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Document Title: Cold Case Investigations: An Analysis of Current Practices and Factors Associated with Successful Outcomes, Executive Summary

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Document No.: 237971

Date Received: March 2012

Award Number: 2007-DN-BX-0014

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Cold Case Investigations:
An Analysis of Current Practices and Factors
Associated with Successful Outcomes

Executive Summary

submitted to

The National Institute of Justice

by the

RAND Corporation

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October 19, 2011

This research was supported by the National Institute of Justice Grant #2007-DN-BX-0014, Office of Justice Programs, U.S. Department of Justice. Points of view in this report are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice.

I. INTRODUCTION

Cold cases are among the most difficult investigators confront. For a variety of reasons—lack of evidence, strained resources, ineffective investigation—a case becomes cold when initial efforts to solve it prove futile. In recent years, rates of clearance for all types of crime have plummeted. Lackluster rates of solution, combined with new technologies such as DNA and automated fingerprint matching, have prompted the police to form “cold case” units, designed to address cases that stubbornly resist solution.

By the late 1980s, the sheer volume of unsolved cases had become overwhelming for many agencies. In addition, the promise of technologies such as DNA and automated fingerprint matching convinced police administrators that old unsolved cases that sat neglected might benefit from a fresh perspective. Hence, the cold case concept was born.

While originally begun to address unsolved homicides, cold case squads quickly expanded to include sexual assault; today, some jurisdictions even utilize the cold case concept in the investigation of property crimes. In addition to utilizing new technologies, other cold case strategies include focusing intensive resources at a single case, utilizing new personnel to provide a “fresh” perspective, and leveraging the use of outside resources (e.g., conducting criminal investigative analysis (behavioral profiling) or submitting the case to the FBI’s Violent Criminal Apprehension Program (VICAP)).

There is wide variability in the manner in which cold case investigations are carried out. For example, there is no universally accepted metric for when a case becomes “cold.” Many jurisdictions arbitrarily use the passage of a year as a boundary, but recent research suggests that is a sharp decline in case solvability after 72 hours (Regoezzi, Jarvis, and Riedel, under review). This suggests that unsolved cases might benefit from cold case techniques employed at an earlier stage of the investigation.

As well, there is wide variability in the manner in which cold case squads are administered, staffed, organized, and resourced. Some smaller jurisdictions don’t field standing units; instead, single investigators pursue cold cases on an ad hoc basis as a collateral duty. In other areas of the country, there are multi-jurisdictional task forces with federal, state, and local representation, organized much like the FBI’s Joint Terrorism Task Forces. And, although there are ample anecdotal reports of success, often sensationally showcased in the popular media (see National Institute of Justice, 2002), it is not clear at present that cold case squads are either effective or efficient.

Despite the growing popularity of cold case units, little is known about how cold case investigations are conducted and funded or how often they are successful. The research behind this report aimed to add to our knowledge of how cold case work is organized and funded, and what factors are likely to produce a successful investigation. This report has two objectives:

- *Assess current practices in cold case investigations and agency policies and procedures and determine which are most effective in solving cold cases*

We know very little about the extent to which cold case investigations are being conducted by law enforcement agencies or how this work is being carried out. Do a large number of agencies have dedicated cold case investigators and/or policies on when cold case investigations are to be opened and how the investigations are to be conducted? Do differences in organization of cold case work and levels of funding of cold case investigations produce differences in clearance rates?

- *Determine which types of cases are most likely to be solved, and develop models for prioritizing cold case investigations based on case characteristics*

As suggested above in the literature review, there has been empirical work on how case attributes and actions by investigators affect clearance rates for homicide and other crimes. We do not know, however, if findings from these studies can be applied to cold case investigations. Cold cases are a subsample of all crimes, but they are emphatically not a representative sample, so it is not clear if the same rules apply. If we could identify case attributes and investigative actions associated with a higher likelihood of clearance, then guidelines could be established to give agencies an idea of which cases are most likely to be solved if an investment resources are expended on a cold case investigation.

In order to address these questions, we conducted a study with two components. . The first of these was a national survey of law enforcement agencies to document the range of ways that cold case work is conducted and assess how this organization affects cold case clearance rates. The national survey was followed up by intensive work in four jurisdictions that conduct large numbers of cold case investigations. In each site, we reviewed up to 200 case files of solved and unsolved cases that have been assigned to cold case squads and extract attributes of the crime and attributes of the investigation that affect cold case solvability.

