Predictive Analytics In Child Welfare: An Overview Of Current Initiatives And Ethical Frameworks To Inform Equitable Policy And Practice

PAUL LANIER, PHD
DANIEL GIBBS, MSW, JD
UNC SCHOOL OF SOCIAL WORK

PREVENTION SCIENCE AND METHODOLOGY GROUP
Outline

• About PSMG: “advance the field of prevention science and support the implementation of evidence-based prevention programs.”

• Brief overview of child welfare policy and practice in the US
  • Focus on preventing child abuse and neglect and implementing evidence-based practices in public child welfare

• Predictive analytics in child welfare

• An ethical framework applied to a child welfare prevention policy

• Findings from recently completed qualitative study
National Overview of Child Welfare System

Exhibit S-2 Statistics at a Glance, 2019

- 4,378,000 million* REFERALS alleging maltreatment to CPS involving 7,880,400 million CHILDREN¹
  - 54.5% referrals SCREENED IN² (become reports)
  - 45.5% referrals SCREENED OUT²

- 2,368,325 million REPORTS received a disposition
  - Submitted by 68.6% professionals, 15.7% nonprofessionals, 15.7% unclassified

- 3,476,000 million CHILDREN* received either an investigation or alternative response
  - 656,000* VICTIMS Includes 1,840 Fatalities*
  - 2,820,000* NONVICTIMS³,⁴

- 380,805 VICTIMS³ received postresponse services
- 898,559 NONVICTIMS⁴,⁵ received postresponse services

- 142,056 VICTIMS⁸ received foster care services (on or after the report date)
- 57,681 NONVICTIMS⁴,⁶ received foster care services (on or after the report date)
2019 Child Fatalities:
- Mostly young children
  - 45% <1 years; 70% <3 years old
- Differences by race
  - 44% White; 2.2 per 100,000
  - 29% African-American; 5.1 per 100,000
- 73% neglect, 44% abuse
- 80% perpetrators are parental caregiver
- 34% had prior CPS contact, 7% identified as prior victim
100,000 dots
Can we prevent 3 child abuse fatalities in this group? What about the 23 per 100,000 for infants < 1 years old?
Figure 1: Framework for prevention of child maltreatment and associated impairment
Child Maltreatment Prevention Policy History

• “Modern” era began in 1960s, battered child syndrome
  • State reporting and response systems

• Led to CAPTA in 1974, (P= prevention)
  • Official reporting system = focus on preventing recurrence

• Keeping Children and Families Safe Act of 2003
  • Directly funds prevention

• Families First Preventive Services Act, 2018

• Always major imbalance in prevention vs. intervention
  • “Preventive Services” 15% of total child welfare expenditures

Oversimplified Description of Child Welfare Policy over Time

Child Protection/Safety
Children’s Rights
Foster care benefits
Public good

Family Preservation
Parental Rights
Foster care iatrogenic effects
Government intrusion
Prevention of Child Maltreatment Fatalities

Imagine a society...

...where children do not die from abuse or neglect.

...where children are valued, loved, and cared for first and foremost by their parents.

Imagine a society...

...where research and integrated data are shared in real time in order to identify children most at risk for abuse or neglect fatalities and make informed and effective decisions about policies, practices, and resources.
Identifying children and families most at risk of a maltreatment fatality is key to knowing when and how to intervene. Therefore, we recommend that states undertake a retrospective review of child abuse and neglect fatalities to help them identify family and systemic circumstances that led to child maltreatment deaths in the past five years. States will then use this information to identify children at highest risk now, and they will develop a fatality prevention plan to prevent similar deaths both now and in the future. Ensuring that the most vulnerable children are seen and supported is a critical element of this process.

Sharing data electronically and in real time will have an immediate impact on improving child protection decision-making by state and local entities.
Analytics with administrative data to prevent child maltreatment?!?

How did we get here?

• Translation of scholarly research
• Epidemiologic research of state-level data consistently showed promise
• Administrative records allow for prospective analysis using retrospective records,
  • Can we predict “future” events from prior data?
• Extended to “real-time” predictive analytics in child welfare practice
any child born with three or more of just a handful of risk factors (prenatal care that began after the first trimester, missing paternity, ≤ high school education, 3+ children in the family, maternal age ≤ 24 years, Medi-Cal Coverage of the birth for a US-born mother), we could identify 50% of children reported for maltreatment before the age of five from just 15% of the total birth cohort.

