Combined DNA Index System (CODIS)-Based analysis of untested sexual assault evidence in Palm Beach County Florida

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ABSTRACT

In August 2015, the Palm Beach County Sheriff’s Office (PBSO) initiated a CODIS-Based Sexual Assault Evidence Testing Initiative, hereafter referred to as the Initiative, as a direct result of the ongoing national inquiry about the number of untested sexual assault cases having DNA evidence stored in law enforcement agency vaults. The Initiative was designed to research sexual assault related evidence including the estimated 1800 untested sexual assault kits stored in the custody of Palm Beach County Law Enforcement Agencies to determine if probative evidence was available, conduct DNA testing on the evidence, and enter all eligible DNA profiles into the CODIS database. Between December 2015 and July 2018 more than 5500 cases were researched and evaluated resulting in evidence from 1,558 cases spanning a 43-year period being tested at a cost of $1,032,496. Nearly 44% of all cases tested provided CODIS-eligible profiles and 36% of those eligible profiles generated a CODIS hit. The positive impact of this Initiative, while already realized by Initiative-related arrests, will continue to grow as additional CODIS hits are generated and investigated by PBSO law enforcement partners. Ultimately, the Initiative will provide information to criminal investigators and the courts including exonerating the innocent, bringing closure to victims, and helping convict the true perpetrators.

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1. Introduction

The Palm Beach County Sheriff’s Office (PBSO) was established in 1909 to serve and protect over 2000 square miles of unincorporated Palm Beach County. The population reached nearly 350,000 people across 24 municipalities in the 1970s; during that time, the Palm Beach County Sheriff’s Office established a crime laboratory. The laboratory tested crime scene evidence for biological material using serological methods for saliva, blood, and semen to provide county law enforcement with potential investigative leads.

In 1993, the first DNA-related tests were conducted at PBSO on crime scene evidence and since then, the Forensic Biology Unit (FBU) has continuously introduced cutting-edge DNA technologies to offer higher degrees of discrimination between and among individuals. A critical addition to PBSO’s DNA testing program came in 1997 with the installation and application of the FBI searchable DNA database called the Combined DNA Index System (CODIS), a software program designed to store and search DNA profiles at the local, state, and national levels. As a powerful investigative tool, CODIS can match a DNA profile from one crime scene to an individual or a DNA profile obtained from another crime scene. The combination of generating DNA profiles from criminal cases along with using the capabilities of CODIS has provided valuable information to law enforcement agencies (LEAs) worldwide.

To initiate DNA testing on a case in the PBSO FBU, an LEA representative must submit a completed request form as per protocol and then submit the evidence. All requested cases are added to a work list for assignment and then tested. Based on this protocol, evidence, including sexual assault kits (SAKs), that has not been requested for testing remains on shelves in evidence vaults. An untested sexual assault case is any case that has potential DNA evidence and a request for testing that evidence has not been submitted.

Although there has been significant research conducted as to why untested SAKs have languished on evidence vault shelves, no definitive cause has been identified [1]. Law enforcement practices,
statutory mandates, victim services, victim rights, DNA technologies, and database search algorithms have all evolved over the past few decades to provide justice for victims, falsely imprisoned defendants, and to identify perpetrators; these changes have come as a result of intense scrutiny of the national issue of untested SAKs.

In August 2015, the PBSO initiated a CODIS-Based Sexual Assault Evidence Testing Initiative. The Initiative was a direct result of the ongoing national inquiry about how many untested sexual assault cases have evidence stored in LEA vaults [2]. In 2015, the Florida Department of Law Enforcement (FDLE) requested information from LEAs regarding Florida’s untested kits through the “Assessment of Florida’s Unsubmitted Sexual Assault Kits” survey [3]. Palm Beach County LEAs estimated 1800 SAKs were untested. As a result, the PBSO Initiative concentrated on the laboratory’s role of working through untested sexual assault evidence in Palm Beach County.

The three-fold purpose of the Initiative was to research all untested evidence stored in the custody of Palm Beach County LEAs, determine if probative evidence was available, and conduct DNA testing. The PBSO launched the Initiative to analyze untested sexual assault evidence for several reasons. For instance, significant improvements in the testing of sexual assault evidence have been made over the years; additionally, new best practices and resources have been developed and implemented to aid in case resolution. Importantly, this Initiative provided a process whereby all Palm Beach County LEAs could identify and submit untested sexual assault evidence—regardless of how long ago the crime occurred—and ultimately enter all eligible DNA profiles into the CODIS database. The appropriate LEAs received CODIS search results to use as potential investigative leads. As part of this Initiative, the JusticeTrax Laboratory Information Management System was updated and simplified to make the database more efficient, informative, and easy to query. Finally, conducting research, evaluation, and testing on untested sexual assault evidence potentially provides investigative leads, identifies serial rapist, offers resolution to the victims and allows a means to improve policies in the laboratory, law enforcement and the courts.

This report describes the Initiative protocol design, research and evaluation of stored untested sexual assault evidence, final testing, and CODIS results for 1558 Palm Beach County sexual assaults that occurred from 1973 through June 30, 2016. Of those crimes, 686 cases had CODIS-eligible profiles; as of April 5, 2019, there were 261 CODIS hits. The final cost for the Initiative was $1.03 million. While the Initiative has ended, the impact to LEA investigations will continue well into the future as LEAs continue to receive and investigate new CODIS database hits.

2. The strategy

The PBSO Crime Laboratory is one of many LEAs across the nation that has conducted a review of untested sexual assault evidence. The PBSO decided that an Initiative (1) to determine the number of cases with untested sexual assault evidence across the county and (2) to develop a testing procedure would require a multidisciplinary approach. Stakeholders were brought together to develop a plan for the Initiative. These stakeholders included staff from the PBSO Crime Laboratory Management Division, FBU, Evidence Unit, and Special Investigations Division; PBSO executive staff; budget personnel; representatives from all Palm Beach County LEAs; and individuals from a private vendor, Bode Cellmark Forensics, Inc. (Bode). In addition, the Palm Beach County Law Enforcement Planning Council (PEPC), which includes all Palm Beach County Chiefs of Police, provided a forum for communicating with the county LEAs throughout this Initiative (Appendix A). All stakeholders were encouraged to participate in the development of the Initiative plan.

This report describes the results of the Initiative based on the following goals:

1. Assessing the scope and securing funding to test sexual assault evidence
2. Developing a research and evaluation protocol
3. Selecting a testing site, as well as testing protocols and evaluation of testing results
4. Entering eligible DNA profiles into CODIS and notifying law enforcement of case results

Testing all SAK evidence within 3 years from when they were first submitted and determining the Initiative’s efficacy based on outcomes were critical to defining the Initiative. To ensure goals were met for this time-sensitive Initiative, flexible milestones within the first 2 years were designed to encourage completion of the plan's objectives.

3. Assessing the scope and securing funding to test sexual assault evidence

Assessing the scope of the Initiative was a dynamic process and took nearly 10 months to construct. As the research process moved forward during these initial months, the scope broadened. Early on, Initiative leaders decided that the PBSO would not “forklift” all sexual assault evidence; in other words, a “test-all” strategy would not be implemented. This strategy would not be necessary because the total number of cases requiring research and submission of evidence for testing was estimated to be manageable for existing staff. The scope ultimately included researching and evaluating sexual assault evidence submitted from the early 1970s through June 30, 2016, a 43-year period. June 30, 2016, was selected as an end point because Florida State Statute 943.326, “DNA evidence collected in sexual offense investigations,” became effective on July 1, 2016 [4]. This statute essentially requires all sexual assault evidence submitted after June 30, 2016, to be tested within 120 days of submission to a forensic laboratory, excluding non-reporter and unfounded cases. The statute diminishes the possibility that sexual assault evidence collected after this date would remain untested and stored on an evidence vault shelf for an extended period of time.