II. LAW ENFORCEMENT SURVEY

A web-based survey was conducted by the University of Baltimore's Schaefer Center for Public Policy (SCPP) using a stratified sample developed from a database of chiefs of police from the Bureau of Justice Statistics. This original database was comprised of 15,884 chiefs of police from all police departments in the United States, including Native American tribal police departments. The sample of 5,000 agencies was comprised of all Native American tribal police departments (44) and all departments with over 100 full time, sworn officers (997). The balance of the sample (3,959) was comprised of police departments in the following size categories: 1,886 from departments with 0 to 25 full time, sworn officers; 1,000 from departments with 26 to 50 full time, sworn officers; 707 from departments with 51 to 75 full time, sworn officers; and 366 from departments with 76 to 99 full time, sworn officers. The web-based survey was administered by SCPP

with Sawtooth Technologies' Sensus web survey software. An initial invitation was followed by two reminders at two-week intervals.

One thousand fifty one surveys were completed. Surveys were returned by 33% of agencies with 100 or more sworn, by 26% of agencies with 76 to 99 sworn, by 27% of agencies with 51 to 75 sworn, by 20% of agencies with 26 to 50 sworn, but only by 12% of agencies with 25 or fewer sworn. We believe that the response rate was low because agencies that did not routinely investigate cold cases are unlikely to have seen a reason to complete the survey, which was focused on procedures followed in cold case work. This explanation is bolstered by the substantially higher return rate among agencies with more than 100 sworn officers -- those agencies most likely to conduct regular cold case investigations. While it is unlikely that the composition of the sample affects the dynamics of cold case investigations (cold cases from responders are unlikely to look substantially different than cold cases of non-responder), the low response rate and differences by agency size are likely to affect estimates of cold case practices (eg., the proportion of agencies that have a dedicated cold case unit.) We believe that the results are reasonably reflective of practices in those agencies that do conduct cold case investigations on a regular basis.

Survey Results

The survey results showed that few agencies (7%) have dedicated cold case units and only a small proportion of agencies have an articulated policy on reactivating and investigating cold cases. Those that do, rely primarily on new witness information and newly testable physical evidence in deciding whether to re-open cases.

By far the most common type of cold cases investigated consists of homicides, followed by sexual assaults and burglaries. Reported clearance rates for all types of cold case investigations are about one in five.

Funding for cold cases appears tenuous. Most agencies do not include cold case investigations as a line item in their budget, and the median allocation of funds for cold case investigations was \$35,000.

Thirteen percent of agencies had policies about the types of cold cases in which DNA samples were submitted to crime labs for matching, most often submitting DNA samples in investigations involving violent crimes. Respondents reported that an average of one in ten DNA samples were matched to a suspect and 5% matched to another incident.

The most common forms of institutional support lent by agencies to support cold case work were overtime pay and travel to pursue leads. The most frequent strategies employed by agencies to promote cold case investigations were assigning senior investigators to work cold cases and providing access to investigative databases.

The median proportion of cases with a known perpetrator in which an arrest was made was reported to be small (5%) and the median proportion of convictions even smaller

(1%). Examination of a range of factors indicated that only the amount of funding provided for cold case investigations affected the proportion of investigations that resulted in arrest.

Finally, respondents indicated that cold cases were more likely to be opened when new information was available from witnesses or informants, when DNA evidence or fingerprints were newly available for testing, when there were outstanding leads to pursue, whether notes from the original investigation were available, or when a suspect had been identified. The same set of factors was judged by respondents to be those most likely to lead to clearing cold cases.

III. CASE FILE ANALYSIS

Site Selection

We used the survey results to select sites for an analysis of case files. We looked at sites that reported conducting in excess of 50 cold case investigations per year in order to ensure that we could obtain a large number of cases for our analysis. There were a dozen agencies that reported conducting more than 50 investigations per year. Among these we selected the District of Columbia, Baltimore, and Dallas. We selected these sites primarily out of convenience and familiarity with personnel and processes these agencies. In these three sites that concentrated on cold case homicide investigations, we hoped to gain a better understanding of factors that are associated with successful cold case outcomes. We aimed to sample equal numbers of successful and unsuccessful cold case investigations and abstract information from files to determine what factors distinguish the two types of cases. To these three sites we added Denver because of a DOJ grant to conduct testing of DNA material in sexual assault cold cases. The Denver sample consisted of cases where a DNA match had been made. The research question in Denver was therefore different than the question in the other three sites: We wanted to know what the probability of an arrest, prosecution, and conviction was among cases where there was a CODIS hit or, in other words, in cases where the perpetrator was known and therefore the case had been “solved.”

