LITERATURE REVIEW SARS-CoV 2 Diagnostics

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WHO TO TEST

CDC recommendations (updated 5/3/20) :

- Patients presenting with COVID-19 symptoms
- Hospitalized patients
- Symptomatic healthcare facility workers, workers living in congregate living settings, and first responders
- Symptomatic residents of long term care facilities, including shelters and detention centers
- Asymptomatic persons at risk for poor outcomes, including racial and ethnic minority groups
- Asymptomatic individuals who are prioritized by health department or clinicians, including but not limited to: public health monitoring, sentinel surveillance, presence of underlying medical condition or disability, residency in a congregate housing setting such as a homeless shelter or long term care facility, or screening of other asymptomatic individuals according to state and local plans

NUCLEIC ACID AMPLIFICATION e.g., PCR (test for active infection)

- Positive PCR may not reflect transmissible infection as reliably as a positive viral culture, since PCR can detect non-infectious viral fragments that persist in the naso- or oropharynx.
- Literature reported PCR sensitivity range from 42%-98.8% with a meta-analysis pooled sensitivity of 89%
- Variables in PCR detection sensitivity include disease state, sample type and technique, and test manufacturer
- CDC currently recommends nasopharyngeal or oropharyngeal swab specimen, though there is a specimen study suggesting lower respiratory samples have the higher detection rates than upper respiratory samples, and PCR via saliva samples have shown to detect SARS-CoV 2 in 87-92% of positive patients (n=35)
- PCR detection of SARS-CoV 2 in stool samples remains positive after oral swab samples indicated convalescence, but researchers are unable to culture from stool samples, suggesting that this may not be a route of transmission

SEROLOGY (test for past infection)

- Positive serology may not confer protective immunity—there are conflicting studies on neutralizing ability of the S1 protein antibodies, and neutralization of viral S2, N or E proteins is not known ; information on this is rapidly evolving: more to come soon...
- Results of two case studies and one retrospective cohort study suggest that serology results are a reliable SARS-CoV 2 infection confirmation test about two weeks after illness onset, with seroconversion timelines similar to that of the 2003 SARS virus
- The 2003 SARS infection does not fully protect from SARS-CoV 2 False positives due to the 2003 SARS coronavirus infection are not likely as it has not circulated the human population since 2003 and positive neutralization was found to be undetectable six years after infection
- Abbott Laboratories' IgG and Roche Diagnostic's IgG & IgM N antigen testing kits have a self-reported sensitivity of 100% with specificities of 99.55% and 99.8% respectively. However, there may be issues with these tests crossreactivity with the regularly circulating caronaviruses

STATUS OF TEXAS & US TESTING?

- As of May 11, 2020 approximately 1,000 tests per day are conducted in Bexar county, and Metro Health has a goal of increasing testing capacity to 3,000 per day, based on estimated need for our population size
- Many Texas health insurers and health maintenance organizations are waiving copayments, deductibles and coinsurance for COVID-19 testing; a list of participating insurance companies are listed here: *https://www.opic.texas.gov/coronavirus*
- There are currently 33 testing sites in Bexar county with three of them being drive-thru testing (PCR) by appointment –they can be found here: *https://covid19.sanantonio.gov/What-YOU-Can-Do/Symptoms-Testing/Map-of-COVID-19-Testing-Sites-in-Bexar-County*
- A recent a large scale serology study done in Santa Clara, California, claims that infection prevalence in the communities could be up to 4%; due to study design and testing kit choice, it is reasonable to consider many of the positives in this study to be false

KEY POPULATIONS

- Men express ACE-2 (the receptor for SARS-CoV-2 entry) more than women; a recent review suggests males may have a predilection for critical disease. Research has also shown that Asians express more ACE-2 receptors on their lung parenchyma, relative to white and black populations but this should not guide allocation of testing resources
- Testing in homeless populations reveals a significant source of COVID-19 transmission and cases, so more accommodating testing (possibly rapid testing modalities) with access to follow-up serial testing in this population may represent efficient utilization of resources by the public health sector
- For low SES populations, healthcare cost perception may represent a barrier to engagement in testing initiatives, which reveals a need for increased outreach on community engagement—In areas where there have been such initiatives, no formal systemic investigations have shown the effects.

Discrepancies in US Race and Ethnic Representation in the US Population vs COVID-19 cases

	US Population	COVID-19 Cases
Caucasian	60.4%	43.4%
Non-hispanic Black	13.4%	32.0%
Hispanic or Latino	18.3%	11.7%

For details and references please visit **https://oume.uthscsa.edu/longco/**