APS TARC
Adult Protective Services Technical Assistance Resource Center | enhancing effectiveness of APS programs

January 2021 Webinar: Predicting Risk of Adult Maltreatment

Questions and Answers

Introduction

The Administration for Community Living (ACL), in collaboration with the Centers for Medicare & Medicaid Services (CMS), have launched a project to explore the use of predictive analytics to predict and prevent adult and elder maltreatment. The project, Predicting Risk of Adult Maltreatment, or PRAM will leverage artificial intelligence, machine learning, and other “big data” tools to investigate patterns of risk and protective factors across multiple data sources to determine if there is an association with [reported] incidence of adult maltreatment. The goal of the project is to create and improve interventions to prevent, and effectively intervene in, adult and elder maltreatment, and as an outcome, improve disabled and older adults’ quality of life and health quality outcomes, and reduce health care expenses.

While adult protective services (APS) agencies are collecting and reporting more and more data on adult maltreatment, little research has been done to date to explore how this data could inform predictive risk factors associated with maltreatment. This webinar provided the results of a literature review on risk and protective factors; a scan of how related fields use machine learning and predictive analytics; the methodology and results of the machine learning predictive analytic approach to identify locations with a high incidence of abuse, neglect, and exploitation. The presentation concluded with implications for research, policy, and practice.

Question

Is there any consideration in the literature around gaining acceptance of the predictive analytics by practitioners?

Answer

We did not identify any literature around gaining acceptance of the use of predictive analytics by APS practitioners. There is, however, some literature in the child welfare field around the importance of transparency in caseworker buy in. See this paper for more information: Chouldechova, A., Benavides-Prado, D., Fialko, O., & Vaithianathan, R. (2018). A case study of algorithm-assisted decision making in child maltreatment hotline screening decisions. In Conference on Fairness, Accountability and Transparency (pp. 134-148). Additionally, we would not view predictive modeling as a replacement of worker judgment, but rather a tool to assist in the identification of maltreatment.

Question

What is the distinction between engagement and involvement from the research question?

Answer

The research question did not differentiate engagement and involvement. To measure engagement and involvement, the model predicted annual average growth rate of ANE.

Question

Are the models explaining county-level variation in rates of reports to APS?

Answer

The models predict county-level annual average growth rate of reports to APS. The average annual growth rate reflects whether a county increased or decreased in the number of reports investigated by APS between the years of 2016 - 2018.

Question

Are the factors predictive of abuse, neglect, and exploitation (ANE) or of growth in ANE? How do we understand the difference in those outcomes?

Answer

The model was predicting annual average growth of ANE as observed in APS investigations. Rather than predicting the per capita rate of APS investigations in a given year, the annual average growth rate of APS investigations reflects more data points and may begin to elucidate factors associated with increase in APS cases and those associated with decreases (at the county level).

Question

What techniques did they use to get a subset of model features as inputs?

Answer

The project team used regression and classification decision tree algorithms, like the CART (Classification and Regression Trees which creates binary trees using features that generate large information gain at each node of the tree) and C4.5 (creates decisions trees where the accuracy of if-then rules and evaluated), as well as ensemble decision tree algorithms; specifically random forest regression and classification.

Question

What is the NAMRS variable?

Answer

The NAMRS variable is a "predictive scale" developed by the data scientists using NAMRS data. It reflects county-level risk of substantiation. The NAMRS variable includes variables on the APS case including features related to the depth of investigation, maltreatment severity, and client characteristics and context.

Question

Have you considered leveraging data from an industry standard Social Determinants of Health screening tool?

Answer

Yes, the project team has considered data elements that are consistent with social determinants of health. The next phase of the project will include additional data on social determinants of health.

Question

Should bias need to be addressed from development of these programs, not just as a "post-implementation" issue?

Answer

Yes, bias has been considered from the beginning of this work. This is part of the reason for ACL's emphasis of use of the Technical Expert Panel: to consider how to respond to issues of bias that are identified in data sets proposed for use, bias resulting from modeling, machine learning, and algorithms, and the application of tools developed from this work.

Question

How can you ensure that bias is eliminated?

Answer

It is complex. It ultimately depends on the use case and types of bias. This website https://deon.drivendata.org/ lays out some of the key areas of bias consideration in data collection, analysis, modeling, and deployment. It may be more realistic to state that biases are identified, understood, and mitigated. As systemic and institutional biases that affect the occurrence of ANE and the provision of services to address ANE are reduced, biases in the resulting data and biases generated by machine learning will be reduced as well.

Question

Would state agencies that collect NAMRS case component data be able to use these algorithms at the individual state level?

Answer

Yes, this may be possible. The likelihood of this increases if we focus the analytics at the state and/or local levels as opposed to applying national models at the state level.

Question

Do you have any recommendations for agencies that are interested in improving their data collection standards so that they can support future data exploration initiatives such as this one?

Answer

This project was limited by missing data in NAMRS, missing data on client/victim characteristics and FIPS codes (essential for county-based analysis) and the quality and consistence of the data submitted. Because of missing data and evidence of poor data quality, we could only leverage data from 11 states in the analysis. As states increase the completeness and quality of the data they collect from the local agencies, we will understand more about the phenomena of adult maltreatment and be able to do more in-depth and comprehensive data analysis.

Question

How can we use this directly in practice and in teaching other health care students or providers?

Answer

At present, the predictive analytics models are too preliminary for direct application to practice. However, the project's results have raised questions about, and given us new avenues of inquiry into, community characteristics that could influence risk and protective factors. This project suggests applying a "person in their environment" model of inquiry to understanding adult maltreatment, which is a break from traditional approaches. The contribution of this work is to expand our theoretical understanding of the phenomena. Watch for a future publication.

Question

Do you envision that states who would use predictive modeling would no longer have a need for risk assessments that may already be a part of practice?

Answer

From the researcher perspective, predictive analytics would be leveraged to augment and/or support decision-making using other tools and practices already in place, and possibly to catch those instances that have historically fallen off the radar.

Question

What additional information is there on older adults and risks? Could you please provide more info on what you need?

Answer

The older adult model had a low R-squared relative to the other models. The top five factors came from the Community Heal Rankings, American Community Survey, and the IRS 990 data. These data sources were valuable contributors across all our models, however, did not have the same predictive explicability as they did for the other models. This suggests that we did not examine data sets of community factors that have an impact on the risk of ANE substantiation for this population. We are wondering if there are data sets of variables that we should have included or should include next time. Suggestions welcome.

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The National Adult Maltreatment Reporting System and the Adult Protective Services Technical Resource Center is a project (HHSP 233201500042I) of the U.S. Administration for Community Living, Administration on Aging, Department of Health and Human Services, administered by the WRMA, Inc. Contractor's findings, conclusions, and points of view do not necessarily represent U.S. Administration for Community Living, Administration on Aging, Department of Health and Human Services official policy.