STEP UP

STOP EPIDEMIC GROWTH THROUGH LEARNING

Early detection

Report by AFEdemy, The Netherlands

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Background and methods

The current COVID-19 pandemic is having a strong impact in everyday life and creating an unprecedented challenge to health and care systems worldwide. Numerous measures to respond to the urgent care needs of those impacted are being taken, while also trying to reduce the long-term impact on vulnerable people, in all ways possible. Since the first cases appeared, countries have developed several strategies, adapted services and a wide range of innovations came up, requiring flexibility, especially to address people's continued care. After the emergency state, a collaborative leadership approach will be essential and working together as a collective, investing in a participatory citizenship, will be key.

The emergency state, the use of teleworking, the social distance, all implied uncovering new methods of work, understanding society's biggest fragilities and will imply changes in work and training, tools and routines that will only be clear in the next months and years. In this process of living "remotely", by far younger generations had an easier adaptation. If, besides age, we address adults with lower qualifications and skills, as it is often the case in the care sector, this is more serious, as they are easily hampered in the search of reliable information due to missing digital skills.

Apart from all the innovations that are being developed and new ways of delivering services, there is the need to prepare bottom-up initiatives that build-up the competences of the professionals in the care sector so that they are prepared to deal with such emergency situations in the future.

STEP_UP intends to develop a training tool for social care professionals, community leaders, informal caregivers and volunteers, where they are introduced to the actual impact of behaviours in the spread of a pandemic/emergency situation. There they can learn about preventive measures, their impacts and different levels – individual, at work, in the family, at state level, among others.

Although there is plenty of information available online, it is difficult to know which one is reliable. Also, there is the need to prepare the right training methods to approach the care sector, in an adequate and engaging way.

The core of this tool will be an educational game but also a Virtual Library was created to allow measures to be shared, consulted and benchmarked..

Besides the other results, a manual on social and policy interventions will be delivered, offering targeted guidelines and insights on early detection, preventive measures, health and social care interventions and policy measures for EU countries.

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Based on the desk research to identify measures to stop spreading the epidemic growth that are stored in the Virtual Library (link), the information from the first round of workshops and eventual additional publications, each partner of STEP_UP elaborates a thematic report in August 2021.

Each report addresses one of the crosscutting themes to combat epidemic diseases or pandemics such as COVID-19, SARS, Ebola virus or Yellow Fever. The reports will be used to build the Social and Policy Interventions Manual, to be delivered at the end of the project in national languages.

To be sustainable for the future and to detect overarching guidelines to stop epidemic growth, the thematic reports focus on more diseases than COVID-19 only. The length of the report is expected to be 12-15 pages at a minimum.

The crosscutting themes are divided among partners as follows:

Crosscutting theme WHO: pandemic and epidemic diseases include among others influenza (pandemic, seasonal, zoonotic), COVID-19, SARS, Ebola, The Plague, Yellow Fever, Cholera	Partner
Early detection: measures, methods and systems available in the partner countries and globally to detect a health emergency virus outbreak before it is widely spread.	AFEdemy
Prevention measures: Limit transmission of COVID-19 – these may be individual or organisational measures. Includes screening (e.g. temperature), washing hands, wearing masks, etc. It is the behaviour itself	SHINE
Healthcare and social care interventions: measures in healthcare organisations, public health, social care	CIPH
Policy measures: Minimize the impact of COVID-19 – these are measures defined / imposed by the government to specific individuals or society. E.g. wearing mask is a preventive measure but the policy measure is the obligation of using mask in the streets. Includes containment, mitigation and suppression measures	ISIS
Communication: governmental, experts communication	WISE

Epidemic diseases and pandemic

Communicable diseases have plagued mankind since time immemorial. In many cases, science has been able to find solutions to keep the spread and burden of these diseases under control. Sometimes, however, a new disease breaks out and increases unexpectedly in the number of disease cases (epidemic) or there is an exponential disease's growth, mostly affecting several countries and populations (pandemic) before effective solutions are found. The most recent example of such a pandemic is COVID-19.

It is not possible to consider that no other health emergency situations will occur in the future. To enable the target group of adult learners of STEP_UP to be prepared for future outbreaks, this report also focuses on measures on epidemic diseases or pandemics that infested Europe in the past or are compatible to COVID-19. Main source: United States Center for Disease Control and Prevention.