Untested cases were researched and evaluated—even if original reports indicated that the victim did not cooperate with law enforcement or the judicial system, the victim could not be located, the suspect stated that consensual sex occurred, the case was closed through plea agreement, the State Attorney’s Office declined case prosecution, or the statute of limitations had expired.

Therefore, the Initiative scope includes any sexual assault case in which evidence was in the care and custody of a county LEA, regardless of the evidence submission date. The scope was divided into two parts. The first census effort was to determine the number of cases with evidence in PBSO Evidence Unit vaults and the second census effort was to determine the number of cases with evidence in non-PBSO LEA Evidence Unit vaults. FDLE survey results guided this effort; as part of the survey, county LEAs estimated the number of cases with untested sexual assault evidence within each jurisdiction. The total number amounted to approximately 1800 cases with untested sexual assault evidence [1].

JusticeTrax queries were conducted for the PBSO untested sexual assault case census. JusticeTrax was purchased in the mid-1990s for the PBSO Crime Laboratory to document forensic evidence submission data. The JusticeTrax sexual assault case census queries were informative, though in a different way than originally expected.

Early projections estimated (1) that approximately 2300 sexual assault case numbers would be identified in the initial query and
that documentation related to the status of each case as well as the total volume of available evidence would define the scope of the Initiative. The first JusticeTrax query showed more than 5500 sexual assault cases in PBSO custody. The predicted number differed from the actual number of sexual assault cases because of incomplete case information in the database and inconsistent descriptors. One of the most basic issues was that over 50% of the sexual assault cases had already been tested, but this information had not been documented in JusticeTrax. Another challenge was that a uniform language to define a sexual assault case did not exist. JusticeTrax entries included terms such as 35/3 (sexual assault) and 43/43 (lewd and lascivious) or other crime identifiers, complicating the identification of sexual assault cases. Furthermore, some sexual assault cases were entered into JusticeTrax without an offense code; therefore, that evidence was not included in the initial scope query.

Challenges arose when sexual assault cases had been submitted but it was not clear if the evidence had been tested because a report was never added into JusticeTrax. Research determined a plea agreement had been reached in some of the cases and the evidence was never tested. In other instances, a report existed but was not readily accessible because the case occurred prior to JusticeTrax implementation. Further complicating research was that the database did not indicate a report had been written for a case but the evidence had not been tested. In most of these cases, the evidence had only been preserved for the possibility of future testing. Likewise, reports may reveal DNA testing was conducted on a case but the testing method involved outdated technology. Where appropriate, these cases would need to be retested using the current technologies and entered into the CODIS database.

The second census effort began in May 2016 at the monthly LEP meeting in West Palm Beach when the Initiative was introduced to all LEA Police Chiefs in the county. The PBSO research and evaluation census had been underway for 10 months at the time of the LEP presentation and a majority of the Initiative challenges had already been identified and addressed. The presentation included the purpose of the Initiative; the status of the PBSO untested sexual assault case census; and an invitation for any LEA to submit untested sexual assault evidence for crimes that occurred before July 1, 2016. The PBSO budget would be used for all non-PBSO cases—including shipping, testing, and reporting results to all LEAs.

LEAs were asked to assess the status of their untested sexual assault cases for testing by March 2017; this timeline gave all LEAs a year to audit, locate, and prepare sexual assault cases for submission. By the end of the Initiative, evidence in sexual assault cases would be tested for 13 law enforcement jurisdictions.

The PBSO FBU could not sustain DNA testing for the county’s current criminal cases plus an estimated 1500 additional sexual assault cases that required testing under the Initiative. Therefore, outsourcing the Initiative sexual assault case evidence for testing was determined to be the most efficient option. Securing the Initiative funding for evidence testing was accomplished in a single phone call when Sheriff Ric Bradshaw asked how much financial support would be needed to test all of Palm Beach County’s untested sexual assault evidence. The cost for testing was estimated to be approximately $1 million, in addition to overtime funding necessary for initial research and case evaluation.

Sheriff Ric Bradshaw immediately secured funding for the Initiative in the fiscal year (FY) 2015 budget and provided support through the end of the Initiative. The projected budget included testing sexual assault evidence, oral standards, and shipping associated with the Initiative; the budget was based on the number of SAKs and the year they were collected. The actual cost of the Initiative included shipping batched cases for testing and completion of testing. Note that a batch was typically defined as 200–400 sexual assault cases. Testing untested SAKs began in December 2015 and ended with the last batch shipment in July 2018. This included testing evidence for 1558 cases, which would ultimately cost $1,032,496.

The first untested SAKs were submitted in Quarter 4 (Q4) of 2015 and the first invoice was approximately $175,000; 2016 (Q1, Q2, Q3) with an estimated cost of $550,000; 2017 with an estimated $250,000 cost; and less than $100,000 for 2018. The average cost to test each sexual assault case equaled $668. In addition to the Initiative testing costs, funding for an estimated 1000 h of overtime was provided through other budgetary means in order to research cases and update the JusticeTrax database; this funding is not included in the testing budget. The budgetary requirements were an essential component in ensuring that the Initiative deadline could be met. Post-Initiative, sexual assault evidence not originally identified during the census will be researched and tested where appropriate.

4. Developing a research and evaluation process

As previously mentioned, this Initiative was primarily conducted to determine if a DNA profile from untested sexual assault evidence could be entered into CODIS and potentially provide an investigative lead for law enforcement. To this end, a decision tree for the research and evaluation process of the Initiative was designed to ensure consistency when assigning a final conclusion for each case.

Prior to conducting a comprehensive evaluation of each case, criminal justice databases integral to the success of the Initiative were used extensively to determine if a sexual assault evidence was to be tested. These secure database programs included the following:

JusticeTrax was the most extensively used database throughout this Initiative. JusticeTrax housed all metadata associated with the crime laboratory’s forensic units—including previously submitted information and information related to tracking Initiative status.

The PBSO CODIS database and the State of Florida CJnet FDLE CODIS database provided information about the status of any case-related DNA profile. This included entering a suspect’s name from a sexual assault case into CJnet to determine if the suspect had a DNA profile at the state level and the type(s) of case(s) associated with that suspect.

The PALMS mainframe database, which houses PBSO law enforcement reports, was regularly used to verify descriptive metadata associated with sexual assault cases. This included verifying birthdates, spelling of names, supplemental reports, suspect status, consensual information, and other documentation.

The STAC database, a secure criminal case information database administered by the State Attorney’s Office 15th Judicial Circuit, was utilized to provide or confirm the status of criminal cases.

Showcase database information is administered by the Clerk of the Court and was routinely used to determine the adjudicated disposition of sexual assault cases.

Corrections Offender Network provided criminal offender information, which was used to link the arrestee to a particular court case to indicate an adjudicated status.

When information was not available in any of these databases, the original casefiles were located and researched to evaluate each case. This process was usually for sexual assault cases that occurred decades ago. Case information was garnered from original hardcopy casefiles or from logbooks stored in the Forensic Division’s casefile room. The case documentation obtained was continuously referred to throughout the Initiative, whether it was for DNA results, evidence and/or DNA standards available for testing, individual parties associated with a case, for example, consensual partners or suspect information, as well as case summary details. Victims and/or suspects were never contacted for additional case details or DNA standards. Early in the Initiative, a decision was made to enter all documentation regarding a case’s CODIS status into JusticeTrax.
This information would support all final decisions and whether to test a case. As shown in Fig. 1, interrogation of each sexual assault case was primarily based on two questions: “Was a crime committed?” If yes, “Was a DNA profile entered into CODIS?”

