Diagnostics and Enhancing Infectious Diseases Surveillance in the Republic of Moldova with ICGEB Collaboration

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We all want to live in a secure world. But new and existing health threats are constantly emerging.
IMPORTANCE OF DIAGNOSTICS

Source: https://www.gov.uk/emerging-infections-characteristics-epidemiology-and-global-distribution

Global map of emerging infections since 2003

- 2009 – Influenza A(H1N1)
- 2010 – Cholera
- 2011 – Influenza A(H3N2)
- 2012 – Severe fever with thrombocytopenia syndrome
- 2013 – MERS-CoV
- 2014 – Bourbon virus
- 2014 – Ebola virus
- 2015 – Zika virus
- 2016 – Crimean-Congo haemorrhagic fever
- 2017 – Lyme disease
- 2018 – Guinea worm
- 2019 – West Nile virus
- 2019 – Avian influenza A(H5N1)
- 2019 – Coronavirus (SARS-CoV-2)
- 2020 – Guine worm
- 2021 – Marburg virus
- 2021 – Dengue
- 2021 – Avian influenza A(H5N1)
- 2022 – Lassa fever
- 2022 – Chikungunya
- 2022 – Litivirus
- 2022 – Langya henipavirus
- 2023 – Nipah virus
- 2023 – Coronavirus (SARS-CoV-2)
IMPORTANCE OF DIAGNOSTICS

At the patient level
- Etiological diagnosis
- Monitoring and follow up (*ICU, treatment effectiveness (HIV), chronic diseases (diabetes)*)

At the population level
- Laboratory based surveillance
  - Notifiable diseases (WHO-IHR)
  - Epidemic prone disease (*Avian influenza, Cholera, Ebola, Plague, Yellow fever, Meningitis, MERS, Influenza, Zika, Rift Valley Fever, Lassa, fever, Leptospirosis, etc*)
  - AMR (*sole source of data for sensitivity testing*)
The Lancet Commission on Diagnostics - 7 Key Messages

1. **47% of the global population** has little to no access to diagnostics.

2. The critical significance of diagnostics in healthcare is undervalued, leading to insufficient financial investment.

3. Ensuring access to primary health care is the “last mile”, and crucial for achieving equity and social justice.

4. The **COVID-19 pandemic** has highlighted how crucial diagnostics are for Universal Health Coverage.

5. Recent **innovations** can enhance accessibility, and democratise diagnostics to strengthen patient autonomy.

6. Enhanced access to diagnostics for six crucial conditions could prevent up to 1.1 million deaths each year.

7. Each dollar invested in diagnostics returns multiple dollars in benefits, especially in middle and low-income countries.
Main inhibitory drivers for availability and equitable access to the supply of diagnostics

1. **Competition** from high-income countries (HIC) buyers

2. Preferred tests by HICs **not suitable and/or unaffordable** for LMICs

3. Access delays due to **slow regulatory approvals** and lack of transparency

4. **Inadequate manufacturing capacity** and **disruptions in supply chains** hinder the distribution of diagnostics

5. **Underfunding research** for many priority diseases in LMICs reduce the availability of tests

6. **Lack of** adequate healthcare **infrastructure** can limit access to diagnostic service
THE CHALLENGES

• Weak diagnostic systems
  – LIMS
  – Poor planning and prioritization
  – Procurement and maintenance challenges

• **Limited workforce** with required competencies, resulting in low access to quality laboratory diagnosis.

• **Limited standardization & quality assurance**

• Despite existing diagnostic capacity, low testing demand & under-utilization:
  – Unaffordable **costs** for the patients
  – Suboptimal **lab-clinical engagement**
  – Lack of **trust** of lab results
  – Lack of knowledge of **appropriate use of lab results**
C O V I D - 1 9 I N R E P U B L I C O F M O L D O V A

- **December 31, 2019**
  First recorded case of COVID-19 in Wuhan, China

- **March 12, 2020**
  Moldovan government declares a state of emergency

- **March 7, 2020**
  First recorded case of COVID-19 in the Republic of Moldova

- **March 16, 2020**
  Moldovan government imposes a nationwide lockdown

- **April 1, 2020**
  Moldovan government introduces a nationwide curfew

- **May 15, 2020**
  Moldovan government begins to ease restrictions

In 1 month, the number of cases = 965,

854 cases **local transmission**
111 cases **imported** cases

*Data from World Health Organization, https://www.who.int*
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COVID-19 eConference
April 24, 2020

Workshop sessions included insights on public health management, diagnosis and surveillance strategies, and vaccination approaches.

