Epidemiology, Clinical Features and Outcomes Of Children With COVID-19 in Kenya

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Scope of the presentation

- Review of burden of COVID-19 in Kenya
- Answer the question – is Kenya experiencing a second wave?
- Review of the epidemiology and management of Paediatric COVID-19 in Kenya
- Review current local research & vaccine development efforts for COVID -19

Disclosure

Relationships with commercial interests:

- **NONE**
- **No conflict of interest**

Latest COVID-19 Burden – 25th Nov' 20

- Total case load - 79,322 from 623,828 total cumulative test
- Widespread community spread
- The youngest is a neonate while the oldest is 99 years
- Cumulative 52,974 recoveries and 1,387 deaths
- 25TH Oct positivity rate of 10.% (810/7,387)
- Kenya's recorded > 4,500 new cases/one month in Sept'2020, with the daily average of 400 cf – but this figure has quadrippled by end of Nov'2020 to over 4-5 times all this following Presidential directive easing containment measures

Latest COVID-19 Burden – 25th Nov' 20

- A total of 1,198 people are currently admitted in various hospitals, while 7,169 patients are on home-based care programme.
- 31 are ICU patients on ventilators, 106 on supplementary oxygen Patients aged between 20-39 years account for 54 per cent of all the positive cases.
- Majority of deaths are amongst those above 58 years

Is Kenya experiencing as A SECOND WAVE?

Comparison of Cases within as month 19th OCT & 19th NOV 2020

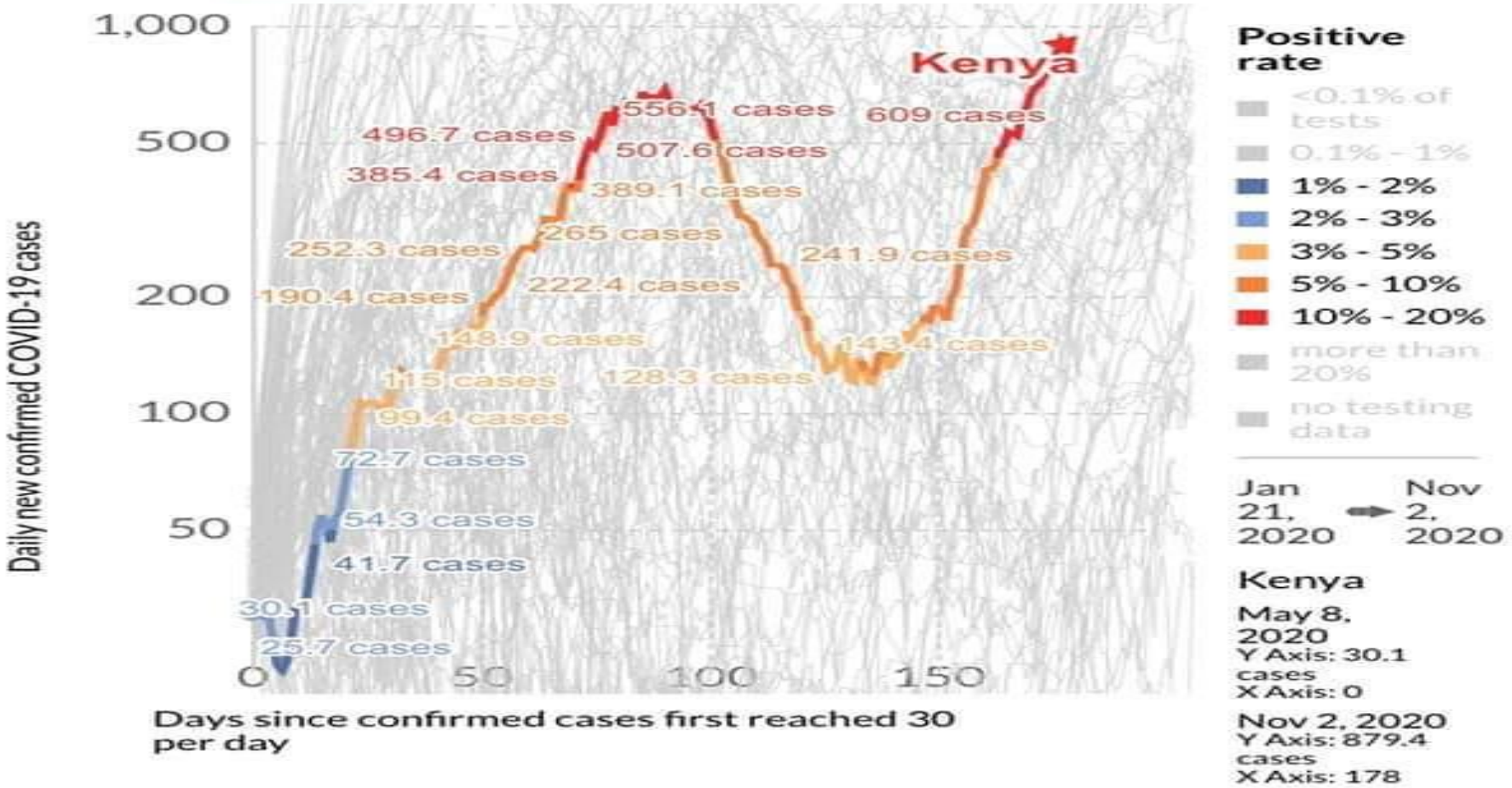
VARIABLES	19-Oct -2020	19-Nov 2020	DIFF	DIFF %
Deaths	839	1330	**491**	**63**
Tests	623828	815040	**191212**	**77**
New cases	195	1459	**1264**	**13**
Cumulative cases	45076	74145	**29069**	**61**
Positivity rate	10.5	14.3%		
Admitted	1084	1116	**32**	**97**
Home based care	2480	6232	**3752**	**40**
ICU	39	59	**20**	**66**
Ventilator	15	27	**12**	**56**
Supplemental Oxygen	20	83	**63**	**24**
Recovered	430	780	**350**	**55**
Cumulative recoveries	32084	50658	**18574**	**63**