However, reporting information about sexual assault cases over the past 50 years had not routinely been entered using searchable, uniform terminology. This is understandable because JusticeTrax was not available for nearly half of the 43-year span covered during this Initiative. Further, the CODIS database has evolved considerably over the past 25 years—including the addition of new DNA markers, improved searching algorithms, rules for entering eligible profiles, and increased types of indices within CODIS. As a result, this Initiative offered the crime laboratory the opportunity to evaluate all integral database information to develop a comprehensive, searchable JusticeTrax.

To more effectively evaluate the approximately 5500 sexual assault cases identified during the PBSO sexual assault case census, standardized terms were designed to document the statuses of sexual assault evidence in JusticeTrax. Standardized terms were beneficial not only for this Initiative but also for ongoing requests for information—such as monthly laboratory statistic reports, requests from the Special Investigations Division for sexual assault case status, freedom of information requests from the media, and status checks for compliance with Florida State Statute 943.326 [4].

Although there was an extensive and important administrative effort to renovate JusticeTrax’s search capabilities, the primary purpose of this review is to summarize the laboratory testing results of the Initiative cases. As a result, a comprehensive description of the JusticeTrax uniform language effort will not be detailed here. However, efforts to update JusticeTrax have led to an improved database that includes supporting documentation for queries, such as the status of whether sexual assault evidence is to be tested. All sexual assault evidence would eventually be classified as a “Requested,” “Do Not Work,” or “Analyzed.”

As stated, the Initiative was CODIS-based. The laboratory does not have any control over the sworn-officer investigation or prosecutorial arm of the judicial system; however, the laboratory does have control over the judicial system’s analytical investigative arm. Cases were researched to determine if evidence would be tested as part of this Initiative; this approach ensured that any DNA profile possibly linked to a sexual assault was in the CODIS database. This means that if the suspect’s DNA profile is in CODIS for an untested sexual assault case, a victim may be assured that the profile will be continuously searched in the database.

The Research and Evaluation Process outlined in Fig. 1 was used as a decision support system to ensure that the results and conclusions for the more than 5500 cases in the Initiative were established by applying the same methodology. The criminal justice databases were critical for determining whether documented, current CODIS information existed. The initial question for all sexual assault cases in the Initiative was about if the case was a criminal case.

4.1. Criminal Case—No

When a sexual assault case was researched and determined by the criminal investigators not to be a criminal case, the case was not tested. These cases were categorized by the laboratory, regardless of the initial criminal report, as one of the following:

1. MEO (Medical Examiner’s Office): If the sexual assault case was from the MEO and no request was submitted to the FBU, the case was not worked. It was not unusual for a SAK to be collected as a precautionary measure in death cases; however, the need to analyze this evidence is rare. Further research and evaluation was discontinued. However, if the MEO submitted a request for analysis, the evidence was tested.

2. Non-reporter: If the sexual assault case was from a non-reporter, the case was not worked. Further research and evaluation were discontinued. PBSO adopted the FDLE “Sexual Assault Kit Frequently Asked Questions” handout, defining a non-reporter as “… one who did not authorize reporting the assault to law enforcement, therefore no police or incident report exists. The medical provider will still carry out the complete forensic and

* = research determined evidence was available for testing and testing would advance the case
** =research determined that possible suspect evidence was available for testing

Fig. 1. 2015-SAEKI – research and evaluation process.
medical examination and the evidence will be preserved and maintained in a manner that protects the identity of the victim. If the victim later chooses to file a report with law enforcement, he or she must sign a release authorizing the medical provider to make their identity known and the forensic examination record available to the law enforcement agency” [5].

3. Unfounded: If the sexual assault case was reported as unfounded in that no crime was committed, the case was not worked. Further research and evaluation were discontinued. As previously cited, “unfounded” does not include situations in which the victim refused to participate in the judicial process, the judicial system has not entered any charges in the case, the victim declined to cooperate with the investigation, the victim cannot be located, the suspect cannot be located, or the statute of limitations has expired.

4.2. Criminal Case—Yes, biological material

If the sexual assault evidence had been analyzed in a criminal case but there was no biological material detected, then the case was classified as “Analyzed” and further research and evaluation were discontinued. In some cases, in which DNA was detected and a CODIS-eligible profile was obtained and entered into CODIS, the case was classified as “Analyzed” and further research and evaluation were discontinued. There were also cases in which a DNA profile was generated but it was not CODIS eligible. Additional research was conducted on these cases. After completion of this research these cases generally resulted in two categories:

1. Further research and evaluation was discontinued if:
   - The DNA profiles matched a victim or an elimination sample. (Note: that an elimination sample is taken from an individual who is not considered a perpetrator or is not connected to the sexual assault but whose DNA may be present.)
   - The profiles were uninterpretable or partial profiles were obtained.

2. Additional testing would be beneficial:
   - Cases in which original DNA testing was done using older or less-sensitive technology

Considering all of the cases researched under the previously stated criteria, approximately 2700 sexual assault cases from the more than 5500 cases identified in the original scope of the Initiative did not need any further testing because the evidence had already been sufficiently analyzed.

4.3. Criminal Case—Yes, suspect information

If the sexual assault case was a crime and there was biological evidence but DNA had not been detected, the case was researched to determine if a suspect had been documented in a report and additionally if the suspect was in the CODIS database. Likewise, a criminal case that had not been tested was also researched to determine if there was a suspect reported and if the suspect was in the CODIS database. Note that a suspect may have been in the FDLE CODIS database as a result of a conviction for a felony offense, certain misdemeanor offenses, or an arrest for a felony as cited in Florida State Statute 943.325 [6]. As this was a purely CODIS-based initiative, that is if the suspect was in CODIS—whether it was for the sexual assault case being researched or an unrelated criminal case—further research and evaluation would be discontinued. However, the suspect being in CODIS was not the lone factor in determining that the evidence in a criminal case would not be tested. The other primary factor was whether analysis could potentially further the prosecution of the case being researched, including the following:

- If the case being researched reported consensual information, no further research was necessary because the suspect’s sexual contact was not in question and the suspect’s DNA profile was in CODIS.
- If the case being researched had been adjudicated guilty and the suspect’s DNA was in CODIS, no further analysis was necessary.
- If the suspect was in CODIS for a different case and testing evidence in the case being researched might assist in adjudication, analysis may be conducted on a case-by-case basis.

Although not originally part of the scope of the Initiative, the possible value of testing evidence in cases in which the suspect is already in CODIS was a reality that was not ignored.

The research and evaluation process resulted in the identification of 1558 cases to be tested for this Initiative. Fig. 2 shows that the earliest sexual assault case identified for testing was a single case from the year 1973. Over a 43-year span ending on June 30, 2016, there was at least one case identified; within this span, only the year 1974 did not provide a case for review. Each dot in Fig. 2 represents a sexual assault case and the year of the assault. Each dot’s color represents the law enforcement jurisdiction in which the assault was reported. The PBSO cases are indicated in dark green. Although approximately 70% of all cases tested in the Initiative were from the PBSO, these cases represented not only unincorporated Palm Beach County but also LEAs that had submitted evidence still in PBSO’s care and custody at the time of the Initiative. The majority of the sexual assault cases tested for the Initiative were from the 1990s or after. Note that there are law enforcement jurisdictions that were ultimately incorporated or contracted into PBSO throughout the 43-year span of the Initiative (Appendix A, see*). Fig. 3 shows the number of sexual assault cases from Palm Beach County LEAs that were ultimately tested for the Initiative.

