

## Predictive Analytics in Health Care and Criminal Justice: Three Case Studies

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### Introduction

With the rise of big data, organizations in many fields are applying some form of predictive analytics to identify patterns and trends that can inform and direct their decision making. Organizations in both the health care and criminal justice fields have been using predictive analytics for a while, but predictive analytics are just beginning to be used in what may best be described as the hybrid field of health care and criminal justice. Predictive analytics are deployed in this hybrid field to anticipate the health needs of the justice-involved, and use this information to treat mental illness as well as other health problems. The underlying assumption is that these pre-emptive actions will reduce the risk of reoffending and reincarceration and thereby promote public safety.

In the field of criminal justice, predictive analytics have already been shown to increase public safety through crime prevention. Perhaps the best known example of this is CompStat, developed by the New York City Police Department. It uses arrest and other criminal data to help pinpoint geographic “hot spots” of criminal activity and direct resources to these areas.<sup>1</sup> Rutgers University’s Risk Terrain Modeling tool combines crime data for a specific locale with other data about the physical environment and forecasts where new crime incidents are likely to emerge and cluster.<sup>2</sup> In addition, many jurisdictions use risk assessment tools like ORAS or Compass to predict the likelihood of reoffending among people who are about to be released from prison or jail, or are being considered for parole or probation.

Taken together, these examples suggest that in addition to increasing public safety, predictive analytics have a role at the intersection of health care and criminal justice. As correctional facilities adopt electronic health records (EHRs) and even gain access to health information exchanges (HIEs), they may look to predictive analytics to help manage inmate health and reduce health care costs within the criminal justice system.

This paper describes three examples of how predictive analytics are being applied at the intersection of health and criminal justice:

- The South Florida Behavioral Health Network is working with Otsuka Pharmaceuticals and IBM to implement the Otsuka Digital Health platform (ODH) to better coordinate care for mental health patients and avert negative outcomes such as re-hospitalization and incarceration.
- Centurion, a correctional proprietary health care provider, uses a free-world public health tool, Impact Pro®, to predict and fend off health crises in incarcerated individuals.



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- The Risks-Needs-Responsivity Simulation tool developed by George Mason University is being used to match offenders up for probation with treatment in the community that will reduce their risk of reoffending.

These case studies illustrate how stakeholders from both health care and criminal justice are working together to find innovative technological solutions to address health conditions that are common among the justice-involved population. This type of collaboration is not easy work. These are two sectors that historically have had little interaction. Despite progress, there is still much they need to learn about each other, especially with respect to information sharing. Two of the three initiatives, the ODH and the Risks-Needs-Responsivity Simulation tool, are yet to be fully implemented. And while Impact Pro is a mature product, its use with justice-involved populations is quite new.

The case studies also underscore how much more work needs to be done to fully leverage predictive analytics in this hybrid field. In addition, all three examples speak to the challenges of capturing and accessing big data. Before the benefits of predictive analytics can be realized, substantial infrastructure needs to be established. But the potential benefits of predictive analytics for both health care and justice match with a growing consensus on the need to end mass incarceration.

### **ODH Platform<sup>3</sup>**

In Miami-Dade County, the South Florida Behavioral Health Network (SFBHN) is working with Otsuka Pharmaceutical and IBM to implement Otsuka Digital Health (ODH), a care coordination platform that supports utilization management and health data integration across providers. When completed, this infrastructure will support predictive analytics, combining Otsuka's expertise in mental health with IBM's Watson technology to help providers intervene with clients before a mental health crisis occurs. While IBM's Watson technology has demonstrated its efficacy in predictive analytics in diverse settings from chess competitions to oncology, the Miami-Dade/Otsuka-IBM relationship will allow Watson to exhibit the full extent of its power at the intersection of health care and criminal justice.

A major impetus for this partnership came from Judge Steven Leifman, an associate administrative judge in the county's criminal division. Judge Leifman supports diverting non-violent, justice-involved individuals with behavioral health disorders out of the criminal justice system into community-based treatment. At over 9 percent, Miami-Dade County has the largest percentage of seriously mentally ill (SMI) individuals of any urban setting in the nation.<sup>4</sup> This unfortunate distinction has a significant impact on the county's criminal justice system, both in the courts as well as in jail, because people with serious mental illness are 14 percent more likely to be incarcerated than hospitalized.<sup>5</sup>

Although diversion can help decrease the burden on the criminal justice system, it does not address the all-too-common occurrence of police intervening when an SMI individual is in crisis. Judge Leifman champions another solution to this problem: treat mental health conditions in community settings rather than the criminal justice system. Scaling this approach, however, requires providers to better coordinate their clients' health care and health information.

