

The Prosecution of Sexual Assault Cases: Correlation With Forensic Evidence

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Received for publication September 1, 2000. Revision received May 23, 2001. Accepted for publication June 13, 2001.

Presented at the Society for Academic Emergency Medicine annual meeting, Chicago, IL, May 1997.

Reprints not available from the authors.

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0196-0644/2002/\$35.00 + 0

47/1/118013

doi:10.1067/mem.2002.118013

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Study objective: We sought to determine the association between historical and physical evidence with judicial outcome in sexual assault cases.

Methods: A population-based, retrospective review of forensic evidence was conducted for all sexual assault cases reported in Duval County, FL, during a 2-year period. Variables examined included age, race of victim, evidence of trauma (body, genital, or both), presence of spermatozoa at the time of the forensic examination, weapon use, and whether the victim knew the assailant. In cases in which an arrest was made, logistic regression was used to estimate the strength of association with the outcome of conviction in sexual assault cases.

Results: During the study period, 821 sexual assaults were reported, and 801 forensic examinations were performed. The victims were predominantly female (776; 97%), with 409 (51%) being black, 376 (47%) white, and 16 (2%) other minorities. A suspect was identified in 355 (44%) of the 801 cases for which a sexual assault forensic examination was conducted. No suspect was identified in 446 (56%) of these cases. There were 271 arrests made. The police did not have enough evidence to arrest a suspect after detention in 84 cases. For those cases in which a suspect was arrested, 153 had charges dropped, 89 were found guilty, 2 were found not guilty, and 27 cases were still pending or the files were sealed and unavailable for review. There was evidence of trauma in 202 (57%) of the examinations, and spermatozoa were found at the time of the forensic examination in 110 (31%) of the cases in which a suspect was identified. Logistic regression found that victims aged younger than 18 years, the presence of trauma, and the use of a weapon by the assailant were significantly associated with successful prosecution. There was a trend toward conviction if the victim was white.

Conclusion: Emergency physicians have an obligation to provide care for victims of sexual assault cases. This care includes a possible legal defense. To that end, emergency physicians should be vigilant in the documentation of the history of the event (eg, weapon use) and in the documentation of traumatic injuries because these factors can assist in a successful prosecution.

[Gray-Eurom K, Seaberg DC, Wears RL. The prosecution of sexual assault cases: correlation with forensic evidence. *Ann Emerg Med.* January 2002;39:39-46.]

INTRODUCTION

An estimated 20% of adult women, 15% of college-aged women, and 12% of adolescent girls have experienced sexual assault or sexual abuse.¹ Multiple studies have been published about risk stratification, injury pattern, psychological impact, and assailant profiles in cases of sexual assault,¹⁻¹³ yet very few studies address the factors associated with successful legal prosecution of these cases. The objective of this study was to review forensic records of sexual assault examinations performed on the general population and to correlate these findings with the legal outcome to determine which factors affected prosecution.

MATERIALS AND METHODS

Duval County, FL, has a population of more than 1 million people. In Duval County, all sexual assault forensic examinations conducted on adults and sexually active adolescents are conducted by the Adult and Adolescent Sexual Assault Program (AASAP). A separate program is available for children and non-sexually active adolescents. Since the completion of this study, the children and adolescent programs have been combined into one unit; the new adult program provides examinations for victims aged 18 years and older. The AASAP is a city-funded crisis intervention center that specifically addresses the emotional, medical, and legal needs of sexual assault victims. All area hospitals, law enforcement agencies, emergency responders, and the rape crisis hot line refer the victims of sexual assault to the AASAP for forensic examination.

A team consisting of a medical counselor and a forensic examiner is on call 24 hours a day. When medically appropriate, the victim is brought to the center for examination. If the victim is unable to come to the center because of physical, emotional, or medical considerations, the

forensic team travels to the victim's location. The team has a comprehensive travel kit that ensures the same quality of examination and evidence collection for examinations performed at the victim's location. The medical counselor provides emotional support to the victim, dispenses medication, coordinates follow-up emotional and medical care, and assists with the examination. The forensic examiner is responsible for all portions of the sexual assault forensic examination, including all historical, medical, and evidentiary information. The forensic examiner is also responsible for maintaining the forensic evidence chain of custody.

