

# If We Had a Crystal Ball, Would We Use It?

Brett Drake, PhD, Melissa Jonson-Reid, PhD

Vaithianathan et al's<sup>1</sup> "Injury and Mortality Among Children Identified as at High Risk of Maltreatment" showcases the promise of predictive risk modeling (PRM). As part of the emerging literature revealing the strong predictive utility of PRM relative to child maltreatment and health, Vaithianathan et al<sup>1</sup> help answer a set of existing questions and pose an entirely new set of perhaps more difficult questions.

PRM involves evaluating a large number of variables to create risk scores for a given outcome in a given population. Previous work in New Zealand revealed that PRMs developed from a full national birth cohort predicting subsequent substantiated child protective services (CPS) referrals had excellent predictive utility (yielding an "area under the curve" approaching 0.90). For example, those 10% of all children categorized as having the highest risk of a substantiated CPS report included the majority (52.7%) of all subsequent CPS referrals.<sup>2</sup> Similar findings are also being obtained in the United States.

The authors of the current article do something unusual: they take a PRM that was created specifically to predict CPS involvement and test it against serious medical outcomes. The CPS-based PRM predicted many non-CPS medical outcomes just as well as the outcomes on which it was originally trained. For example, in the current study, those 10% of children most at risk included 57.1% of all postneonatal unintentional injury deaths and 50.0% of all inflicted injury deaths. The authors reinforce recent work<sup>3-5</sup> in

which researchers showed that bias (eg, class bias, surveillance bias) in CPS referral and substantiation is far less of a concern than was commonly believed.

Vaithianathan et al<sup>1</sup> add to the literature in which researchers have shown that PRM may represent a breakthrough in predicting negative child outcomes. Additionally, they suggest that PRM models trained on 1 outcome may be usable to predict other related outcomes. This finding requires replication across differing contexts.

Most important, it is becoming increasingly difficult to ignore the question, "What do we do with the predictive power that PRM confers?" Answering this question is complicated by a range of factors, including an ongoing lack of clarity about the role of CPS (is it more like a criminal justice system or a public health system?), the patchwork nature of current family and child supportive services in the United States, and concerns about the ethics of using state-held data as a basis for preventative service provision.

Perhaps the simplest possible case in point would be a decision to offer voluntary preventive services to the 10% of highest-risk children (covering half of all children with subsequent injury deaths) or the top 20% (covering over three-fourths of all such children). Until now, preventive services have been parent-initiated or from a hotline referral. This system breaks down relative to child fatalities because most fatalities happen early. The simple fact of the matter is that

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the status quo came into being in the absence of the necessary technology to create effective “early warning systems.” We now have that prognostic capacity, but we have no way to use it.

New Zealand has been considering just such a program: a voluntary program for supporting families identified as being at high risk. Ethical reviews of this proposal have been favorable.<sup>6</sup> It is possible that the ethical cost of not using accurate predictive models is greater than any ethical cost attendant to instituting such models. Creating such a program in the United States is not utterly without precedent,<sup>7</sup> but it would represent a paradigmatic change in how we see the role of the state in protecting children and supporting families, supplementing the current hotline-gated system

with an empirically sound and timely, preventive system.

The question is, “Do we want to do it?”

#### ABBREVIATIONS

CPS: child protective services  
PRM: predictive risk modeling

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