

Challenges in Forensic Sampling in The Pre-Analytical Phase While Maintaining Chain of Custody in Sri Lanka and System Improvement in the Medico-Legal Unit of District General Hospital, Matale, Sri Lanka


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Abstract

Chain of custody, in legal contexts, is the chronological document that records the sequence of custody, control, transfer, analysis, and disposition of materials, including physical or electronic evidence. The biggest risk of breaking the chain of custody is holding evidence that is inadmissible in court. If the chain of custody is broken, vital evidence could be deemed legally worthless. The author has observed suboptimal standards for post-mortem sample collection and storage at the Medico-legal unit of Matale. The author noticed a knowledge gap in maintaining the chain of custody among medical officer-medico-legal and morgue health care assistants. The standard operating procedure was implemented to ensure that all stakeholders maintain the proper chain of custody in post-mortem samples. Improvements were also made to increase the security of the Post-mortem sample storage. We suggest the standard operating procedure in the whole country so that the institutions and the stakeholders adhere to the duties specified in the standard operating procedure leading to improvement in the desired chain of custody of the post-mortem samples. It is essential that the College of Forensic Pathologists of Sri Lanka, in collaboration with the ministry of health, develop an updated recommendation on sample collection for medico-legal units of Sri Lanka. The Ministry of Health of Sri Lanka should upgrade the medico-legal units based on those recommendations. We recommend appointing an authorised officer, such as a forensic nurse or development officer, to the medico-legal units to handle forensic samples.

Keywords: Maintaining chain of custody, standard operating procedure, post-mortem samples, system improvement

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Introduction

In legal contexts, a chain of custody (COC) is the chronological documentation that records the sequence of custody, control, transfer, analysis, and disposition of materials, including physical or electronic evidence. [1] Of particular importance in criminal cases, the concept is also applied in civil litigation. If properly maintained, it assumes that the sample collected initially is the one the laboratory receives for analysis.

The biggest risk of breaking the COC is holding evidence that is inadmissible in court. If the COC is violated, vital evidence could be deemed legally

worthless. This often happens if the COC form or evidence bag is not labelled, the transfer takes an

unreasonable amount of time, or the evidence falls into the wrong hands.

Much of the controversy surrounding the O.J. Simpson murder trial in the 1990s was due to an improper COC and evidence handling.[2] It showed mistakes in collecting the blood and that the samples could have been mixed up or "cross-contaminated" at the crime scene or laboratory.[2]

This paper reviews the challenges and the current practice of taking forensic sampling while maintaining COC in Sri Lanka to reform.

Objectives

The implementation of this SOP aims to

1. improve the standards in the pre-analytical phase of forensic samples and

- ensure that all activities involving forensic sample collection are performed to maintain COC.

Discussion

Deficiencies identified in the pre-analytical phase of post-mortem samples at the medico-legal unit of Matale

Suboptimal standards were observed at the Medico-Legal Unit (MLU) of the District General Hospital, Matale, in the post-mortem (PM) sample collection and storage until dispatch to the laboratory for testing, as described below.

There needed to be proper, separate containers available to collect specific post-mortem samples. Though it is recommended, the PM samples were not sealed at the time of initial collection. There was no proper wax seal or separate secure refrigerator to store PM samples. The PM samples were stored in a place accessible to other hospital healthcare workers who were not attached to MLU. There were deficiencies in the documentation of the post-mortem sample register. A knowledge gap was also observed in medical officer-medico-legal (MO/ML) and morgue health care assistants (MHCA) on maintaining COC. There was no internal standard operating procedure (SOP) at the MLU.

The PM samples were in the custody of MHCAs.

Asian Human Rights Commission in November 2011 identified three (03) broad issues related to medico-legal work in Sri Lanka and submitted comprehensive suggestions to adapt and improve the current system. In that, it is identified that (1) Sterile containers (Screw capped bottles or rubber top vials), (2) Standard labels (adhesive type), (3) Standard tags, and Sample sealing tapes are essential in investigations.[3]

Many obvious deficiencies and demands related to medico-legal work in the country have gone unnoticed and unheard for decades.[3]

Causes for lack of updated knowledge on the chain of custody among ordinary medical officers, and morgue health care assistants

Standard practice in many countries is that Forensic Medicine is handled only by Specialists in forensic medicine (SFM) or trainees under supervision after completion of residency [4].