Fig. 2. Predicted probability of being reported for maltreatment (and 95% CI) by count of risk factors at birth.

1. Included risk factors are those considered "modifiable", at least in theory.
2. Risk factors are unweighted and ordered based upon their frequency within the cohort (from most to least common).
3. Non-modifiable variables not included are set at the group mean, given other risk factors.
Uncharted Waters: Data Analytics and Child Protection in Los Angeles

BY DANIEL HEINPEL

A county-led forum in Los Angeles is seeking to reduce child abuse.

On Wednesday, July 22, Los Angeles County held a community forum to discuss the limits of technology and data mining in determining which children are at risk for abuse.

The question of whether child welfare agencies can use data to identify cases of child abuse has generated much debate. Some say that high-tech solutions can help predict cases of child abuse, while others argue that such programs can lead to over-reaction and racial profiling.

The Los Angeles County Board of Supervisors is considering whether to adopt a highly-publicized and controversial data mining system, known as the Rapid Safety Feedback System (RSFS), that claims to identify children at risk for abuse. The system, developed by Eckerd, a non-profit organization based in Florida, was developed to stem the tide of child abuse deaths in Hillsborough County, Florida, after an unprecedented nine child homicides in less than three years.

Eckerd Connects’ Eckerd Rapid Safety Feedback (ERFS) was developed to stem child abuse deaths in Hillsborough County, Florida, after an unprecedented nine child homicides in less than three years. (Eckerd Rapid Safety Feedback)

Data mining program designed to predict child abuse proves unreliable, DCFS says

By DAVID JACOBSON AND GARY MARX
CHICAGO TRIBUNE | DEC 01, 2017 AT 5:31 AM

Eckerd Connects’ Eckerd Rapid Safety Feedback (ERFS) was developed to stem the tide of child abuse deaths in Hillsborough County, Florida, after an unprecedented nine child homicides in less than three years.

Forward-looking. Eckerd Connects is a non-profit organization that serves children and families. It is known for its innovative approaches to child welfare and its emphasis on evidence-based practices.

Eckerd Connects’ Eckerd Rapid Safety Feedback (ERFS) was developed to stem the tide of child abuse deaths in Hillsborough County, Florida, after an unprecedented nine child homicides in less than three years. (Eckerd Rapid Safety Feedback)

Eckerd Connects’ Eckerd Rapid Safety Feedback (ERFS) was developed to stem the tide of child abuse deaths in Hillsborough County, Florida, after an unprecedented nine child homicides in less than three years. (Eckerd Rapid Safety Feedback)
Current Models
Ethical Frameworks

FAT/ML
Fairness, Accountability, and Transparency in Machine Learning
https://www.fatml.org/

**Responsibility**
Make available externally visible avenues of redress for adverse individual or societal effects of an algorithmic decision system, and designate an internal role for the person who is responsible for the timely remedy of such issues.

**Explainability**
Ensure that algorithmic decisions as well as any data driving those decisions can be explained to end-users and other stakeholders in non-technical terms.

**Accuracy**
Identify, log, and articulate sources of error and uncertainty throughout the algorithm and its data sources so that expected and worst case implications can be understood and inform mitigation procedures.

**Auditability**
Enable interested third parties to probe, understand, and review the behavior of the algorithm through disclosure of information that enables monitoring, checking, or criticism, including through provision of detailed documentation, technically suitable APIs, and permissive terms of use.

**Fairness**
Ensure that algorithmic decisions do not create discriminatory or unjust impacts when comparing across different demographics (e.g., race, sex, etc.).
Birth Match
So, What is Birth Match?

Birth Record with Infant and Parent Information

Matches identified resulting in local CPS response (investigation)

Linked with historical CPS data
Public health departments (birth match). Several states have “birth match” programs that require hospitals to alert CPS to the births of children born to parents who have previously had a termination of parental rights. These families then receive, at minimum, timely home visiting to ensure that this very high-risk combination of child vulnerability and likely parental incapacity receives a prompt protective response.¹¹¹ A detailed description of the
The number of children identified through birth match between hospitals and CPS as being at risk due to the prior termination of parental rights due to the parent’s perpetration of violence on another child.
Better Use Data to Protect Children and Support Families
A policy action to Stop Family Violence

Action

Encouraging states to link and share data across systems can enable them to protect newborns at risk of maltreatment and to target preventive services to their families:

