DO’S AND DON’TS OF ANTIBODY TESTING: POLICY AND PRACTICE

UPDATE: NEPAL IN THE CONTEXT OF COVID-19

JULY 22, 2020
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ON-DEMAND RESOURCES

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Questions?
Write to: info@acmt.net
Q&A will be at end of the Webinar

Please type your questions into the Q&A or Chat function during the webinar and we will get to as many as we can

We monitor all platforms, including YouTube and Facebook, for questions
CONFLICT OF INTEREST

NONE OF OUR SPEAKERS HAVE ANY CONFLICTS OF INTEREST TO DISCLOSE
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DO’S AND DON’TS OF ANTIBODY TESTING: POLICY AND PRACTICE

MEDICAL AND PUBLIC HEALTH CONSIDERATIONS OF COVID-19

Gigi Kwik Gronvall, PhD
Senior Scholar, Johns Hopkins Center for Health Security
Associate Professor, Johns Hopkins Bloomberg School of Public Health
Baltimore, MD
Two reports, intended to present the latest science to policymakers


SEROLOGY TESTING PROVIDES IMPORTANT DISEASE PREVALENCE INFORMATION

- Serology tests are blood tests to detect an immune response to SARS-CoV-2
- The presence of antibodies in the serum can indicate if a person was once infected with the virus, even if they have cleared the virus

**IgG**: Emerge later, but are more specific (10+ days symptom onset)

**IgM**: The early responders (5-10 days post symptom onset)

(from Sigma Aldrich)
Serology results can be used to understand the true prevalence of an infection.

- Individuals with no symptoms have antibodies to the virus, but may not have been tested using molecular methods.
- Serology testing can capture all individuals, no matter the type or range of symptoms, who were infected.
- Seroprevalence studies may be used to determine the case fatality rate.
- Fill in gaps left by contact tracing.
Serology test results alone cannot tell us if a person is immune to reinfection.

- We do not know what levels or longevity of antibodies are necessary for protective immunity to SARS-CoV-2.
- Serology tests cannot tell us if a person’s immune system has memory, or the immune system’s ability to recognize a previously encountered pathogen and produce a rapid, strong response.
- Depending upon the seroprevalence, may be less useful for individual decision making (assuming durable immunity).
WHAT MAKES A GOOD SEROLOGY TEST?

- The test must have high **sensitivity** and **specificity** to prevent false negatives or positives.
- The test must be validated by independent, unbiased sources (such as the NCI).
- The FDA is currently regulating test development in the US, with recent policies providing more stringent approval criteria.
### Sensitivity and Specificity Can Have Large Impacts on Test Accuracy

A population of 1 million people contains 150,000 infected individuals. Assuming a sensitivity and specificity of 95%, the table below illustrates the outcomes of testing:

<table>
<thead>
<tr>
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<th>Infected</th>
<th>Not Infected</th>
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<tr>
<td><strong>Seropositive</strong></td>
<td>142,500</td>
<td>42,500</td>
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<tr>
<td><strong>Seronegative</strong></td>
<td>7,500</td>
<td>807,500</td>
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**Total Infected:** 150,000

**Total Positive Tests:** 185,000

- **False Positives:** 42,500
- **False Negatives:** 7,500

**Percent of Positive Tests that Were Inaccurate:** 22.97%

**Positive Predictive Values:** 77.03%

Seemingly high sensitivities and specificities can lead to false negatives and positives depending on disease prevalence.
POSITIVE PREDICTIVE VALUE

**Cellex test**
- 93.8% sensitivity
- 95.8% specificity

**For an individual...**
- 5% seroprevalence: A positive result would have a 47% probability of being inaccurate
- 15% seroprevalence: A positive result would have an 20% probability of being inaccurate
- To get a much more accurate result, need to have multiple sequential testing.
SEROLOGY TEST TYPES

**RDT**
- **Rapid Diagnostic Test**
  - Takes 10-30 minutes
  - Qualitative (yes/no)
  - Small and portable
  - Requires a fingerstick
- **Quick yes or no results**

**ELISA**
- **Enzyme-Linked Immunosorbent Assay**
  - Takes 2-5 hours
  - Quantitative (antibody levels)
  - Requires lab space and trained personnel
  - Requires blood sample
- Levels, but not efficacy

**NA**
- **Neutralization Assay**
  - Takes 3-5 days
  - Quantitative (antibody levels)
  - Requires lab space and trained personnel
  - Requires blood sample and live virus
- Levels of effective antibodies

*What it provides*
The Center for Health Security has created a **serology test tracker** to provide information on available serology tests around the world.

- Tests are categorized by health agency approval status
- Updated twice weekly
PRIORITIES AT THE NATIONAL AND LOCAL LEVEL

National
- Coordinate validation and availability of tests, and make validation results public
- Collect testing data and provide testing guidance
- Conduct and coordinate serosurveys
- Fund research
- Establish a site like clinicaltrials.gov but for serosurveys and observational data
- DON’T: use these for immunity passports

State/Local
- Plan, conduct, and oversee public and private testing
- Use serology tests for contact tracing efforts
DETERMINING THE CORRELATES OF IMMUNITY

- Antibody levels waning?
- T cells vs. B cells in immunity
- What is the future of antibody testing?
  … still much to learn!
THANK YOU!