Identifying potential biological evidence for possible testing was related to determining the CODIS status of a sexual assault case. The location and category of evidence in each case would ultimately be entered into JusticeTrax and were defined as follows:

Sexual Assault Kit: A query in JusticeTrax showed that there were many cases in which the original SAK was stored in the Evidence Unit. The original SAK was usually one designed by FBU staff in collaboration with medical professionals and provided to Palm Beach County LEAs and medical facilities. A typical PBSO SAK contains envelopes with sterile swabs used for the collection of forensic evidence and instructions regarding the preservation of biological evidence. The number and types of evidence collection devices within the SAK have evolved over the past 50 years. For example, in 2017 the National Best Practices for Sexual Assault Kits: A Multidisciplinary Approach was published by the National Institute of Justice and recommend swabbing, not scraping, the underside of the fingernails during the victim’s medical examination [7]. Subsequently, the PBSO SAK was modified to reflect these recommendations.

The Sexual Assault Kit category also refers to those cases in which the evidence type was either not indicated, usually from other LEAs, or the evidence could not be categorized in another way. For example, there was evidence labeled as “swabs,” “gauze,” “panties,” “napkins,” or other descriptors within the sexual assault case.

Sero/DNA Bag: On occasion, evidence from a SAK would be transferred to a preservation container, called a “Sero/DNA bag,” which was stored in an offsite building that maintained a constant temperature. The Sero/DNA bag represents the evidence in the original SAK. In some cases, the PBSO Evidence Unit retained the
SAK with the evidence removed and preserved; in other cases, the SAK had been destroyed as per standard operating procedure. Regardless, the Sero/DNA bag represents the original evidence in a sexual assault case.

**Oral Standards:** Swabbing the inner mouth cheeks from a known individual provides a DNA standard for that individual, which is used for DNA profile comparisons. The research and evaluation process of this Initiative included the verification of suspect and victim names and birthdates associated with oral swab evidence, and all additions and corrections were entered into JusticeTrax with as much descriptive information as possible.

**Slides:** In several instances, the only evidence in the sexual assault kit were smear slides prepared from oral, vaginal, or rectal swabs in which sperm cells were detected microscopically.

The total number of cases to be tested was 1558—with 1700 items submitted for testing as a part of the Initiative. Fig. 4 shows the number and types of evidence tested for each Palm Beach County LEA.

Nearly 73% (1233) of the evidence from the original SAKs was submitted for testing and 25% (416) of Sero/DNA bags with sexual assault evidence was submitted for testing. It is important to note that a SAK and a Sero/DNA bag are considered to be a single type of evidence; however, within the physical SAK and Sero/DNA bag, there are several sources of potential forensic biological evidence that have been collected and at least three of these samples have been tested usually. These include the oral swabs, vaginal swabs, and rectal swabs from the victim; depending on the circumstances and testing results, other evidence that may have been preserved in
the SAK could be tested. In addition, standards from individuals and—in three cases—slides from the SAK were tested. Considering the evidence within the SAKs and the Sero/DNA bags, more than 5000 actual individual items were tested.

The research and evaluation of sexual assault cases included verification of whether a case was a suspect or no-suspect case. Of the 1558 cases to be tested, 79.4% of the cases (1,238) had verifiable information regarding perpetrator status, either a suspect or an “unknown suspect” was reported. In 320 cases, the status of a suspect was unclear.

Fig. 5 shows initial case information for each participating LEA based on cases with perpetrator information. In the graph, the “S” column depicts the number of LEA cases with a reported suspect and the “U” column depicts the number of LEA cases with an unknown reported, Appendix A.

For the 1238 cases with information regarding a perpetrator, 60% (749) of the Initiative cases had documented information about possible suspects, whereas 38% (481) of the Initiative cases were considered “unknown suspect” or “no suspect” cases. Eight PBSO sexual assault cases indicated there were two perpetrators—one perpetrator was a known suspect and the other was an unknown suspect. There were always more cases in which a suspect had been documented versus cases in which the suspects were unknown.

In addition, cases in which there was no information or incomplete information regarding a suspect were designated as partial information or “P” (320, data not shown). For example, a report stating “Unknown if sexual activity occurred—victim was intoxicated and cannot remember events” was not designated as a case with a suspect or an unknown suspect. The incorporated Palm Beach County agencies were not requested to provide suspect information; therefore, the majority of cases regarding suspect information were PBSO cases.

The research also showed that there was case information regarding multiple perpetrators with known or unknown suspects reported in a sexual assault case. Table 1 shows the suspect information format.

There were 691 sexual assault cases in which there was a single suspect, or 86% of all cases with a suspect (Fig. 6). In addition, there were 38 cases with two known suspects and 20 cases in which three or more suspects were reported. Note that suspect information did not always mean that an oral standard for the suspect had been submitted into evidence.

For those sexual assault cases in which the perpetrator was unknown, there were 390 sexual assault cases in which a single unknown suspect was reported—or 81% of all cases in which no suspect information was available (Fig. 6).

In addition, 75 cases reported two unknown suspects; in 15

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### Table 1

| Suspect Information |
|---------------------|
| S                   |
| SS                  |
| SSS                 |
| SSSS                |
| SU                  |
| U                   |
| UU                  |
| UUU                 |
| UUUU                |
| P                   |

**Notes:**
- **S**: Single Suspect
- **SS**: Two Suspects
- **SSS**: Three or More Suspects
- **SU**: Single Suspect and a Single Unknown Suspect
- **U**: Unknown Suspect
- **UU**: Two Unknown Suspects
- **UUU**: Three or More Unknown Suspects
- **UUUU**: Nine Unknown Suspects (1 case)
- **P**: No Report, Partial/Missing Information

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**Fig. 5.** Agency versus number of cases with or without suspect information (n = 1238).
cases, three or more unknown suspects were reported. A single case with nine unknown suspects was included in the multiple-suspect cases.

Fig. 7 shows the year the untested sexual assault case was reported to law enforcement compared to the number of cases in which there was suspect information.

The data in Fig. 7 are presented as the percent of suspect information per year; the darker highlighted data represent a larger number of cases than the lighter highlighted data, which represent a smaller number of cases. For example, in the year 2001, 36% of the untested cases were from a single suspect, 2% of untested cases had two suspects, and 2% of untested cases had three suspects. For the same year, 26% of the untested cases reported a single unknown suspect, 3% with two unknown suspects, and no cases with three or more unknown suspects. During this same year, suspect information was not available in a criminal investigator’s report in 31% of all Initiative untested cases (P). The data show that for every Initiative year, untested sexual assault cases with single-suspect or single-unknown suspect information were reported. In fact, the grand total in Fig. 7 shows that 44% of all Initiative untested cases had a single suspect and 25% were single-unknown suspect cases. More than 20% of all cases did not have any suspect/no-suspect information (21%). Note that due to rounding of individual data points in Fig. 7, yearly total percentage for suspect information may be exceeded by 1%

4.4. Budgetary needs

Securing the budgetary needs for this Initiative was based on the amount and types of evidence. Fig. 8 shows the cost of conducting DNA testing. The final total cost of the Initiative was $1,032,496; 73% of that cost ($753,722) was for testing SAKs and 26% ($268,449) was for testing Sero/DNA bag evidence. The approximate cost per SAK or per Sero/DNA bag was $645.