Daily new confirmed COVID-19 cases

Our World in Data

Shown is the rolling 7-day average. The number of confirmed cases is lower than the number of actual cases; the main reason for that is limited testing.

LINEAR | LOG | Select countries | More



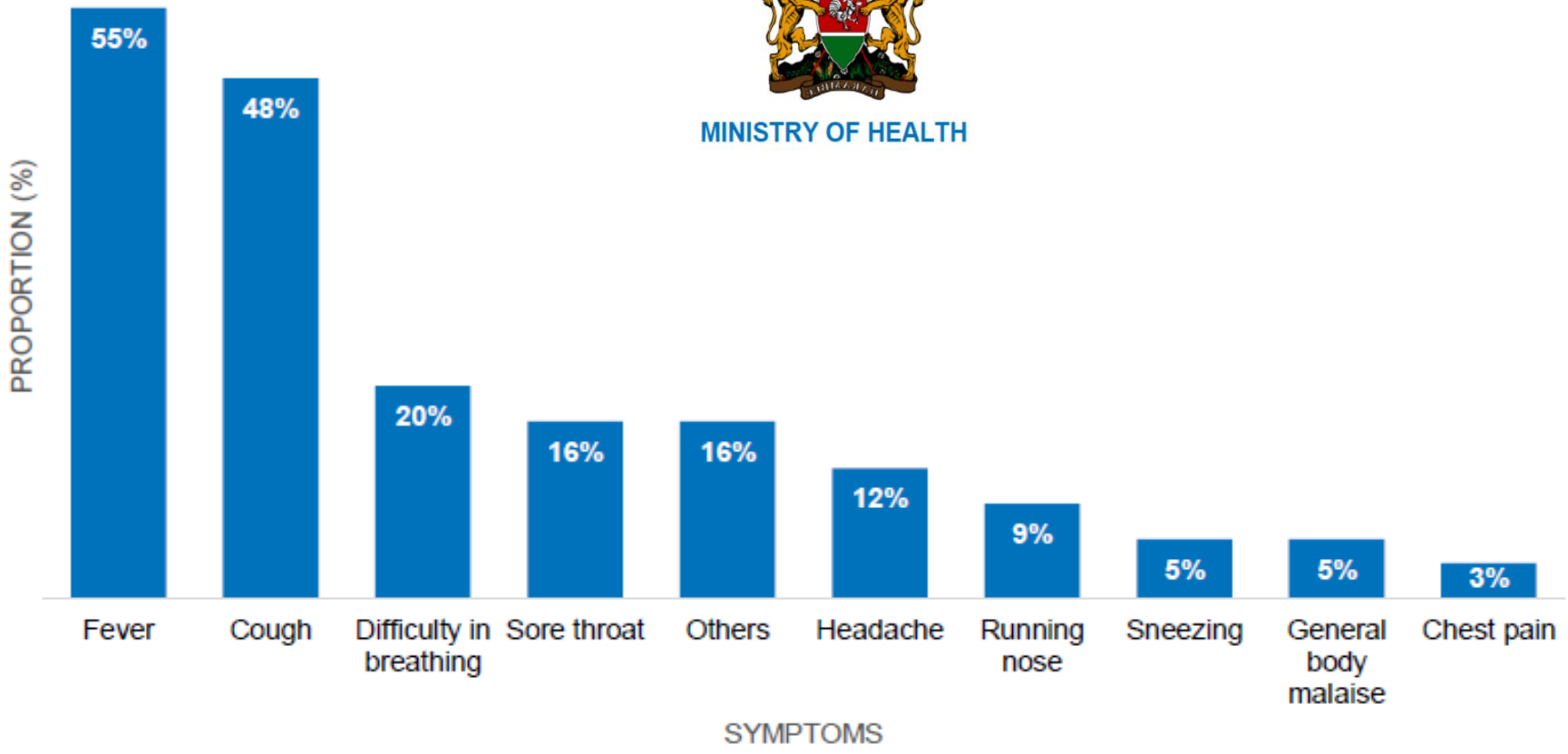
Source: European CDC – Situation Update Worldwide – Last updated 2 November, 10:06 (London time), Official data collated by Our World in Data

