non-missile community. The observed breast cancer cases in the missile community are about as many breast cancer cases as would be expected in a population of this size based on national cancer rates. The number of prostate cancers in the missile community is greater than we would expect to find in a population of this size based on national cancer rates. The relatively small numbers overall and incomplete case capture with the initial dataset makes it difficult to draw any definitive conclusions at this time. Additional analysis of further datasets will continue.

NHL remains an important focus of concern for this study. We found 23 cases of NHL in the missile community and 526 cases of NHL in the non-missile community for a total of 549 cases of NHL in the entire cohort of over 2 million. These counts, again, are lower than what we would expect to find in a population this size, but we are continuing to look at more data.
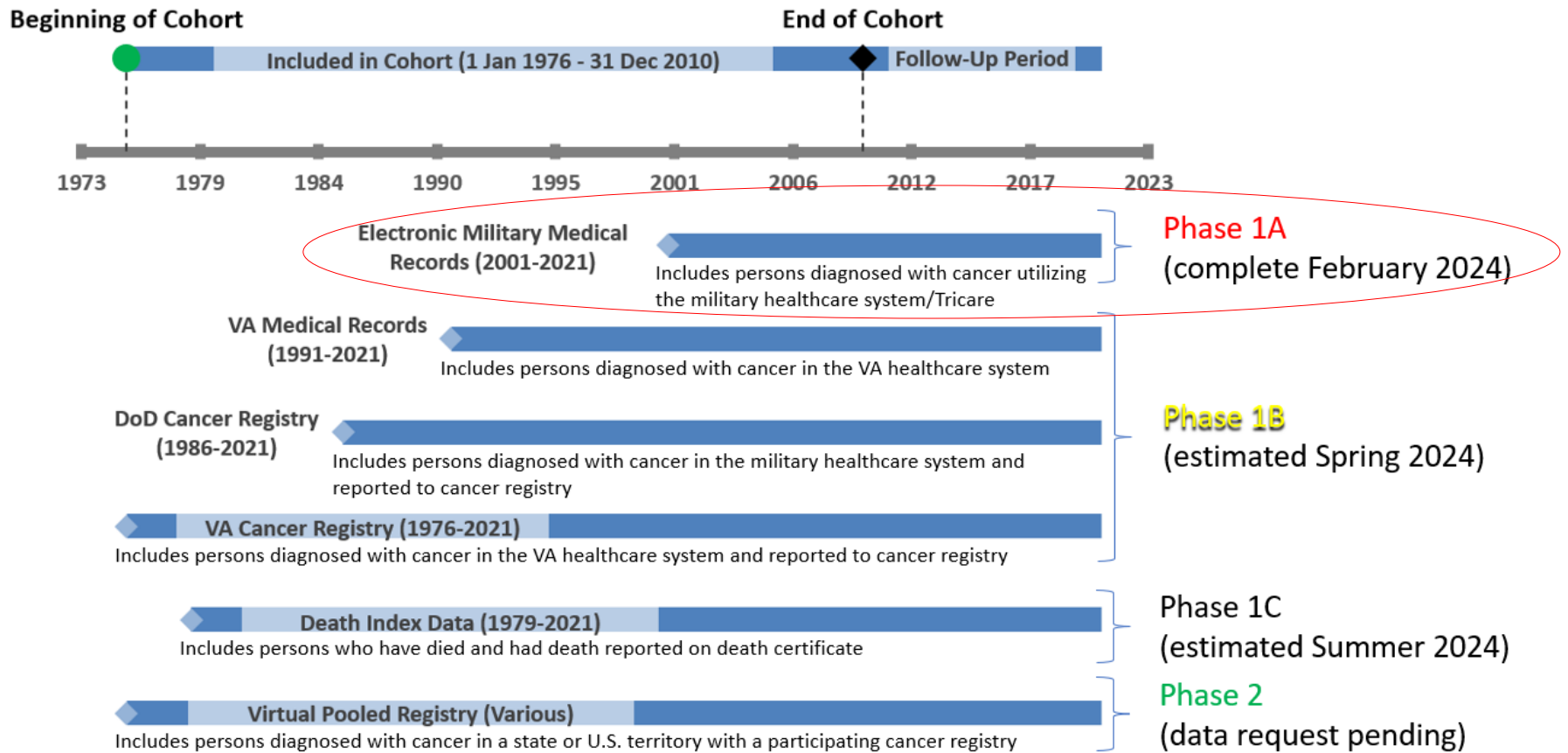
4. **NEXT STEPS:** The next phases of the epidemiologic portion of the MCCS are in progress. During Phase 1B, data from VA Medical Records, the DoD Cancer Registry (Oncolog), and the VA Cancer Registry will be included. Phase 1B is projected to conclude by the end of Spring 2024 at which time we will analyze this more robust dataset, capturing more complete data over the entire study timeframe and population.