Oral standards were tested at a separate cost of $195 each. Oral standards predominantly included suspect and elimination standards initially submitted in a case, or after the SAK was tested and further research conducted, the laboratory requested an oral standard for DNA comparison purposes.

5. Selecting a testing site, testing protocols, and testing result evaluation

The sexual assault case submission process for the Initiative was a dynamic process that stretched over a 3-year period, beginning with researching cases in September 2015 followed by shipping cases from December 2015 through July 2018. The vendor selected for the testing of these cases was Bode Cellmark Forensics, Inc. (Bode). The process for selecting Bode followed all budget and procurement protocols for a sole source vendor. This vendor’s laboratory has been vetted through annual audits for nearly 25 years. When this Initiative was introduced, the PBSO already had several unrelated contracts for DNA analysis with Bode which included the proprietary case management and reporting capabilities as described below.

Bode was selected as the PBSO Initiative testing site based on documentation submitted to the PBSO that supports compliance of the following mandatory criteria:

a. Accreditation: Bode has been accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) against national standards since 2002, followed by ASCLD/LAB-International accreditation based on ISO/IEC 17025: 2005 standards.

b. Quality Assurance Standards: Bode complies with the FBI Quality Assurance Standards for Forensic DNA Testing and DNA Databasing Laboratories.

c. Capacity: All PBSO-validated methodologies and technologies were used for all Bode testing protocols. High-throughput robotic capabilities were imperative because Bode was contracted to accept “batches” of approximately 200–400 sexual assault cases per batch. During the Initiative time period of December 2015 through July 2018, the following technologies were used for Initiative cases:

| Date                        | Quantification | STR Analysis | Instrument       |
|-----------------------------|----------------|--------------|------------------|
| January 2016 to end of Initiative | PowerPlex Fusion 5C | Plexor HY | 3130XL/3500XL    |
| January 2016 to September 2016 |                |              |                  |
| September 2016 to present   | Quantifiqer Trio |              |                  |
### Turnaround Time
Approximately 40–50 cases were to be reported per month on a rolling basis over 18–24 months. Depending on how many cases would need to be processed or whether new technologies or methodologies were implemented, the turnaround time was re-evaluated every year.

### Case Management
To determine which cases may provide quality DNA profiles for comparison purposes, Bode had a validated Y-screen method in place for all sexual assault evidence. Bode utilized solid-phase extraction methods and screened SAK body swabs for the presence of male DNA using a total human-to-male quantification assay. Utilizing laboratory validated cutoffs, analysis of samples with male quant values between 0 and 0.002 ng/µl, an undetermined (negative) male DNA result, or a male:human ratio less than 2% would be terminated. Further downstream, DNA testing occurred for a single male DNA-positive sample and the victim’s reference sample. Samples selected for DNA testing were chosen based on a variety of potential criteria including: case scenario, the location from where the sample was taken, and quantification information. Analysis of data was conducted with the GeneMapper® or Fig. 7. Percent Case Suspect Information v Year Sexual Assault Reported (n = 1558).
GeneMapper ID-X® Software. Profiles were interpreted utilizing binary methods.

f. **Reporting Capabilities:** Prior to the Initiative, the PBSO FBU Laboratory—through an agreement with Bode and the PBSO Information Technology Division—developed a secure website to eliminate hard-copy case documents, thus utilizing a complete electronic-based reporting system. Bode designed and maintains the secure File Transfer Protocol (FTP) site. All data pertaining to the analysis of each case, including controls for all methodologies, interpretation results, and conclusions, were transferred to the secure FTP site.

g. **Security:** Access to the FTP site must include a unique username and password for each user, which ensures security and confidentiality are maintained. Bode transferred all sexual assault casework files to this secure location; the documents were then securely transferred to a PBSO server. Each LEA also had secured jurisdictional access to the FTP site to access case DNA reports. Bode retained file information on the site for 2 weeks; afterward, the information was removed.

h. **Cost:** SAK analysis was $645 per kit, which included three evidence swabs plus the victim oral standard. Additional oral standards were $195 per sample, and the cost of DNA analysis on SAK slides were evaluated on a case-by-case basis. Invoices from Bode included the case numbers (Bode and LEA), the cost of testing, and the date of the case report.

The official PBSO-Bode contract for the Initiative was signed in December 2015; Bode received the first batch of cases at that time. There was an agreed upon 45-day start time delay after Bode received the December batch. At that time, the PBSO was using the Promega DNA “Fusion 5C” kit on casework evidence, and Bode laboratory was nearing completion of its Fusion 5C validation. The PBSO technical leader reviewed and approved all validation results before the Initiative cases could be tested using this chemistry. Testing began once the studies received approval.

Details regarding documentation of case evidence transfer from the PBSO Evidence Unit to Bode included providing a manifest of all cases shipped by batch, including the case number and item description. Items going into a shipping box were scanned and the information was entered in JusticeTrax. Great care was taken when shipping evidence to the Bode laboratory to assure that the chain of custody was maintained for each individual item, that the proper supporting documents were included, that every item was clearly identified, and that there was minimal chance of loss or deleterious effects.

As mentioned, the first phase of the Initiative involved the research and evaluation of PBSO sexual assault cases and the second phase involved non-PBSO LEA untested sexual assault cases. Typically, a minimum of 200 cases were identified for testing; the cases were physically located and then prepared for submission to Bode. The first batch of 256 cases was shipped in December 2015. In total, there were seven batches shipped to Bode during this time period (refer to Fig. 9 for more information).

There were 797 sexual assault cases shipped to Bode in 2016, including a Q1 batch with 250 cases and an additional 250 cases in Q2. There were 297 sexual assault cases submitted to Bode in Q3 of 2016, and no additional cases submitted to Bode in Q4. There were 435 cases from non-PBSO departments in 2017, which was expected based on information described in Goal 2. The final untested sexual assault cases were shipped in Q1 and Q3 of 2018.

As shown in Fig. 10 whether or not a suspect had been identified in a sexual assault case was not a deciding factor for submitting that case to Bode for testing. As sexual assault cases were identified for

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**Fig. 8.** Evidence Type v Cost of Initiative per Sample Type.

**Fig. 9.** Agency v Case Submission Date (n = 1,558).
testing through the research and evaluation decision process, cases were added to a batch list and then submitted to Bode for testing. Fig. 11 shows that throughout the submission process, there were cases with one or more suspects (S, SS, SSS); one or more unknown suspects (U, UU, UUU), including a sexual assault with nine unknown suspects (UUUU); cases in which the suspect status was not reported (P); and cases with one known suspect and a single unknown suspect in the same case. The goal was to have cases designated for testing as soon as possible, even if a suspect had not been identified. This allowed for the Initiative to progress in a more efficient and deliberate manner.

Throughout the Initiative, the CODIS Administrator was emailed every month about cases that were ready for review. This occurred on a rolling basis, as per the contract. For cases in which additional information was needed, there was constant and open communication—such as verification of birthdates, clarification of suspect information, possibility of additional evidence, and other inquiries. In July 2018, the final Initiative batch of sexual assault cases was submitted to Bode for testing.