Jan 21, '20 — Nov 2, '20

Distribution of symptoms

About 30% of cases are symptomatic

MINISTRY OF HEALTH



COVID-19 among Kenyan Children

- Over 1,200 children now affected ; youngest neonate
- Majority are household contacts of adults ;
- M:F ratio almost 1:1
- 10% of all paed cases are under 20 years of age
- 0-9 years – 3.8% of total while 10-19 years – 6.2% of total paed cases; and 38.1% are under age of 10
- The first paed death was a kid with aplastic anemia post BMT

COVID-19 among Kenyan Children

- Majority often times asymptomatic
- Most affected kids have been stable, and recovering well , with a generally mild disease
- Symptoms often overlap – those seen in children
  - Fever - 55%;
  - Cough - 37.0%
  - Others
    - nausea/vomiting/diarrhea/shortness of breath/Abdominal pain
    - Poor appetite or poor feeding

COVID-19 among Kenyan Children

- Lab --- CBC changes –
  - commonest leukopenia/lymphopenia
- Associated conditions –
  - mainly URTIs/Pneumonia – with Ground-glass opacity in some observed in the CT scan when done, most CXR are unremarkable
- Death rare –
  - only among those with comorbidities – cancer/post BMT

COVID-19 among Kenyan Children when compared to Kenyan adults

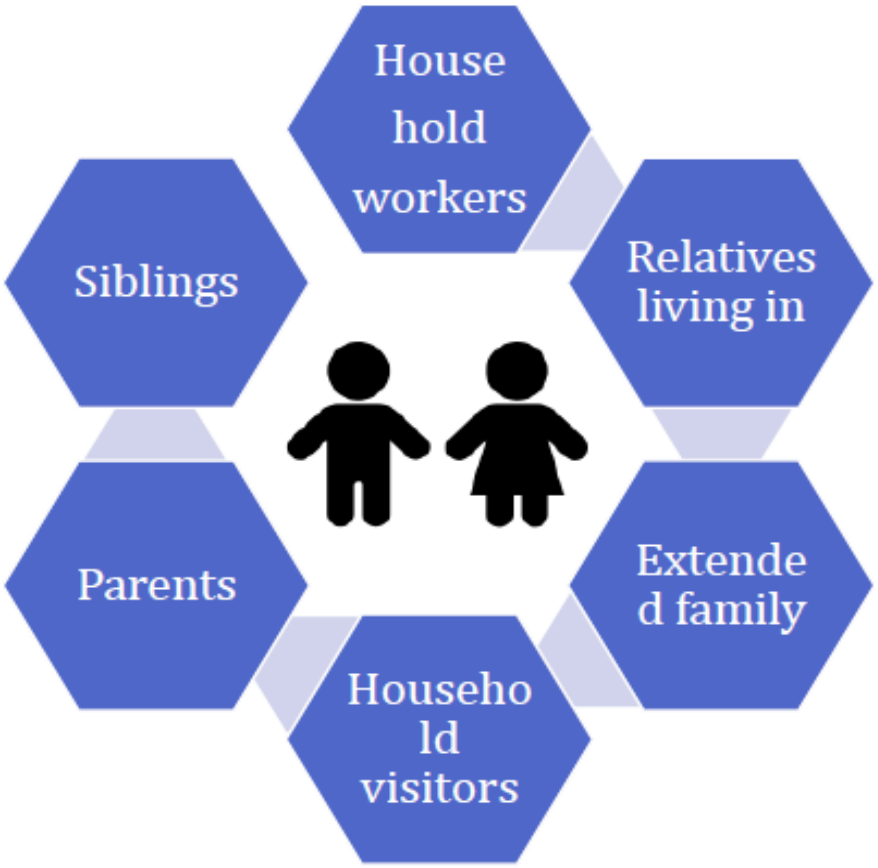
- COVID -19 is less common in Kenyan kids than adults
- They tend to suffer co-infections especially pneumonia & URTI
- Almost 50/50 Male:Female ratio, unlike adult COVID which mainly affects male gender
- Better ICU outcomes
- Children acquire COVID-19 from adult H/H contacts
- Clinical course of COVID-19 in kids is far less severe and the hospital outcomes tend to be better in critically ill children than the outcomes reported in adults

Management of Paed COVID19 in Kenya

Identifying a child's household contacts

Experience from China:

- **>50%** of all patients with COVID-19 had at least one family member with the disease
- **75–80%** of all clustered infections were within families



Management of Paed COVID19 in Kenya

Clinical Features of COVID-19

Symptoms	Children (% Freq)	Adults (% Freq)
Cough	48.5	59
Fever	41.5	99
Tachypnea	28.7	31
Fatigue	7.6	70
Pharyngeal Erythema	46.2	-
Tachycardia	42.1	-
Diarrhea	8.8	-

Spectrum of Illness	Children (% Freq)	Adults(% Freq)
Mild & Asymptomatic	94.2	81
Severe	5.2	14
Critical	0.6	5
Paediatric Severe & Critical Illness		
< age 1 year	10.6	
1-5 years	7.3	
6-10 years	4.2	
11-15 years	4.1	
16-17 years	3	

For children **History of household contact** is important

Management of Paed COVID19 in Kenya

Essential investigations to rule out common causes of respiratory illness

Full Hemogram	WBC counts vary- Lymphopenia is commonest
Chest X-ray	**Common**: patchy or diffuse asymmetric airspace opacities **Less common**: pneumothorax, cavitation, or lymphadenopathy

CT Scan chest- increase diagnostic yield when used with RT-PCR

Common: bilateral ground glass opacification- peripheral distribution and involving lower lobes

