



Leveraging a Novel Data Integration Platform for Career Path Modeling to Optimize Flight Surgeon Manning

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INTRODUCTION

- U.S. Air Force (USAF) has faced chronic shortages of flight surgeons. USAF flight surgeons provide operational mission support through aeromedical risk assessment by applying aeromedical standards, force generation through medical readiness, expeditionary base laydown through preventive health, and aeromedical evacuations as clinical providers. Prolonged deficiencies can lead to systemic vulnerabilities detrimental to aircrew health, mission readiness, and global medical operations.
- Traditional methods for manpower analysis are hindered by disparate and siloed data sources that lack dynamic modeling capabilities. The USAF School of Aerospace Medicine launched the Analytic Consultation Data Cell (ACDC) project to analyze training pathways and assignment outcomes to model and simulate training pipelines with the goal of improving operational flight surgeon manning. This presentation outlines the first-year initial proof-of-concept efforts of ACDC.
- This pilot study assessed the effectiveness of two different training pathways, comparing the Operational Graduate Medical Education (OGME) residencies compared to Traditional Graduate Medical Education (TGME) residencies. OGME is a specialized training curriculum that bridges standard residency training with operational aerospace medicine skillsets for an assignment in an operational flying unit upon graduation. The OGME was established to build a predictable, structured pipeline for residency trained and operationally ready flight surgeons as embedded support for flying, special operations, and remotely piloted aircraft units.
- By analyzing rates of operational assignments, time to first operational tours, and longitudinal retention, this analytic model can serve as a decision analysis template for USAF flight surgeons and other career fields with critical shortages using a data-driven framework to inform future manning strategies.

METHODS

Overview

- This study leverages Envision, a USAF cloud-based data and analytics fabric, to access and integrate datasets. A comparative analysis against established aggregate data from USAF flight surgeon personnel and readiness registries were used for validation.
- OGME vs TGME comparative analysis is a subset of a larger data analytics and decision support effort to model USAF flight surgeon recruitment, retention, and utilization with historical personnel data to improve Flight Surgeon assignments into flying units.
- A completed model will allow USAF leaders to use simulation and modeling to forecast future outcomes if decision nodes were adjusted through incentives or policies.
- This study was approved by the Air Force Research Laboratory Institutional Review Board (IRB), Protocol # FWR20260012E.

Methodology and Analysis

- Study Design: A retrospective cohort study was conducted.
- Data Source: De-identified personnel data was sourced from the USAF Envision platform.
- Study Period: Data from January 01, 2007 to December 31, 2023.
- Descriptive statistics were used to summarize cohort characteristics.
- Transition rates from residency (AFSC 44X, 45X) to operational flight surgeon roles (AFSC 48X) were calculated, as well as time to completion of flight surgeon training requirements.
- Career retention between OGME vs TGME cohorts compared using Kaplan-Meier curves.
- All analyses and graphs were performed and created using 'Pipeline Builder', 'Code Workspace' or 'Contour' native to the USAF Envision platform.

PARTICIPANTS

- The study population included all Active-Duty surgeons during January 01, 2007, to December 31, 2023. (N = 5,228)
- Participants were categorized into two cohorts:
 - OGME = personnel records indicated participation in OGME. (n = 187)
 - TGME = All other medical residents not in the OGME program. (n = 7,522)
- A 'transition to an operational assignment' is defined as a change in the recorded Duty AFSC from a medical or surgical residencies coded (44X, 45X) to an operational flight surgeon code (48X).
- Demographic composition were 5,535 White, 978 declined response, 615 Asian, 387 Black or African American, 128 more than one race, 30 Native Hawaiian/other Pacific Islander, and 29 American Indian/Native Alaskan. Details available in Table 1.

RESULTS

Table 1. Demographics by GME

	TGME	OGME	Total
Sex			
Male	5120	133	5253
Female	2402	54	2456
Race			
American Indian/Native Alaskan	14	0	14
Asian	384	11	395
Black or African American	214	1	215
Declined to Respond	2825	46	2871
Identified more than one	87	3	90
Native Hawaiian/Other Pac Isl	12	0	12
White	3483	126	3609
Commission Source			
Air Force Academy	250	15	265
ROTC	213	7	220
USU and other sources	6589	165	6754

