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# Is the Autopsy Report a “Gold Standard”?

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# Background

- The topic started from a previous study<sup>[1]</sup> about the mismatch rate of the underlying cause of death on death certificates and autopsy reports, in which we used the diagnoses on autopsy report as the gold standard
- Compared to a death certificate based on information about the patient during their lifetime, an autopsy report provides more comprehensive diagnoses of the deceased's illness or injury by examining the patient's body post-mortem



# Autopsy: Definition and Purpose

- An autopsy, also known as post-mortem examination, is a kind of medical investigation, usually performed by a pathologist in a surgical procedure including a thorough examination of a corpse by dissection<sup>[2]</sup>
- Forensic or clinical purpose(s) to:
  - ✓ identify the deceased
  - ✓ establish sequence of events in multi-casualty situations
  - ✓ evaluate **determine the cause, manner, and mechanism of death**
  - ✓ rate the quality of medical diagnosis or treatment



# Autopsy Report: Common Elements

- Deceased identification and time/location/pathologist of autopsy
- Cause of death (opinion, comment, discussion)
- Clinical history and clinicopathological correlation
- External examination
- Internal examination and organ descriptions
- Microscopic examination
- List of diagnoses and pathological findings

Autopsy reports do not typically include all possible elements, and vary depending on different countries, states, facilities, and the pathologists' personal reporting style.<sup>[2-5]</sup>



# Case Format Overview

Autopsy reports elements ( <i>n</i> =329)	<i>n</i>	%
Internal examination	308	93.6%
External examination	302	91.8%
Diagnoses or pathological findings	302	91.8%
Microscopic examination	281	85.4%
<b>Cause or mechanism of death</b>	251	76.3%
<b>Clinical history section</b>	195	59.3%



## How Format Impact

	Not Match	Match
Has No Clinical History	78	54
Has Clinical History	43	152

$$\text{Odds Ratio} = \frac{54/78}{152/43} = 5.1$$

( $p < 0.001$ )

The odds of having matched diagnoses on death certificates and autopsy reports were 5.1 times higher among the autopsy with clinical information than the autopsy without clinical information.



# Underlying Cause of Death (UCOD)

- Most deaths are caused by multiple causes. Thus, developing statistical information summarizing what conditions cause death could be complex, and significant patterns or trends in causes of death might be missed.
- To address this problem, the concept of an underlying cause of death - the disease or injury that triggers all other causes or conditions - was developed to help simplify and standardize the cause of death<sup>[6]</sup>.

(!) Even with an element-complete autopsy report, it remains challenging to determine the underlying cause of death.



# Types of UCOD Determination

USTUR autopsy reports could be categorized based upon how straightforward it was to determine the UCOD:

- **Type I:** Pathologist clearly identified a progression of diseases (%)  
E.g. The decedent **died as a result of** cardiac arrhythmia **due to** cardiomegalia **due to** hypertensive cardiovascular disease.
- **Type II:** Pathologist identified the most possible cause of death or the most significant conditions (%)  
E.g. **The most significant condition** at the time of death was severe acute pyelonephritis that probably resulted in urosepsis. Atherosclerotic and hypertensive cardiovascular disease was **another significant condition**.
- **Type III:** A judgment based on personal knowledge and experience because autopsy reports that only list autopsy findings and not give any conclusion (%)



# Conclusion I

- The autopsy report is not a gold standard if the goal is to completely explain the cause of death with a specified disease or diagnosis.
- Lack of a **standard uniform format** for autopsy reports
  - ✓ Omit important information that can affect subsequent research
- Difficult to identify an underlying cause of death in the **complex mechanism** of human body
  - ✓ Need sufficient autopsy evidence to support determining cause of death
  - ✓ Depend heavily on the pathologists' knowledge of the disease and their judgment based on personal experience



## Conclusion II

- Despite its limitations, the autopsy report is still the most reliable way to understand the cause of death. Compared to clinical diagnosis, imaging, and laboratory results, it provides the **most comprehensive information** about the deceased's body and gives **direct evidence** of the development of disease or injury in the body.
- Other benefits for medical or health research<sup>[7]</sup>:
  - ✓ Uncover clinically undetected diagnoses
  - ✓ Understand disease mechanisms
  - ✓ Improve medical diagnosis and treatment
  - ✓ Educate health practitioners
  - ✓ Correct public health statistics



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**Thank you!**