Method

We set out a goal of capturing up to 200 cases that had been actively worked as cold case investigations per site, or as many as were available. In the three sites where we sampled homicide cases (Washington, Dallas, and Baltimore) we sought equal numbers of cases that had been cleared (either by arrest or by exceptional means) and cases that had been actively worked, but not solved. We had hoped that we would be able to draw random samples of cases that were solved and those that were worked on but not solved using computer databases. However, none of the three homicide case sites had computer files that were suitable for sampling cases. Worse, there was no source that we could use to determine which cases had been worked as cold cases, which had been solved, and which

had been worked but not solved. In all three homicide sites, cases where a cold case investigation had been conducted were mixed in with other homicide files with no special notations on the folder that indicated that a cold case investigation had been undertaken. Therefore, we were forced to rely on cold case investigators to sample for us. We asked that they provide us with equal numbers of resolved (cleared either by arrest or through exceptional means) and unresolved. In essence, this is a standard case-control sample design: We cannot know whether the cases that we received were representative of the entire set of cold case investigations. However, since the numbers that we requested represented a large proportion of cold cases worked at each site, the samples are likely fairly representative of cold case investigations for each jurisdiction.

In all, we sampled 189 homicide cases in the District of Columbia, 113 in Dallas, and 127 in Baltimore. In each of the homicide sites, roughly half of the cases had been solved and half remained unsolved. For each sampled case we collected seven categories of data from cases sampled: Victim characteristics, crime context, motivation for crime, human capital, physical evidence, basis for opening the cold case investigation, and actions taken by cold case investigators. Variables are summarized in Appendix A.

Predicting Cold Case Homicide Investigative Success

Combining data from the three homicide samples, we attempted to determine if we could predict which cases were likely to be resolved based on information about the victim, crime context, motivation, evidence, basis for opening the cold case investigation, and actions taken by cold case investigators. The goal of this analysis was to find the variables that were associated with the probability of solving a cold case. The dependent variable, therefore, was whether the case was solved or not, i.e., whether the case was cleared by an arrest or resulted in an exceptional clearance.

Variables that were significant in our multivariate analysis are displayed in Table 1. The chance of solving a case declines with increasing age of the case and when victims are known to be drug users. If a motive is discovered during the initial investigation and/or a prime suspect is identified, the odds of a successful cold case investigation are greatly improved. When cold case investigations are initiated based on victim family inquiry or simply on elapsed time alone, the likelihood of a successful resolution decline significantly, most likely because there is no evidentiary basis for initiating an investigation. Finally, the chances of solving a case increase when investigators develop a new theory of the motivation for the crime, interview additional witnesses, or conduct a suspect line-up.

Table 1: Variables Associated with Homicide Cold Case Clearance

Variable	Explanation
Drug User	1 if the victim was a Drug User 0 otherwise
Age of Case	Age of the case in months
Motivation Known	1 if the motivation is known 0 otherwise

Prime Suspect	1 if there is a Prime Suspect 0 otherwise
Suspect DNA Tested	1 if the suspect's DNA has been tested 0 otherwise
Prints Recovered	1 if outcome is productivity 0 otherwise
Suspect DNA ID	1 if the suspect's DNA has been identified 0 otherwise
Basis Routine	1 if the basis for re-opening the case was routine 0 otherwise
Basis Family	1 if the family was the reason for re-opening the case 0 otherwise
Actions Line-up	1 if a new line-up was conducted 0 otherwise
Actions Additional Witness	1 if additional witnesses were interviewed 0 otherwise
Actions New Theory	1 if a new theory was developed 0 otherwise

Analysis of Denver Sexual Assault Cases

In Denver, the sampling frame was very different. The Denver sample consisted of all CODIS hits among sexual assault cases submitted for DNA analysis as part of the jurisdiction's federal grant. In Denver, the research question was not "What factors predict success in cold case investigations?", but rather "What is the chance of obtaining an arrest and conviction given a CODIS hit on suspect DNA?"

