5 Forensic specimens

SUMMARY

■ The primary aim of a forensic examination is to collect evidence that may help prove or disprove a link between individuals and/or between individuals and objects or places.

■ In sexual violence cases, as in any other criminal investigation, the following principles for specimen collection should be strictly adhered to:
  - collect carefully, avoiding contamination;
  - collect specimens as early as possible; 72 hours after the assault the value of evidentiary material decreases dramatically;
  - label all specimens accurately;
  - dry all wet specimens;
  - ensure specimens are secure and tamper proof;
  - maintain continuity;
  - document details of all collection and handling procedures.

■ Health workers should be aware of the capabilities and requirements of their forensic laboratory; there is no point collecting specimens that cannot be tested.

5.1 The purpose of forensic specimens

The objective of forensic evidence is to prove or exclude a physical connection between individuals and objects or places. Such evidence comprises a wide variety of substances or objects, the analysis of which requires specific, often specialized scientific skills.

The close encounter of assailant, victim and crime scene may result in an interchange of traces of evidence (Locard’s principle). Biological traces (i.e. hair, blood, semen, skin fragments) may be found on both the victim and assailant; for instance, the victim’s blood could get onto the assailant’s clothes. Fragments from the scene (e.g. mud, vegetation) may link a victim and assailant to a particular location, or they may each have left traces of clothing or biological traces at the scene.

On the basis of the facts available and information provided by the patient and investigators, the health worker must decide which specimens to collect from the individuals involved. When faced with such decisions, it is important to be mindful of what purpose the specimen will serve, what link is potentially going to be established and whether such a link may assist the investigation of the case. Important points to keep in mind when conducting an examination of a victim of sexual violence with a view to obtaining forensic evidence are highlighted in Box 6.
There is a wide range of specimens that could be collected in order to assist the criminal investigation process. It is essential that health workers have a clear understanding of the capabilities and requirements of their forensic laboratory. For instance:

- **What specimens can be tested?**
- **How should individual specimens be collected, stored and transported?** It is important to be aware of the fact that all aspects of the collection, transport and analysis of forensic specimens may be subject to legal scrutiny, the results of which may affect the outcome of criminal proceedings.
- **How are results made available?**

All these questions need to be considered before a forensic service is provided: there is no point collecting specimens that will not or cannot be tested.

### 5.2 Forensic specimen collection techniques

When collecting specimens for forensic analysis, the following principles should be strictly adhered to:

- **Avoid contamination.** Ensure that specimens are not contaminated by other materials. Wear gloves at all times. Modern DNA assay systems are very sensitive and may detect small amounts of extraneous material.
- **Collect early.** Try to collect forensic specimens as soon as possible. The likelihood of collecting evidentiary material decreases with the passing of time. Ideally, specimens should be collected within 24 hours of the assault; after 72 hours, yields are reduced considerably.
- **Handle appropriately.** Ensure that specimens are packed, stored and transported correctly. Analytical laboratories should be able to provide
guidance on special requirements for specimen handling and storage. As a general rule, fluids should be refrigerated; anything else should be kept dry.
- **Label accurately.** All specimens must be clearly labelled with the patient’s name and date of birth, the health worker’s name, the type of specimen, and the date and time of collection.
- **Ensure security.** Specimens should be packed to ensure that they are secure and tamper proof. Only authorized people should be entrusted with specimens.
- **Maintain continuity.** Once a specimen has been collected, its subsequent handling should be recorded. Details of the transfer of the specimen between individuals should also be recorded. It is advisable to check with local authorities regarding the protocols for the recording of such information.
- **Document collection.** It is good practice to compile an itemized list in the patient’s medical notes or reports of all specimens collected and details of when, and to whom, they were transferred.

Table 9 lists the range of forensic specimens that are typically of interest in cases of sexual violence, together with notes about appropriate collection techniques and comments on their relevance.

<table>
<thead>
<tr>
<th>SITE</th>
<th>MATERIAL</th>
<th>EQUIPMENT</th>
<th>SAMPLING INSTRUCTIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anus (rectum)</td>
<td>Semen</td>
<td>Cotton swabs and microscope slides</td>
<td>Use swab and slides to collect and plate material; lubricate instruments with water, not lubricant.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Lubricant</td>
<td>Cotton swab</td>
<td>Dry swab after collection.</td>
<td></td>
</tr>
<tr>
<td>Blood</td>
<td>Drugs</td>
<td>Appropriate tube</td>
<td>Collect 10 ml of venous blood.</td>
<td>2</td>
</tr>
<tr>
<td>DNA (victim)</td>
<td>Appropriate tube</td>
<td>Collect 10 ml of blood.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothing</td>
<td>Adherent foreign materials (e.g. semen, blood, hair, fibres)</td>
<td>Paper bags</td>
<td>Clothing should be placed in a paper bag(s). Collect paper sheet or drop cloth. Wet items should be bagged separately.</td>
<td>3</td>
</tr>
<tr>
<td>Genitalia</td>
<td>Semen</td>
<td>Cotton swabs and microscope slide</td>
<td>Use separate swabs and slides to collect and plate material collected from the external genitalia, vaginal vault and cervix; lubricate speculum with water not lubricant or collect a blind vaginal swab (see Fig. 11).</td>
<td>1</td>
</tr>
<tr>
<td>Hair</td>
<td>Comparison to hair found at scene</td>
<td>Sterile container</td>
<td>Cut approximately 20 hairs and place hair in sterile container.</td>
<td>4</td>
</tr>
<tr>
<td>Mouth</td>
<td>Semen</td>
<td>Cotton swabs, sterile container (for oral washings) or dental flossing</td>
<td>Swab multiple sites in mouth with one or more swabs (see Fig. 12). To obtain a sample of oral washings, rinse mouth with 10 ml water and collect in sterile container.</td>
<td>1</td>
</tr>
<tr>
<td>DNA (victim)</td>
<td>Cotton swab</td>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>
### Table 9  
**GUIDELINES FOR MEDICO-LEGAL CARE FOR VICTIMS OF SEXUAL VIOLENCE**