Black Death/Plague

The Black Death or Plague is a bubonic plague that struck Europe and Asia in many different centuries in the past. The plague caused many casualties: estimations are that about 50% of the populations were killed. The plague is spread by a bacillus that travels from person to person through the air, or by bites of infected fleas and rats. Symptoms are that people are covered with black boils that oozed blood and pus. The disease was very effective: people could go to bed healthy and be dead in the morning. Prevention from the plague is to make the environment rodent-proof, avoid skin contact and control fleas on pets. Plague vaccines are in development but are not expected to be commercially available in the immediate future.[1]

1918 H1N1 / Spanish Flu

The 1918 H1N1 flu pandemic, sometimes referred to as the "Spanish flu," killed an estimated 50 million people worldwide. Mortality was high in people younger than 5 years old, 20-40 years old, and 65 years and older. An unusual characteristic of this virus was the high death rate it caused among healthy adults 15 to 34 years of age. At that time there was no vaccine to protect against influenza infection and no antibiotics to treat secondary bacterial infections. Control efforts were limited to interventions such as isolation, quarantine, good personal hygiene, use of disinfectants, and limitations of public gatherings.

SARS-CoV

Severe acute respiratory syndrome (SARS) is a viral respiratory illness caused by a coronavirus called SARS-associated coronavirus (SARS-CoV). SARS was first reported in Asia in February 2003. The illness spread to more than two dozen countries in North America, South America, Europe, and Asia, before the SARS global outbreak of 2003 was contained. Since 2004, there have not been any known cases of SARS reported anywhere in the world. In general, SARS begins with a high fever (temperature > 38 degrees Celsius). Other symptoms may include headache, discomfort and body aches. Some people also have mild respiratory symptoms at

[1] Centers for Disease Control and Prevention, https://www.cdc.gov/plague/prevention/index.html.

the outset. Most patients develop pneumonia. SARS is spread by close person-to-person contact and droplets spread by air.

2009 H1N1 / Mexican Flu Pandemic

In 2009 an influenza (flu) virus emerged that had never been seen before in humans. This virus contained a unique combination of influenza genes not previously identified in animals or people. The United States Center for Disease Control and Prevention estimated that 150,000-575,000 people worldwide died during the first year the virus circulated. 80 percent of these deaths were estimated to have occurred in people younger than 65 years of age. This is quite different from typical seasonal influenze epidemics, during which about 70-90 percent of the deaths are estimated to be people older than 65. An effective vaccine is available and many younger people were vaccinated in 2010.

MERS

Middle East Respiratory Syndrome (MERS) broke out in 2012 and is an illness caused by a virus (more specifically, a coronavirus) called Middle East Respiratory Syndrome Coronavirus (MERS-CoV). Most MERS patients developed severe respiratory illness with symptoms of fever, cough and shortness of breath. About 3 or 4 out of every 10 patients reported with MERS have died. MERS-CoV can be spread through close contact, suc as caring for or living with an infected person. Preventive measures are washing hands, cover mouth and nose with a tissue, avoid personal contact and clean and disinfect frequently surfaces.

Introduction to the measures

At the start of the Stop epidemic growth through learning (STEP_UP) project, partners performed a desk research to identify measures that are used or recommended to stop the spreading of epidemic diseases or pandemics. The identified measures are categorized and stored in the virtual library on the project website.

The measures are categorized as follows:

- Early detection: measures, methods and systems available in the partner countries and globally to detect a health emergency virus outbreak before it is widely spread
- Prevention measures: Limit transmission of COVID-19 – these may be individual or organisational measures. Includes screening (e.g. temperature), washing hands, wearing masks, etc. It is the behaviour itself
- Healthcare and social care interventions: measures in healthcare organisations, public health, social care

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- Policy measures: Minimize the impact of COVID-19 – these are measures defined / imposed by the government to specific individuals or society. E.g. wearing mask is a preventive measure but the policy measure is the obligation of using mask in the streets. Includes containment, mitigation and suppression measures
- Communication: governmental and experts' communication towards the general public

Based on this categorization of measures and additional information, each project partner prepared a thematic partner report. This report will become part of the manual on social and policy interventions, Intellectual Output 2 of the project. The manual will target adult learners that work as professionals in municipalities and welfare organizations as well as social and health care providers, mainly those in auxiliary positions and lower skills. Additionally, volunteers in associations, initiatives, and other community organisations will be provided with options and strategies to contribute for public awareness.

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Early detection measures

This report will focus on measures to enable early detection of upcoming health emergencies and to prevent the emergency to become pandemic or epidemic. Early detection plays a crucial role in all treatment and prevention strategies.