Of 97 DNA-match cases for which we have information, 56 or nearly six in ten about resulted in an arrest and 55 in a court filing. In the other 42 cases, the district attorney decided that there was not a strong enough case to file. The primary reasons for not filing cases were victim problems – victims were judged to be uncooperative, unreliable, or unavailable. The other frequent reason given by prosecutors for not filing was that the DNA match did not yield a suspect, but instead pointed to another crime.

Fully 93% of those cases that were filed resulted in convictions either by pleas or by a verdict at trial. Just 6% of filings were dismissed and 2% were found not guilty after trial. Moreover, a large majority of those who were convicted received lengthy prison terms. In fact, 56% of those convicted were sentenced to 25 year or longer sentences.

The multivariate analysis conducted on Denver data allowed us to ask a different policy question than we were able to ask at the other sites. In Denver, we know that, even when a CODIS hit is obtained, there is still a good likelihood that the prosecutor will not file a case, or – in some cases – may not win a conviction once a case is filed. Therefore, the question of interest is, "Given a suspect match from CODIS, what information that is

available at the time a cold case investigation is opened predicts whether a case will result in conviction?

Table 2 displays the factors that were significantly associated with court filings for cases where a suspect had been identified through a CODIS DNA hit. The odds of obtaining a conviction increased dramatically in cases with a victim who has expressed willingness to cooperate with authorities, in cases where the victim does not have a criminal record, in cases where the alleged perpetrator is a stranger, and in cases in which a suspect had been identified in the initial investigation. These findings all make sense. Sexual assault cases are extremely difficult to prosecute without a willing and credible victim since the issue is not just whether sex occurred, but whether the victim failed to consent. A similar argument can be made for the higher conviction rate for strangers: If victim and perpetrator are acquainted, a consensual sex defense may be credible to a jury. In cases where a suspect was identified in the initial investigation, there are likely to be independent sources of evidence tying the suspect to the crime in addition to the DNA match. One finding was harder to explain. Surprisingly, the odds of conviction are lessened when victims report the assault after the day on which it occurred. Together, the variables in the model explain nearly 40% of the variation in convictions.

Table 2: Coding of Predictor Variables for Denver Sexual Assault Analysis

Variable	Explanation
Criminal History	1 if the victim had a criminal history 0 otherwise
Cooperation	1 if cooperated 0 otherwise
Injuries	1 if injuries were non-visible 0 if visible
Perpetrator	1 if a single perpetrator 0 if multiple perpetrators
Suspect Match	1 if matched a suspect 0 otherwise
Other Witnesses	1 if there were other witnesses 0 otherwise
Relationship	1 if stranger 0 otherwise
Bystander Present	1 if bystanders where present 0 otherwise
Elapsed Time	1 if victim reported crime the same day 0 otherwise
Person of Interest ID	1 if person identified 0 otherwise

Observations While on Site

In the course of analyzing the survey data and spending time on site, we have made some interesting observations about how cold case work is conducted. The first observation, and one that surprised us, is that cold case work is usually opportunistic. We had expected that agencies would routinely assess unsolved cases for cold case investigation potential, would study the case and actions taken to date, undertake some preliminary instigative steps, and then determine whether a full-fledged cold case investigation was called for. Instead, what we most often found was that cold case investigations were the result of “breaks” in the case. Most often, the police would pick up someone on some charge after a case went cold, and the suspect on the new case would offer to trade information about the cold case in exchange for favorable treatment on the new charge. Or a girlfriend might break up with the (unknown) perpetrator in a cold case and suddenly be willing to testify against her former boyfriend. Or a suspect might be arrested on federal charges and, as part of a plea bargain, confess to a local cold case charge. In any of these situations, a cold case investigation would be opened. But, in reality, at the point that the “investigation” was opened, the case had already been solved.

Our observations also suggested that agencies do not track even the most rudimentary statistics on the number of cold case investigations opened, the number cleared, the number that result in an arrest, or hours spent on cold case investigations. Moreover, according to survey respondents, the rate of success in cold case investigations is low: One in five cold case investigations result in a clearance, and this includes not just arrests, but also exceptional clearances. So, while it is true that solving an old case may be very satisfying to investigators and may give the victim's family some peace, the question remains, "At what cost?" Without better documentation of cold case statistics, we cannot determine whether the expenditure of time and resources justifies the ultimate payoff.

