Recommendation xx: MPD should continue its work on an early warning system and move in the future towards working with Chicago Data Science for Social Good to enhance the early warning system. [President's Work Group 11]

It has long been known that in most police departments, a small proportion of officers are responsible for the bulk of adverse events (e.g., complaints, inappropriate use-of-force cases, etc.). For example, it's known that officers who are involved in one questionable officer-involved shooting are far more likely to be involved in additional subsequent shootings. In response, police departments through the U.S. have implemented early intervention systems (also referred to as early warning systems) – systems to identify officers at high risk of future adverse events, to allow early intervention (retraining, counseling, reassignment, or other measures) to prevent adverse events. Such systems allow a department to intervene to avert potential tragedies.

The core element of any proper early intervention system is a computerized mechanism to flag at-risk officers. For example, MPD has recently begun using IAPro (Internal Affairs database software), including the EIPro early intervention platform. Using this, in conjunction with a mechanism that allows human judgment to factor into the alert system, is a worthwhile advance for MPD.

However, almost all existing systems, including those employed by IAPro, use simplistic, inaccurate rules such as thresholds (e.g. 3 complaints in 180 days) to flag officers. Such simplistic, arbitrary, binary threshold approaches don't provide a quantitative assessment of risk and have very limited predictive value – performing only modestly better than chance in flagging officers who go on to be involved in future adverse events. The inaccuracy of flagging based on such an approach can result in the system being ignored (e.g., since too many officers are flagged for intervention) and questions of legitimacy. There's long been a need for a more sophisticated, accurate approach using an actual statistical model or machine learning algorithm.

Fortunately, such an approach – a data-driven, properly *predictive* early intervention system – has recently been developed by the University of Chicago Data Science for Social Good Fellowship (DSSG) and the Center for Data Science and Public Policy (DSaPP), as part of the Obama White House Police Data Initiative. This data-driven system uses a machine-learning approach, provides continuous risk scores rather than binary flags, can incorporate information on differences between neighborhoods and shifts, and provides a large improvement in sensitivity and specificity. DSSG/DSaPP partners and works with police departments on implementation of the system. Implementations are now being used in the Charlotte-Mecklenburg and Metropolitan Nashville Police Departments, and multiple other police departments have taken steps toward implementation, including the San Francisco Police Department.

The increase in accuracy over traditional systems is striking. For example, compared to the optimized binary threshold system that the Charlotte-Mecklenburg Police Department was using earlier, the DSSG/DSaPP system generated a 76% increase in true positives (i.e., officers who went on to have adverse events over a one-year period) and a 22% decrease in false positives. It was also able to provide insight into the factors most predictive of future adverse events.

An advantage of a predictive score (as generated by such a system), as opposed to a simple binary threshold, is that it's quantitative, with the highest risk corresponding to the highest scores (in the extreme tail of the distribution). This permits a department to prioritize intervention, recognizing tradeoffs and allocating resources to those officers who need it the most. The ability of such a system to

incorporate information such as neighborhood and shift is another important advantage (e.g., a given frequency of use of force may be more concerning in an officer assigned to a low-crime beat than one assigned to a high-crime beat). In addition, such a system cannot readily be gamed, in comparison to traditional, known, binary thresholds, for which officers can slightly modify behavior to avoid detection (e.g., not reporting an action taken).

Given knowledge of this program, action item 11 of the President's Work Group report recommended that the Ad Hoc Committee *"speak with the University of Chicago Data Science for Social Good statisticians to explore collaboration to develop a predictive early warning system."* On September 7, 2017, the Ad Hoc Committee hosted a presentation on predictive early intervention systems by data scientist Joe Walsh of DSSG. After full examination of the question, the Ad Hoc Committee recommended implementation by MPD. This system will more accurately identify the MPD officers in greatest need of intervention.

Such a predictive early intervention system could potentially be built on top of MPD's IAPro database, and could also potentially use other data. The system should be set up to maximize accuracy in predicting risk of adverse incidents and should utilize any data needed for this purpose, including all complaints, even those not sustained, and information from officers' long-term history. A robust early intervention system requires as much information as possible – excluding some types of information (such as old or "unfounded" complaints) would impair performance (e.g., such exclusions have been recognized as contributing to the poor performance of the Chicago Police Department early intervention system).

DSaPP recently partnered with Benchmark Analytics to commercialize the University of Chicago early intervention software. This partnership has also launched a Research Consortium, composed of academics and practitioners, to research how to more accurately identify officers who engage in problematic conduct and to find evidence-based interventions most effective in altering such conduct. MPD should inquire about the most appropriate means of acquiring and implementing suitable predictive early intervention software in the current context.