In a chance meeting with an Otsuka representative at a conference, Judge Leifman shared his thoughts about the needs of the SMI population. This encounter led Otsuka to visit Miami-Dade County and see firsthand the conditions there. Otsuka, in association with IBM, was searching for a community with a strong desire to improve mental health outcomes and a substantial behavioral health infrastructure where the ODH could move health care delivery from a reactive to a proactive mental health care model. In 2012, after conducting a 16-week observation of the behavioral health landscape, Otsuka and IBM made a decision to implement the ODH in Miami-Dade County—making use of the strong community support for comprehensive care coordination that included predictive analytics.

Because the SFBHN network provides mental health services for the county, the infrastructure for the ODH needed to be established there, beginning with implementation of the ODH's utilization management module. With the utilization module in place, Otsuka integrated the health care information of all SFBHN's subcontracting organizations into the ODH dashboard. The dashboard allows health care providers to access a client's complete behavioral health information, regardless of where the care occurred. Previously, this data was available only by running retrospective reports from data batched over monthly to the SFBHN from its subcontracting agencies. That arrangement allowed SFBHN to identify high utilizers of health care and determine which providers were treating these patients, but did not allow providers of one subcontracting agency to access the information from another subcontracting agency.

To break down the data silos, IBM built a platform that allows multiple EHR systems to upload information to the SFBHN through the ODH. This platform allows client data to be uploaded to the ODH after each encounter with a provider. In cases where providers are still using paper systems, they may enter their encounter data directly into the ODH.

From the ODH dashboard, providers can see the entire spectrum of their clients' integrated behavioral health information. The dashboard also flags when a patient has visited an emergency room or missed an appointment with a provider. In the future, it will also flag encounters with public safety. With such alerts, providers can reach out to their patients and find ways to better engage them. The SFBHN, as the umbrella organization, can also review records to see when a client has had a crisis. If necessary, the SFBHN can reach out to member organizations to offer assistance in better managing their clients.

New technology also changes how people perform their tasks. The introduction of the ODH is no exception. Some providers within the SFBHN are very familiar with various technologies and the integration of the ODH into their workflow did not create many obstacles. But for less technically advanced providers, especially those still using paper systems, the ODH was more challenging. To address these issues, a change management team helped providers adjust their practice to the new technology. In addition, Otsuka has a help desk that supplies assistance in both English and Spanish.

Plans are underway to bring the ODH into the county's court and jail system. ODH data will be mapped to Miami-Dade County's Criminal Justice Information System (CJIS), which tracks a person's booking history, court cases, court dockets, arrest records, charges, jail intake, and release data. All this information in the CJIS is linked by a unique identifier, which is tied to a

person's thumbprint. By mapping the CJIS to the ODH, a provider in the community could see when a client is involved in the criminal justice system. Conversely, criminal justice stakeholders, particularly those responsible for providing health care services, will know if the person has a behavioral health history.

The ODH will streamline data sharing between the courts and behavioral health treatment providers. Currently, transfer of this data is limited by aging telephone and fax technology. Now it will be possible to quickly identify individuals who have behavioral health histories. With this information, caseworkers in the court's mental health jail diversion programs can identify and link individuals to services or providers that are already treating them. Using the ODH, caseworkers may also identify providers based on treatment capacity and clinical expertise, ensuring that people are referred to programs where they can be seen as soon as possible and receive services that are most appropriate to their needs.

At the jail, the ODH will be available to inmate health care providers. Often, individuals are not willing to reveal that they have a behavioral health history, and as a result, they are not placed in appropriate housing units or maintained on psychotherapeutic medications. When that happens, SMI individuals in jail settings may experience a crisis, potentially endangering themselves and others in the jail.

For judges presiding over problem-solving courts (those that address specific issues like mental illness or substance use disorders), the ODH offers a more immediate way to review treatment compliance and work with defendants and treatment providers to adjust care as necessary. It provides judges with information that typically is not immediately available to them in the current siloed data environment.

