Predicting Deployability from Modifiable Behaviors in Active Duty Air Force Service Members

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Background:

Readiness for deployment is a critical issue for the Military Health System. Service members complete numerous requirements of physical and mental health to ensure medical readiness for deployment. How can that data be leveraged to improve the detection of identifiers that indicate an individual's readiness for deployment?

In 2015 the Army developed and deployed the Medical Analytics Tool (MRAT). MRAT supported Army Medicine's transformation from a healthcare system to a system for health by identifying at-risk Soldiers earlier than previously feasible, improving evaluative quality, and enabling clinicians to better engage patients.

The goal of the present effort was two-fold: first, to modify an Army program (Medical Readiness Analysis Tool, MRAT) that was originally developed to estimate the probability of a service member becoming non-deployable in a six-month period for Air Force purposes, and secondly, to discover modifiable health behaviors (e.g., BMI, smoking, blood pressure, heart rate, and prescription opioids) that are associated with readiness for deployment.

Methods:

322,555 health records were selected from the Health and Readiness Optimization (HeRO) Report, which uses data from both the Periodic Health Assessments (PHA) and Fitness Management System II (AFFMS II). We started with started with 40 variables (demographic, health, nutrition). The surveillance period was January 01, 2017 to December 31, 2017. The outcome period was determined by looking forward 6 months based on profile information during July 01, 2017 to June 30, 2018. Variables were screened using stepwise and entry method regression (set up as 0.3, stay level as 0.35).

The data was modelled using logistic regression. A key feature of MRAT is that it assigns weights (positive and negative scores) to relevant items in a service member's health profile. Protective factors (items that reduce the risk of non-deployability) are assigned positive values and risk factors (items that increase the risk of non-deployability) are assigned negative values. The sum of the values are then converted into a probability.

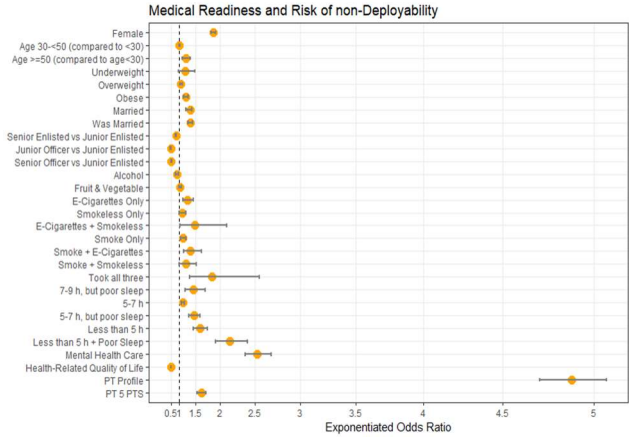
Results:

Risk factors

Being female	Smoking
Age of over 50	Little/poor sleep
Overweight & Obese	Mental health profile
Marriage	PT Profile
Fruit & Vegetable	PT 5PTS.

Protective factors

Higher rank
Alcohol use
Health related quality of life.



The orange dot is the odds ratio for the corresponding variables or subtype of variables, the horizontal whisker is the 95% confidence interval (CI) of the odds ratio. For the vertical dashed lines: yellow dots on the left side of the line (> 1) indicate that the variable (or subtype) could decrease the probability of non-deployability. Yellow dots that fall on the right side of the line indicate an increase in the probability of non-deployability.

Conclusions:

- MRAT can be used to identify high-risk individuals who may warrant follow-up and/or intervention.
- **Unit level**: MRAT can be used to identify high-risk units.
- **MAJCOM and Field Operating Agencies (FOA) level**: MRAT can also be used to effectively allocate resources to units and MTFs with the greatest need.
- **Component and enterprise levels**: MRAT can ultimately support data-driven decisions and inform policy.

As we continue to align the MHS under DHA, partnering with our sister services can ensure that a Medical Readiness Assessment Tool promotes the medical readiness of all service members. While each of the services measures availability for deployment in different ways, the risk factors included in our model are not unique to the Air Force. Future versions of the MRAT model may be able to include additional modifiable risk factors which would enhance the actionability of the MRAT. With the roll-out of MHS Genesis and realignment of duplicative processes across the services, an MRAT enterprise solution would best be implemented in a Tri-Service readiness tracking tool rather than three parallel models in ASIMS (USAF), MEDPROS (USA), and MRRS (USN). While this would require the engagement of readiness SMEs across the services, doing so would best support the Military Health System mission to provide health support for the full range of military operations and sustain the health of all who are entrusted to MHS care.