Twitter Thread by Andrew Lee

Andrew Lee
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Normally I enjoy the high standards of journalism in @guardian . Not today as disappointed with misleading headline that suggest infections are spreading fastest in children. It'll worry parents/teachers & I doubt most readers will unpick the

The latest REACT1 report shows prevalence of infection in ALL age groups has fallen, including children aged 5-12 from 1.59% in Round 8 to 0.86% in Round 9a. The authors of REACT1 report also (wisely) didn't try to interpret the prevalence figures.
2/
https://t.co/SR9PioFNHd

If this were a research trial you wouldn't place much weight on the age differences in % prevalence because of the wide confidence intervals, i.e. differences weren't statistically significant.
3/

I've previously tweeted on the challenges (& dangers) of interpreting surveillance data. One would need lots more contextual info to make sense of it & arrive at sound conclusions.
4/
https://t.co/CRW6uFXUdf

> Misinterpretation of surveillance data is a serious issue. Surveillance data needs to come with a warning label - Open to biases - interpret with caution! Some may not realize that surveillance often does not measure all infection, it's a proxy for actual disease incidence.
> 1/
>
> — Andrew Lee (@andrewleedr) February 14, 2021

Undoubtedly some will extrapolate from the prevalence of infection figures in children to other settings i.e. schools based on the headline. I'd advise caution as there is a real risk of over-interpretation through extrapolation of limited data. Association is not causation.
5/

What REACT1 can't tell us is how infectious children are or how much child infections drive the pandemic. Finding viral RNA on PCR from a child tells you nothing about how much virus they are shedding. Neither can it tell you the direction of transmisison (who infected who).
6/

Those of us in public health are well familiar with Bradford Hill criteria for causation that outlines key factors to consider. It would make sense to apply this approach to this issue.
7/

Table 6–3. The Hill criteria for inferring causation

Criteria	Definition
Strength	A strong association is more likely to be causal. The measure of strength of an association is the relative risk and not statistical significance.
Consistency	An association is more likely to be causal when it is observed in different population groups.
Specificity	When an exposure is associated with a specific outcome only (for example, a cancer site or even better a particular histological type of this cancer), then it is more likely to be causal. There are exceptions, however, for example, smoking causing several forms of cancer.
Temporality	A cause should not only precede the outcome (disease), but also the timing of the exposure should be compatible with the latency period (in non-infectious diseases) or the incubation period (in infectious diseases).
Gradient	This criterion refers to the presence of an exposure-response relationship. If the frequency or intensity of the outcome increases when an exposure is more intense or lasts longer, then it is more likely that the association is causal.
Plausibility	An association is more likely to be causal when it is biologically plausible.
Coherence	A cause and effect interpretation of an association should not conflict with what is known about the natural history and biology of the disease, or its distribution in time and place.
Experimental evidence	If experimental evidence exists, then the association is more likely to be causal. Such evidence, however, is seldom available in human populations.
Analogy	The existence of an analogy (for example, if a drug causes birth defects, then another drug could also have the same effect) could strengthen the belief that an association is causal.

Source: Hill, 1965.

Is there CONSISTENCY? What's been reported has been mixed, but @ECDC_EU , @CDCgov , @RCPCHtweets & other expert review groups have concluded the balance of evidence suggests kids aren't key transmitters of infection.
https://t.co/llVkHkwrRS
https://t.co/c8oOgua9FE
8/

> The science shows us that most disease transmission does not happen in the walls of the school, but it comes in from the community. So, CDC is advocating to get our K-5 students back in school at least in a hybrid mode with universal

> mask wearing and 6 ft of distancing. https://t.co/dfvJ2nl2s4
>
> — Rochelle Walensky, MD, MPH (@CDCDirector) February 14, 2021

Is the SPECIFICITY of the association or are there other confounders? Indeed the REACT1 report clearly show there are multiple other drivers such as deprivation & household size, etc...

9/

What about TEMPORAL SEQUENCE, i.e. does a rise in school outbreaks then follow a rise in community outbreaks? We aren't seeing that.
https://t.co/VPbAmsbApG
10/

> Preprint of Welsh study studying staff-pupil #SARSCoV2 infections in schools between Aug-Dec'20. They report total number of infected staff & pupils within a school following re-opening wasn't associated with an increased subsequent risk of testing positive in staff or pupils.1/ https://t.co/w8pBpxbz3b
>
> — Andrew Lee (@andrewleedr) February 8, 2021

For me what also matters is PLAUSIBILITY & COHERENCE with what is known about the natural history and biology of the disease. Studies have shown that kids, being smaller, produce far fewer aerosols than adults. They also shed less virus than others.
https://t.co/Rv1e2VfJi6
11/

> Study in @PNASNews of COVID19 aerosol generation:
> - 18% of subjects accounted for 80% of exhaled aerosol
> - significant correlations were observed between exhaled aerosol, age, & BMI
> - all subjects <26 y of age & all subjects under 22
> BMI were low spreaders of exhaled bioaerosol https://t.co/eAkTiKDbyk
>
> — Andrew Lee (@andrewleedr) February 13, 2021

And also

https://t.co/GHa0FoJ34m
https://t.co/vW1b7j9p9j

And we know symptomatic persons shed more virus. So it follows that an adult is more likely to infect a child than the other way.
https://t.co/NpVoTakbzs

12/

> Dutch study finds kids<12y infected with COVID19 have significantly lower viral loads than adults. 16-fold difference vs elderly.
>
> SARS-CoV-2 viral load distribution reveals that viral loads increase with agehttps://t.co/6phqzVbwYY
>
> — Andrew Lee (@andrewleedr) February 3, 2021

This isn't to say that infections from children to adults don't happen. Of course they do, but at much lower levels than the other way around. We mustn't lose sight of the fact that adults still account for the bulk of infections.

13/

We know that of all settings, household transmission is the highest risk. If infection is introduced into the household the majority of household members are likely to get infected. Community transmission matters.
https://t.co/OvWN28MZ0Y
https://t.co/fEOOvn6eE0

14/

> 8. Back to the role of community transmission. The CDC's focus on this is consistent with our own modeling work. Keeping transmission down in the community is the best way to keep it down in the schools. Figure from v.1 of our paper at https://t.co/WLVXv8hYcg pic.twitter.com/AyKKW3bfEH
>
> — Carl T. Bergstrom (@CT_Bergstrom) February 12, 2021

This in no way refutes need for public health measures in schools to reduce risks of infection. Yes precautionary principle is important but need to balance both benefits & harms. Measures must be proportionate to actual (rather than perceived) risk.
https://t.co/VkugKMnS9R

15/

> I have seen some repeated assertions about the evidence on #COVID19, children and schools recently which sound convincing, but unfortunately are false
>
> It is a sensitive and important topic, which is important to get right
>
> Shall we bust some myths? \U0001f4a5
>
> Let's go!
>
> 1/10
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> — Alasdair Munro (@apsmunro) February 18, 2021

See also @apsmunro's excellent thread that outlines the evidence base.

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— Alasdair Munro (@apsmunro) February 18, 2021