Medical students are taught basic principles of Forensic Medicine in the universities of Sri Lanka. [5] The doctors who have passed the medico-legal module exam conducted by the Department of Forensic Medicine from a recognised university of Sri Lanka along with the MBBS degree are considered an expert in related matters such as

examination for drunkenness, examination of victims of trauma following road traffic accidents, assaults in the field of forensic medicine in the court of law.[9]

With the current system, a significant proportion of medico-legal work is done by government medical officers who do not have postgraduate qualifications in forensic medicine.[6] Moreover, OPD doctors and DMOs must perform medico-legal work in peripheral hospitals lacking MLU.

In Sri Lanka, medico-legal work is handled by many categories of doctors such as MO/ML, district medical officers (DMO), outpatient doctors of the hospital (OPD) who lack postgraduate qualifications with updated knowledge compared to postgraduate trainees in Forensic Medicine, specialists in forensic medicine (SFM).[7,8]

The medical officers not trained in medico-legal work with insufficient experience results in the medical evidence not being presented correctly in court. [10]

However, nowadays, the new MO /MLS are trained at the Institute of Forensic Medicine and Toxicology, Colombo, before their appointment to the relevant MLU.

Also, MHCA, who assists in the autopsy, needs to gain knowledge of the critical aspect of Forensic Medicine.[3] They are recruited to the Ministry of Health with an essential qualification of Ordinary level examination. They are given in-service training once they are attached to an MLU. The expected standard practice is that morgue technician are a specialised category with knowledge and training in developed countries.[11]

Deficiencies identified in the Currents practice of pre-analytical phase Post-mortem samples in Sri Lanka, and best practice

The Ministry of Health of Sri Lanka issued a PM sampling circular in 1981 with detailed explanations on specimen collection, labelling, and transport to the Government Analyst department (GAD) for toxicological examination. [12] This circular should be updated to the present context.

Developed countries and forensic institutions have issued updated recommendations for collecting forensic specimens, labelling, packaging, and storage that align with current evidence-based practice.[13][14]

Glass screw cap bottles are supplied in the MLU for the storage of blood for testing for alcohol without sodium fluoride, which is a preservative for ethanol in the blood.[15] The laboratory of the Hospital

assists in measuring and adding this minute quantity of sodium fluoride. The standard practice in developed countries is for glass bottles or vials being provided with added preservatives.

Also, no larger glass crew cap bottles are available for collecting blood or other specimens for the toxicological examination, which needs larger quantities compared to alcohol examination. The practice that is existed is to collect them in unsuitable containers or multiple small glass containers.

The pre-analytical phase (i.e., collection, transport, and storage) has a substantial role in the quality and reliability of analytical results, which depend on the quality and acceptability of specimens. Additionally, these pre-analytical steps are critical in forensic cases.[16]

Even though the expected standard practice is to have an external or internal standard operating procedure on the COC, most MLU lacks them.[17]

The seal-proof transparent polythene bags help store the sample until it is dispatched to the laboratory, which is unavailable to MLU in Sri Lanka.[3]

There are separate printers available to print labels for the post-mortem samples in recognised MLUs, which is not available in Sri Lanka. The Usual practice is to use handwritten tags in this regard.

The printed registers on PM samples are unavailable in the Ministry of Health for the MLU to the whole country.

MLU that SFM heads lack a specified officer who keeps those collected samples in custody until dispatch to GAD. The HCMA is utilised to dispatch and receive pieces. Some Forensic departments of the universities have technical officers who have the knowledge and are being used in this regard. In the past, SFM was arrested in connection with the loss of valuable samples indicating the unnecessary responsibility placed on the SFM for the custody of samples.[18] In developed countries, MLU and hospital forensic samples are in the custody of an officer responsible for maintaining the COC, such as a forensic nurse.[19]

Interventions done at Matale

The MO/MLs and MHCA of Matale were educated on the importance of maintaining the COC.