We have also noted in our time on site that there generally is no tracking what happens to cases after they are "cleared." That is, outcome information generally stops at the point of clearance – either by arrest or by exceptional means. The cold case units did not track whether cases that were cleared were also prosecuted and convicted. Many of the clearances in our sample were exceptional clearances – that is, they did not result in an arrest because the suspect was dead, serving a lengthy prison sentence, recently convicted on federal charges, or simply could not be found. Moreover, there is reason to think from the survey data and from our conversations with investigators that even in cases where an arrest is made, a successful prosecution is not by any means guaranteed. Witnesses may have disappeared, died, or memories may have clouded over time. Physical evidence may be lost or may have deteriorated.

Denver, where police and prosecutors work hand-in-hand from the beginning of cold case investigations, was a striking exception. Because the prosecutor's office is involved, in Denver we have good data on case outcomes beyond the point of clearance. But, even with the cooperative arrangement between police and district attorney in Denver, there still are many cases where a successful prosecution is not possible in spite of the fact that a DNA match has been made.

IV. CONCLUSIONS

Based on this research, we have come to understand that there are several types of cold case investigations. The three types involve very different processes and, if we are to come to understand the value of cold case investigations, we need to draw a clear distinction between them and to develop separate estimates of their costs and benefits. The first type is the classical cold case investigation where a detective picks up a case file because of a family or media inquiry or procedural review of cases that have remained unsolved for a specified length of time. The investigator reviews the file and determines whether there are leads that have not been thoroughly exploited. For example, are there potential witnesses who were not interviewed or whose story seems inconsistent in light of other evidence? This type of case is typified by work of the Vidocq Society, a group of forensic professionals and motivated private citizens who, as a public service, donate deductive, scientific and other talents to solve cold cases in which their help is requested by local police agencies.

The second type of cold case investigation is based on availability of forensic tests. Forensic material from old cases once thought not to be amenable to DNA testing may now be testable with advances in DNA technology. DNA samples that could once be matched only to DNA samples from one or two known suspects may be run against the CODIS database containing DNA of tens or thousands of offenders. A DNA match is then the basis of a potentially strong case against the suspect. Federal funds are making this type of cold case investigation increasingly common.

The third type of cold case investigation consists of those cases that are opened only because an individual charged with a crime confesses to the outstanding crime as part of a plea deal or an eyewitness announces willingness to finger a suspect in return for leniency after the witness is arrested for participating in a crime.

Each of these types of investigations has implications for cost and for the likelihood of success. The third type of case involves little new investigation and the cost is low. If the criterion for success is clearance, all such cases result in at least an exceptional clearance. A large majority likely also result in conviction. Submitting or re-submitting DNA material for laboratory testing (the second type of case) is relatively inexpensive (the initial investment is the cost of DNA laboratory processing), but the rate of success from indiscriminant DNA testing of large numbers of cases is likely to be well below 50%. Finally, the first type, or classic cold case investigation is likely to incur the highest costs and to have a low rate of success, even if judged by the lenient standard of exceptional clearances. Assessments of the value of cold cases need to draw these distinctions when estimating the value of investments made in resources to investigate cold cases.

Questions Going Forward

We come away from our investigation having more questions than answers about cold case investigations. We were surprised at the lack of accountability in cold case work. What is the main purpose of investing resources in cold case investigations? Is it simply to respond to a victim's family concern that justice be done? That is highly satisfying to the individuals who work on cold cases, but not a good organizational rationale for investing time and money in an investigation. Is the purpose to increase clearance rates? To an extent, this does seem to be the rationale for working on cold cases. The more cold cases that are solved within a reporting period, the higher the period's overall homicide clearance rate.

But the primary justification for working cold cases has to be the same as the reason for working new cases: To bring perpetrators to justice and to protect society from dangerous individuals. If that is the purpose of working cold cases, then the bottom line must be not just whether a case is cleared, but whether a perpetrator is arrested, tried, and convicted. Yet, we were surprised to learn that there is little emphasis on convictions as a goal of cold case investigations and little tracking of conviction rates for cold cases. If obtaining a conviction is the ultimate goal, then it would seem logical for cold case investigators to

work closely with prosecutors when screening cases so that they could decide whether, if the case were to be solved, there would likely be a prosecutable case. This is the model that was being used in our Denver site for the sexual assault cold case project. Police investigators sat down with prosecutors to determine whether each case that had material that could be submitted for DNA testing was likely to result in a conviction assuming that a CODIS hit would be made on suspect DNA.