There is concern in some quarters, notably among public defenders, that the ODH could be used to prosecute people. Much effort has focused on ensuring that the ODH is used solely as a health care tool. These discussions are still under way.

Florida allows for sensitive information, including protected health information, to be shared without individual consent. Under the auspices of one or more local government units, a data collaborative may be set up. All entities contributing data must be on the steering committee of the data collaborative and each entity has a veto over which data elements are to be shared. Currently, two other counties in Florida have data collaboratives. These counties use the data for running reports retrospectively, but Miami-Dade County wants the ability to share data in real time to facilitate continuity of care and meet the needs of the courts, providers, and consumers of behavioral health treatment services.

Ultimately, the partners in the initiative—the courts, police, and behavioral health care organizations—want the ODH to support predictive analytics. A coordinated care record that integrates data from courts and jails will be needed to get there. With data from a comprehensive, integrated record system, the ODH can generate accurate risk profiles and alerts that signal an impending crisis for an SMI individual.

Because Otsuka is the mental health expert in the partnership, it will supply a core mental health data set to support the predictive analytic functions. The de-identified data has been used to test analytic assumptions. With the integration of IBM's Watson technology into the ODH, behavioral health treatment providers in cooperation with criminal justice stakeholders might be able to use predictive analytics to determine the likelihood of an individual suffering a mental health crisis, being arrested, or losing housing. Providers can target services to prevent the individual from winding up in an emergency room, psychiatric facility, or jail.

The ODH is costly. Otsuka and IBM have already spent between \$38 million and \$50 million to implement it. But the underlying system that the ODH would fix is very broken. It is not only expensive but inefficient for local governments to continuously incarcerate mentally ill individuals. Over five years in Miami-Dade County, 97 high utilizers were arrested 2,200 times; spent 27,000 days in the Dade County jail, and 13,000 days at an emergency room, crisis unit, or psychiatric facility; and cost taxpayers \$13 million.<sup>6</sup>

These kinds of statistics show how the health care and criminal justice systems have been responding to behavioral health needs in a reactive, episodic manner. With a high population of SMI individuals, Miami-Dade County needs the mental health and criminal justice sectors to work together in order to anticipate crises instead of being trapped in a continuous cycle of crisis management.

The connection between mental health and criminal justice is becoming more evident every day. Otsuka and IBM recognize this trend. The ODH is not just a project being developed for Miami-Dade County. It has a wider scope. As more communities recognize the costly implications of mass incarceration, they will come to see that they must also address mental illness.

Jurisdictions should pay close attention to the entrance of predictive analytics at the crossroads of health care and criminal justice. Predictive analytics are not a magic bullet that solves all problems but a technological attempt at restoring balance to an imbalanced system. By breaking down silos and analyzing data, predictive analytics can guide individuals into appropriate treatment instead of incarceration.

### **Impact Pro<sup>7</sup>**

The Otsuka-IBM project in Miami-Dade County revealed how resource-intensive a predictive analytics project can be. Moving from using predictive analytics to divert people away from criminal justice to actually treating people within the criminal justice system is in no way less costly. Although such investments in predictive analytics for health care delivery within jails or prisons would normally be outside the scope of a correctional institution's budget, the recent entry of a Medicaid managed care company into the health and criminal justice domain changes this picture.

In 2013, Centene Corporation, a Medicaid managed care company, joined with MHM Services, a provider of correctional mental and acute health services. Together, they created Centurion, a new correctional health care provider that, for the first time, will operate within corrections

using managed care principles. Centurion is the correctional health care contractor for the states of Tennessee, Minnesota, Massachusetts, and—as of 2015—Vermont.

As a joint venture, Centurion seeks to leverage the correctional experience of MHM with the Medicaid managed care experience of Centene. In addition, Centene shares with Centurion technologies that Centene uses to better manage its Medicaid patient population. These technologies include a predictive analytic tool, Impact Pro.