A new wax seal was prepared. The Standard operating procedure (SOP) used at the Institute of Legal Medicine and Toxicology (IFMT) was improved with the approval of the head of the institution of the IFMT and implemented at the

MLU. The SOP at MLU of Matale was developed with Sinhala language translation to benefit MHCAs not literate in English.

The implementation of the SOP is to ensure that all activities involving PM samples are collected and stored to maintain proper COC. This SOP complies with the circular issued by the ministry of health.

A centrifuge was installed in the morgue of MLU for separating serum in serological testing.

A newly printed register was prepared with printed pages indicating the details of the deceased, the sample, the judicial medical officer and the health care assistant who assisted in the autopsy, and details of the intermediate person who took over the sample to dispatch to the GAD, etc.

Several steps were taken to improve the security of the PM samples, such as a separate refrigerator which could be locked with a key, limited accessibility of the keys to the sample room, dual authentication with no single officer having access to all the keys of the sample room, installation of CCTV cameras at the MLU and the morgue complex.

Conclusions and Suggested reforms

We suggest implementing the SOP by the Ministry of Health to all the MLUs so that the institutions and all the stakeholders adhere to the duties specified in the SOP to improve the desired quality of the PM samples.

It is essential that the College of Forensic Pathologists of Sri Lanka, in collaboration with the Ministry of Health, develop updated recommendations on sample collection with particular emphasis on appropriate containers, equipment, and registers for the MLU of Sri Lanka.

The Ministry of Health needs to upgrade the MLU based on the recommendations.

We recommend appointing an authorised officer, such as a forensic nurse, development officer, or MO / ML, to the MLU to handle forensic samples.

We also recommend proper training of MHCAs with an appropriate curriculum by the Ministry of Health.

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Annexures

Annexure 1: Standard Operating Procedure (SOP) on Autopsy Sampling at the Office of the Judicial Medical Officer, Matale, Sri Lanka

