

## Recovering of DNA evidence after rape

Ruxana Jina, Rachel Jewkes, Nicola Christofides, Joe H Smith

**Objective.** Sexual assault evidence collection kits (SAECKs) are used to collect evidence for DNA recovery after rape. The aim of this study was to assess the extent of completion of the kits by health care workers in 6 provinces of South Africa.

**Methods.** A cross-sectional study was conducted to code SAECKs that were analysed at one forensic science laboratory in South Africa.

**Results.** The findings from 204 SAECKs that were analysed are presented. The study found that none of the SAECKs complied fully with administrative quality requirements. Almost all of the specimens that were collected were analysed, except for pubic and head hair specimens that were rarely collected and analysed. A quarter of SAECKs did not have one of the three genital specimens

collected. The presence and availability of all three genital swabs for forensic DNA analysis were found to be significant as this increased the chance of evidence recovery and obtaining a foreign forensic DNA profile. In 80% of cases, the DNA matched the suspect.

**Conclusions.** The importance of administrative quality and the significance of collecting all three genital specimens should be emphasised in training programmes for health care workers. The study raises questions related to other aspects of sexual assault services and has implications regarding the overall quality of care that survivors receive.

*S Afr Med J* 2011;101:758-759.

South Africa has an extremely high burden of rape.<sup>1,2</sup> Several initiatives have aimed to improve services for rape survivors. Evidence collection kits for DNA recovery have undergone several revisions since their introduction in 1992. New Sexual Assault Evidence Collection Kits (SAECKs) were first launched in 2000 and have been modified subsequently several times. Since their introduction, anecdotal reports of usage shortcomings, as well as incorrect packaging and labeling, and incomplete specimen collection,<sup>3</sup> have been made.

Studies have looked at the provision and quality of sexual assault services provided after 1994<sup>2,4</sup> but there has been minimal research on the use and completion of SAECKs or on the availability of DNA evidence from specimens collected in SAECKs.

In 2005, a cross-sectional study was conducted at the Forensic Science Laboratory (FSL) in Pretoria. An FSL computer database was used to identify SAECKs analysed between 1 January 2005 and 31 July 2005. A data capture sheet was developed for collecting information on the date and time of the crime, police station involved, age of the victim, health care facility where evidence was collected, date and time of evidence collection, completion of documentation during evidence collection, and the specimens collected. Information was also obtained on the date of specimen analysis, outcome of the analysis, and the reason why the analysis was conducted. Ethical approval for the study was obtained from the Human Research Ethics Committee of the University of the Witwatersrand (M050413).

Data were obtained from 204 SAECKs from 6 provinces from which SAECKs were analysed by the FSL in Pretoria. Most ( $N=174$  – 95.1%) of the SAECKs were completed by doctors, while 9 (4.9%) were completed by nurses. Assessing the administrative quality of the SAECKs found that the case number was correctly recorded in 98.5% ( $N=200$ ) of the kits, and that an Inventory of Evidence Collected Form was present in 89.2% ( $N=181$ ) of the kits. Information on the form was completed in at least 80% of the SAECKs. The three components that had the lowest compliance with correct documentation were recording of the patient's previous sexual history (79.6%), time of the evidence collection (91.2%) and the completion of the specimen inventory (92.3%).

Almost all the swabs, underwear and tampons that were collected were analysed, but other specimens were less consistently examined (Fig. 1). In particular, head and pubic hair that was combed or collected was almost never analysed. Significantly fewer external genital, vaginal, cervical and blood specimens were collected from children than from adults.

In 80.0% ( $N=140$ ) of adult cases and 65.4% ( $N=17$ ) of child cases, foreign DNA was identified. The FSL had not received the suspect's blood sample for DNA analysis in 27 (15.3%) adult cases and 4 (15.4%) child cases. In the remaining cases, the DNA matched the suspect in 80.5% ( $N=91$ ) of the adult cases and 76.9% ( $N=10$ ) of the child cases. Logistic regression models showed that the recovery

School of Public Health, University of the Witwatersrand, Johannesburg  
Ruxana Jina, MB ChB, MMed  
Nicola Christofides, B(Log), MPH

Gender and Health Research Unit, South African Medical Research Council, Pretoria  
Rachel Jewkes, MB BS, MSc, MFPHM, MD

Biology Section, Forensic Science Laboratory, South African Police Services, Pretoria  
Joe H Smith, MTech

Corresponding author: R Jina (ruxana.jina@gmail.com)

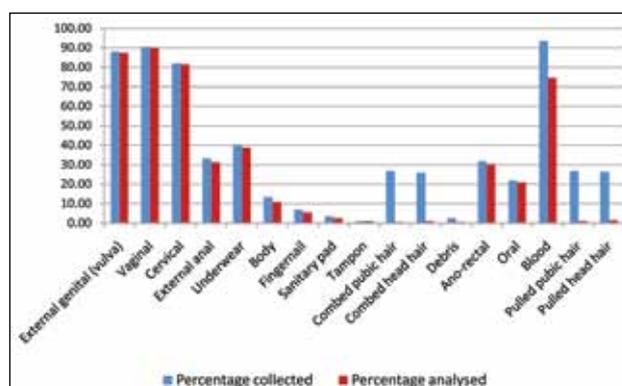


Fig. 1. Sexual Assault Evidence Collection Kit specimens collected and analysed ( $N=204$ ).