PLEASE REACH OUT IF YOU HAVE ANY QUESTIONS

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Associate Professor, Johns Hopkins Bloomberg School of Public Health
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UPDATE: NEPAL IN THE CONTEXT OF COVID-19

MEDICAL AND PUBLIC HEALTH CONSIDERATIONS OF COVID-19

Ramu Kharel, MD, MPH
Founder, Health Advancement Programs to Serve All (HAPSA)
Global Emergency Medicine Fellow, Department Of Emergency Medicine at Brown University
Providence, RI
OBJECTIVES

- Discuss Nepal’s context
- COVID updates in Nepal
- Discuss unique challenges facing Nepal due to COVID
NEPAL
Population: 30 million
Median age 24.5 years
Rural: 79.8% of total population
Life expectancy: 71.3 years
Physician density: 0.65/1000; ICU beds: <1500; Ventilators: <500 (all full as of 7/19)
30 % of GDP is remittance
Tourism a major source of economy
COVID IN NEPAL

- **January 24, 2020**: First case identified
- **March 14**: Suspension of travel from all countries on tourist visa
- **March 23**: 2\textsuperscript{nd} case identified in Nepal
- **March 24**: Country wide lockdown started
- **May 16**: 1\textsuperscript{st} COVID death
- **June 9**: Reopening plan in 5 stages created
- **July 20**: ~18K cases, and 40 deaths
EPIDEMIOLOGICAL CURVE NEPAL

New cases

Nepal

All time

186

July 20
CHALLENGE I: RDT (SEROLOGY) VS. RT-PCR

- Up until April 4, there were less than 80 PCR tests done daily
- Up until 11 May, less than 1000 PCR tests daily
- July 20th: 319,872 PCR tests done

- In mid June, Nepali people took streets to protest perceived government apathy, incompetence and corruption.
- Widespread accusation of taking kickbacks while purchasing PPE as well as RDT tests from companies abroad
URGENTLY EXPAND PCR TESTING
Nepal relying on unreliable COVID-19 kits

Government prepares to import more untested RDT test kits, and directs hospitals to use them

Ramu Sapkota
May 22, 2020

Latest

20 years ago this week
16th July, 2020
Kunda Dixit

Will Nepal get 2nd term at UNHRC?
16th July, 2020
Nepali Times

Nepal hydroelectricity sector gets COVID-19 shock
15th July, 2020
Raju Baskota

Nepal plans to evacuate
Further use of rapid diagnostic tests for COVID-19 will end up killing more Nepalis

Lhamo Yangchen Sherpa and Mallika Aryal
June 12, 2020
Public health experts suggest more PCR tests as they call into question the efficacy of rapid test kits

The Department of Health Services, however, bets on rapid test kits in the fight against coronavirus even though the National Public Health Laboratory says the validity of RDT kits was based on a small sample size.
CHALLENGE II: PROTECTING MIGRANT WORKERS

- 4th most remittance dependent economy in the world
- Nepal has almost 1 million workers in gulf countries in harsh conditions, who are stranded, who need to come back to the country (*companies refusing to take care of migrants*)
- Migrants stranded in the border and outside the airport; as well as mismanagement of quarantine facilities;
- *Returnees dispersed in rural Nepal without proper screening caused rise in cases in rural areas (especially in border areas to India)*
The ticking time bomb of Nepal's returning migrant workers

India's coronavirus lockdown forced migrant Nepali workers to flee back home, creating humanitarian and economic crises.

by Asad Hashim

9 Jun 2020
CHALLENGE III: WEAK HEALTH SYSTEM & LACK OF TRAINING

- Physician ratio is low, ICU capacity, ventilator capacity is low → **ventilator capacity filled**
- Gap in the role of private and public owned institutions → **private hospitals refusing patients (lack of PPE/training)**
- Multiple reports of healthcare workers refusing care, abuse of HCWs, ambulance refusing transport → **rural health post training and COVID related education has been delayed**
ON THE BRIGHT SIDE

- Young population: will likely lead to low mortality (*Current CFR < 0.3%*)
- Mask adherence and awareness has been rising
- Early travel ban was fruitful
- Rural area better for physical distancing
- World bank support in COVID response: $27M
- Utilization of PCR tests has been increasing
- MOHP communication daily and improvement in risk communication
- Phased reopening strategies applied
HAPSA: HEALTH ADVANCEMENT PROGRAMS TO SERVE ALL

- Hand washing awareness in local context: ongoing since 2013
- Videos made for Nepal’s national TV promotion:
  - Masks and proper use
  - Making your own mask
  - Hand washing
  - Gloves and their roles
- Live Q&A with focus on rural areas in Nepal
- Hotline of doctors/public health workers available for public regarding COVID
HAPSA AWARENESS CAMPAIGN

HAPSA, what is happening in our villages?

16 weeks ago · 292.4K Views

Like 😊 😇 😅 3.2K
HAND WASHING CHALLENGE IN NEPALI FUN SONG

Tag 10 of your friends to Nepali handwashing challenge!
16 weeks ago · 63.9K Views
KEY POINTS

- Initial focus on the wrong test for diagnosis set the country back by months
- Nepal’s context provided some unique challenge in COVID response: Migrant Workers Influx, rural majority, weak infrastructure
- Rural and young population will likely help keep mortality low
THANK YOU/QUESTIONS

- Facebook: /hapsa4all
- Instagram: @namastedoc
- Website: www.hapsa4all.org
Q&A
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Write to: info@acmt.net
Re-Opening Schools During COVID-19
Claire Barnett, MBA, Founder & Executive Director, Healthy Schools Network
Allen Barkkume, MS, Industrial Hygiene Consultant, New Jersey Work Environment Council

Wednesday, July 29, 2020
3:00 PM EDT

www.acmt.net/covid19web