Impact Pro generates predictive models for patients. By using multiple algorithms to analyze a patient's data against an expansive health data repository of evidence-based and proprietary back-tested historical data, Impact Pro generates a predictive model that categorizes a person by risk:

- high-risk patients have multiple co-morbidities and a predicted possibility of hospitalization or high utilization of other medical resources;
- moderate-risk patients have one condition like asthma, congestive heart failure, kidney failure or diabetes; and
- low-risk patients have no chronic condition or have a condition that is well-managed.

Risk categorizations are not necessarily static. Over time, Impact Pro monitors ongoing health conditions as new data becomes available and can reclassify patients as needed.

The challenge for predictive analytics within a correctional environment is that an in-depth history of an inmate's health status is not always available. The accuracy of the predictive model that Impact Pro generates is obviously dependent on the amount of accessible health information. In the Medicaid managed care world, Centene can usually access claims data, medication lists, and laboratory results for its patients. In fact, when Centene enters a managed care market, it routinely receives from the Medicaid state agency six to 12 months of claims history to help ensure continuity of care. All this data gives a holistic view of a person's health profile and produces a better predictive model.

Even in cases where incarcerated people have a medical claims history, it may be difficult for Centurion to gain access to the claims data from the holder. However, Centurion is working with a state Medicaid agency for access to its claims data, which the state initially was reluctant to allow. Other sources of data for patients in corrections come from offender management systems, interfaces from correctional pharmacy suppliers, and HL7 feeds from laboratories that contract with correctional facilities. But basically the data about individuals must be built up over time through medical intake and the capture of health data generated from health care encounters.

Centene's and Centurion's use of predictive analytics is closely tied with utilization management. Utilization management provides evaluations on the appropriateness of and medical need for services using evidence-based criteria. In both correctional and non-correctional environments, these evaluations are essential for controlling costs while delivering quality health care.

Centene and Centurion employ a product called TruCare for utilization management. This tool, like Impact Pro, uses evidenced-based criteria to make care determinations. Users of TruCare can launch directly into Impact Pro and see medical history and indicators of future predictive values to help make better decisions about appropriateness of care.

With this shared technical infrastructure, Centurion can more easily implement approaches to health care that Centene developed for Medicaid managed care programs. For example, in the Commonwealth of Massachusetts prison system, Centurion is using Impact Pro to target individuals who could benefit from health intervention coaching. Using lab values and data on overuse of prescriptions and emergency room visits, Impact Pro identifies people who have conditions like diabetes and asthma that are not well controlled. Once identified, specialist nurses can assist each patient with a care plan. Just as in Medicaid managed care, this approach works better than reactively responding to acute crises and empowers each patient to better control his or her condition.

Furthermore, Centurion's leveraging of Centene's experience in Medicaid managed care and predictive analytics is playing a significant role in Centurion's contract with the Vermont Department of Corrections (DOC). Centurion's contract is the first correctional health services pay-for-performance contract in the nation.<sup>8</sup> Typically, contracts for health care in corrections have been structured around units of service, meaning that the provider must supply a certain number of practitioners and services to a correctional institution. The assumption was that health outcomes were linked to the specified number of providers and services. Unfortunately this assumption about health outcomes often is not valid. Many recent news stories suggest that units-of-service contracts for correctional health care do not guarantee good care or good outcomes.

The Vermont contract, however, directs resources to where they will have the greatest impact. Redirecting resources toward need is thought to better fit the often hectic environment of corrections—described as going from one unforeseen crisis to another. The pay-for-performance contract creates a financial incentive framework that promotes staying ahead of crises.

Similar to how Centene operates in the Medicaid managed care market, Centurion receives a capitated rate for each person incarcerated and a bonus for meeting pre-defined performance goals. Impact Pro's role in this contract is essential: ranking patients in a predictive model directs resources to those people at risk of a negative health outcome. Much like a Medicaid managed care model, this incentive model is designed to guard against negative outcomes while rewarding providers who meet performance metrics.

To help achieve the goals of the new pay-for-performance contract, Centurion is installing a correctional EHR called CorrecTek in the Vermont facilities. CorrecTek's data will be loaded into Centene's enterprise data warehouse so that the data is available to both Impact Pro and TruCare. In addition, Centurion plans to integrate data from Vermont's statewide HIE into Impact Pro as a part of the contract with the Vermont DOC. Because most of the correctional facilities where Centurion works are still using paper-based systems, connecting with EHRs and HIEs is a significant development for Centurion, enabling the capture of more data than a paper-based system.

