Development and Deployment of A Physical Workload Monitoring System for Injury Prevention

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Summary: Vital to the health and well-being of the operator is preventing injuries. While keeping the individual on the battlefield increases lethality, treating a training obtained injury can utilize millions of dollars when direct/indirect medical expenses/costs, and limited or lost duty days are factored in. As many preventable injuries stem from overuse and overtraining occurrences throughout the training pipeline, the need to track the operators' workload, strength/performance, and rehab recovery timelines to help prevent future injuries becomes apparent.

Methods-Results: A proof of concept (POC) project was developed to determine the feasibility of rolling out a self-administered monitoring system for leadership to track the progress of a training course within the Marine Corps pipeline at the School of Infantry-West. In total, data was collected on 360 students by a total of 12 instructors throughout the course. Data collected included command info, demographics, physical performance, training metrics, injury occurrences, drop rates/explanations, and wearables. All collected data was then published to a single dashboard that was filtered and aggregated to various levels of granularity depending on the level of leadership. For example, a drill instructor could see the repetitions an individual within their squad completed on a performance test while the Colonel could receive an aggregated visualization of the entire command's performance. Lastly, all data could be entered into a tablet directly in the field or into a desktop computer. While the proof of concept proved to be attainable, the success of the system was largely dependent on the buy-in from those entering data.

Conclusions: Training is a symbiotic relationship between stressing the physiological system while allowing time to recover/adapt. The development and execution of an immediate monitoring system can aid in balancing this stress-adaptation paradox if buy in and utilization is achieved. Future directions to expand on this POC can include expanding the number of domains collected metrics and deploying machine learning and artificial intelligence algorithms to mine the data once a sufficient amount has been collected. All of which can work towards preventing the common overuse injuries that occur throughout the training pipeline.

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