Anatomical Pathology One Health and Biosurveillance of Emerging & Re-emerging Diseases

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Introduction

Greek words: Pathos= disease. Logos= study.

- It is the scientific study of disease into its:
 - Nature
 - Causes
 - Mechanisms
 - Effects.
- It is important to realize that Pathology here deals with abnormalities in STRUCTURE and/or FUNCTION

INTRODUCTION

- The anatomic pathology specialty plays a fundamental role within the multidisciplinary health systems team,
- since the majority of diseases are diagnosed by studying changes in cells, tissues and organs at both the macro and microscopic levels.

INTRODUCTION

- Thus, this specialty is generally circumscribed in: surgical pathology, cytology and necropsy.
- Today, with the advent of new **technologies**, the practice of the specialty has considerably expanded its activity (immunohistochemistry, immunofluorescence, electron microscopy, molecular pathology, among others)(1).

INTRODUCTION

- The Investigations, Treatment and prevention of diseases all depend on knowing the underlying pathology in the patient.
- The COVID-19 pandemic has reminded pathologists of our significant roles in the management and understanding of rapidly spreading and dangerous pathogens, from identifying the agent to characterizing the clinical pathology to managing the dead.

- Prevention and preparedness to health threats pose several challenges:
- To identify multifactorial drivers,
- To detect and evaluate risks as early as possible,
- To involve multiple actors and stakeholders, and
- To make information and data transversely and transparently accessible

- One Health can provide strategic scientific support if governance, research and training aim
- To overcome the barriers that hamper interaction, collaboration and coordination between sectors and disciplines.
- At the same time, it is misleading to trace any pandemic to a single trigger without
- Considering the multifactorial causes,
- Complex determinants and drivers that contributed to its occurrence.
- Unfortunately, to date, health systems have operated in isolation

- The **zoonotic origin** of most emerging pathogens,
- The crucial role played by humans in the overexploitation of the environment and
- The complexity of socio-economic drivers involved in the emergence and
- The complexity spread of epidemics requires a holistic One Health approach, which
- Should be designed and implemented in order to
- Improve the effectiveness of prevention and preparedness plans.

- The majority (61%) of human pathogens are zoonotic,
- Meaning that they are transmitted between animals and humans (Taylor et al. 2001).
- And if we limit our concerns to just emerging infectious diseases (EID) of humans, 75% of those are zoonotic!





Introduction

The WHO defines a pandemic simply as "the **worldwide spread** of a **new** disease". This does not exclude non-infectious diseases, though all current attention is on infections; and it has to be "new". Thus pandemic can be communicable or non-communicable (NCD),

Introduction

- One of the most obvious consequences of the COVID-19 pandemic is it has made us all 'experts' now: on epidemiology, vaccines, testing strategies, therapies, and on the subtle distinctions of dying with versus of COVID-19.
- Extraordinary has been the speed at which the scientific endeavours (including pathological identification and genetic sequencing of the virus) mushroomed.

The roles of pathology in pandemic infections

- The roles of multi-disciplinary pathology in pandemic infectious diseases are many.
- They are grouped into three chronological phases, early, middle & late.
- Of course, with the earlier 20th century influenzas and HIV/AIDS, this sequence was not followed since medical diagnostic technology, particularly for identifying virus infections, had not evolved to its current state with reliance upon molecular diagnostics.

The roles of pathology (all disciplines) in a pandemic severe infection

Early phase	Identification and characterisation of the infectious agent
	Generation and evaluation of diagnostic tests for the infection
	Drafting simple clinico-pathological case
	definitions or indicators of the new infectious disease
	Advising on health & safety issues around the treatment of patients with the disease
Middle phase	Roll-out and performance of diagnostic tests
	Detailed description of the clinical pathology,
	ie what the infection does to tissues, organ
	and how it results in disease and mortality
	Research into the pathogenesis of the disease
	Advising on health & safety issues around the
	post-mortem examination of patients who die
	with the disease
	autonsy examinations on those who die of
	and with the infection recommending what
	diagnostic samples to take
	Advising on safe practices for those who
	remove and dispose of cadavers that contain
	the infection ^a
	Diagnosing through autopsy who has died
	because of the infection versus with the
	infection; evaluating the impact of co-
	morbidities on the outcome of infection
	including cofety studies in animals and
	humans
Late phase	Monitoring, through autopsy, adverse effects
	of treatments and vaccines against the
	Infection Monitoring through the outenou the notential
	average deaths from other causes as the
	pandemic impacts on normal diagnostic and
	life-saving therapeutic procedures
	Veterinary pathology study of possible
	sources of the infection in the wild and how
	they transmitted to humans
	Eternal population surveillance for the
	infection, in the living and the dead

The roles of pathology in pandemic infections

- The focus is on some of the processes in the Table as they apply to human cellular pathology practice. In particular:
- 1) a comparative overview of their clinical pathologies;
- 2) how autopsy pathology practice has managed and its codes of practice; and
- 3) what can cellular pathology contribute, beyond what is already evident, to our knowledge of the pandemic clinical pathology and public health.