Epidemic Surveillance
September 21-23, 2021

co-funded by Regione Friuli Venezia Giulia
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**Biotech Impact**  
September 21-23, 2022

Biotechnology in Sustainable and Economic Development: The Intersection of Science, Policy, and Social Responsibility.

**CAPACITY BUILDING FOR DISEASE SURVEILLANCE - ICGEB COLLABORATION**

**INVEST IN WORKFORCE EXPANSION AND UPSKILLING**
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**Epidemic Surveillance**
- September 21-23, 2021
- 150 participants

**Biotech Impact**
- September 21-23, 2022
- 200 participants

**Emergency Response Training**
- October 17-18, 2023
- 120 participants

Virus diagnostics, surveillance, public health challenges in crisis situations, biosecurity and regional responses to COVID-19 and other epidemics.
General Purpose
- Contribute to improve research and development capacities in Moldova, particularly in the areas of infectious diseases and health surveillance systems.
- Create the premises for evidence-based decisions of Moldovan authorities in this area.

TARGETED RESULTS
- Staff trained
- Local SARS-CoV-2 analysed
- International partnership consolidated
ENHANCING SURVEILLANCE

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GRANTS FOR YOUNG SCIENTISTS

Arturo Falaschi Short-term PhD Fellowship - 3 months

Objective
- to study the level of immunity across convalescent and vaccinated people from Republic of Moldova

Developed tools
- ELISA
- Neutralization assay
  *FACS
  *High content analysis

RESULTS
Staff trained to develop diagnostics

- 296 samples (96 controls, 100 CP, 100 vaccinated with Sinofarm) - tested
- IF paper
- PhD thesis
Networking expanded
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Networking expanded
The TBFVnet project grows with new partners

Jul 6, 2022

On June 21 - the Tick-Borne Flaviviruses network welcomes new partners from the Republic of Moldova. During the online meeting between project partners, the Veterinary Research Institute of the Czech Republic, the Biomedical Research Center of the Slovak Academy of Science, the ICGBE and the Norwegian Institute of Health, presented their expertise in the field of tick-borne flaviviruses research, diagnostics and surveillance. Scientists from the Nicolae Testemitanu State University in Chisinau and the National Agency for Public Health of Moldova were invited to the meeting following their expression of interest in the topics of TBFVnet.

TBFVnet is a network of scientific research institutes across central and eastern Europe with the aim to study and survey tick-borne flaviviruses. The power of both survey and research relies on the collaboration between different institutes in as many countries as possible. One of the most promising objectives of TBFVnet project was to gather new research institutes in the network that could bring new knowledge and expertise and be a new observatory on tick-borne flaviviruses in Europe. This objective was reached in June with the entry of two new partners from the ICGBE Member State Moldova. Moldova is one of the countries in Europe within the endemic region of TBE and other tick-borne flaviviruses. It was actually thanks to the contacts ICGBE has in the country that two institutes, the Nicolae Testemitanu State University in Chisinau and the National Agency for Public Health, got to know about the network.
The TBFVnet project grows with new partners

Dec 6, 2022

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2 months training at Molecular Virology Laboratory, Trieste, Italy

- LAMP RT-PCR Testing (SARS-CoV-2/TBEV/ZIKA)
- TBEV Genome Alignment
- Western Blot
- TBEV Primer Design

PhD Project

Genotypic diversity and phylogenetic analysis of TBEV in regional outbreaks

NICOLAE TESTEMITANU STATE UNIVERSITY OF MEDICINE
AND PHARMACY OF THE REPUBLIC OF MOLDOVA

TBFVnet
A network of laboratories that study and survey Tick-Borne FlaviViruses
Lessons learned from the implementation of COVID-19 response in the Republic of Moldova

• The COVID-19 pandemic was a health crisis with serious economic and social impacts.
• Sequencing technology is key to identification, monitoring, detection of new pathogens and variants and may become the most essential element for manufacturing of medical countermeasures.
• Local diagnostic capacity is key to the first detector first responder approach.
• Improvement and actions need to be implemented before crises starts.
• Development and modernization of medical infrastructure is a public priority.
• Training and preparation of medical staff for crisis response is crucial.
• Participants
• Norwegian Ministry of Foreign Affairs
• BWC – ISU
• ICGEB