TORY W. WOODARD
Colonel, USAF, MC, CFS
Commander, USAF School of Aerospace Medicine
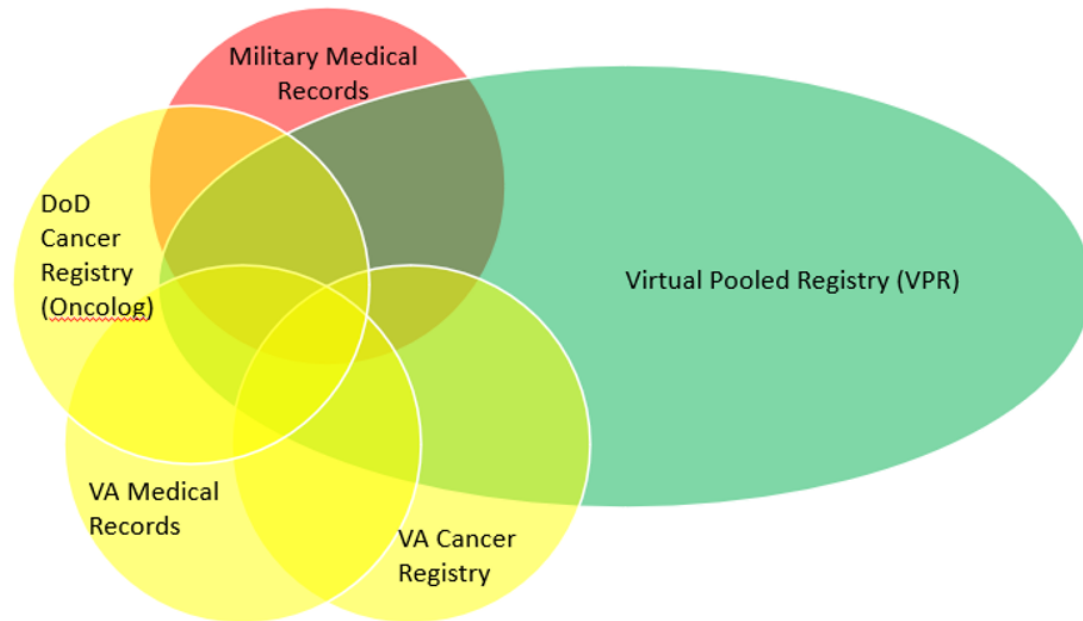Director, Defense Centers for Public Health-Dayton

3 Attachments
1. Attachment 1: Missile Community Cancer Study Data Sources Timeline
2. Attachment 2: Missile Community Cancer Study Data Sources Venn Diagram
3. Attachment 3: Phase 1A Cancer Counts for Selected Cancers

Attachment 1: MCCS Data Sources Timeline

Attachment 2: MCCS Data Sources Venn Diagram* (approximation only, the size of each circle and areas of overlap will only be known after Phase 2 is complete)

Missile Community Cancer Study Phases

Phase 1A - Military Medical Record

Phase 1B - DoD Cancer Registry
- VA Medical Records
- VA Cancer Registry

Phase 2 - Virtual Pooled Registry
(state cancer registries)

NOTE: Cancer counts in the missile community and in the non-missile community and anticipated to increase as we progress Phase 1A → Phase 1B → Phase 2

Diagram labels: Military Medical Records; DoD Cancer Registry (Oncolog); VA Medical Records; VA Cancer Registry; Virtual Pooled Registry (VPR)

*Does not show Phase 1C. Phase 1C will bring in mortality data. This will be used to calculate mortality rates (death rates) in the missile community but will not add additional cancer cases for calculating cancer incidence.

Attachment 3: Phase 1A Cancer Counts

	Expected Total in Missile Community	Observed Total in Missile Community	Observed Total in Non Missile Community	Total Observed Cases Found in Phase 1A (Observed Totals in Missile Community + Non Missile Community)
Phase 1A All Cancers	800	198	4865	5063
Phase 1A NHL	81	23	526	549
Phase 1A Breast	13	13	570	583
Phase 1A Prostate	19	24	405	429
Phase 1A Colon/Rectum	71	18	320	338
Phase 1A Hodgkin Lymphoma	81	16	291	307
Phase 1A Kidney/Renal Pelvis	40	7	165	172
Phase 1A Leukemia	57	9	229	238
Phase 1A Lung/Bronchus	26	3	102	105
Phase 1A Melanoma	109	27	687	714
Phase 1A Ovarian	3	3	63	66
Phase 1A Pancreatic	9	3	54	57
Phase 1A Testicular	194	27	689	716
Phase 1A Thyroid	79	23	678	701
Phase 1A Urinary/Bladder	18	2	86	88

Expected counts over the study period were calculated using the Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Data, 8 Registries, from 2001-2020. Expected counts were adjusted for age, sex, and race. Breast cancer cases were limited to females. Observed counts are from DoD medical data only and are expected to change when additional datasets are added in Phase 1B and Phase 2.