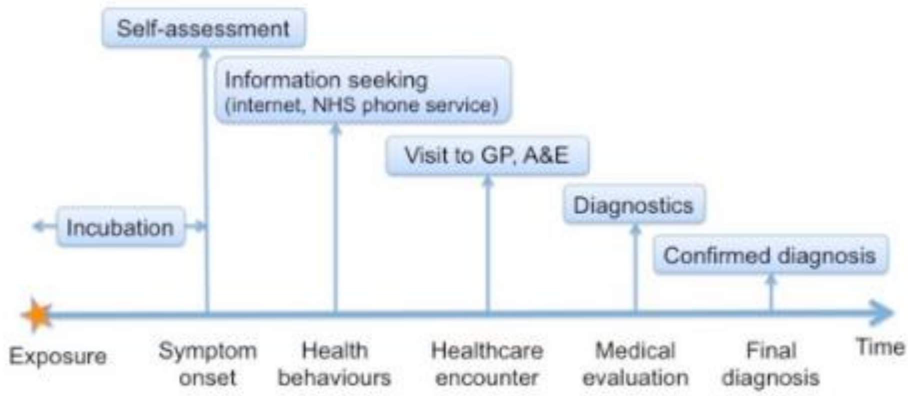

Figure 1: Exposure - diagnosis timeline, 2021; source: i-Sense, UK

After exposure to a health threat, an incubation period follows. During that period a person can be infected, but be unaware of the infection or be asymptomatic. In that last case, the person can affect others, without knowing. Following the onset of symptoms, a variety of health behaviours and health encounters may occur depending on the severity of the symptoms. For example, searching for information on the internet, consulting an e-doctor or if symptoms are more serious, visiting their local GP or emergency unit. There, an initial diagnosis will be made and samples may be sent off to laboratories for a definitive diagnosis. The time delay between exposure and confirmed diagnosis may be cost days, to weeks or months depending on the type infection.

Rapid and accurate identification of the underlying agent (the bacterium or virus) using diagnostic testing is essential to select the correct control measure, such as containment, confinement, antimicrobials and vaccines. This is particularly true for emerging diseases, such as COVID-19, where society finds itself in a race to develop new controls as the disease spreads. In an outbreak situation, vigilant monitoring is vital to inform where to focus effort and assess the effectiveness of interventions.

Worldwide, however, many infections remain undetected. Due to poor diagnostic tools, infection is often undiagnosed and therefore untreated, or diagnosed at the late stage when treatment becomes less effective. This results in on-going transmission of serious infections, and delay in the identification of emerging threats leading to major human and economic consequences for millions of people (i-Sense, 2021).

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This makes it very important to also focus on early detection. In this report we will focus on measures that enable early detection of health emergencies and infectious diseases. Recommendations for social workers, policy makers and general public conclude the measures. Additionally, some good practices were assembled.

Measure 1: Disease surveillance

Disease surveillance is an information-based activity involving the collection, analysis and interpretation of large volumes of data originating from a variety of sources. The data can be collected nationwide or in small areas, such as neighbourhoods, regions or vulnerable population groups. Examples of healthcare data sources are: general practitioners' reports on patients with for example influenza or COVID or dedicated hospital data.

The information collated is then used in a number of ways to

- Evaluate the effectiveness of control and preventative health measures.
- Monitor changes in infectious agents e.g. trends in development of antimicrobial resistance.
- Support health planning and the allocation of appropriate resources within the healthcare system.
- Identify high risk populations or areas to target interventions.
- Provide a valuable archive of disease activity for future reference.

To be effective, the collection of surveillance data must be standardized on a national basis and be made available at local, regional and national level. It is essential to create a communication point in forecasting and responding to disease outbreaks and incidents of regional, national and international significance.

In Europe, the European Centre for Disease Control (ECDC), performs surveillance activities on 56 communicable diseases and related special health issues from all 27 European Union Member States and of Iceland and Norway. Data submission and subsequent validation is the responsibility of European networks or disease experts nominated by the Member States.

Target group(s) of this measure are public and health authorities mainly. Health authorities need to take action to control the infectious disease and prevent a further outbreak. Public authorities are responsible for the facilitation of the surveillance and – if necessary – take administrative actions or communicate with stakeholders or the general public. The surveillance is facilitated by providing sufficient financial resources, enabling usage of health data and enabling reporting.

Surveillance is essential to detect infectious diseases in an early stage and to prevent them to become pandemic of epidemic.

Impact of surveillance: the better the surveillance performs, the less impact it should have on society as a whole. That is, because surveillance enables early detection and this knowledge should in general lead to sufficient action by health and public authorities to avoid further spreading. Sufficient action may include isolation of the affected people, adequate monitoring, small scale lockdown. It is published in the media that the outbreak of COVID-19 in Wuhan at first was denied by the Chinese authorities and therefore could spread throughout the city and China. Chinese residents freely travelled, for example, to Europe and brought the disease with them. Before real action was taken, COVID-19 already became the pandemic we are still in (anno 2021).