Centurion has taken important and innovative steps in attending to the health care needs of incarcerated individuals, but just as important as treating people in corrections is preparing them for release. As many studies show, if a former detainee can be connected with health services shortly after release, the chance of recidivism decreases.<sup>9</sup> Impact Pro may be used to generate a health profile of a person who is preparing for release. This would assist clinicians and release planners in counseling the individual on how to manage his or her health conditions and medications following release. This potentially valuable use of the Impact Pro predictive model has not yet been applied outside the correctional environment.

The data gap between corrections and community at re-entry arises from disconnected information infrastructures. A key challenge to re-entry planning involves finding a health care provider in the community for the person being released, and then transferring health information from the correctional setting to that provider. Historically, the vast majority of justice-involved individuals have been uninsured, making it difficult for them to get health care in community settings. With the expansion of Medicaid eligibility in some states, that is starting to change. Still, connecting a newly enrolled justice-involved individual with appropriate providers in the community is challenging. Likewise, all the kinks in creating technological connectivity and interoperability have not been resolved. Despite the extraordinarily large investment in EHRs and HIEs generated by the HITECH Act, most health care providers have far to go before achieving connectivity and interoperability—and for providers in correctional settings trying to connect with community providers, the distance is even greater.

How Centurion is employing Impact Pro sets the stage for a time when all the pieces of the health and criminal justice puzzle are in place. As Centene moves into more Medicaid expansion states, a patient of Centurion in corrections at release might ultimately go on to become a patient of Centene in the community. The information from Impact Pro could easily be shared since both Centurion and Centene use the same enterprise data warehouse. This shared infrastructure is prescient. Some jurisdictions have already suggested that recidivism, like re-hospitalization or emergency department admissions in Medicaid managed care, might be considered a negative performance metric. Like the Otsuka and IBM project, predictive analytics could be used to identify a person at risk, address those risks, and hopefully help prevent reincarceration. These models of predictive analytics, however, are not the only tools to stop reincarceration. In the next case study, we will see how probation and parole can use predictive analytics to predict and assess the needs of an individual under community supervision.

### **RNR Simulation Tool<sup>10</sup>**

Otsuka and Centurion approached predictive analytics from a health data perspective: analyzing personal health data against historical population data to suggest a course of action. But predictive analytics have other uses. In probation and parole, risk assessment tools employ predictive analytics to determine appropriate levels of community supervision. These actuarial tools identify factors that are often related to health conditions, such as behavioral health issues and substance abuse. These factors also often contribute to reoffending, and studies have shown that treating these issues can lead to a reduction in recidivism.

Both Impact Pro and the ODH use historical data as the basis of their predictive analytics. The RNR Simulation Tool, however, uses a meta-analysis of research as the basis of its algorithms for predictive analytics. This is partly because probation and parole officers are not health care providers, and there's a big difference between identifying a risk and recommending a treatment to address that risk. The Risk-Needs-Responsivity (RNR) model is a well-regarded scientific framework that describes how jurisdictions can manage the step from risk assessment to identifying an appropriate evidence-based treatment for a justice-involved individual.

RNR categorizes the risks identified from a justice-involved person's assessment as either static factors or dynamic factors. Static factors are number of prior arrests, history of prior incarceration, history of prior probation violations, age of first arrest, and other past factors. Dynamic factors are substance abuse, education deficiencies, antisocial personality patterns, and pro-criminal attitudes. Once identified, the dynamic factors are treated as "needs." These factors are criminogenic and are responsive to evidence-based treatment. The "responsivity" component relates to identifying a unique evidence-based treatment regime for the individual based on the risks (static factors), needs (dynamic factors), and strengths of the individual. The RNR tool strongly emphasizes cognitive-based therapies.

The RNR framework is designed to identify criminal justice risk and use that information to assess treatment need. By using the RNR framework, probation or parole agencies can direct resources to where they are most needed.

The RNR model, however, is only a framework for using risk assessment to match an individual with a treatment program. Each jurisdiction must resolve how the data is obtained to assess an individual's risk, assign treatment, and identify appropriate providers to deliver the treatment. There are multiple challenges for jurisdictions wishing to use the RNR model. First, the information from an assessment needs to be interpreted in order to produce a treatment plan. Next, probation or parole officers need to identify a community provider that offers the needed treatment. Finally, gaps in a jurisdiction's provider network may make it impossible to get the right treatment for a particular person.