The same 9 examiners (8 physicians and 1 nurse practitioner) performed all of the sexual assault forensic examinations during the study period. All examiners underwent formal classroom and clinical instruction, in addition to a period of clinical observation before becoming forensic examiners. Each followed the same evidence collection protocol and documentation procedures. Continuing education was provided through monthly peer review of examination technique and documentation.

The forensic examination protocol was based on national models.¹²⁻¹⁶ A rape kit with a standardized form was used. Victim demographics, medical history, reproductive history, and history of the assault were recorded. Physical examination for both body and genital trauma was performed. Colposcopy was unavailable. Swab specimens of each orifice penetrated were taken. Dry-mounted and wet-mounted microscopic slides of the swab specimens were made. The wet-mounted slides were reviewed by the examiner at the time of the examination for spermatozoa. Urine pregnancy tests were performed for all appropriate cases. All findings were documented on the standardized form and traumagrams. All evidence was appropriately cataloged and stored to maintain the chain of custody. Victims were offered sexually transmitted disease and pregnancy prophylaxis in accordance with the Centers for Disease Control and Prevention recommendations and were given follow-up appointments with medical, counseling, and victim compensation services.

The forensic examination kit including all collected evidence, physician history of the event, physician examination, and examination findings were available for law enforcement and state attorney review during all phases of the investigation.

A database of information was created at the AASAP. All information obtained during the interview and examination was cataloged into this database. Information was

input by 1 person specifically trained for this purpose. The information was entered into the database on the work day after the examination. Random audits were performed by the physician supervisor and the program director to ensure the accuracy of data entry.

A retrospective review was performed for all sexual assault patients referred to the AASAP for a 2-year period, from October 1, 1993, through September 30, 1995, using this database. Victim demographics, trauma findings, presence of spermatozoa, weapon use, and assailant information were recorded from each case.

The legal resolution for each case was obtained through the use of computerized law enforcement files, state attorney's legal files, and courtroom proceedings. The arrest and prosecution of any criminal is a lengthy proceeding. To allow for this delay, 4 separate searches for the legal outcome of each of the cases were performed during a 4-year period.

The variables of victim age, victim race, body trauma, genital trauma, presence of spermatozoa, weapon use, and whether the assailant was known to the victim were correlated with legal outcome. Logistic regression was used to estimate the strength of the association of the selected variables with the legal outcome of those cases in which a suspect was arrested. A subanalysis was performed with the Pearson χ^2 test to determine the effect of the prosecutor's race and the victim's socioeconomic status for those cases which were dropped from prosecution after an arrest was made. The prosecutor's race was a known factor because of the limited number of attorneys in the sexual assault division. Socioeconomic status was extrapolated on the basis of the victim's zip code. Because of the retrospective nature and confidentiality of the data collected, this study was reviewed by the institutional review board and approved using an expedited review process.

RESULTS

A total of 821 patients were referred to AASAP for sexual assault forensic examination during the 2-year period. An examination was performed on 801 of the 821 victims referred to the AASAP with the complaint of sexual assault; 20 patients refused examination and received counseling services only. Law enforcement identified a suspect or suspects for 355 (44%) of the 801 active cases. The variables of victim age, victim race, evidence of trauma, presence of spermatozoa, weapon use, and whether the assailant was known to the victim were then

correlated for each of the 355 cases. The sex of the victim was also identified.

There were 345 female victims and 10 male victims. The age range was from 12 to 77 years, with a median age of 24 years. Fifty-one percent of the victims were black, 47% were white, and 2% were other minorities.

Evidence of trauma was found in 57% of the forensic examinations. Twenty-two percent of the victims had only body trauma, 12% had only genital trauma, and 23% had trauma to both the body and to the genital regions. Documented body trauma included abrasions, contusions, lacerations, ligature marks, burns, and bite marks. The extremities were the most frequently injured site, followed by the head and neck region, the back, the chest, and the abdomen. Genital trauma consisted mainly of cervical erosions, superficial lacerations to the vaginal opening and orifice, swelling, abrasions, and erythema.