Recommendations for successful surveillance are:

- Take legal measures to disclose health data and data usage on infectious diseases
- Provide mandatory measures to health professionals to disclose (anonymous) data on infectious diseases
- Install a data collection and interpretation unit, such as Robert Koch Institut (Germany), National Institute for Public Health and the Environment (Netherlands), Croatian Institute of Public Health (Croatia), Health Protection Surveillance Centre (Ireland), European Centre for Disease Control (EU), Centers for Disease Control and Prevention (United States).
- Install an information streaming and reporting structure in which the unit or centre reports to the government on a regular basis and acutely in case of emergencies.

Measure 2: Digital surveillance

Eventual lacks of adequate disease surveillance systems in vulnerable regions need to be improved and digital surveillance could present a viable approach (Milinovich et al, 2014). Digital surveillance seeks to gain knowledge of public health issues through the analysis of data in the digital domain (such as internet search metrics, Twitter posts, WhatsApp or online news stories), the distribution of these data, and patterns of access.

In the case of SARS it has already shown some promise, where the Global Public Health Intelligence Network, a news-feed aggregator developed by the Public Health Agency of Canada, provided the first alert of SARS (more than 2 months before publication by the WHO) and prompted confirmation of an emerging disease event by the Chinese government.

A more recent developed system, [HealthMap](), applies a similar data-aggregation approach to monitor different kinds of diseases. In 2014 HealthMap reported a strange fever in Guinea in 2014, 9 days before the release of official case information for the ongoing Ebola outbreak.

Digital surveillance is performed on different kinds of communicable diseases.

Target groups: Public health community in general, scientists, policy workers and healthcare professionals can view and use different

The expected result of digital surveillance is to detect communicable and infectious diseases in an earlier stage than normal disease surveillance offer.

Impact(s): data on social media and other sources from individuals will be collected and analysed to enable digital surveillance. This may impact the privacy protection and breaches in confidentiality need to be secured to authorised organisations only.

Recommendations:

- Advise on legislation for privacy protection and usage of anonymised data.
- Advise to include this approach in public health administration.

Measure 3: Artificial Intelligence and Machine Learning

The application of artificial intelligence (AI) and machine learning (ML) in healthcare can detect even weak signals of infectious diseases and trends. According to Agrebi and Larbi (2020), "Detection of weak signals enables the early identification of trends before they become significant and important. This is highly used in the field of cybersecurity. Translated to health care, this would mean identifying a signature in few individuals or a cluster of individuals and predicting the clinical trajectory of the rest of the population. Various sets of data have been elegantly used to predict infectious diseases epidemics. The problem with infectious diseases [...] is their unpredictability as well as the multiple factors that affect the process of infection and transmission. AI is the form of computing that allows machines to act or react to input, similar to the way humans do, by performing cognitive functions."

To improve diagnosis and to block transmission, AI can be applied. For example in Singapore airport, temperature checks are performed systematically using a thermal camera. Another approach is to classify patients by using vital signs, such as respiration rate, heart rate and facial temperature. People with high risk for influenza can be identified using neural networks and fuzzy clustering methods. Agrebi and Larbi further focus on the emergence of Internet of Things (IoT). The data derived from IoT enables to better track and control infectious diseases globally. Social interactions are very important drivers of infectious diseases transmission, and therefore network analysis becomes a must to understand how in a group of individuals the social interactions shape the infectious disease dynamics. IoT can also be applied in healthcare institutions to enable early detection, however this still is at the beginning of development.

Remote sensing case study

In a clinical study on remote sensing of infectious diseases, an automated infrared thermography (IRT) camera system was used to measure body temperature, heart and respiration rates (Guanghao Sun et al, 2017). Since the outbreak of SARS in 2003, infrared thermography (IRT) systems have been used as border-control devices at most major international airports to screen passengers for fever by measuring their body temperature at a distance. IRT measurements depend on the environment where the device is placed in. And body temperature can easily be influenced, so IRT screening suffers from low sensitivity.

A combined visible and thermal image processing approach that uses a complementary metal oxide semiconductor (CMOS) camera-equipped IRT system was tested if it could address this issue. This system utilizes a multisensory fusion technique to remotely measure heart and respiration rates using a microwave radar, and the facial skin temperature is measured using IRT. The results from case–control studies that investigated seasonal influenza screening showed a detection accuracy that ranged from 81.5% to 98.0% using the heart and respiration rates and the facial skin temperature, which is higher than the detection accuracies of the conventional fever-based screening methods.