To address these challenges, the Center for Advancing Correctional Excellence in the Department of Criminology, Law and Society at George Mason University has developed the RNR Simulation Tool.<sup>11</sup> This web-based application gives jurisdictions the means to implement the RNR framework. It has three components: assessing an individual and matching with appropriate evidence-based treatments; classifying and assessing the adoption of evidence-based programming in available programs; and evaluating jurisdictional capacity to address programming requirements specific to population characteristics.

Similar to screening tools, the RNR Simulation Tool requires the parole or probation officer to enter 17 items, including the person's race, sex, and age. In addition, the tool requires data specific to criminal justice such as offense category, risk level, type of correctional setting in which the person is currently situated, length of time within the correctional institution, and the jurisdiction's definition of recidivism (i.e., re-arrest or reconviction within a specified time period ranging from one to three years). Health data includes a description of an individual's substance abuse or mental health conditions and health insurance status. Finally, there are life-

style questions involving work, education level, family involvement, housing, and criminogenic associations.

Using this information, the RNR Simulation Tool applies algorithms against a database of individual profiles and generates a recidivism prediction for the individual and treatment recommendations based on the individual's risk and needs. There are six categories of evidence-based treatment recommendations:

- substance dependence for cocaine/opioids/methamphetamines
- criminal thinking/cognitive restructuring
- self-improvement and management
- interpersonal skills
- life skills
- supervision/punishment

Multiple evidence-based treatment programs may be suggested for an individual. In turn, each recommendation is scored with a recidivism predictor based on the individual's assessment.

The web screening survey is not the only means by which the RNR Simulation Tool generates recommendations for individuals. It integrates assessment tools and works with data from a variety of sources. The Center for Advancing Correctional Excellence is experimenting with an API version that will seamlessly transfer information from an assessment tool to the RNR Simulation Tool, thus eliminating the need to re-enter data manually.

An individual's success in a given treatment program depends not only on how fully that person engages in treatment, but also on the program's use of best practices. To identify areas for program improvement, providers complete a self-evaluation survey that takes about 45 minutes and includes descriptions of the treatment offered by the program, staffing, and the patient population being served. Treatment data includes dosage (i.e., participation requirements), location of treatment, evaluations, and funding sources. Staff information requires details about qualifications, professional degrees, and training. Population characteristics include demographics, criminal justice involvement, and percentage of individuals who complete the program.

Once the survey is completed, the RNR Simulation Tool produces a report on the program's strengths and weaknesses. This assessment evaluates how well a program identifies risks, targets needs, and provides the right level of treatment (responsivity). The report provides structural assessments of how a program is implemented, whether it provides a sufficient dosage of treatment, and whether restrictions on individual freedom are required for more effective treatment.

Every jurisdiction is different and the need for various control and treatment programs will vary among jurisdictions. Some jurisdictions might need all treatment programs, but for others

a subset will suffice. The third component of the RNR Simulation Tool, Assess Jurisdiction Capacity, details how a jurisdiction should allocate its programming resources. To get a picture of the treatment program landscape, the RNR tool analyzes data about the targeted population: demographics, education levels, family structures, criminal activity, and incidents of substance and mental illness. It then generates a report specifying the best program matches for that jurisdiction.

This trio of tools to decrease recidivism through predictive analytics, treatment matching, and assessment of jurisdictional capacity is particularly germane to the current political climate. National interest in finding alternatives to incarceration is growing. This is most evident in California. In *Brown v. Plata* (2011), the U.S. Supreme Court ordered the state to remedy prison overcrowding. In response, the state legislature passed AB 109, which requires individuals sentenced for non-serious, non-violent or non-sex offenses to serve their sentences in county jails instead of state prisons. In addition, the law moved the supervision of designated parolees from state parole to county probation. To address this new burden, Santa Cruz County and San Francisco Probation are using the RNR Simulation Tool to implement the RNR framework.

The Santa Cruz County Probation Department is focusing first on assessing community providers. With the RNR Simulation Tool, the probation department can determine whether providers are using treatments associated with successful outcomes. Using the generated assessments as a guide, providers select two or three areas for improvement and modify their program accordingly. Six months later, providers are re-assessed. Through this process, the probation department decides whether to continue contracting with a provider.