Spermatozoa were found by the forensic examiner in 31% of the examinations. An independent in-house study evaluating the ability of the forensic examiners to correctly identify spermatozoa was conducted during the same period. The slides reviewed by the examiners were sent to the pathology laboratory for staining for the presence of spermatozoa. The pathologists were blinded to the findings of the forensic examiners. The results of the unstained wet-mounted slides as read by the forensic examiners had a 98% correlation with the results of the stained slides as read by the pathologists.

DNA testing was not yet the standard in the jurisdiction during the study period. It was only performed at the request of law enforcement or legal counsel. The rate of DNA testing was unavailable for review.

A weapon was used by the assailant in 28% of the assaults. Guns (11%) and knives (10%) were the most common weapons used. Other weapons included blunt objects such as baseball bats, broomsticks, and ax handles.

The assailant was known to the victim in 65% of the assaults. The assailant was recorded as black in 32% of the cases and as white in 10% of the cases. The race of the assailant was not recorded by the examiner in 58% of the cases.

An arrest was made in 271 (76%) of the 355 cases in which a suspect was identified (Figure). Arrest warrants were not prepared for 84 cases (24%) with an identified suspect. This was primarily because of victim request that the police drop the charges or an ironclad alibi by the suspect. Victim refusal to identify the suspect at the time of police inquiry accounts for the discrepancy between the percentage of cases with a suspect identified by the police

(44% of the total forensic examinations) and the percentage of cases in which the victim revealed to the physician examiner that the assailant was known (65% of the total forensic examinations).

The state attorney’s office chose not to pursue prosecution for 153 cases. In cases which the attorney decided not to prosecute, a “drop code” was assigned to the case. This code indicated the reason for not pursuing prosecution. In 56% of the cases, the drop code indicated a victim reason for not pursuing prosecution. The prosecutor’s discretion rather than a victim reason or evidentiary findings accounted for the highest percentage of cases dropped from prosecution. The state attorney chose not to prosecute because of a lack of evidence in only 10% of the cases (Table 1).

There were 118 cases in which legal counsel proceeded with prosecution. Assailants were found guilty of sexual battery or sexual battery–related crimes in 89 (75%) of the prosecuted cases. A not-guilty verdict was rendered in 2 cases (2%). Twenty-seven cases (23%) are either currently in legal proceedings or the files have been sealed and are unavailable for review (Figure).

Statistical analysis of the strength of association of the selected variables with the legal outcome was performed using logistic regression. These results, the odds ratios, and confidence intervals are reported in Table 2. Victims

Figure.

Legal resolution for cases of sexual assault that occurred in Duval County, FL, from October 1, 1993, to September 30, 1995.

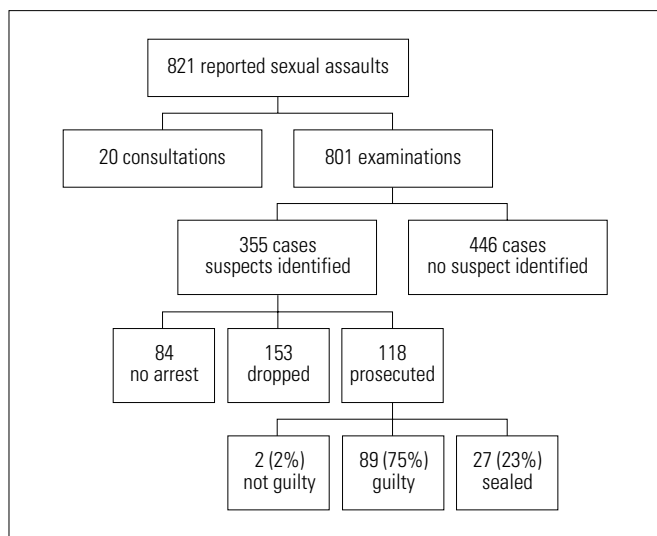


Table 1.

State attorney–cited reasons for not pursuing prosecution of the 153 dropped cases that had an identified suspect.

| Reason Case Was Dropped | No. of Cases | % |
|---------------------------------|--------------|----|
| Victim reason | | 27 |
| Victim no show | 11 | |
| Unable to locate victim | 11 | |
| Victim requested no prosecution | 20 | |
| Statutory factor | | 15 |
| Lack of witness cooperation | 1 | |
| Insufficient evidence | 15 | |
| Defendant had good alibi | 4 | |
| Citizen’s dispute | 2 | |
| Charge consolidated | 1 | |
| Prosecutor’s discretion | | 58 |
| Prosecutor’s judgment | 16 | |
| Improbability of conviction | 30 | |
| Victim reluctant | 8 | |
| Victim credibility | 34 | |

Table 2.