Target groups of measure: healthcare organisations and public authorities.

Expected result of the measure: much is expected from artificial intelligence and machine learning to early detect infectious diseases (and other diseases such as early stages of cancer or heart diseases).

Impact: the usage of AI and machine learning can severely impact human lives and privacy if no additional measures are taken.

Recommendations for our learners

- Carefully read the Ethics guidelines for trustworthy AI: https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai. On this webpage you can download the guidelines in your own language. Based on the feedback on pilots, the Trustworthy AI Assessment List was developed (European Commission, 2020)

Measure 4: Syndromic surveillance

Mass gatherings are a daily occurrence worldwide and provide a scenario ripe for public health aims and objectives utilising syndromic surveillance (Berry, 2019). Syndromic surveillance is the real-time (or near real-time) collection, analysis, interpretation and dissemination of health-related data enabling early identification of the impact (or absence of impact) of potential human public health threats that require effective public health action. It relies on clinical signs, epidemiologic trends and proxy measures (e.g., absenteeism, drug sales, doctor visits) that create a provisional diagnosis (or 'syndrome'). It has evolved over the last two decades, with each use a test and opportunity to improve its efficacy. Syndromic surveillance itself is not a 'technology', but instead a design of real-time disease surveillance aided by technological advances and dynamic computer algorithms.

Syndromic surveillance is for example applied by the French Institute for Public Health Surveillance (Triple-S Syndromic Surveillance Survey). In Triple-S epidemiological data algorithms and daily to weekly measures of acute health-related events are monitored on deviations and daily 'alarms' in various categories as compared to the local epidemiologic baseline. The British NHS combines calls to the NHS Direct telephone health advice line with information from general practitioners weekly numbers.

The target groups are public health authorities.

Result of the measure is to early detect infectious diseases in mass gatherings.

Impact of the measure is to enable public health authorities to come into action rapidly in case of infectious threats.

Recommendations:

- Facilitate information exchange
- Advice on a solid legal base for data management

Measure 5: Preventive testing

Preventive testing is to test people who have no symptoms on carrying an infectious disease. With the school re-opening, preventive testing is applied. Also, preventive testing is needed in case people without vaccination or not being not recovered from COVID since the last 6 months, want to take a flight, visit an event or match.

In Slovakia, COVID-19 infections fell after the rollout of rapid population-wide testing. However experts say that mass testing can contribute to a reduction in cases, but they are not sure how much of the drop was a result of testing, as other restrictions, such as closing schools, indoor hospitality and leisure activities, were introduced at the same time (Mahase, 2020).

Slovakia deployed around 20 000 medical staff and 40 000 non-medical staff to run the programme, which started with a pilot from 23 to 25 October and was followed by a round of national mass testing on 31 October and 1 November. High prevalence counties were then targeted with a subsequent round on 7 and 8 November.

More than five million tests were completed; the scheme involved swabbing by trained medical staff. Although Slovakia's testing was not mandatory, residents who did not attend were told to stay at home for 10 days or until the next round of mass testing. Those who participated received a medical certificate confirming their infection status, and a negative test certificate was required by employers in order to enter workplaces, while other venues carried out random checks. Anyone who tested positive was asked to quarantine for 10 days, along with all members of the same household and their self-traced contacts.

Target group of this measure was the whole Slovakian adult population.

The result of the measure was a drop down of the number of affected people, however the testing was accompanied with other measures, so it is hard to define the exact result of the measure. The testing has not been repeated to detect other varieties of the COVID-19 virus.

Impact of the measure has not been defined. That is, in literature it is not explained what the impact is on individuals who are more or less forced to be subject of testing.

Recommendations:

- Preventive testing must be well prepared and executed by professional staff.
- To test the effect of preventive testing, other measures should be avoided.
- Secure the collection and storage of body material.

Good practices

Good practice #1

European Centre for Disease Prevention and Control

https://www.ecdc.europa.eu/en

Objectives

The main objective of the European Centre for Disease Prevention and Control (ECDC) is the early detection of infectious diseases at European level, to inform the public and to prevent the further spreading of affected people.

General population and healthcare professionals in particular.

Key facts and implementation

ECDC is an EU agency aimed at strengthening Europe's defences against infectious diseases. The core functions cover a wide spectrum of activities: surveillance, epidemic intelligence, response, scientific advice, microbiology, preparedness, public health training, international relations, health communication, and the scientific journal *Eurosurveillance*.

