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Nuclear Technology & Disease Prevention: What ASEAN Can Do

By Julius Cesar Trajano

SYNOPSIS

Many countries are still struggling to expand their testing capability to diagnose more potential COVID-19 patients amidst shortage of detection kits. A nuclear-derived detection technique recently developed by the IAEA may be a promising method if more widely used by governments around the world. This highlights the peaceful application of nuclear science in public health.

COMMENTARY

MANY COUNTRIES, including several ASEAN member states, are struggling to test more people for the COVID-19 while facing a shortage of detection kits. In March 2020, the International Atomic Energy Agency (IAEA) announced that it will provide diagnostic kits, equipment and training in nuclear-derived detection technique for any member states requesting support as they grapple with the spread of COVID-19.

To move this forward, the US Government has recently provided the IAEA with US$6 million voluntary contribution, which will be used by the IAEA to provide requesting member states with COVID-19 testing kits and training. The IAEA has now received requests from around 60 member states and is ready to train their scientists.

Plugging the Gap: Lack of Testing Kits

The nuclear-derived diagnostic technique, known as Real-Time Reverse Transcription Polymerase Chain Reaction (RT-PCR), can help detect the novel coronavirus accurately within hours in humans, as well as in animals that may also host it.

This may be a promising method for testing. It has been used in the rapid detection and identification of viruses that are causing some of the world's most dangerous diseases in the recent past, such as Avian Flu, Ebola and Zika. Whether it would be effective in detecting COVID-19 once it is widely used by states should be further investigated.

For over 50 years, the use of nuclear techniques in medicine and nutrition has become one of the most extensive peaceful applications of nuclear technology. The development of nuclear-derived detection kits by the IAEA exemplifies the crucial role of other international organisations (an example is the Food and Agriculture Organisation or FAO), apart from the World Health Organisation (WHO), in times of global health crisis.

The IAEA cooperates with the WHO and other key partners to assess the current level of knowledge about COVID-19, identify gaps and work, where it can contribute, in the multilateral approach to mitigate the spread of COVID-19.

Plugging the Diagnostic Gap

There is also a large diagnostic gap in the global health response owing to the global shortage of testing kits. RT-PCR can help address this. While it will not totally solve the global shortage, the nuclear-derived technique may help countries increase their supply of coronavirus testing kits and equip many other countries which currently do not have their own detection technique and capability.

The WHO has urged all countries to test every suspected case and ramp up their respective detection capabilities.

From 30 March - 9 April 2020, scientists and veterinary experts from the countries concerned will be trained by the joint IAEA-FAO team to use the RT-PCR with the needed testing kits. This effort is aimed at improving their surveillance and response capabilities to the outbreak and their preparedness for future ones. The focus is on early detection of viruses.

The prevalence and global implications of pandemics compel other international organisations to contribute to the efforts of the WHO. While the IAEA is a specialist body with expertise in nuclear technology for peace and development, it does not have a broad mandate on health. It does, however, have the mandate and capability to transfer technology to help save lives.

For instance, the IAEA responded quickly to the Ebola crisis in West Africa in 2014 through providing nuclear-derived diagnostic kits and laboratory supplies for use in the field. In 2016, the IAEA, in partnership with the FAO, assisted member states to deploy sterile insect technique, a mosquito control system, that uses radiation to help stem the Zika outbreak. This latter technique is also used now to combat other mosquito-borne diseases.

The collaborative initiatives of the IAEA and FAO underscore the key role of other international organisations, apart from the WHO, in stemming the spread of COVID-19 and other diseases that can lead to epidemics or pandemics.

The participation of other international organisations fits into the multifaceted nature of the COVID-19 pandemic and its implications. Undeniably, they all must not work in silos as they address a global pandemic, while fulfilling their respective mandates.

What Can Southeast Asia Do?

The region's expertise in nuclear applications in public health is not lacking. Local expertise, as a result of decades of research and training, has grown steadily as demonstrated recently by the Vietnamese authorities controlling the spread of African Swine Fever using nuclear-assisted technique in 2019.

Higher education plays an essential role in nuclear capacity building that includes nuclear applications in disease surveillance and prevention. Despite the absence of nuclear power plants in Southeast Asia, several universities and knowledge centres in the region continue to offer institutionalised academic programmes and research activities in nuclear sciences and engineering.

Indeed, the role of nuclear technology in public health, especially in producing testing kits in times of disease outbreaks and pandemics, reflects the importance of maintaining and even investing more in the region's nuclear education programmes.

ASEAN member states, especially those that have very limited testing coverage and capability, could tap into the assistance offered by the IAEA so as to benefit from nuclear technology applications in disease surveillance and prevention.

Way Forward

Currently, the Philippines, Cambodia, Vietnam, Malaysia and Thailand will receive training assistance on the utilisation of RT-PCR. The ASEAN-IAEA Practical Arrangements on the peaceful uses of nuclear technology, signed in 2019, would be a useful framework for knowledge and technology transfer to Southeast Asian nations.

Furthermore, ASEAN member states can maximise the burgeoning cooperation among their nuclear regulatory bodies through the ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM). Another area of growing cooperation is by the regional centres of excellence on nuclear security and safety.

The applications of nuclear technology in disease surveillance ought to be regularly included in training programmes/courses, workshops and other modalities of knowledge sharing amongst these regional institutions.

Regional states have to decide whether and how to utilise the nuclear-derived detection technique and seek the IAEA's support. They also have to determine how this technique can strengthen the detection and response measures of countries once it is rolled out globally. This is not only for the COVID-19, but also in dealing with other communicable diseases that may break out in the future.

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