of DNA evidence was associated with completion of all genital specimens (vulva, vaginal and cervical) (OR=2.86; 95% CI 1.15 - 7.10) when controlling for whether the specimens were collected from an adult or child case, the type of kit used, and the day of the week that the specimens were collected (Table I). The association between evidence recovery and the collection of 'essential specimens' (genital and external anal specimens) when controlling for SAECKs completed in adult or child cases and the day of the week that the specimens were collected was not significant (OR=2.00; 95% CI 0.79 - 5.09).

**Table I. Logistic regression models of factors associated with DNA evidence recovery**

|                     | OR (95% CI)        | p-value |
|---------------------|--------------------|---------|
| <b>Model 1</b>      |                    |         |
| Genital specimens   | 2.86 (1.15 - 7.10) | 0.023*  |
| Day of the week     | 1.08 (0.88 - 1.27) | 0.631   |
| SAECK from child    | 0.75 (0.88 - 1.27) | 0.558   |
| Type of SAECK       | 1.00 (0.40 - 2.52) | 0.997   |
| <b>Model 2</b>      |                    |         |
| Essential specimens | 2.00 (0.79 - 5.09) | 0.130   |
| Day of the week     | 1.08 (0.90 - 1.30) | 0.403   |
| SAECK from child    | 0.62 (0.20 - 1.90) | 0.389   |

\*Statistically significant at 5% level.

Our findings suggest that there is a greater chance of DNA evidence recovery if more genital specimens are collected. Several deficiencies in the collection and processing of specimens were also identified. Firstly, there is evidence that SAECKs were sometimes inappropriately used – 11 kits were completed 10 days after the assault, when evidence recovery would be impossible; while the kits from many child victims did not have all of the specimens collected. More than 10% of SAECKs did not have the necessary administrative forms that would support the findings in court.

The logistic regression shows that completing all of the three genital swabs was associated with a greater likelihood of finding DNA. However, the possibility of reverse causation must be considered, whereby doctors might have collected more specimens in cases where there definitely was seminal fluid, assuming that there would be a greater chance of DNA recovery. Doctors clearly made decisions regarding specimen collection when dealing with individual patients, as no SAECK had all the specimens collected. It is understood that the availability of some specimens depends on the type of the assault, the time of the assault and actions that occurred during and after the

assault. Then again, approximately a quarter of the SAECKs did not have all three genital specimens collected that are most indicated with a history of rape.

Poor compliance with administrative requirements by doctors has been shown. Some administrative information is critical for court purposes while other aspects assist with the analysis of specimens. Minor errors in record keeping and discrepancies in information can result in dismissal of a case.<sup>5</sup> Training of health care workers on the importance of the administrative processes and maintaining the chain of evidence is essential.

This was a methodologically difficult study as the researchers had limited access to the FSL. Random sampling was not possible as there was no sampling frame for the period, and it was unclear whether the 204 coded SAECKs represent a census for the period. The multivariate results for 'essential specimens' might have been affected by the small sample size, which resulted in inadequate power to detect a significant difference.

It was encouraging to find that some male DNA was obtained in a number of SAECKs, and the study demonstrated that the collection of genital specimens may increase the likelihood of recovering evidence. The significance of collecting these specimens in all age groups should be emphasised in training programmes. The study raises questions related to other aspects of sexual assault services and has implications regarding the overall quality of care that survivors receive. It also provides information regarding the potential value of scientific evidence in trials. However, it is clear that although changes were made in sexual assault services and specifically with the evidence collection kits, this did not directly translate into improvements of service delivery for rape victims. Systemic changes still must be addressed.

**Acknowledgement.** The authors thank the Forensic Science Laboratory in Pretoria for granting permission to conduct the study and for assistance in the data collection.

#### References

1. United Nations Office on Drugs and Crime. Eighth United Nations Survey of Crime Trends and Operations of Criminal Justice Systems. Geneva: United Nations 31 March 2005. <http://www.unodc.org/pdf/crime/eighthsurvey/5678pvr.pdf> (accessed 26 September 2005).
2. Jewkes R, Abrahams N. The epidemiology of rape and sexual coercion in South Africa: an overview. *Soc Sci Med* 2002;55:1231-1244.
3. Martin LJ. Forensic evidence collection for sexual assault: a South African perspective. *Int J Gynaecol Obstet* 2002;78 Suppl 1:S105-S110.
4. Christofides NJ, Jewkes RK, Webster N, Penn-Kekana L, Abrahams N, Martin LJ. "Other patients are really in need of medical attention" – the quality of health services for rape survivors in South Africa. *Bull World Health Org* 2005;83:495-502.
5. Department of Health. National Management Guidelines for Sexual Assault Care. Pretoria: National Department of Health, December 2004.

Accepted 1 July 2011.