Less common: pleural thickening, pleural effusion and lymphadenopathy

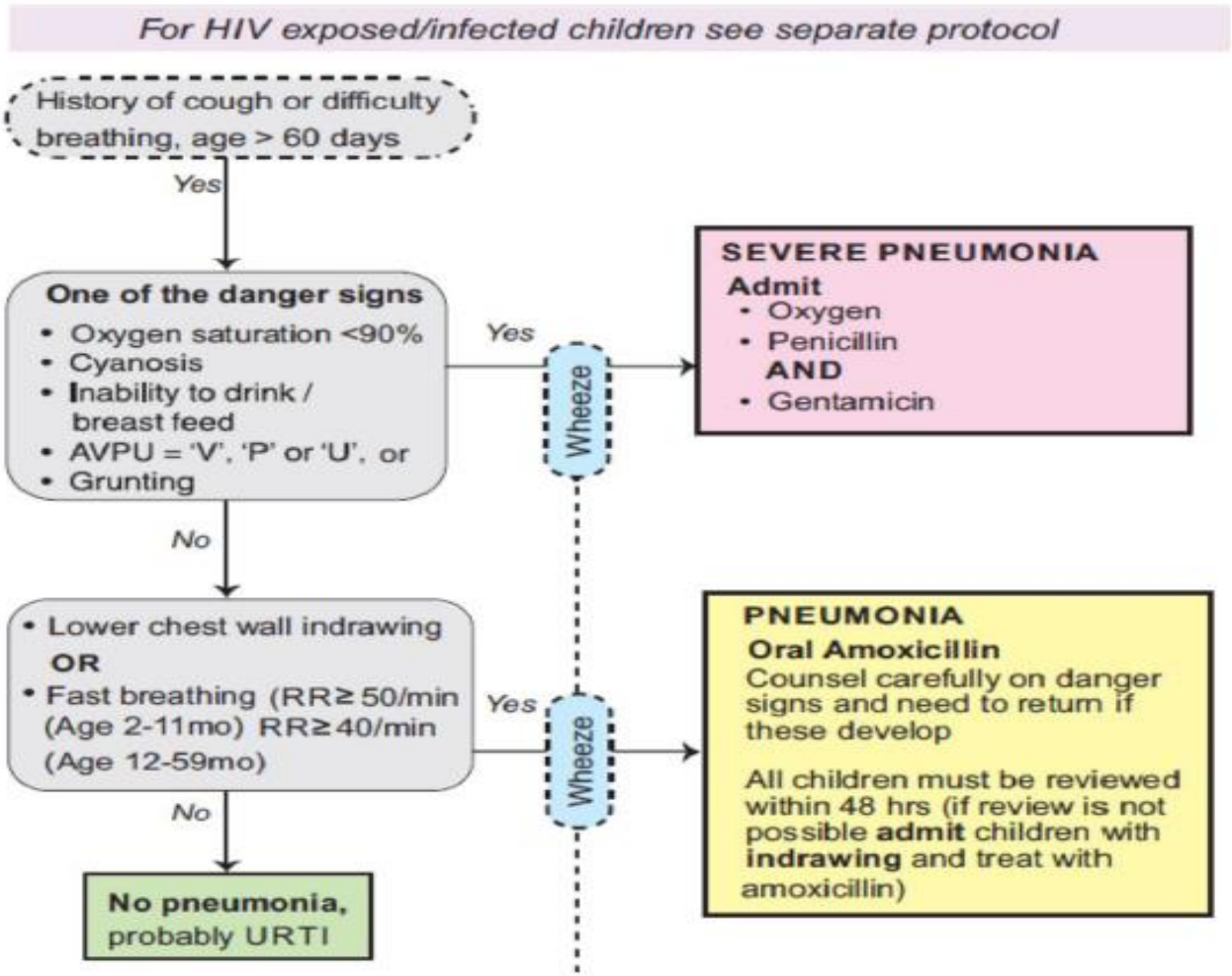
Management of Paed COVID19 in Kenya

Empiric treatment of bacterial pneumonia & supportive care

- Empiric antibiotics- suspected bacterial pneumonia (within 1 hour in outpatient)
  - Below 5 years- Amoxicillin DT, IV antibiotics(penicillin and gentamicin)
  - Above 5 years- Amoxicillin-clavulanic PLUS erythromycin or azithromycin
- Safety of NSAIDS – **Paracetamol** has been used for management of fever.
- Ensure adequate feeds.
  - Oral- Preferred route
  - NGT – unable to feed/ severely ill patients
  - IVF- Vomiting everything or unarousable coma.
- Steroids - not indicated

Management of Paed COVID19 in Kenya

Treatment of pneumonia syndrome



Local Paediatric COVID-19 research

Paed COVID19 Research in Kenya

PAEDIATRIC MULTISYSTEM INFLAMMATORY SYNDROME (PMIS) IN THE COVID-19 ERA: A KENYAN PERSPECTIVE

Principal Investigators:

Angela Migowa, Pauline Samia, Del-rossi Sean Quadros, Chemutai Kenei, Ombeva Malande, Laura Oyiengo, Laura Lewandowski

- A study in the referral health facilities across 47 counties in Kenya
- Identify cases of pediatric multisystem inflammatory syndrome (PMIS) - detailed chart review using the WHO PMIS data collection tool
- Each PMIS case analyzed to determine proportion of cases that will be COVID 19 positive.