6. Entering eligible DNA profiles into CODIS and notifying law enforcement of case results

The Initiative was designed to minimize the impact on FBU staff in the PBSO Crime Laboratory so that ongoing casework testing would continue without interruption. This goal was accomplished by relying on Crime Laboratory Administration staff and Evidence Unit staff to conduct research and evaluation using criminal justice databases, document case information in JusticeTrax using unique searchable uniform language, locate evidence, prepare evidence for submission to Bode, and maintain chain-of-custody.

Early in the Initiative, a determination was made that the laboratory’s CODIS Administrator would need to be closely involved with Initiative cases that had potential or definitive CODIS-eligible DNA profiles generated from the sexual assault evidence. Initially the FTP site streamlined the case review process because biologically negative or Y-screen negative cases were forwarded directly to the case law enforcement contact, thereby forgoing a review by the CODIS Administrator. However, training and fielding questions by law enforcement points of contact were directly impacting the efficiency of case reviews for both the points of contact and the CODIS Administrator. The CODIS Administrator has the ultimate authority to enter a DNA profile into the database; therefore, it was imperative that a review of each case was conducted by an individual experienced and educated in the statutory and accreditation standards associated with the database. As a result, in order to maintain proper quality control over the entire DNA review process, the FBU CODIS Administrator reviewed all Initiative case reports and made decisions regarding CODIS entries.

The Initiative budget was based on completion of case reports as indicated on Bode invoices. However, the CODIS Administrator did not have to wait for an invoice to review a completed report. The contract agreement was that all cases were to be reported monthly on a rolling basis over 18–24 months. At the beginning of every month, the CODIS Administrator received a notice that reports had been uploaded to the FTP site. An example of Bode notification of completed reports for the month was, “There were 28 cases uploaded to the FTP site for the month of February and are now available for review. Please let me know if you have any questions. Also attached is the updated PBSO status sheet.” This notification allowed the CODIS Administrator to access the cases prior to receiving an invoice. Case data and reports were transferred from the FTP site to a PBSO FBU secure electronic network for evaluation. Bode met the requirements of the case report turnaround time agreement throughout the Initiative as previously described.

There are national standards for uploading DNA profiles into the
CODIS database; these standards may be found in the National DNA Index System (NDIS) manual [8]. Additional standards exist for individuals operating CODIS and the site where the CODIS software resides. For example, the standards require the participating laboratory to be accredited and to have at least two full-time individuals who are qualified analysts. The PBSO laboratory has a full-time CODIS Administrator and an assistant who are both qualified DNA analysts; the laboratory has been accredited since 1992 and has been internationally accredited to ISO-17025 standards since 2011. All NDIS requirements to participate in CODIS at PBSO are audited annually and have been rated in compliance. The NDIS manual requires documentation that

1. “... there shall be documentation that a crime has been committed.”

2. “Forensic unknown, forensic mixture or forensic partial DNA records shall originate from and/or be associated with a crime scene in order to be eligible for NDIS; the source of which is attributable to a putative perpetrator. Forensic unknown, forensic mixture or forensic partial DNA records from solved and unsolved cases are eligible for upload to NDIS. The Forensic Indexes contain DNA records obtained from forensic samples recovered directly from the victim (such as a sexual assault evidence kit); the victim’s clothing, or the crime scene, and are believed to be attributable to the putative perpetrator.”

Not all profiles generated from an Initiative sexual assault case are eligible for upload into CODIS. For example, a profile does not qualify for upload if (1) it does not meet the minimum local, state, or national CODIS core loci requirement; (2) it matches a victim or an elimination standard, or (3) it is an uninterpretable or a partial mixture.

6.1. Testing results

Final testing results for the sexual assault Initiative cases. For post-DNA testing, all cases were classified as one of the following:

1. CODIS: A CODIS designation indicated that a case generated a CODIS-eligible profile, which was then entered into the database. CODIS cases accounted for 44% (686) of all cases tested. Included in the CODIS entries were cases in which the only profile entered was from a suspect known standard. Florida statute 943.325 allows samples from suspects that were lawfully obtained during the course of a criminal investigation to be entered into CODIS as a legal sample [6].

2. No Eligible Profile (NQP): NQP indicated that the Y-screen male results for male DNA were positive but analysis did not yield a CODIS-eligible profile. NQP cases accounted for 31% (476) of the cases tested.

3. Y-Screen Negative (YQN): A Y-screening result indicated that male DNA was not detected and the suspect was unknown. As a result, the case analysis was discontinued. The YQN cases accounted for 25% (396) of the cases tested.

Note: Prior to the classification of the NQP and YQN cases, if additional evidence was available for testing, the analysis was subsequently conducted.

4. Awaiting Review: As of the date this paper was written, a single sexual assault case was still under review.

The Initiative ultimately was able to enter DNA profiles into CODIS from 686 sexual assault cases, or 44% of all cases tested. In contrast, testing results showed that over half of all cases tested, 56%, did not provide an investigative lead (NQP, YQN).

Original case report details about suspect information (i.e., whether there was a suspect or an unknown individual involved) were also documented for each case when additional information was available. In addition to type a number of suspects, Fig. 11 also shows the DNA testing results of each case; results are categorized by whether a case generated a CODIS-eligible profile (CODIS-44%), a case did not generate a CODIS profile (NQP-31%), or a case did not detect male DNA during testing (YQN-25%).

CODIS (686): There were 686 Initiative cases for which DNA CODIS-eligible profiles were obtained. The total number of cases with CODIS entries for which a known suspect was reported was 393, or 57% of all CODIS entries (S, SS, SSS). In contrast, there were 239 (35%) cases with an unknown suspect (U, UU, UUUU) UUUU. As would be predicted, the greatest number of CODIS entries came from cases (358) in which there was a single suspect, or 52% of all cases, compared to 189 CODIS-entry cases with a single unknown suspect, or 27%. Note that 7% of cases with a CODIS-eligible profile were cases in which the suspect status was not documented (P). There were six cases in which there was a single suspect and an unknown suspect (0.9%).

NQP (476): Cases that were Y-screen positive but further DNA testing did not result in a CODIS-eligible profile were not researched further. The total number of NQP cases in which a known suspect was reported was 185 or 39% (S, SS, SSS). In contrast, there were 125 (26%) NQP cases with an unknown suspect (U, UU, UUUU). Again, as would be predicted, the greatest number of NQP cases reported a single suspect (171), or 36% of all NQP cases, compared to 99 NQP cases with a single unknown suspect, or 21%. Note that 34% of cases with no CODIS-eligible profile came from cases in which the suspect status was not documented (P). There was one case in which there was a single suspect and an unknown suspect (0.1%).

YQN (396): Testing was discontinued for Initiative cases that were Y-screen negative and the suspect was unknown (YQN). The total number of cases with Y-screen negative results in which the suspect was known was 171, or 43% of all YQN cases (S, SS, SSS). In contrast, there were 116 (29%) YQN cases with an unknown suspect (U, UU, UUUU). As would be predicted, the greatest number of YQN cases were those in which there was a single suspect (162), or 41% of YQN cases, compared to 102 YQN cases with a single unknown suspect, or 26%. Note that 27% of YQN cases were cases in which the suspect status was not documented (P). There was one case in which there was a single suspect and an unknown suspect (0.1%).

Untested Initiative sexual assault cases with CODIS entries included profiles from sexual assault evidence and profiles from reported suspect standards. Fig. 12 shows the LEA and the numbers of evidence and suspect profiles entered into CODIS from each LEA’s untested sexual assault cases.

The Initiative’s 686 sexual assault cases entered 726 CODIS-eligible profiles because several cases provided more than a single CODIS-eligible profile. For example, a single PBSO case had five separate CODIS entries, including one evidence profile and four suspect profiles. There were four PBSO cases, each with three CODIS entries, and 29 LEA cases with two entries each (data not shown).