ECDC disease programmes cover:

- Antimicrobial resistance and healthcare-associated infections
- Emerging and vector-borne diseases
- Food- and waterborne diseases and zoonoses
- HIV, sexually transmitted infections and viral hepatitis
- Influenza and other respiratory viruses
- Tuberculosis
- Vaccine-preventable diseases.

The ECDC also monitors and provides information on COVID-19, and supports the response by Member States to the pandemic.

Results

Information of ECDC on the COVID-19 virus is freely available on the website. The visitor can download up-to-date databases, but also watch the Dashboard with information on the variant distribution among the affections. See picture.

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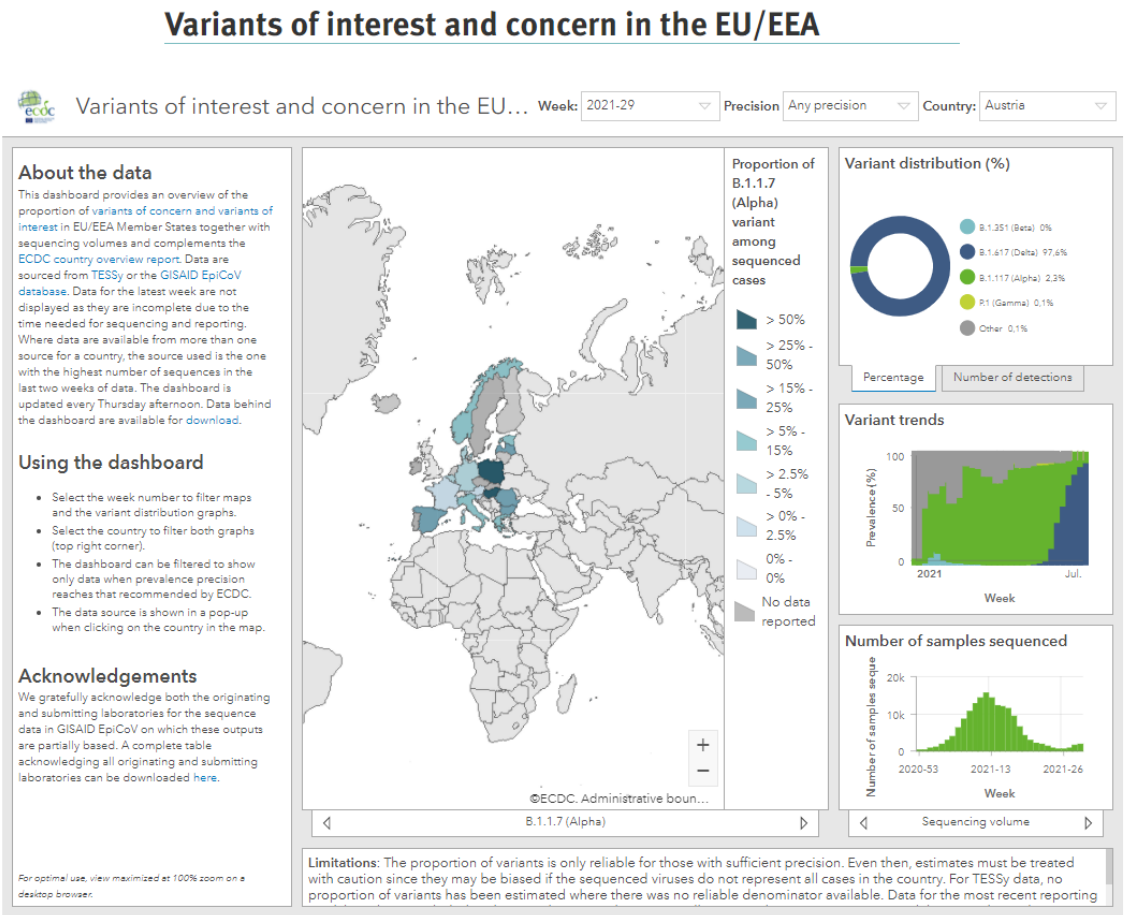

Figure 2: COVID-19 Dashboard. Source: ECDC

Good practice #2

HealthMap

https://healthmap.org/en/

Objectives

The main objective of HealthMap is the early detection of infectious diseases at local level, to inform the public and to prevent the further spreading of affected people.

General population and healthcare professionals in particular.