Figure 1. AFSC Category by GME

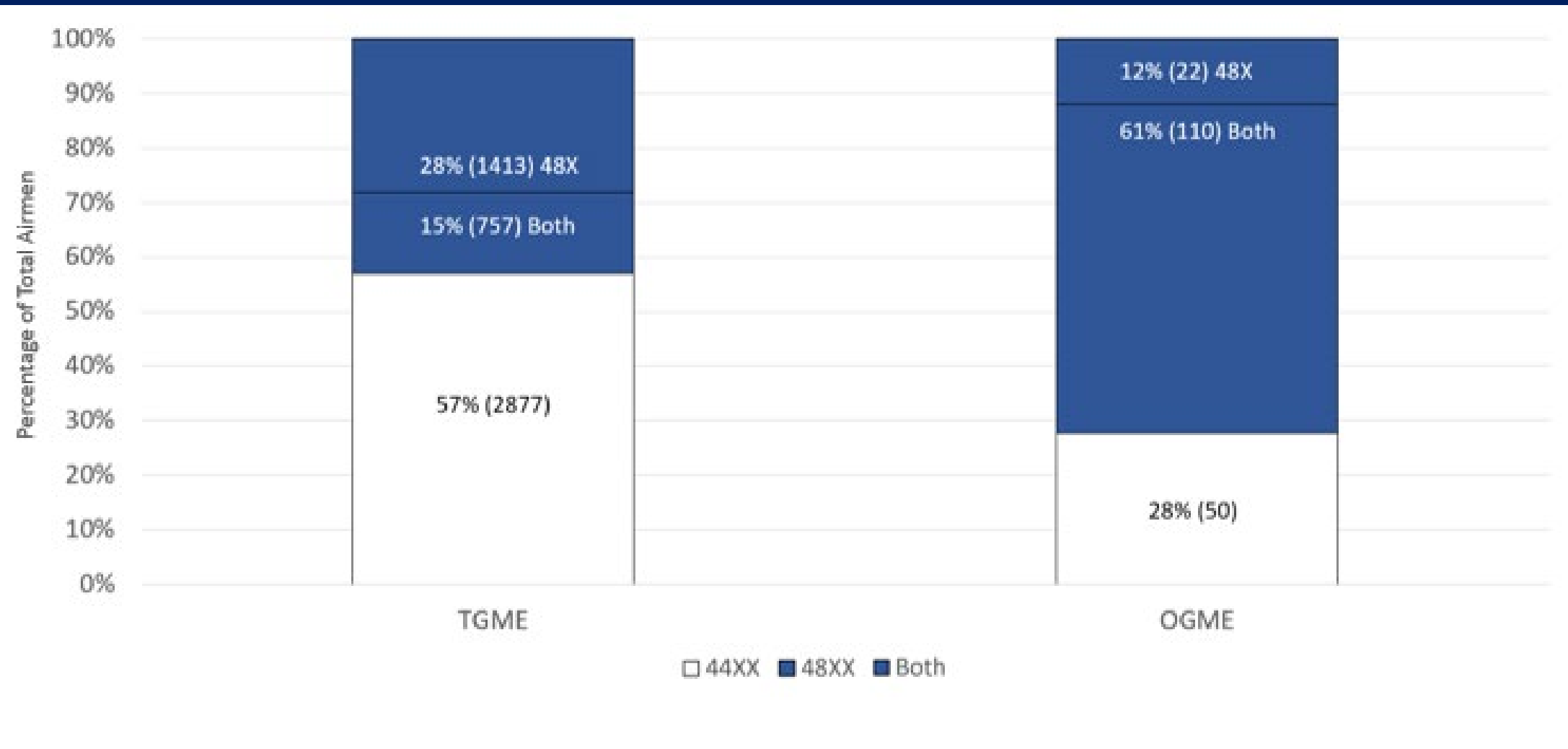