Fig. 13 shows (1) the number of sexual assault cases tested in which a CODIS-eligible DNA profile was entered into CODIS and (2) the year of the initial report. The data points are color-coded based on the identity of the LEA case number.

The first batches of sexual assault cases for review were returned in April 2016. The first CODIS hit occurred July 1, 2016. For the purpose of this report, the last hit was recorded on April 4, 2019. To date, five LEAs—PBSO, WPBPD, BBPD, JPD, and BRPD—have been notified of hits from this CODIS-based Initiative. CODIS hits
occurred throughout the Initiative, with the greatest number of hits in Q2—Q3 of 2017 and Q1—Q3 of 2018 (Fig. 14A). The data show that 36% of profiles entered into CODIS as part of this Initiative had a CODIS hit. Comparatively, the PBSO has seen an average annual hit rate of approximately 28% over the past six years.

Fig. 14A shows sexual assault cases reported by the year, the number of cases with CODIS hits for each year, and the color-coded LEA that submitted the case. CODIS hits were recorded for 35 of the 43 years covered in this Initiative. Note that there were 261 CODIS hits (Fig. 14B) but 255 cases with a CODIS hit (Fig. 14B). This is because within the years of 1988, 1991, 1994, 1995, 2001, and 2014, there were five PBSO cases with two hits each and a WPBPD case that had two hits.

A match and a hit, by NDIS definition, are not the same. A match is an association between DNA profiles and a hit is a match reportable to NDIS.

Table 2 describes the NDIS classification and number of Initiative sexual assault CODIS hits. The CODIS architecture is divided into three levels: local, state, and national. PBSO is a local CODIS laboratory. Investigations aided (IA) is defined as the number of crimes in which CODIS provided assistance, such as cases solved or serial links determined. There were nearly twice as many IA at the state level than at the national level or within the local level combined (Table 2A).

A forensic hit (FH) is defined as DNA profile that hits on a forensic evidence DNA profile in the database (Table 2B). The greater majority of FHs occurred at the local level (35) compared to the state and national FHs. Offender hits (OHs) in which a DNA evidence profile hits on a convicted offender in the database occurs only at the state or national level. The data clearly show that the FDLE CODIS database provided the majority of convicted OHs (142). In 2011, Florida Statute 943.325 was enacted requiring all individuals arrested for any felony offense or attempted felony offense must submit a DNA sample at the time he or she is booked into a jail, correctional facility, or juvenile facility [4]. As a result of the Initiative, there were 23 CODIS hits corresponding to arrestees on the national (4) and state of Florida (19) levels. A legal DNA profile is defined as a known reference sample from a person whose DNA sample is collected under state law by legal authorities. There were 26 legal hits (LHs) with Initiative DNA profiles.

Fig. 15 shows the number of cases from six LEAs in which there were CODIS hits that aided investigations (IA) at the local, state, and
Fig. 14. CODIS a. Number of CODIS hits per agency per initiative yearly quarter (N = 261). B. Number of cases with CODIS hits per year per LEA (n = 255).

Table 2
Number of CODIS hits and investigation aided Category.

| A | Investigations Aided |
|---|----------------------|
| IA-Local | IA-State | IA-National |
| 62 | 160 | 35 |

| B | Forensic Hit | Offender Hit | Arrestee Hit | Legal Hit |
|---|-------------|-------------|-------------|----------|
| FH-Local | FH-State | FH-National | OH-State | OH-National | AH-State | AH-National | LH-Local | LH-State | LH-National |
| 35 | 2 | 1 | 142 | 30 | 19 | 4 | 25 | 0 | 1 |
As indicated, the greater majority of IA hits were at the state level for all departments, including 44% for PBSO and 27% for WPBPD. The JPD, BBPD, GAPS, and BRPD departments also had CODIS hits during this Initiative. The greater majority of IA hits were on the state level due to the number of OHs (Table 2).

For the purpose of this report, CODIS hits were recorded as FHs, OHs, AHs, or LHs. Fig. 16 shows the distribution of FHs and OHs within each level of CODIS for every LEA. Note that 92% of the total FHs were from the local CODIS database. OHs at the state level accounted for 83% of all OHs. The 23 CODIS local and state arrestee hits (AHs) were recorded only for the PBSO since the FBU has ownership of the CODIS database. The WPBPD and the PBSO had 25 local legal CODIS hits (LH) and the PBSO had a LH on the national level.

There were 199 database entries that returned CODIS hits from 20 state and federal databases—including the FBI database in Quantico, Virginia; the United States Army (Department of Forensic Science) database in Forest Park, Georgia; and the Bureau of Forensic Sciences of in Puerto Rico database. Fig. 17 shows the number of CODIS hits on the national and state levels.

The CODIS Administrator followed a set protocol when a database hit occurred. All CODIS hits were peer reviewed prior to distribution; once a hit was verified, a CODIS notification letter for each CODIS hit was emailed to the case contact(s) at the involved LEA(s). The CODIS notification letter generally contained the following information: the PBSO laboratory number, the LEA case number, a description of the evidence in which the hit occurred, and the related case/OH information.

6.2. Initiative-related arrests

Retroactive testing of sexual assault cases adds layers of investigative complexities. As a result, meticulous strategies were developed among the vendor, the FBU, criminal investigators and prosecutors in order to finalize a disposition for every case in the Initiative. With regards to CODIS hits, upon notification by the CODIS Administrator that an Initiative CODIS hit was obtained, the general collaborative strategies employed by the criminal investigators included contact with the CODIS Administrator to verify and clarify laboratory results obtained in the case. The criminal investigators then proceeded with an investigation similar to that outlined in the RTI International “Prioritizing Cold Case CODIS Hit Follow-Up: Strategies for Sexual Assault Investigators” [9].

As of June 20, 2019, PBSO has made five arrest associated with the Initiative including a jury trial with an adjudication of guilty. The WPBPD has made four arrests associated with the Initiative.

The following articles provide additional information about the arrests:

1. **February 11, 2019**: DNA match brings man’s arrest 20 years after alleged rape near West Palm [Link](https://www.palmbeachpost.com/news/20190211/dna-match-brings-mans-arrest-20-years-after-alleged-rape-near-west-palm). A jury found the defendant guilty of sexual battery on July 15, 2019. [Link](https://www.palmbeachpost.com/news/20190715/jury-finds-man-guilty-in-cold-case-rape-trial)

2. **January 17, 2019**: Riviera Beach man arrested after teen sexually assaulted more than 20 years ago in West Palm Beach [Link](https://www.wptv.com/news/region-c-palm-beach-county/riviera-beach-man-arrested-after-teen-sexually-assaulted-more-than-20-years-ago-in-west-palm-beach)

3. **November 28, 2018**: DNA match broke 18-year-old West Palm rape case, police say [Link](https://www.palmbeachpost.com/news/20181128/dna-match-broke-18-year-old-west-palm-rape-case-police-say)

4. **June 3, 2019**: PBSO makes arrest in 1998 sexual assault: Belle glade man in custody [Link](https://www.palmbeachpost.com/news/20190603/pbso-makes-arrest-in-1998-sexual-assault-belle-glade-man-in-custody)

5. **June 19, 2019**: Police: DNA test leads to arrest in 24-year-old rape case in West Palm Beach [Link](https://www.wptv.com/news/region-c-palm-beach-county/west-palm-beach/police-dna-test-leads-to-arrest-in-24-year-old-rape-case-in-west-palm-beach)

All CODIS profiles generated as a result of the Initiative will be searched continuously as per protocol.
7. Conclusions

The Initiative began in late 2015 after design completion and budget approval. As with any Initiative of this magnitude, it was critical that questions of importance be scientifically articulated to ensure achievable and credible answers. The foundational question for Initiative stakeholders was, “Why is this Initiative important?” The answer was found in newspaper articles, radio interviews, journal manuscripts, grant solicitations, podcasts, television documentaries, and many more communication modes that reinforced that an untested SAK denies justice to a survivor, stops possible post-conviction relief, and eliminates potentially critical information to law enforcement.

