

My Indicators Story: the Lab-XL project



- In the 1990's, EPA Region 1 levied **6-figure fines** for RCRA violations in many academic labs.
- Three mid-sized New England schools agreed to work with the Clinton/Gore EPA to develop an alternative rule that **promoted pollution prevention** while addressing the **paperwork concerns** RCRA brings to labs.
- We (the EPA and the schools) had to decide what indicators to use to determine the success of the new rule.
- The EPA had ideas for 4 indicators; the schools had ideas for 4 other indicators. We decided to keep them all and then throw in a tie-breaker = **9 indicators**

9 EPI's in three categories

Category 1: Pollution prevention
(physical changes)

HCOC inventory results

HCOC survey response

P2 opportunity assessments

Chemical recycling rates

Amount of laboratory hazardous waste generated

Category 2: Environmental Awareness

Survey scores from laboratory workers

Number of laboratory workers trained

Category 3: Compliance

Meeting objectives and targets

EMP Conformance

The XL Extension



- The schools provided reports each year for the 4 year term of the agreement.
- The results were not clear enough to convince the (Bush) EPA of a clear win, so we **extended the agreement three years** to collect more data.
- For the extension, the schools decided to focus on 4 indicators, based on the ***Plan, Do, Check, Act*** cycle; two were seen as leading and two as lagging. EPA had no objection to this change.
- In December, 2008, **EPA declared victory** and issued Subpart K nationally (with a state option). This was the only XL project to create permanent regulatory change.



Three Indicator Lessons I Learned

1. Information is expensive.

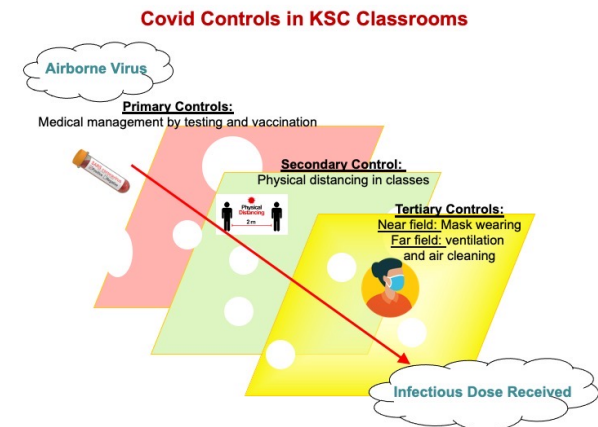
- It's unlikely that EHS pertinent information will be captured as a matter of course. It is important to select indicators with this in mind.
- "Measure what you want, not what you don't want" – e.g. P2, not HCOCs

2. Campbell's law: *The more important a metric is in decision making, the more likely it is to be manipulated.* (paraphrased from Wikipedia)

- A suite of indicators will be needed to accommodate this reality
- The indicators will need to evolve over time - start-up indicators will be different from ongoing program indicators.
- Leading indicators are not just ahead of the curve, they are also motivators

3. The model makes a difference. (remember all the disinfecting we did in spring, 2020?)

- Models don't suggest **error bars**
- There are **ethical components** of any indicator. As one example, maintaining the indicators effort on the EPA side required upper management commitment
- Indicators often hide **power relationships** within an organization.



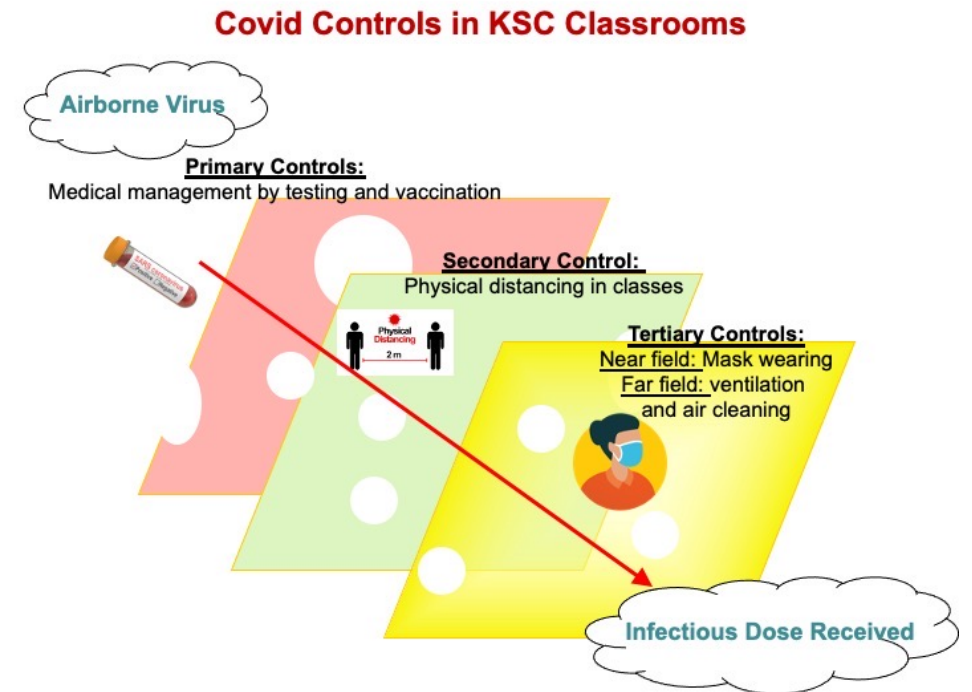
Updating these Lessons for 2021 (i.e. Covid indicators)

Leading Indicators?

- Vaccinations
- Mask wearing
- Physical distancing policy
- Particle control in ventilation systems

Lagging Indicators?

- Infections
- Hospitalizations
- Deaths
- Sewer virus numbers



Audience Question: Is CO2 a Leading or Lagging Indicator of Covid risk?

Wow. So, there you have it. @agotoronto is a very well ventilated space, similar to outdoor air. Get your masked and vaxxed self there and enjoy some art!

 Cheryl White @LadyScorcher · 4h
Art gallery. 📍
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- Leading.
- Lagging.
- It depends on other factors.
- There is no relationship between the two.

The Challenge of Uncertainty – the Size of the Holes in the Model

Layer	Estimated uncertainties
1) Medical Interventions: Testing and Vaccinations	<ul style="list-style-type: none"> • Testing reached 95% of the KSC population and isolation of positives and their contacts was rapid. • Vaccinations are more than 90% effective, but uptake in the population is currently 60%
2) Physical distancing	<p>Hallway observations and CO₂ readings at KSC indicate that physical distancing was appropriate in most classrooms. There are CO₂ concerns in some classes in low ventilated, crowded rooms.</p>
3a) Controlling Near-field exposures: Mask wearing	<ul style="list-style-type: none"> • Lab research finds that masks are about 65% effective in controlling particles. • KSC mask wearing was about 94%, but some people don't cover noses (7% in April; much higher now).
3b) Controlling far-field exposures: Ventilation and air cleaners	<p>We deployed HEPA air cleaners to poorly ventilated classroom spaces. Initial results indicate that cleaners reduce the time required to return to background particle levels from 1 hour to 30 minutes. Covid transmissions have been reported in less than 15 minutes</p>

Covid Controls in KSC Classrooms