Strength of association of the selected variables for convicted cases.

| Variable | Odds Ratio | 95% CI |
|-----------------|------------|-----------|
| Age <18 y | 2.23 | 1.20–4.16 |
| Weapon used | 2.00 | 1.05–3.81 |
| Trauma | 1.93 | 1.08–3.43 |
| White race | 1.56 | 0.89–2.72 |
| Sperm detected | 0.94 | 0.52–1.70 |
| Assailant known | 0.87 | 0.48–1.58 |

Table 3.

Strength of association of the selected variables for those cases that were dropped from prosecution.

| Variable | Odds Ratio | 95% CI |
|-----------------------|------------|-----------|
| No weapon used | 2.00 | 1.11–3.63 |
| Age >18 y | 1.76 | 1.01–3.07 |
| No trauma | 1.68 | 0.98–2.86 |
| Race other than white | 1.61 | 0.96–2.69 |
| No sperm detected | 1.07 | 0.61–1.85 |
| Assailant unknown | 0.87 | 0.50–1.52 |

younger than 18 years, the presence of trauma, and weapon use by the assailant were all significantly associated with successful prosecution. Although not statistically significant, there was a trend toward successful prosecution if the victim was white. Conversely, cases were more likely to be dropped from prosecution by the state attorney's office if the victim was older than 18 years and if no weapon was used by the assailant (Table 3).

A subanalysis of the effect of the race of the prosecutor and the socioeconomic status of the victim was performed to determine whether these variables affected those cases in which a suspect was arrested but was subsequently dropped from prosecution. The Pearson χ^2 test revealed no association between the race of the prosecutor and successful prosecution ($P=.91$) and no association between the socioeconomic status of the victim and successful prosecution ($P=.70$).

DISCUSSION

Law enforcement agencies in the United States received 355,300 reports of sexual assault in 1995. More than 129,000 arrests were made in 1995 for forcible rape and other sex offenses.³ More simply put, one violent sex offense was reported for every 625 residents.³ Many of these victims presented to the emergency department for their initial care. Many received a forensic examination performed by the emergency physician according to ED protocol. A large study by Riggs et al⁷ provides descriptive data on the examination findings and on victim, assailant assault, and treatment characteristics for sexual assault victims. Injuries were recorded, and evidence was cataloged. But did any of it make a difference? Did any of it matter from a legal prosecution standpoint?

In 1985, Tintinalli and Hoelzer⁸ published a study reviewing the legal resolution of the sexual assault forensic examinations performed at Detroit Receiving Hospital. Although 372 records were reviewed, 81% were lost to follow-up, and only 18% (67 cases) had an arrest warrant issued. Correlation of the forensic evidence with legal resolution led Tintinalli and Hoelzer to conclude that there was no statistically significant correlation between spermatozoa, trauma, and legal outcome. In addition, on the basis of the legal findings from these 67 cases, Tintinalli and Hoelzer further stated, "We believe pelvic examination is not medically indicated as a routine in sexual assault evaluation."⁸

Rambow et al⁹ published a study contradicting those findings in 1992. The study reviewed 182 forensic exami-

nations performed at Hennepin County Medical Center. A suspect was identified in 29% (53) of the cases. On the basis of the forensic findings, the study concluded that trauma is significantly associated with successful prosecution, that the presence of spermatozoa or acid phosphatase favors successful prosecution, and that injuries would be missed if a complete examination were not done.

The conclusions reached by these investigators are certainly in opposition. In fairness, there have been many changes in the judicial system, incidence of reporting sexual assault, evidence collection, and societal perception of sexual assault victims since the 1985 Tintinalli and Hoelzer study. These factors cannot be quantified but have certainly changed the role of the physical examination in prosecution. Both authors made conclusions on the basis of a relatively small number of forensic examinations performed at large, urban teaching hospitals. Therefore, it is difficult to extrapolate these findings to the general population.