Key facts

HealthMap, a team of researchers, epidemiologists and software developers at Boston Children's Hospital founded in 2006, is an established global leader in utilizing online informal sources for disease outbreak monitoring and real-time surveillance of emerging public health threats. The freely available Web site 'healthmap.org' and mobile app 'Outbreaks Near Me' deliver real-time intelligence on a broad range of emerging infectious diseases for a diverse audience including libraries, local health departments, governments, and international travellers. HealthMap brings together disparate data sources, including online news aggregators, eyewitness reports, expert-curated discussions and validated official reports, to achieve a unified and comprehensive view of the current global state of infectious diseases and their effect on human and animal health. Through an automated process, updating 24/7/365, the system monitors, organizes, integrates, filters, visualizes and disseminates online information about emerging diseases in nine languages, facilitating early detection of global public health threats.

HealthMap team consists of workers of the Computational Epidemiology Lab from Boston.

Funding and support is received from organisations such as Google, Unilever, Defense Threat Reduction Agency.

Implementation

HealthMap makes use of different alert sources. For example: ProMED Mail (Program for Monitoring Emerging Diseases, from the International Society for Infectious Diseases), World Health Organization, GeoSentinel (Clinician-based sentinel surveillance of individual travellers from the International Society of Travel Medicine and CDC), Food and Agriculture Organization of the United Nations, EuroSurveillance.

The best illustration of what HealthMap does is at hand of the Dutch case on August 12th, 2021

Based on my location, it reports 47 alerts for all diseases in the past week. That is for:

- 37 Respiratory Alerts (36 COVID-19 and 1 SARS),
- 3 Other alerts (1 undiagnosed, 1 other plant disease, 1 pests)
- 3 Gastrointestinal Alerts (1 Hepatitis A, 1 Salmonella, 1 Norovirus),
- 2 Neuro Alerts (1 Meningitis – Neisseria, 1 Rabies),
- 1 Antimicrobial resistance, 1 STD Alerts (Gonorrhea),
- 1 Animal Alerts (Avian influenza)

The user can sign up for email alerts.

The user can search on other countries. The world map shows dots in different sizes and colours.

Results

The user can find adequate information on infectious threats.

The practice is still going on.

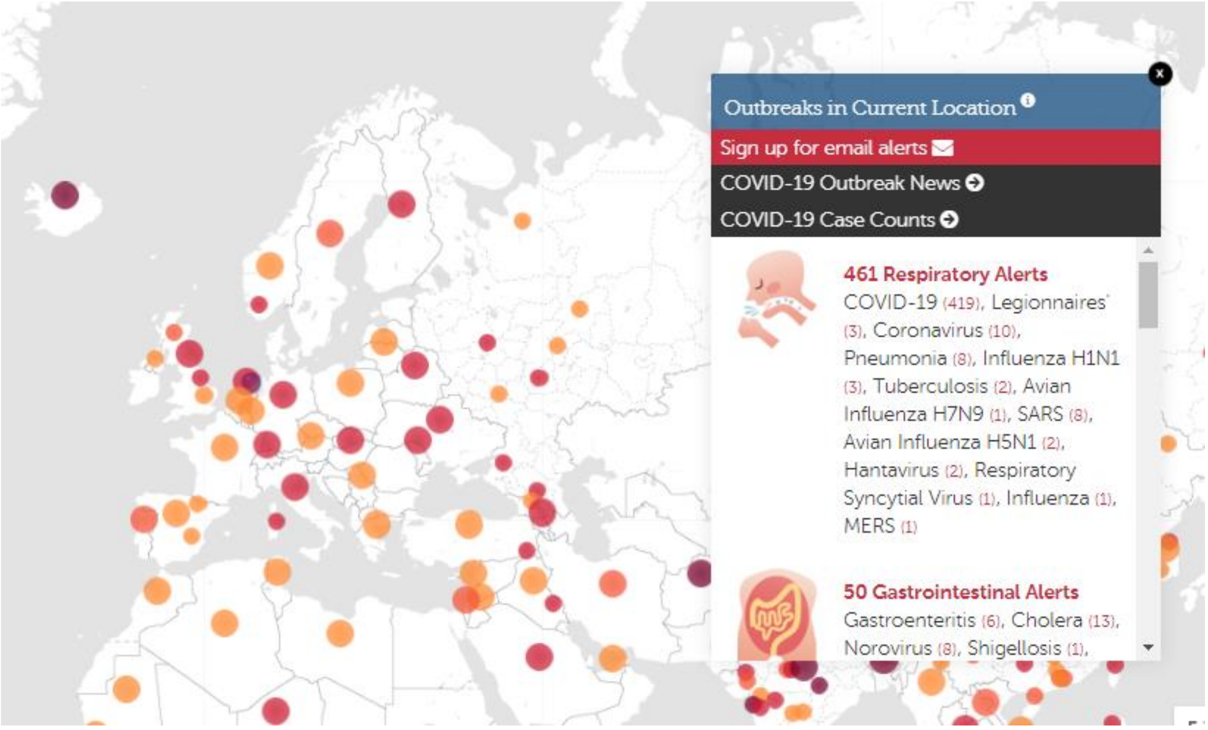

Figure 3: HealthMap view, source HealthMap.org

(Good) practice #3

Example of the Singapore AI device to check body signs and temperature at a distance

Objectives

To easily test individual vital signs or to monitor groups on different body signs on infectious diseases.