Caveats:

- It is important to recognize the limitations of the material available to study the tissue pathology of some pandemics:
- Mainly it is autopsy samples from people who have died of severe infection, and
- Therefore represents the end of a spectrum of possible pathological abnormalities plus
- Opportunistic infections in those who do not die rapidly plus
- The effects of therapy.

Anatomic Pathology roles

- Pandemics bring an avalanche of changes and restructuring of healthcare activity and specialist training program
- Biosecurity measures for health professionals and administrative staff had to be implemented at the highest level
- Continuing with the quality of diagnostics
- Reassignment of duties to Pandemic
- Teleworking when social restriction necessary

Anatomic Pathology roles

- Apply your expertise in anatomic pathology:
- To cutting-edge research focused on emergency animal/human disease and
- To investigate novel emerging pathogens.
- Contribute to biosecurity by
 - Participating in the maintenance and
 - Development of surveillance and exclusion testing programs

Anatomic Pathology biosurveillance roles in humans

- Notice and report and unusual or unexpected clinical or histopathological presentation
- Notice and report and unusual or unexpected clinical presentation during cytology clinics
- Notice unusual or unexpected autopsies and report
- Prepare necessary IPC SoPs
- Participate in emergency preparedness training, planning and surveillance

The role of the Mortuary in biosurveillance

- 1. A study report of autopsy findings
- 2. A publication on pathology findings in pandemic decedents
- 3. A small guideline/manual/algorithm on how to conduct autopsies in highly contagious conditions
- 4. Dissemination of findings to policy makers and subsequently the general public
- 5. Rolling out training on the experience on the Management of Dead Bodies in Highly Contagious Conditions to hospitals and mortuaries in Tanzania.

6. Improving infectious autopsy pathology training and research for both undergraduate (MD, BMLS) and postgraduate (MMed) students and possible inclusion of this component in the curriculums in the country

The role of the Mortuary in biosurveillance

The role of staff working in the mortuary
The role of students working in the mortuary

3. The role of the Police in the mortuary

4. The role of relatives in the mortuary

5.The role of logisticians/theologians in the mortuary: funeral operators, transporters, religious leaders e.g Muslims, etc

6.The role of family members of people who work in the mortuary

Anatomic Pathology biosurveillance roles in animals

- Notice and report and unusual or unexpected clinical or histopathological presentation
- Notice unusual or unexpected necropsies and report

Compare new or unusual clinical, tissue or cellular pathology findings with those happening in humans and report

Prepare how to receive, gross and process biopsies during pandemic

DISEASE CARE ALGORITHM



SELF DIAGNOSIS is a major limitation to pt care

SELF DIAGNOSIS: self-referral is limited by

- i. **Ignorance** on **disease** as well as about **its outcome**:
- ii. Stigmatized disease and/or its treatment
- iii. Asymptomatic presentation:
- iv. Mild symptoms

Way forward

- Conclusion: anatomical pathology will remain an integral part of modern medicine particularly in the era of:
- Evidence-based medicine
- Targeted therapy
- Customized therapy
- Individualized therapy
- Precision medicine but also in
- Disease/complication prevention and screening and prognostication & follow-up

Way forward

- There is no alternative to
 - Disease prevention
 - Promoting screening/early diagnosis, biosurveillance
 - Multidisciplinarity
 - Supportive and ancillary diagnostics
 - Best results can be achieved by:
 - Investment in lab diagnostics
 - Lab collaboration/integration (AP-AP, AP-CP, AP-Molecular, AP-Radiology, etc)
 - Referral & Telepathology, information systems

Steps to Improve Pathology Diagnosis

Intelligent and cost-effective integration of the various methods indiagnostic algorithms

Wayforward

- Include AP in biosurveillance programmes
- Include AP in NPHL (open a unit at the National Lab): now it contains mostly Microbiology/Immunology, Parasitology & Haematology (AP & CC are not present)
- Prepare a BSL3/BSL4 Histopathology Labs and Mortuary to handle highly contagious pathogens
- Include AP in algorithms and guidelines

Asanteni sana THANK YOU FOR LISTENING