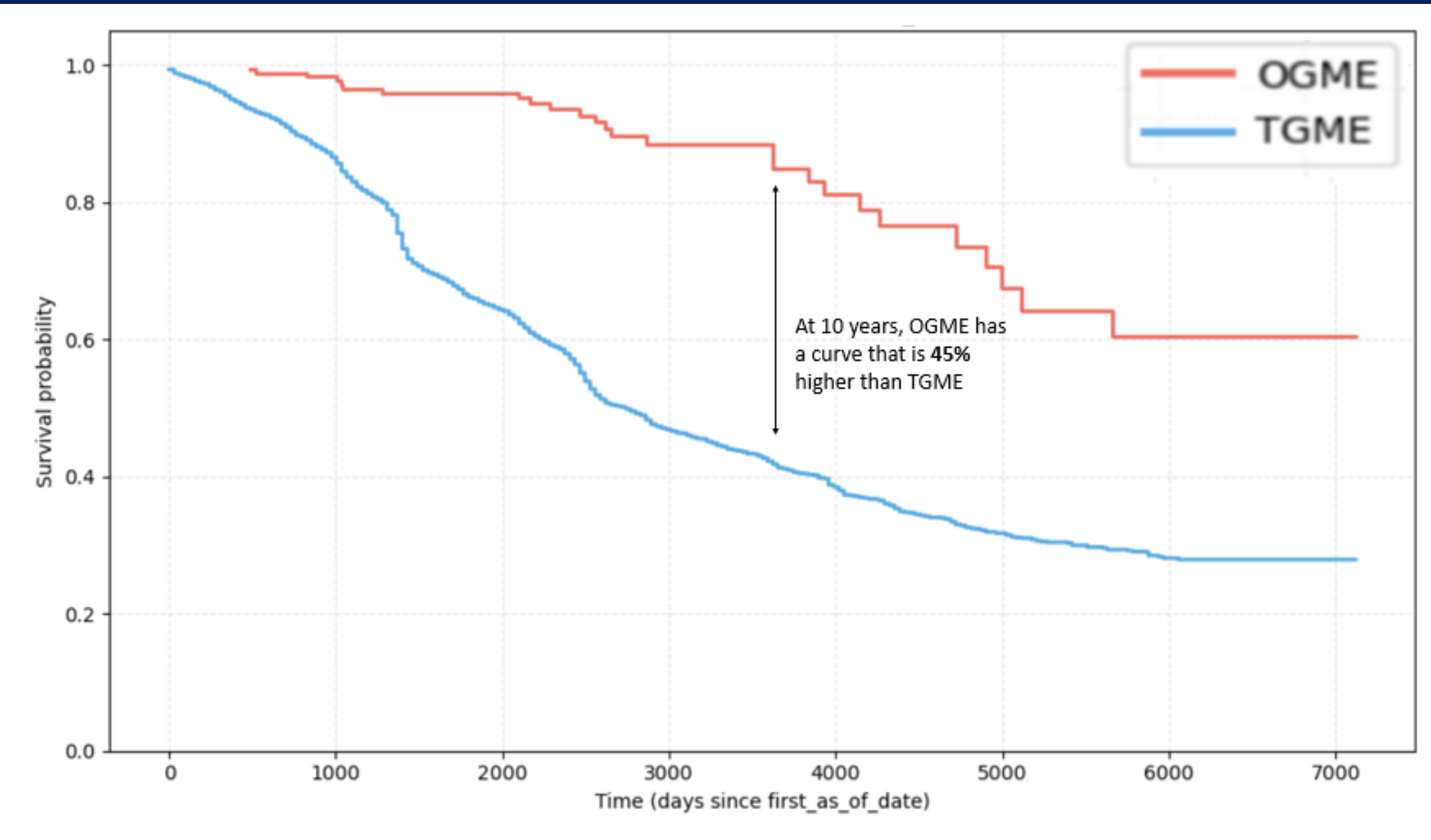