The RNR Simulation Tool also has a component to assess jurisdiction capacity. The probation department can use this assessment component to contract with providers who actually meet the needs of people the probation office is supervising.

The provider network for the project is still under development. Currently, the probation department uses the Correctional Assessment and Intervention System (CAIS) for assessments. By fall 2015, a new API interface between the CAIS system and the RNR Simulation Tool will automate individual assessment and provider identification.

To monitor the recidivism rate and evaluate effectiveness of the RNR Simulation tool, the county has begun to integrate the jail management system with the probation office's case management system. In addition, because AB 109 provided an option for convicted offenders to serve either a full or a split sentence, California inadvertently created an environment with a control group and a treatment group that Santa Cruz County can study. Those individuals on probation will receive treatment, while those individuals serving a full sentence will not. To improve the predictive analytics of the RNR Simulation Tool, the data from Santa Cruz's case management, assessment tool, and recidivism rates will be integrated into the underlying databases.

What is obvious already is that the probation office needs a fuller range of programming than is currently available. Poor outcomes may stem in part from probationers being placed in programs that do not address their needs. A substantial infrastructure must be built in order for

the RNR framework to be implemented. This issue is not unique to Santa Cruz County, and it's very likely that other probation and parole offices that use the RNR Simulation Tool in this way will encounter it as well.

Even though health providers, like probation and parole officers, may be using predictive analytics for the first time, their task is far less complicated than that of probation or parole officers. Health providers use predictive analytics of health data to respond to health needs and risks. In addition, they can tap into an existing infrastructure of treatments, providers, and protocols to address those needs and risks.

Probation and parole officers using the RNR Simulation Tool are basing predictions on criminal justice data and using those predictions to inform their selection of treatment and services available in the community. Furthermore, the probation and parole departments need to ascertain what types of providers are needed to reduce recidivism risk and the adequacy of those providers. The success of the predictive analytics for justice-involved individuals is not judged by health outcomes but by recidivism rates.

Clearly, for probation and parole, the concerns of criminal justice are primary. However, the RNR Simulation Tool creates a bridge for understanding the health issues that often contribute to justice involvement. At the same time, the RNR Simulation Tool gives probation officers an idea of how such a treatment will affect recidivism. Like the other predictive analytic projects reviewed here, the RNR Simulation Tool is not a stand-alone solution, but it gives its users—probation and parole officers—an evidence-based way to manage a complex clientele.

## Conclusion

The three initiatives described here are at various stages of implementation. Two projects—the ODH in Miami-Dade County and the RNR Simulation Tool in Santa Cruz County—are in development. And while Centurion is using Impact Pro at multiple institutions, the company is still translating its parent company's Medicaid managed care experience to a correctional environment.

Nevertheless, these three case studies show that predictive analytics can serve health care and criminal justice in two ways. The first way is health-centric. By tracking health data, predictive analytics can generate risk assessments that help ensure that individuals receive timely and appropriate evidence-based treatments both in the community and in correctional settings. The second way is oriented toward criminal justice and is aimed at reducing criminal justice involvement. These two objectives are inextricably tied: If unmet health needs drive an individual's involvement with public safety, then evidence-based community treatment of those needs is an appropriate and cost-effective societal response.

Health-related objectives take precedence over criminal justice when individuals are in the community and an appropriate community support system is in place. Precedence shifts toward criminal justice, however, when a person becomes justice-involved and enters that system, where the primary duty is to uphold public safety. Health takes a secondary role. For example,

probation and parole are first and foremost concerned with recidivism, which may be affected not only by health but by many other factors, such as gang membership. This primacy of criminal justice was most clearly reflected in the RNR Simulation Tool.

There is, however, a more basic tension between health care and criminal justice that pertains to data sharing, which is prerequisite for predictive analytics. As mentioned, accessing or capturing big data can be challenging. Health care providers frequently are reluctant to share data with criminal justice, for several reasons, including lack of familiarity with and understanding of the criminal justice system and concern that sharing health data with criminal justice could violate patients' right to privacy and lead to their prosecution. These issues emerged in the Impact Pro and ODH initiatives, and, while not insurmountable, health care and criminal justice stakeholders need to work through them together. A different tension arises around the RNR Simulation Tool: As criminal justice agencies try to connect a justice-involved individual with services in the community, they need to assess and evaluate the quality of provider programs that previously were not subject to objective scrutiny.