We did not see evidence that cold case units were tracking conviction rates or other basic information on the efficacy and efficiency of cold case investigations. Agencies had basic statistics on the number of cold cases worked, the number cleared by arrest, and the number of exceptional clearances. They did not generally have information on court filings, convictions, sentences, or the time spent on cold case investigations relative to the number of clearances obtained. In agencies where there are a fixed number of dedicated cold case investigators, it is relatively straightforward to divide the hours worked by number of cases cleared. However, it was our observation that the number of cold case investigators is not always fixed, and that detectives switch back and forth between active and cold case investigations.

Based on these results, we suggest two topics that should be researched to better understand the potential for cold case investigations:

I. Conduct cost effectiveness analysis of investigator time spent on cold cases vs. new cases

Because of the paucity of data on cold case investigations, we know little about the return on investment of investigative resources put into cold cases relative to active cases. For a police agency with a fixed investigations budget, the question of what proportion of resources should be diverted to cold cases is a practical decision with important consequences. Collection of information in a number of selected agencies would help inform those decisions:

- Assemble statistics on the number of cases investigated, cases cleared, and arrests made for cold case versus new investigations. This information could be gathered in compiled form from quarterly or annual reports, to the extent that it is available. However, since we have found that compiled information is especially scarce for cold case investigations, we anticipate that often this information would have to be compiled from unit logs or the logs of individual investigators.
- Develop estimates of time spent on cold case and active case investigations by coding the frequency of different types of investigative activities (interviewing witnesses, querying investigative databases, preparing evidence for forensic testing, administrative tasks, etc.) on active and cold cases. Interview investigators to determine the average time involved for each type of investigative activity. Combining these two sources of information (activity frequency and time estimates from interviews), would allow the development of estimates of average investigative times for active and cold cases.

Using the data collected, it would be possible to develop cost effectiveness models that relate the average amount of time spent on active and cold case investigations to clearances and arrests. The models would specify the expected number of clearances and arrests per hour of effort expended on active case and cold case investigations.

II. Assess the conviction rate for cold cases and determine whether involvement of prosecutors in investigations leads to a higher rate of convictions

In a sample of agencies that conduct a large number of cold case investigations, determine the conviction rate for successful cold case investigations (i.e., those investigations that resulted in a clearance). Determine what proportion of cleared cases is filed and what proportion of the filings result in convictions. It would also be useful to collect reasons prosecutors gave for not filing cases and reasons for dismissal stated in prosecutor files for those cases that were filed but later dismissed. Interviews with detectives and prosecutors would provide further insight into the most common reasons that cleared cold cases do not result in a conviction.

Analysis of these data would yield a number of important pieces of information, including:

- The average rate of case filings and convictions;
- Comparison of filing and conviction rates across sites to determine if sites where police cold case investigators consult with prosecutors throughout the investigative process have a higher rate of filings and convictions than other jurisdictions.
- Develop statistical models that relate case characteristics to filings and convictions. This could result in recommendations about how cold case investigations ought to be prioritized in order to maximize convictions.

APPENDIX A: Data Abstracted from Cold Case Files

Victim Characteristics	Crime Context	Motivation	Human Capital	Physical Evidence	Basis for Cold Case Investigation	Cold Case Actions
Age	Time between crime & police arrival	Drug feud	Prime suspect identified	Weapon recovered	Elapsed time	Tested physical evidence
Gender	Location of body	Theft	Prime suspect interviewed	Casings recovered	Family inquiry	Re-interview witnesses
Race	Struggle preceded death	Personal or emotional	Prime arrested, released	Slugs removed	New physical evidence	Interview additional witnesses
Known gang member	Method of death	Gang feud	Eyewitness identified	Prints recovered	New testing methods/untested evidence	New theory or suspect
Known drug dealer	Time between crime & police arrival	Sexual assault	Other witnesses identified	ID through prints	Media inquiry	Pursued outstanding leads
Known drug user	Location of body	Drug feud	Prime suspect identified	Suspect DNA tested	New information from witnesses	Checked investigative database
Known prostitute		Theft	Prime suspect interviewed	Suspect ID'd via DNA	Suspect came forward	Conducted line-up