PAEDIATRIC MULTISYSTEM INFLAMMATORY SYNDROME (PMIS) IN THE COVID-19 ERA: A KENYAN PERSPECTIVE

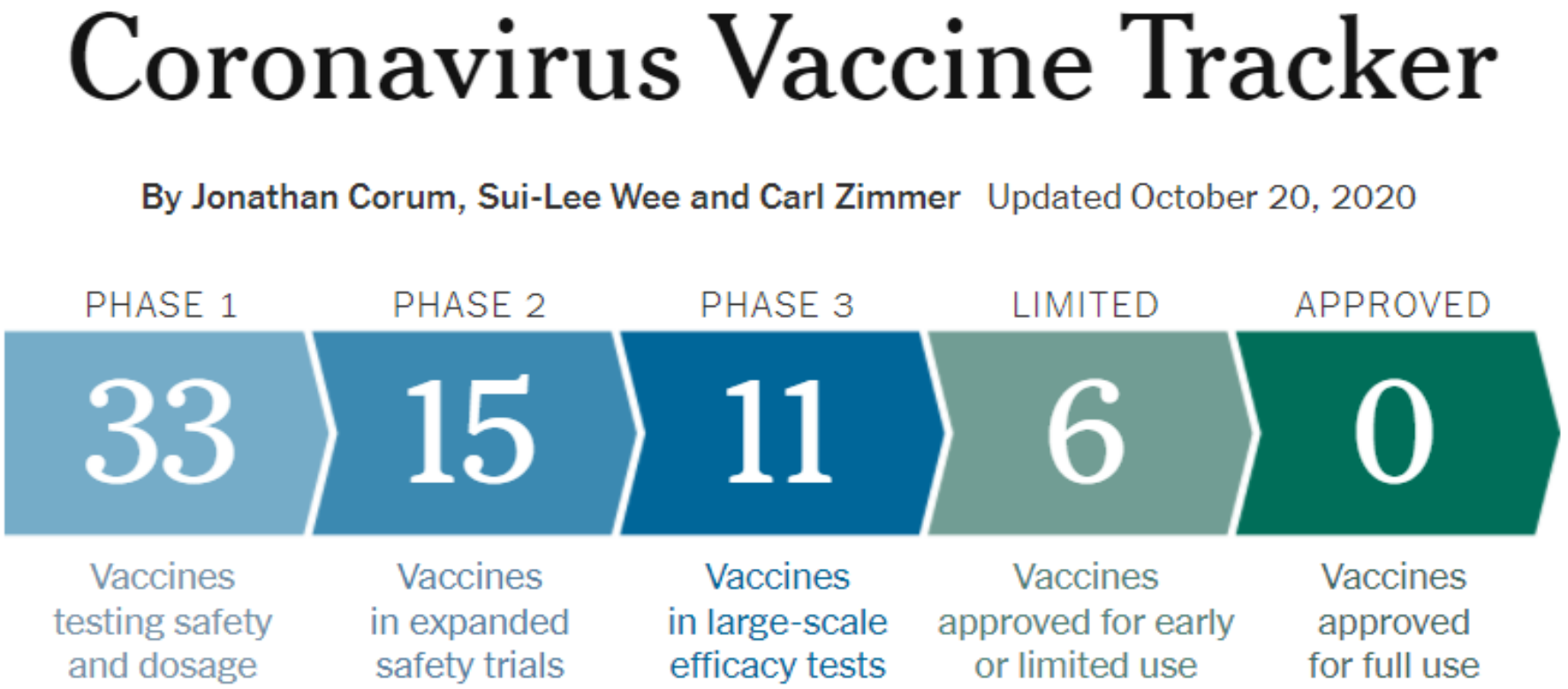
- The primary objective
  - To determine the specific epidemiologic and clinical characteristics of patients who present with pediatric multisystem inflammatory syndrome (PMIS).
- The secondary objective is to determine the proportion of PMIS patients who are confirmed COVID -19 positive.
- The tertiary objective is to determine the outcome of PMIS patients as evidenced by duration of ICU admission, duration of hospital admission and mortality due to PMIS