Description

iFace III

iFace III is a latest Facial Recognition Terminal using facial recognition algorithms, temperature detection and masked individual identification. It is equipped with ultimate anti-spoofing algorithm for facial recognition against fake photos and videos. iFace III is compatible with Singapore SafeEntry system. i.e. upon successful verification of Face with normal temperature, SafeEntry QR code will appear. Then the user can scan the SafeEntry QR code for contact tracing submissiion.

Figure 4: TraceTogether-only SafeEntry, source iFaceIII

Conclusions and recommendations

Early detection of an infection with a virus is highly important to prevent the virus from further spreading. The sooner it is known that a person is carrying an infectious disease and the right measures are taken, the less other people will continue to spread the virus.

To early detect the occurrence of an infectious disease among the population, several methods are used. The central collection and monitoring of health data is most common and is practice in all countries. With the opportunities of ICT, the surveillance methodologies have been broadened: digital surveillance and syndromic surveillance include the usage of big data to transfer this to relevant information. The usage of artificial intelligence, internet of things, sensors and machine learning, is the next step. When further developed it can also detect even weak signals of infectious diseases. The final early detection method was preventive testing of the population.

Digital tools and data collection/interpretation are quite supportive to early detect infectious diseases or other irregularities among the population. The backside of it is the big potential breaches in human dignity and privacy. Governments, advocacy groups and the general public must continue to take measures to avoid violation of basic human rights and not to become a 'Big Brother 1984-state' where no deviancies are allowed. Adequate legislation, public awareness and debates on values and highly secured data management are crucial. The learners of STEP_UP play an important role in this debate and can provide or advise on the best measures.

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Sources

AGREBI (SAID) AND ANIS LARBI, Use of artificial intelligence in infectious diseases, Arificial Intelligence in Precision Health, 2020, pages 415-438, online available: doi. https://dx.doi.org/10.1016%2FB978-0-12-817133-2.00018-5, assessed August 10th 2021.

BERRY A.C., Syndromic surveillance and its utilisation for mass gatherings, Epidemiology & Infection, 2019, 147: e2. Online available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6518567/, assessed August 18th 2021.

GUANGHAO SUN et al., Remote sensing of multiple vital signs using a CMOS camera-equipped infrared thermography system and its clinical application in rapidly screening patients with suspected infectious diseases, International Journal of Infectious Diseases, Volume 55, February 2017, Pages 113-117. Online available: https://doi.org/10.1016/j.ijid.2017.01.007, assessed August 18th 2021.

HIGH-LEVEL EXPERT GROUP ON ARTIFICIAL INTELLIGENCE, SET UP BY THE EUROPEAN COMMISSION, Ethics guidelines for trustworthy AI, 2019, online available: https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai, assessed August 17th 2021.

HIGH-LEVEL EXPERT GROUP ON ARTIFICIAL INTELLIGENCE, SET UP BY THE EUROPEAN COMMISSION, Trustworthy AI Assessment List, 2020, online available: file:///C:/Users/GEBRUI~1/AppData/Local/Temp/MicrosoftEdgeDownloads/9eac57c5-8cc4-4705-a017-cc9ee4e61870/trustworthy_ai_assessment_list2_8801AC90-EC38-BD6F-01D4A56BBFD6DD3D_60440.pdf, assessed August 17th 2021.

I-SENSE, The need for early detection of infectious diseases, web article, https://www.i-sense.org.uk/infectious-diseases/need-early-detection-infectious-diseases, assessed August 20th 2021.

MILINOVICH (GABRIEL J), RICARDO J SOARES MAGALHÃES, WENBIAO HU, Role of big data in the early detection of Ebola and other emerging infectious diseases, The Lancet Global Health, Volume 3, Issue 1, E20-E21, January 01, 2015. Online available: https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(14)70356-0/fulltext, assessed August 10th 2021.

MAHASE (ELISABETH), Covid-19: Mass testing in Slovakia may have helped cut infections, BMJ 2020; 371:m4761. Online available: https://www.bmj.com/content/371/bmj.m4761, assessed August 17th, 2021.