In contrast, this study is a population-based study because all forensic examinations in Duval County are performed by the AASAP. There is no hospital selection bias or law enforcement selection bias. Therefore, the results have great internal validity. Although examiner bias was present, it was decreased as a result of the standardized training process, examination kit, peer review, and the small number of forensic examiners.

This series is the largest series of its kind reviewing the correlation of the examination findings with the legal resolution of sexual assault cases. Our conclusions are based on 355 forensic examinations performed by the same 9 examiners using a standardized approach. Each of the 355 cases has an identified suspect or suspects and a known legal conclusion.

The victim demographics of this series parallels those found in other articles.⁷⁻¹¹ Rape is a crime which primarily affects young to middle-aged female victims. The number of male rape victims may actually be much higher; however, social and cultural factors often prevent male victims from reporting.¹⁷ Cultural issues, fear of law enforcement, language barriers, and lack of knowledge about the crime itself may also account for the low number of other minorities who reported victimization in this study.

Traumatic injuries were documented in a large percentage (57%) of the examinations. Other reports of trauma from sexual assault range from 29% to 80%.⁷⁻⁹ Examiner training and standardization of documentation by the use of traumagrams may in part be responsible for these results. The focused nature of a dedicated examina-

tion team may also lead to a more detailed search for traumatic injuries.

The forensic examiners reported the presence of spermatozoa on wet-mounted microscopic slides in 31% of the cases. This actually represents a higher percentage of cases with spermatozoa present compared with other reports. Other studies report a 13% to 17% incidence of spermatozoa findings with unstained microscopic evidence alone.^{7,9} Prostate-specific antigen staining methods can increase these results up to 50%.¹⁰ The prostate-specific antigen staining for the cases in this series was performed by an outside laboratory and was unavailable for review or correlation. This represented a limitation to our study.

The increased incidence of spermatozoa detection probably results from a variety of reasons. There is an active community education program regarding sexual assault prevention and victimization in Duval County. This may result in earlier reporting. This topic is a standard part of law enforcement continuing education in Duval County. Investigators are aware that a time delay may negatively affect the forensic findings. It is easy for both victims and law enforcement officers to access the AASAP, and there is minimal delay in the completion of a forensic examination. In addition, the focused nature of the examiner training may increase the detection of spermatozoa.

DNA analysis was not the standard in the jurisdiction during the study period. The lack of consistent analysis and the inability to review the DNA findings in cases in which analysis was performed represented a limitation to our study. There have been significant advancements made in the field of DNA matching. In addition, many law enforcement agencies are now creating large databases of "DNA fingerprints." It is likely that these advancements will increase the significance of spermatozoa detection and result in an increased emphasis on its importance during prosecution. Hypothetically, in the future, DNA analysis will be performed in all cases and these results will be compared with the established databases of "DNA fingerprints."

Weapon use in sexual assault cases ranges from 12% to 27%,^{3,7,11} which is consistent with the findings in this study. The absence of a weapon is not surprising considering that most assailants use the threat of force and personal physical strength to subdue their victims. It is important for the physician to document weapon use, the threat of force, and the use of force because a physician is allowed to report this information to the court during testimony.

Normally, when a person testifies in court, he or she may only report those things of which he or she has direct knowledge. He or she may not testify regarding things that were verbally communicated by the victim. To do so is considered heresy and is inadmissible. However, a physician giving medical testimony is allowed to do this if it is pertinent to the physical examination.

Weapon use or use of force is important because it directs the examiner to look for specific injuries or potential areas of injury. Therefore, the medical examiner may report items such as "he held the gun to my back" because the gun could have resulted in a potential injury and focused the examiner's attention to the victim's back. Documentation of these statements allows the medical expert to substantiate the victim's testimony. Documenting these statements incorrectly can be devastating to a victim's credibility with the jury.

The age of the victim, the presence of trauma, and the use of a weapon all strongly correlate with successful prosecution. These factors represent visual and clinical evidence that the prosecutors can present to a jury. Juries are made up of people with their own preconceived ideas and emotions. Traumatic injuries, violent weapons, and younger, more vulnerable victims affect these emotions. These findings may create a selection bias within the legal and judicial system. In addition, traumatic injuries are concrete evidence that something did indeed happen. The absence of these factors does not mean that a rape did not happen; however, it does make the case less impressive and harder to prove to a jury.