STEP	Standard Operating Procedure on Autopsy Sampling	මරණ පරීක්ෂණය තුරුමදී සාම්පල ලබා ගැනීමේ ක්‍රමවේදය
1	Consultant JMO or MO/ML is responsible for determining the autopsy samples to be taken in each case	එක එක අවස්ථාවලදී මරණ පරීක්ෂණයට අදාලව ලබා ගතයුතු සාම්පල කීරණය කිරීම විශේෂඥ අධිකරණ වෛද්‍ය නිලධාරී / වෛද්‍ය නිලධාරී නීති වෛද්‍ය වරයාගේ වගකීමකි.
2	Prior to the autopsy examination consultant JMO or MO/ML notifies the morgue technician of the possible samples: -Histology -Toxicology -Microbiology -Sexual assault Samples	මරණ පරීක්ෂණය ආරම්භ කිරීමට ප්‍රථම විශේෂඥ අධිකරණ වෛද්‍ය / වෛද්‍ය නිලධාරී නීති වෛද්‍ය විසින් අවශ්‍ය වියහැකි සාම්පල වර්ග පිළිබඳව මහා මරිරාගාර විවිධවිදක සහයක වෙත දැනුම් දෙනු ඇත. -පටක විද්‍යාව/පටක වේදය -බුද්ධකවේදය / වීෂ විද්‍යාව -ක්ෂුද්‍ර ජීව විද්‍යාව -ලිංගික අන්වරණ සම්බන්ධ සාම්පල
3	The morgue Technician ensures all the containers and swabs are available	සාම්පල ලබාගැනීමේදී අවශ්‍ය බහාලුම් හා ද්‍රව්‍ය (swabs, containers) ආදිය සපයා තැබීම මහා මරිරාගාර විවිධවිදක සහයක විසින් සිදුකල යුතුය.
4	During the autopsy consultant JMO or MO/ML takes all Samples and places them in the appropriate container	මරණ පරීක්ෂණය තුරුමදී විශේෂඥ අධිකරණ වෛද්‍ය/ වෛද්‍ය නිලධාරී නීති වෛද්‍ය විසින් සියලු සාම්පල ලබාගැනීම හා නිසි බහාලුම් වලට පෑදීම සිදු කරනු ඇත.
5	Consultant JMO or MO/ML labels the Samples With the SR number, the name and date/time of collection. All labels are checked and verified by consultant JMO or MO/ML. Samples should be sealed.	ලබාගත් සාම්පල් ලේබල් කිරීම, (Labels) විශේෂඥ අධිකරණ වෛද්‍ය/ වෛද්‍ය නිලධාරී නීති වෛද්‍ය සිදු කරනු ඇත. සියලුම ලේබල් පරීක්ෂා කිරීම සහ සත්‍යාපනය කිරීම විශේෂඥ අධිකරණ වෛද්‍ය/වෛද්‍ය නිලධාරී නීති වෛද්‍ය විසින් සිදු කරනු ඇත. සාම්පල සීල් කැබය යුතුය.
6	Consultant JMO or MO/ML fills in the appropriate laboratory request form before leaving the mortuary	විද්‍යාගාර වලට යැවීමට අවශ්‍ය පෝරම මහා මරිරාගාරයෙන් පිටතට ගෙන යාමට පෙර විශේෂඥ අධිකරණ වෛද්‍ය/ වෛද්‍ය නිලධාරී නීති වෛද්‍ය විසින් සම්පූර්ණ කරනු ඇත.
7	The morgue technician writes in the sample dispatch register	මහා මරිරාගාර විවිධවිදක සහයක විසින් අදාල විද්‍යාගාර වෙත ගෙනයානු ලබන සාම්පල අධිකරණ වෛද්‍ය නිලධාරී කාර්යාලයේ ඇති නිසි ලේඛනයේ ලේඛන ගත කර යුතුය.
8	At completion of the autopsy, the morgue technician responsible for the case, transfers the samples, together with the Request forms, to the laboratory.	මරණ පරීක්ෂණය අවසන්වූ පසු අදාල මහා මරිරාගාර විවිධවිදක සහයක විසින් සාම්පල හා පිටවූ පෝරම විද්‍යාගාර වෙතට රැගෙන යා යුතුය. සාම්පල රැගෙන යාම මරණ පරීක්ෂණය සිදුකල දිනම හෝ රාත්‍රියකට පසු සිදුකල පරීක්ෂණ වල සාම්පල පසුදිනම විද්‍යාගාරය වෙත ගෙන යා යුතුය.
9	At the laboratory, the laboratory technician checks the labels and the request forms to ensure they are consistent and correct.	විද්‍යාගාරයේදී විද්‍යාගාර සහයකයින් විසින් ලේබල් සහ ලේඛන පත්‍ර සහ සාම්පල හා සසඳා පරීක්ෂා කරනු ඇත.
10	If correct, the samples are accepted, entered in the laboratory receipt book and this is signed by the laboratory technician	නිවැරදිව සකස්කර ඇති සාම්පල විද්‍යාගාරයෙන් ලබාගත් පසු විද්‍යාගාර සාම්පල ලේඛනයේ ඇතුළත්කොට විද්‍යාගාර සහයක විසින් අත්සන් කර යුතුය. විද්‍යාගාර ලේඛනයේ සාම්පල හරවා ගිවිසුම් ලබාගැනීමේ විස්තර සටහන් කර යුතුය.
11	If the forms or labelling is Incorrect the laboratory contacts Consultant JMO or MO/ML to correctly complete Forms	නිවැරදි නොවන ලේබල්/පෝරම ඇති අවස්ථාවකදී විද්‍යාගාර සහයක නිවැරදිව පෝරම පිරවීමට විශේෂඥ අධිකරණ වෛද්‍ය නිලධාරීගේ/වෛද්‍ය නිලධාරී නීති වෛද්‍ය ගෙන් විමසා භ්‍යංගුරු ලබා ගත යුතුය.
12	If the MO/ML does not complete the correct form within 2 days, morgue technician/ cutter informs the consultant JMO	අදාල වන පෝරම වෛද්‍ය නිලධාරී විසින් දින දෙකක් ඇතුළත සම්පූර්ණ නොකරයි නම්, ඒ බව මහා මරිරාගාර විවිධවිදක සහයක විසින් විශේෂඥ අධිකරණ වෛද්‍ය නිලධාරී කුමා වෙත දැනුම් දිය යුතුය.