The PBSO Crime Laboratory initiated this Initiative because there were untested SAKs in the county’s evidence vaults and also because CODIS is a powerful tool that could be used to potentially move unsolved sexual assault cases forward. The crux of the Initiative involved constructing a CODIS-based Initiative whereby case evidence would be researched and evaluated to determine if a case-related DNA profile could be entered into the database. The criteria to determine if a case should be tested were delineated in a decision tree format to maintain continuity during the multiyear process. Initiative funding began immediately in October 2015 and included hundreds of hours in overtime, batching cases for shipping, and vendor testing costs—all of which are supported to this day. Making the Initiative available to all Palm Beach County LEAs was critical to ensuring all untested sexual assault cases were considered. As a result, many LEAs either submitted evidence or had SAK evidence already stored at the PBSO included in the Initiative. The Crime Laboratory defined very specific CODIS-based goals for this Initiative; consequently, more than 5500 cases were researched and evaluated. Additionally, decisions about whether to test cases and the rationale for those decisions were documented in JusticeTrax using uniform language. The restructuring of the JusticeTrax documentation guidelines was critical and will be useful for future queries.

Ultimately there were 1558 sexual assault cases tested during the course of this Initiative. Over 5000 pieces of sexual assault evidence were tested for this Initiative; these pieces included individual items within a SAK. Evidence spanning a 43-year period had to be located, verified, logged, and shipped to Bode. The earliest untested sexual assault case was from 1973 and ultimately, although the Y-screen result was positive, a CODIS-eligible profile was not generated. However, out of the 52 cases from the 1970s, nine of the cases had CODIS-eligible profiles—although a hit has not yet occurred. Research showed that 42.6% of all untested SAKs had a single suspect involved and nearly 25% had a single unknown suspect involved. About 20% of cases did not have any information regarding suspect information.

After testing, cases were categorized as (1) having no detectable male DNA, (2) having male DNA but no CODIS-eligible profile(s), or (3) having CODIS-eligible profile(s). Nearly 44% of all sexual assault cases tested provided CODIS-eligible profiles and 36% of the eligible profiles generated a CODIS hit (Fig. 18). However, 57% of the cases tested did not provide any DNA profiles that qualified for database entry. One case remains under review, as of the date this paper was written. The data regarding the relationship between a case and suspect information as well as the types of CODIS hits provided by the Initiative were documented.

The PBSO Initiative team has spent thousands of hours locating, researching, evaluating, testing, and reporting about the sexual assault cases involved in this program in order to show a good-faith efforts.
effort to address the past and move forward into the future. Thousands of pages of electronic data were generated from the testing phase of the Initiative; each page was reviewed and documented by dedicated Crime Laboratory staff.

Sheriff Ric Bradshaw provided in excess of a million dollars over a three-year period for this Initiative. There has been widespread support throughout Palm Beach County including the Services and Certified Rape Crisis Center, County Commissioners through budget approvals, all County Law Enforcement Agencies, and PBSO Victim Services. Is the cost worth the effort? There have been multiple scientific publications that have examined the positive return on investment when laboratories analyze untested SAKs \([10,11]\). One study saw a return on investment range from 9874% to 64,529% from the testing of all sexual assault kits \([11]\). Importantly, a cost:benefit analysis is not relevant to the ultimate goal of providing a pathway to healing and justice for each victim of sexual assault through the efforts of this Initiative. This is exemplified in the Initiative case of the now 39-year-old victim sexually assaulted as a teenager in 1998. Once notified of the 2018 CODIS hit, the victim wanted the case to proceed to a trial. The Palm Beach Post reported that after a jury found the defendant guilty of sexual battery with a deadly weapon or physical force, the victim stated to the judge during the sentencing phase, “I prayed for the moment to talk on behalf of myself and for others,” she said. “I want to help other women find their voice and stand up to their attackers” \([12]\). The crime laboratory continues to audit the Evidence Unit locations to determine if there are sexual assault cases in which evidence (other than SAKs) was submitted but the cases were not detected in the initial query of JusticeTrax. The Initiative was—and still is—a dynamic, refined, fluid process. In fact, over 6000 cases have been researched as of the writing of this paper, with nearly 50 additional sexual assault cases submitted to Bode. The PBSO continues to budget for the testing of these cases as the research and evaluation process used for this Initiative provides a comprehensive and effective means to reduce sexual assault case backlogs.

Finally, in 2016, Florida passed Senate Bill 636, which provides guidelines for LEAs and forensic laboratories about the investigation of reported sexual assaults—including submission timelines for testing. Enacting this legislation in Palm Beach County was seamless because the commitment to test sexual assault cases qualified under the statute that was already in place.

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### Declaration of competing interest

None.

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Thanking all of the individuals who provided guidance throughout this Initiative is an impossible task. As a result of their diligence, commitment, and dedication to Palm Beach County citizens, thousands of untested SAKs have been researched and numerous decisions have been documented so that the evidence no longer languishes on evidence shelves. The hope is that this Initiative has provided a path forward for sexual assault survivors and their families.

To ensure the statistics and analytics associated with the Initiative were presented logically and accurately, Tableau generously provided free access to their software. This invaluable assistance is greatly appreciated.

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Survivors who want to check on the status of a reported sexual assault case that occurred in Palm Beach County are encouraged to call the Sexual Assault Hotline number shown in the information below. The following may be found on the PBSO website (http://www.pbso.org/inside-pbso/law-enforcement/strategic-operations/special-investigations-division/sexual-assault/):

**PBSO Assistance for Sexual Cases.**

The Palm Beach County Special Investigations Division commands a team of trained detectives that specializes in sex-related crimes. Their experience and knowledge provide survivors with the best opportunity to have their cases presented before the State Attorney for prosecution.

The Palm Beach County Victim Services Sexual Assault Unit provides 24-h assistance to sexual assault victims within Palm Beach County. The counselors respond to assist survivors and act on their behalf. Counselors provide services to assist victims with police investigations, medical and legal procedures, crisis intervention, individual counseling, therapy, and support groups.

Sexual Assault Hotline: (561) 833–7273 (24 h). Palm Beach County Victim Services: (561) 355-2073. Palm Beach County Sheriff Office: (561) 688-3400.

### Appendix A

| Acronym | LEA Agency |
|---------|------------|
| BRPD    | Boynton Beach Police department |
| BGPD    | Belle Glade Police department |
| BRPD    | Boca Raton Police Service Department |
| GAPD    | Greenacres Police Department |
| JPD     | Jupiter Police Department |
| LPPD    | Lake Park Police Department |
| LWPD    | Lake Worth Police Department |
| MPPD    | Manginia Park |
| PBCPP   | Palm Beach County Park Police |
| PBSO    | Palm Beach County Sheriff’s Office |
| PPD     | Pahokee Police department |
| SBPD    | South Bay Police department |
| WPBPD   | West Palm Beach Police Department |
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