The trend toward successful prosecution if the victim was white was an interesting finding. This is most assuredly a result of multiple causes representing the spectrum of cultural, educational, social, and racial biases for the victim, law enforcement, legal system, and process of trial by jury.

A significant limitation to this study was the ambiguity associated with the reasons for not prosecuting 153 cases in which a suspect was arrested. These dropped codes accounted for a significant proportion (43.5%) of the cases in which the victim identified a suspect. The dropped codes were assigned by the prosecutor, and, as shown in Table 1, the classifications overlapped extensively. These assigned codes were subject to tremendous interpersonal bias. The state's attorney's office has an obligation to the public to proceed to trial only with cases that have been determined to have a high likelihood of successful prosecution. The office has finite resources and should use those resources to the best of its ability to assure maximal service to as many people as possible. However, there may

be a selection bias in the way these cases were assigned to the prosecutors. Sexual assault cases were normally assigned to the more junior members of the prosecution team. These prosecutors frequently had a very large caseload and limited experience in the field of sexual assault. In addition, these prosecutors are frequently transferred to other divisions within the state attorney's office after a few years to avoid burnout and to provide the junior attorneys with a well-rounded legal experience.

The majority of cases that were dropped from prosecution were dropped without physician input. Physicians were rarely asked to interpret the physical findings unless the decision had already been made to proceed with prosecution. There was no protocol to include the physician examiner in the decision whether or not to proceed with a case.

This limitation should not be understated. An article in the *Washington Law Review* emphasized that prosecutors have almost unlimited discretion in charging suspects for sexual assault and that this leads more often to underenforcement rather than overenforcement in cases of sexual assault.¹⁸ The article further stated that practical factors such as office caseload, likelihood of conviction, and victim credibility played more of a role than statutory factors or the elements of the crime when a prosecutor was determining whether or not to pursue a case. Unless the system of prosecution is held to more stringent accountability for determining which cases actually receive prosecution, the affect of this factor cannot be adequately quantified. Until this issue is addressed and corrected, the use of physician forensic examination cannot be fully understood.

The fact that the examiners in this study had received a focused education for performing sexual assault forensic examinations does add a potential bias. However, every emergency physician is capable of performing this high standard of care in any ED.

A forensic examination is nothing more than a physical and gynecologic examination with accurate documentation of history, injuries, and physical observations. A traumagram is nothing more than a sketch of the human body. There are numerous ready-made kits to assist with evidence collection and paperwork. Any hospital laboratory can assist with spermatozoa detection if the examiner does not feel confident with this skill. Some states even have written guidelines for performing sexual assault forensic examinations.¹⁹

Some may argue that this level of care cannot be provided in busy community EDs. The authors of this study disagree with that premise. Emergency physicians in busy

community EDs have the time and knowledge base to give thrombolytics to patients with acute myocardial infarctions. We have the time and knowledge base to perform lumbar punctures on neonates with sepsis. We have the time and knowledge base to resuscitate cardiac arrest, refractory ventricular tachycardia, and overdose-induced cardiovascular collapse. We certainly should have the time and knowledge base to provide appropriate care to victims of sexual assault.

Rape is a psychologically devastating crime.^{1,20} The physical and emotional healing process is lengthy, complex, and, unfortunately, incomplete in many cases. Fear, anxiety, depression, sexual dysfunction, and impaired social abilities impede the recovery process.^{1,21-23} Although no single event will complete the recovery process, the arrest and successful prosecution of the victim's assailant can be an important step. It is essential for all health care providers performing forensic examinations to take accurate histories and to document detailed trauma findings for all victims of sexual assault. The information gathered by a thorough forensic examination does make a difference in the legal outcome for cases of sexual assault.

Author contributions: KGE and DCS conceived the study. KGE, DCS, and RLW designed the trial. KGE supervised the conduct of the study and collected the data. DCS and RLW provided statistical advice on study design and data analysis. KGE drafted the manuscript and all authors contributed substantially to its revision. KGE takes responsibility for the paper as a whole.

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