Figure 2. Survival Curves by GME

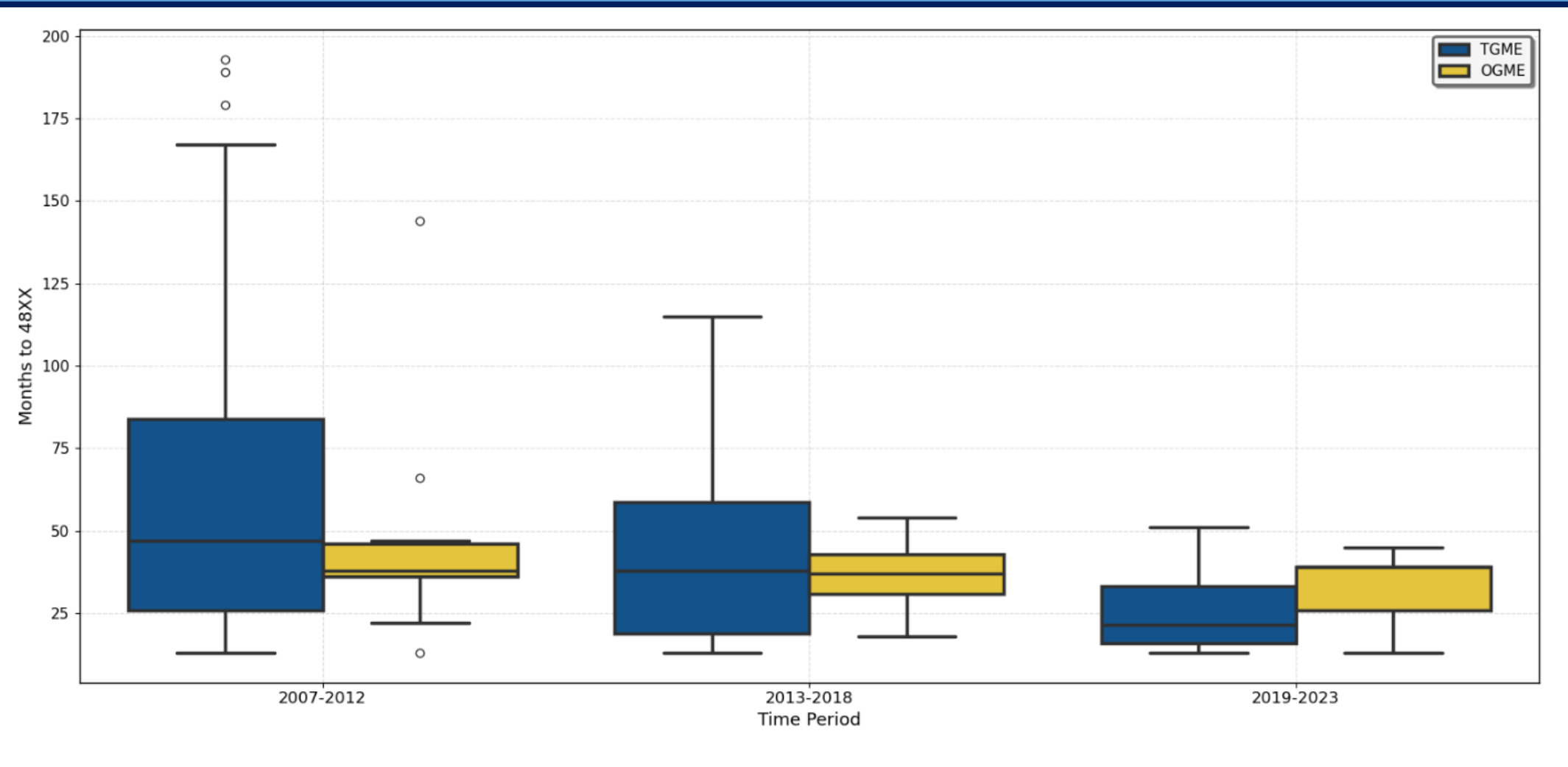


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Figure 3. Median Months to First Operational Role by GME



DISCUSSION

- Key findings demonstrated OGME graduates, when compared to TGME graduates, were more likely to transition to operational assignments at 73% vs 43% respectively (Figure 1).
- The OGME program also resulted in a significantly higher retention rate compared to the TGME program over the long term (Figure 2) After approximately 10 years (3,650 days) the survival probability (retention) for the OGME cohort is 83%. For the same 10-year period, the survival probability for the TGME cohort is substantially lower at 38%.
- The trends for median months to first operational role after graduation (Figure 3) was unexpected. TGME has gradually decreased number of months from residency to flight surgeon transition while OGME transition from residency to flight surgeon roles have remained constant. TGME residency transition may include residencies completed outside of military training facility based GME programs which may not reflect status in a military occupational code while the member is in Air Force Institute of Technology student status.
- ACDC established a scalable model for integrating personnel and operational data to support critical manning decisions by leveraging database and data analytics tools within Envision.
- This pilot model opens the pathway to expand predictive tools with outcomes from node variables that enable evidence-based decision-making support for training, manning, and force generation for the Air Force Medical Service and operational flying units.
- Our findings suggest that strategic investment in and expansion of the OGME program could be a highly effective strategy for helping mitigate the chronic flight surgeon shortage.

LIMITATIONS

- The descriptive nature of this study limits causal inferences.
- As a retrospective cohort analysis of personnel data, this study cannot determine the individual motivations behind career decisions.
- Current data sources may not capture the complexities of the personnel system duty codes.
- The dataset did not include subjective metrics such as job satisfaction or measures of burnout, which could provide additional context for the observed retention differences.
- The Kaplan-Meier survival (retention) curve may be biased towards physicians who have longer commitments due to service academy, USU, or existing payback commitments.

FUTURE RESEARCH

- Future studies could supplement these quantitative findings with qualitative data, such as surveys or interviews, to better understand the factors influencing career path decisions, satisfaction, and retention among flight surgeons.
- The modeling approach used in this study can and will be applied to other critically underfilled USAF occupations to optimize training pipelines and manning strategies.

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