But even amid these tensions, predictive analytics hold clear benefits for both health care and criminal justice. Throughout the three case studies, we saw that untreated behavioral and mental health issues contribute to many encounters with public safety. Predictive analytics as a proactive tool can help health care providers anticipate or react to crises and keep their patients out of the criminal justice system. Keeping people in the community instead of incarcerating them means that providers can treat patients more effectively and efficiently. It also reduces the burden on police, courts, and jails.

Court decisions and legislation provide further impetus for health care and criminal justice to work together around predictive analytics. Overcrowding at prisons is now a constitutional issue. The potential for predictive analytics to identify ways to divert people out of corrections makes it an attractive technology. And, with the passage of the Affordable Care Act and the expansion of Medicaid eligibility in some states, many people who cycle through the criminal justice system will, for the first time, have access to health insurance. As Centene and Centurion recognized, Medicaid claims are an incredibly valuable source of health data that can be used to support predictive analytics. As more data becomes available, more accurate predictions can be generated.

Finally, broader forces may drive health care and criminal justice to collaborate on predictive analytic solutions. As the conditions and the costs of corrections become widely known, politicians and interest groups from both the right and left are looking for ways to reduce the incarcerated population. Predictive analytics could help them achieve that goal. Diverting individuals to treatment is far less costly than incarceration and receiving treatment in the community is far more humane.

Furthermore, as pay-for-performance contracting takes hold in the health care industry, companies like IBM, Otsuka, and Centene/Centurion are seeing that the silos between health care and corrections must come down. Pay-for-performance contracting requires understanding that all sectors of health care, especially those sectors like corrections that serve the most vulnerable populations, are connected. To better manage the health care of individuals cycling through the

criminal justice system, the data from these two systems must be unlocked and shared. Predictive analytics will be essential for interpreting this new form of big data. And although the three case studies presented here are still in their early stages, in five or ten years, the kinds of initiatives they represent may be the rule rather than the exception.

### Endnotes

- 1 See [http://www.compstat.umd.edu/what\\_is\\_cs.php](http://www.compstat.umd.edu/what_is_cs.php).
- 2 See <http://rutgerscps.weebly.com/rtm.html>.
- 3 Information on the ODH Platform is based on interviews and correspondence with Laura Naredo, vice president for continuous quality improvement, South Florida Behavioral Health Network; and Tim Coffey, coordinator, Eleventh Judicial Circuit, Criminal Mental Health Project.
- 4 See <http://www.jud11.flcourts.org/scsingle.aspx?pid=285>.
- 5 Judge Steven Leifman, chair, Task Force on Substance Abuse and Mental Health Issues in the Court, Supreme Court of Florida, "Ending the Criminalization of Mental Illness," speech to Prosecutors Against Gun Violence, March 24, 2015, [http://www.cochs.org/files/mental-health/Mntl\\_Hlth\\_Presentation\\_Leifman.pdf](http://www.cochs.org/files/mental-health/Mntl_Hlth_Presentation_Leifman.pdf).
- 6 Ibid.
- 7 Information on Impact Pro is based on interviews and correspondence with Keith Leuking, operations director, Centene Corporation.
- 8 See [http://www.cochs.org/files/vermont/cochs\\_pay\\_for\\_performance\\_in\\_corrections.pdf](http://www.cochs.org/files/vermont/cochs_pay_for_performance_in_corrections.pdf).
- 9 David Mancuso and Barbara Felver. Providing Chemical Dependency Treatment to Low-Income Adults Results in Significant Public Safety Benefits. Washington State Department of Social and Health Services, Research and Data Analysis Division. February 2009.
- 10 Information on the RNR Simulation Tool is based on interviews and correspondence with Faye Taxman, professor in the Criminology, Law and Society Department and Director of the Center for Advancing Correctional Excellence at George Mason University; and Andrew Davis, senior departmental administrative analyst, Santa Cruz County (Calif.) Probation Office.
- 11 See <http://www.gmuace.org/tools/>.