COVID-19 Vaccine research

Background – Vaccine development

- The race to find vaccine is on.
- Immunization currently prevents 2-3 million deaths every year - There are now vaccines to prevent > 20 diseases.
- There are currently > 100 COVID-19 vaccine candidates under development.
- When a safe and effective vaccine is found, COVAX (led by WHO, GAVI and CEPI) will facilitate the equitable access & distribution of these vaccines in all countries. People most at risk will be prioritized.

48 vaccines currently in clinical trials on humans, & at least 89 preclinical vaccines are under active investigation in animals



The Process

PRECLINICAL PHASE:

- Test a new vaccine on cells and then give it to animals such as mice or monkeys to see if it produces an immune response. We have confirmed 89 COVID preclinical vaccines in active development.

PHASE 1 SAFETY TRIALS:

- Give the vaccine to a small number of people to test safety and dosage as well as to confirm it stimulates the immune system.

PHASE 2 EXPANDED TRIALS:

- Give the vaccine to hundreds of people split into groups, such as children and the elderly, to see if the

The Process

PHASE 3 EFFICACY TRIALS:

- Scientists give the vaccine to **thousands of people** and wait to see how many become infected, compared with volunteers who received a placebo.
- In June, the F.D.A. asked for evidence that vaccines can ***protect at least 50 percent of those who receive it.***
- In addition, Phase 3 trials are large enough to reveal evidence of relatively rare side effects that might be missed in earlier studies.

EARLY OR LIMITED APPROVAL:

- China and Russia have approved vaccines without waiting for the results of Phase 3 trials. *The rushed process has* ***serious risks.***

The Process

APPROVAL:

- Regulators in each country review the trial results and decide whether to approve the vaccine or not. During a pandemic, a vaccine may receive emergency use authorization before getting formal approval. Once a vaccine is licensed, researchers continue to monitor people who receive it to make sure it's safe and effective.

COMBINED PHASES:

- One way to ***accelerate*** vaccine development is to combine phases.
- Some coronavirus vaccines are now in Phase 1/2 trials, for example, in which they are tested for the first time on hundreds of people.

PAUSED:

- If investigators observe worrying symptoms in volunteers, they can put a trial on pause. ***After an investigation, the trial may resume or be abandoned.***

FDA strict guidelines to coronavirus vaccine makers seeking early approval

- Proof an experimental vaccine is at least 50% effective
- Vaccine makers to follow volunteers for a median of two months after the final dose- two shots spaced three to four weeks apart.
- Document at least five cases of severe COVID-19 observed in the participants who have received a placebo, - in order to determine the risk of respiratory disease induced by vaccination — a key safety worry for both developers and regulators.

RNA vaccine

- While conventional vaccines work by presenting the body's immune system with the inactivated real virus or antigens derived from it, injecting mRNA into cells means that they produce the required viral proteins directly inside the human body.
  - "A big advantage of mRNA vaccines is that scientists can skip the laboratory production of proteins by directly injecting the molecular instructions to make the protein into the human body itself."
- In this case the RNA sequence is taken from the SARS-CoV-2 virus genome, stimulating an immune response that should later stop the COVID-19 disease.
  - One advantage to mRNA vaccines is a cheaper, faster production process, making them potentially the most scalable to tackle a global pandemic.

MODERNA RNA VACCINE

- Early data from their trial.
- There's more work to be done before they'll know if the vaccine really is safe and effective. And even if Moderna's vaccine gets the green light from the F.D.A., it will take months to reach widespread distribution.
- The scientists randomly assigned volunteers to get either the Moderna vaccine or a placebo. The trial was blinded, placebo controlled meaning that neither the volunteers nor the people running the trial knew who got what.

MODERNA RNA VACCINE

- Moderna recruited 30,000 volunteers across the United States to participate in its trial.
  - A quarter of the participants are 65 years or older.
  - White people make up 63 percent of the volunteers; 20 percent are Hispanic; 10 % are Black; and 4% Asian Americans.