- Federal policy should encourage states to adopt Birth Match, a program that links state child-welfare, birth, and criminal-justice data to identify newborns at high risk of severe and fatal maltreatment.6

2. Implement birth match programs in order to identify and reach out to very high risk families within days of new births.

   a. In a decade, 20 states will have instituted birth match programs that alert child welfare services if births occur in families with prior failed cases or current open cases.
Initial Concerns about Birth Match Policy

- Developed in response to specific high-profile (media attention, headline grabbing) fatal maltreatment cases
- **No evidence** regarding prior TPR as a risk factor for fatal infant maltreatment
  - Yes prior CPS involvement is a risk factor, but no evidence for TPR as proxy for highest risk
- **No evidence** that Birth Match is efficacious or effective on any scale
- No publicly available reviews of policy implementation
- Is this the right thing to do? = Many open questions of ethics
  - Do the potential negative consequences of over-surveillance of vulnerable groups outweigh the benefits of preventing fatal maltreatment?
  - What is our societal tolerance for false positives?
  - Is this use of data in line with other applications in data science?
Prior Work

Algorithmic Transparency for the Smart City

Robert Brauneis & Ellen P. Goodman

20 Yale J. L. & Tech. 103 (2018)

“As a society, we are now at a crucial juncture in determining how to deploy AI-based technologies in ways that promote, not hinder, democratic values such as freedom, equality, and transparency.”

Fairness, Accountability, and Transparency in Machine Learning

Bringing together a growing community of researchers and practitioners concerned with fairness, accountability, and transparency in machine learning
Current Study

PURPOSE: DESCRIBE THE IMPLEMENTATION OF BIRTH MATCH
Key Informant Interviews with State-Level Officials Responsible for Implementation of Birth Match

- Interview topics
  - History of Birth Match
  - Process for identification and automated data linkage
  - Organizational structure for policy implementation
  - Effectiveness of the policy through evaluation
  - Limitations and unintended consequences of the policy
Key Informant Interviews with State-Level Officials Responsible for Implementation of Birth Match

Findings

• Why did states decide to do Birth Match?
  • Focus on child safety following high-profile child deaths
  • Legal precedent for it (i.e., anticipatory neglect)

• What does their system look like when implemented?
  • No manual for Birth Match, all states doing it differently
  • Implementation challenges

• What have states found from evaluation of Birth Match?
  • Little or no ongoing evaluation or public review of the policy
  • Not sure if it is working to prevent infant maltreatment
  • Little or no consideration of unintended consequences or impact on families
  • Awareness of issues related to racial/ethnic disparities in child welfare, but hadn’t looked at it
Conclusion and Recommendations

- Conduct research to determine whether Birth Match is effective and what are the tradeoffs
- Start with smaller pilots prior to statewide/jurisdiction implementation
- Engage families targeted by Birth Match in all stages of implementation
- Implement desirable documentation and principles of fairness, accountability, and transparency
- Education of the public, social workers, advocates, policymakers about algorithmic decision-making
FIGURE 1
A Framework for Implementing, Evaluating, and Assessing a PRM-Based Hotline Screening Process

Specify the use case

Build and refine the model

External review of ethical issues

Test model using historical data:
- Overall accuracy
- Subgroup accuracy
- External validation

Implementation

Process and outcome evaluations of implementation

Continuous evaluation

Maximize transparency and community engagement at every step of the process

Key questions framed in context of the use case and compared to prior practice:
- Is the algorithm as designed and as used more accurate than current practice in general and for subpopulations?
- Is the use of the PRM ethically equivalent to or superior to prior practice?
- Are practically and ethically necessary implementation processes employed?
Future Questions/Directions for the Field

• Are we trying to identify a “black swan” – fatal infant maltreatment is extremely rare

• Is the goal to replace social workers with computers, or are we designing new tools to help social workers do their job (human-computer interaction)? How does this change the work?

• Can jurisdictions identify/use a common set of evaluative/equity criteria? How do we make this an ongoing process versus checking a box?

• Does COVID-19 and reduced reporting rates impact our calculus about the need for more surveillance?
Thank you!!
Questions/Comments

Contact info:

Paul Lanier
email: planier@unc.edu
Twitter: @planierunc

Daniel Gibbs
email: dangibbs@email.unc.edu
Twitter: @daniel_j_gibbs
References