Lab safety needs to be more open in the face of risky pandemic flu research

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Taking no chances with flu viruses. Credit: ringai, CC BY-NC-ND

The danger of reporting findings before peer review is that scientists often can't talk about the details of their research, which can lead to hype or fear in the media.

A recent example of this is a controversial influenza study led by Yoshihiro Kawaoka at the University of Wisconsin-Madison, first

reported by the Independent. While Gizmodo said Kawaoka had created a strain of flu that could kill all of humanity, the New Scientist took the view that we should worry more about regulating the research than the research itself. The ethics of the research also split top scientists.

Kawaoka is famous for his work involving controversial experiments with both ebola and influenza viruses. In 2011, he created of a strain of H5N1 avian influenza that could transmit between ferrets (which stand in for humans in flu experiments). And last month, he released a study in which he and his team pieced together a strain of avian influenza that closely resembled "Spanish influenza," a human flu virus that killed 50m people in 1918.

Kawaoka's new study comes with a lot of big question marks attached. But an absence of information doesn't justify panicking – or shrugging.

Biosafety levels

Kawaoka's research is an immune escape study: samples of a strain of the 2009 H1N1 flu virus – formerly called "swine flu," but now circulating yearly as seasonal flu – are exposed to antibodies, which are created by the body's immune system to fight infection. The virus particles that evade the antibodies are then harvested and cultivated. This process, according to the Independent, was repeated until a virus emerged that altogether "escapes" the effects of the immune system.

According to some scientists who have seen the research, the results are quite alarming – a real "humdinger of a virus", said one. The problem is we don't know how safe the study was.

The Independent reported that this particular experiment was done at biosafety level 2 (or "BSL-2") which requires safety equipment and training, but no custom-engineered laboratory structures. But the

Wisconsin State Journal emphasised that Kawaoka performs his experiments in his state-of the-art BSL-3 agriculture lab. These labs require a secure, purpose-built areas, special equipment for handling pathogens, and the use of ducted ventilation to draw away and filter out pathogenic organisms from the air.

This difference matters, because the safety conditions under which research is conducted is a primary factor used to determine whether researchers have acted safely. Of course, different experiments – using different kinds of influenza viruses – need different safety measures. Research may use both kinds of containment; some parts are done in lower containment areas because they are deemed less risky.

But history can catch up with a person. In 2006, Kawaoka's lab was required to stop a study of Ebola virus, because it lacked the facilities to comply with US federal guidelines. Ebola is required to be handled in BSL-4 conditions, but Kawaoka was working in BSL-3.

It was also recently revealed that Kawaoka's most recent published work on the Spanish flu virus received little initial oversight from the university's biosafety committee and that the National Institute of Allergy and Infectious Diseases – which develops better ways to diagnose, treat and prevent the many infectious – had to step in to demand a review.

"Escape mutant" studies aren't exactly new. Studies in avian influenza, HIV, and cancer all document the ways that the immune system changes the ways that viruses function. Until we know more about what Kawaoka's experiment accomplished, and how, it is hard to know which types of biosafety his team ought to have used. All we have to go on is his history. That should cause us concern, but it is not enough to make a final judgement.

Absence of evidence is not evidence of absence

Studying viruses is risky, and sometimes those risks can be high. In June, up to 86 people were exposed to anthrax when the virus was moved to a low-containment room without being successfully inactivated. In July, it was revealed that samples contaminated with H5N1 highly pathogenic avian influenza – much like the kind Kawaoka has used in previous experiments – were sent to an unsecured laboratory. The pandemic flu strain of 1977 is believed to have been the result of a laboratory accident.

Kawaoka's research – past, present, and future – requires close monitoring: what precautions should we take when we perform the research, how we communicate this research, and even if we pursue the research at all. These are hard judgements, but essential to promoting public health without creating more problems than the effort is worth.

Making those judgements requires the right kinds of information. Right now, we don't have that. This leads some people to be alarmist, and some to downplay any and all risks. Not knowing isn't the same thing as being safe. Kawaoka's reputation is one of "crazy, dangerous" experiments, as one scientist put it. But before we make calls like that – or to the contrary – we need the right information.

And we need that information before the research happens. Right now, no review mechanism exists to quantify the potential risks and benefits of proposed research. Lab accidents are a fact of life; the stakes are raised when the subject of research is a new disease-causing microbe. Not having good, detailed information about safety isn't a reason to panic or shrug – it is a reason to go and get that information.

Source: The Conversation