- The 95 people who got sick with Covid-19 reflect the diversity:
  - Fifteen were 65 or older.
  - The group also included 12 Hispanic volunteers, four Black participants, three Asian Americans and one multiracial person.
  - The efficacy and safety appeared the same in all of the subgroups. But researchers will have to wait for the trial to advance further to confirm this finding.

Pfizer's Vaccine

- Pfizer developed the vaccine with its partner BioNTech NOW report that its coronavirus vaccine is **95** percent **though initially they reported 90%** effective and had no serious side effects
- The data showed that the vaccine prevented mild and severe forms of Covid-19
- And it was 94 percent effective in older adults, who are more vulnerable to developing severe Covid-19 and who do not respond strongly to some types of vaccines.
- The trial results — less than a year after researchers began working on the vaccine — shattered all speed records for vaccine development, a process that usually takes years.

How do Moderna's early results compare with Pfizer's?

Pfizer provided less detail in its announcement last week on Nov. 9 than Moderna did on Monday, Nov. 16.
Pfizer's outside board of experts analyzed 94 volunteers and estimated that the effectiveness of its vaccine was over 90 percent.
They did not specify how many people who got sick had received the vaccine or the placebo.

Nevertheless, the estimates for the two vaccines are clearly in the same ballpark. What's more, they both far exceed the F.D.A.'s requirement that coronavirus vaccines have an efficacy of more than 50 percent.

Pfizer did not report how many volunteers had severe Covid-19, or what fraction of those people got the vaccine. Findings like these are expected to come out in the next few weeks.

How do Moderna's early results compare with Pfizer's?

- The Pfizer and Moderna vaccines are similar not only because they use mRNA but also because they coax our cells to make the same viral protein, called spike.
  - Other vaccines that don't use mRNA also make the spike protein their target. The success of Moderna and Pfizer may bode well for them as well.

- Moderna vaccine is preferred to Pizer vaccine in that
  - It can be kept at – 20 degrees temperature
  - Can be transported while frozen at - 20degrees compared to Pfizer's -70 degrees requirement
  - It is easier to distribute - favorable cold chain needs
  - Electiveness of 94.5 C – though now Pfizer has reported 95% -- higher than what they had earlier reported as 90%

How do Moderna's early results compare with Pfizer's?

- A number of teams have created vaccines based on another virus called an adenovirus, for example.
  - The adenovirus slips into cells, delivering the gene for the spike protein.
  - On Wednesday, a sponsor of a Russian vaccine announced that its adenovirus-based vaccine, called Sputnik V, was over 90 percent effective.
  - Outside experts wanted to see more data, however, because the announcement was based on just 20 sick volunteers — far fewer than in the Moderna and Pfizer trials.

- AstraZeneca and Johnson & Johnson are also conducting Phase 3 trials on adenoviruses that carry the spike protein gene.
  - And other companies, including Novavax and Medicago, are running advanced trials on vaccines that deliver the spike protein itself, or pieces of it, to the body.

What do the Pfizer and Moderna reports mean together?

- Pfizer and Moderna used the same basic design to build their vaccines.
- Both vaccines contain a genetic molecule called messenger RNA, which is wrapped in an oily bubble.
  - The bubble can fuse to a muscle cell and deliver the RNA. Encoded in that molecule are instructions for building a single coronavirus protein called spike.
  - When a vaccinated cell releases copies of the spike protein, the immune system learns to make antibodies against it.
- While scientists have investigated mRNA vaccines for years, no vaccine has yet been licensed as safe and effective to use in people.
- Neither trial has uncovered serious side effects from the vaccines, although studies on their safety are continuing.

How are other vaccine makers faring?

- A number of teams have created vaccines based on another virus called an adenovirus, for example.
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What happens next?

- Both the Moderna and Pfizer trials are continuing to gather more data from large studies.
- The two companies expect to apply to the FDA in the next few weeks for an emergency use authorization to begin vaccinating the public.
- The F.D.A. will review the applications and consult with its own external committee of experts before making a decision.
- If it authorize the vaccines — as experts think it will — a committee at the Centers for Disease Control and Prevention will then make recommendations for who should be first to receive a vaccine.
- It’s possible that the distribution of one or both vaccines will begin by the end of the year.


Thank you