<table>
<thead>
<tr>
<th>SITE</th>
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<th>SAMPLING INSTRUCTIONS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Nails</td>
<td>Skin, blood, fibres, etc. (from assailant)</td>
<td>Sterile toothpick or similar or nail scissors/clippers</td>
<td>Use the toothpick to collect material from under the nails or the nail(s) can be cut and the clippings collected in a sterile container.</td>
<td>6</td>
</tr>
<tr>
<td>Sanitary pads/ tampons</td>
<td>Foreign material (e.g. semen, blood, hair)</td>
<td>Sterile container</td>
<td>Collect if used during or after vaginal or oral penetration.</td>
<td>7</td>
</tr>
<tr>
<td>Skin</td>
<td>Semen</td>
<td>Cotton swab</td>
<td>Swab sites where semen may be present.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Saliva (e.g. at sites of kissing, biting or licking), blood</td>
<td>Cotton swab</td>
<td>Dry swab after collection.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Foreign material (e.g. vegetation, matted hair or foreign hairs)</td>
<td>Swab or tweezers</td>
<td>Place material in sterile container (e.g. envelope, bottle).</td>
<td></td>
</tr>
<tr>
<td>Urine</td>
<td>Drugs</td>
<td>Sterile container</td>
<td>Collect 100 ml of urine.</td>
<td>2</td>
</tr>
</tbody>
</table>

1. The following general procedures apply to the use of swabs for the collection of various materials for forensic analysis:
   - Use only sterile, cotton swabs (or swabs recommended by your laboratory).
   - Do not place the swabs in medium as this will result in bacterial overgrowth and destruction of the material collected by the swab. Swabs placed in medium can only be used for the collection of bacteriological specimens.
   - Moisten swabs with sterile water or saline when collecting material from dry surfaces (e.g. skin, anus).
   - If microscopy is going to be performed (e.g. to check for the presence of spermatozoa), a microscope slide should be prepared. Label slide and after collecting the swab, rotate the tip of the swab on the slide. Both swab and slide should be sent to the laboratory for analysis.
   - All swabs and slides should be dried before sealing in appropriate transport containers. A hole or cut may be made in the swab sheath to allow drying to continue.

2. Toxicological analysis may be indicated if there is evidence that a victim may have been sedated for the purpose of a sexual assault. In cases where the patient presents within 12–14 hours after possible drug administration, blood samples should be taken; urine samples are appropriate where there are longer delays. Seek the advice of the laboratory regarding suitable containers for specimens of this type.

3. There are a number of ways in which foreign material attached to a victim’s skin or clothing can be collected. If there is a possibility that foreign materials have adhered to the victim’s skin or clothing, the victim should be asked to undress over a large sheet of paper. Any loose material will fall onto the paper and can either be collected with a pair of tweezers or the entire sheet of paper can be folded in on itself and sent to the laboratory. Alternatively, the victim’s clothing can be collected and sent to the laboratory. If clothing is wet, however, it should be dried before being packaged up or sent to the laboratory without delay.

4. Collection of scalp hair is rarely required, but may be indicated if hair is found at the scene. About 20 hairs can be plucked or cut. Ask for guidance from the laboratory regarding the preferred sampling techniques for scalp hair. The victim’s pubic hair may be combed if seeking the assailant’s pubic hair; the combings should be transported in a sterile container.

5. Firmly wiping a cotton swab on the inner aspect of a cheek (i.e. a buccal swab) will collect enough cellular material for analysis of the victim’s DNA. Alternatively, blood may be taken. Buccal swabs should be dried after collection. They should not be collected if there is any possibility of foreign material being present in the subject’s mouth (e.g. if ejaculation into the victim’s mouth occurred).

6. If there is a history of the victim scratching the assailant, material collected from under the nails of the victim may be used for DNA analysis.

7. Sanitary pads or tampons should be air-dried if possible. They should then be wrapped in tissue and placed in a paper bag.
The presence of semen is best confirmed by taking a swab followed by microscopy. Fig. 11 illustrates the recommended technique for taking a blind vaginal swab. The swab is gently introduced beyond the hymen, taking care not to touch the external structures as it is being introduced and is advanced towards the vaginal vault. Fig. 12 demonstrates how to swab the mouth if there has been an allegation of ejaculation into the mouth. As the spermatozoa and semen tend to collect in the spaces between the teeth and the gingival margins of the lower jaw, a dry swab should be firmly but gently placed in the spaces between the teeth. This swab should be dried, capped and labelled.
Figure 12  How to perform a swab of the mouth for spermatozoa