

# Early warning system to avert COVID-19 lockdowns

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Scientists are developing a coronavirus early warning system that could prevent future lockdowns by combining data on vaccine uptake with wastewater testing.

The project will better forecast the COVID-19 pandemic's trajectory,

allowing experts to identify potential hotspots early, predict stresses on hospitals and ICUs, and create more focused access to vaccines.

Despite the success of the vaccine rollout and early data suggesting they prevent transmission, experts say such systems are still needed. New variants remain a risk and a spike in flu cases, combined with COVID-19, could place the NHS under pressure next winter.

## **COVID-19 data**

The new project is a partnership between the Universities of Edinburgh, Glasgow and Stirling, Scottish Environment Protection Agency (SEPA) and Scottish Water.

It is funded by the Economic and Social Research Council (ESRC) as part of UK Research and Innovation's rapid response to COVID-19.

The project will utilize data from Public Health Scotland that provides near instantaneous information on vaccine uptake, COVID-19 testing and the number of cases, broken down by individual parts of Scotland.

## **Wastewater monitoring**

The wastewater monitoring program run by SEPA and Scottish Water identifies when [genetic material](#) from the virus is present in wastewater.

While these 'genetic fragments' present no known risk of infecting people with COVID-19, it is possible to link these results to specific areas and highlight where infections are increasing or decreasing, helping Scotland understand the prevalence and distribution of the virus.

## **Improving forecasts**

The University of Edinburgh team will use these real time data to adapt their existing models of COVID-19 spread and improve short and medium term forecasts. The updated models could then be used to evaluate different strategies to control COVID-19 outbreaks without the need for further lockdowns.

Experts say long-term forecasts will be possible as more data becomes available on vaccine-induced and natural immunity, loss of immunity and areas where vaccine uptake has been low.

## **Gaming simulation**

The teams from the Universities of Edinburgh and Stirling will conduct a survey to gauge attitudes towards and ease of access to vaccines and examine how the results relate to the Scottish index of multiple deprivation.

Areas of high deprivation have been disproportionately affected by COVID-19 and previous surveys have indicated they are more likely to experience low vaccine uptake.

This four-pronged approach will allow the building of so-called 'vaccination games' – simulations to see how various scenarios involving differing rates of [vaccine](#) uptake in communities play out.

"While we can all hope for eradication of COVID-19 this summer, a more realistic possibility is that we find ways of dealing with regular localized outbreaks. This partnership aims to identify strategies to show where these are, by rapidly picking up outbreaks and introducing local control measures such as surge testing and intensive contact tracing. A key to this is to understand how the numbers of people being vaccinated may vary geographically, as any local clusters with larger numbers of

unprotected individuals could drive local outbreaks. In a winter where resources will also be strained by flu and other seasonal infections, controlling those outbreaks, if they occur, could be crucial to avoiding further lockdowns," says Professor Rowland Kao, lead researcher, The Roslin Institute, University of Edinburgh

"SEPA was among the first European agencies to begin work, with the help of key partners, to pinpoint COVID-19 RNA in local waste water samples in May 2020. The recent announcement from Scottish Government of additional funding means this work has an extension until March 2022. Our laboratory near Eurocentral will continue analyzing around 200 samples a week, collected by Scottish Water from waste water treatment works across the country, playing a significant role in Scotland's recovery from COVID-19. We're proud that our science expertise is helping public health partners make key decisions to support community testing and we'll continue to work closely with health specialists and academic partners," says David Pirie, executive director, SEPA.

Provided by University of Edinburgh

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