Fort Pichaidaphak Hospital (FPCDH) COVID-19 System: The COVID-19 Screening and Monitoring Tools for Patients and Active Case Finding

Samai Khampan, M.D.[1], Sararak Choosakul, M.D.[2], Thongthiw Pairoh, B.Sc. (Med. Tech.)[3], Kitsada Sawatwong[4]

[1]Medical Director, Fort Pichai Dap Huk Hospital, Uttaradit 53000, Thailand

[2]Deputy Medical Director, Fort Pichai Dap Huk Hospital, Uttaradit 53000, Thailand

[3]Medical laboratory technologist, Fort Pichai Dap Huk Hospital, Uttaradit 53000, Thailand

[4]Computer technical officer, Fort Pichai Dap Huk Hospital, Uttaradit 53000, Thailand

Received 13 March 2022 • Revised 5 April 2022 • Accepted 25 April 2022 • Published online 1 May 2022

Abstract:

Background: The situation of the epidemic of COVID-19 from December 2019 until the present, the violence affected the service of the secondary care unit. The insufficient medical personnel caused the heavy workload. As a result, many service recipients have to wait more than a day for access to COVID-19 screening tests. Fort Pichaidaphak Hospital is a secondary care unit has performed screening duties for the SARS-CoV-2 since the risk screening process, specimen collection, laboratory analysis, reporting the results of the examination and repeating follow-up appointments in high-risk groups undergoing quarantine.

Objective: The researchers aimed to evaluate the efficacy of The FPCDH COVID-19 system, compared with conventional system using disease investigation form (Novelcorona2) and also the satisfaction of the medical personnel and the patients who are undergoing quarantine.

Methods: The FPCDH COVID-19 system was established by the Pathology Department in two platforms: a web application platform and a Line official account platform that is connected to the system of the Department of Disease Control, Ministry of Public Health and the National Health Security Office (NHSO) to reduce the turnaround time for both reactive and proactive COVID-19 screening services and reporting laboratory results. Moreover, it was used to monitor abnormal symptoms of those who were undergoing quarantine and assessed the medical personnel and patients' satisfaction.

Results: Conventional system using disease investigation form (Novelcorona2) took longer periods of time then putting the screening personnel at risk of contacting the patient's illness for an average of 2 minutes 52 seconds per patient. The examination reporting procedure was duplicated and delayed, taking an average of 7 minutes 56 seconds per sample, while proactive FPCDH COVID-19 system took 78 minutes per 100 patients. In addition, repeating follow-up appointments in high-risk contacts who had been quarantined was able to be followed up only 58.97% by using the conventional method. Thereby increasing the

Corresponding author: Samai Khampan, M.D.
Fort Pichai Dap Huk Hospital, Uttaradit 53000, Thailand
E-mail: fort.pichai.hospital@gmail.com

GMSMJ 2022; 2 (2): 121-128

@2022 GMSMJ. Hosting by Mae Fah Luang University. All rights reserved

community infection rate compared to the FPCDH COVID-19 system which was able to increase the percentage of repeat follow-up appointments in high-risk contact group to 88.93%. FPCDH COVID-19 system was able to reduce the time in the reporting process by using an average time of 34 seconds per 1 sample and reduce the time for proactive COVID-19 screening by using an average duration of 31 minutes per 100 patients. Satisfaction rate in using the FPCDH COVID-19 system was more than 85.00%.

Conclusion: FPCDH COVID-19 system is highly efficacious screening and monitoring tools for COVID-19 patients.

Keywords: COVID-19, Home isolation, Community isolation, Screening, Report

Introduction

In the situation of the epidemic of COVID-19 from December 2019 until the present several waves of violence affected the service of the secondary care unit which has insufficient number of medical personnel to meet the workload which affects many parts of the service.[1,2] Both cause service delays. As a result, many service recipients have to wait more than a day for access to COVID-19 screening tests. Fort Pichaidaphak Hospital is a secondary care unit has performed screening duties for the COVID-19 virus since the risk screening process, collect specimens, laboratory analysis, reporting the results of the examination and repeat follow-up appointments in high-risk groups undergoing quarantine.

Because COVID-19 is a disease that is spread through droplets transmission, which can be transmitted through long talks or contact with secretions from patients. In addition, in order to test for COVID-19 infection, a history of screening must be taken using a disease investigation form (Novelcorona2) in all patients. Therefore, the screening officer must spend time only taking the history and recording the information in the disease investigation form, an average of 2 minutes 52 seconds per patient. This dis not include the length of time to measure vital signs and complete other records, which was the amount of time that if personal protective equipment was not properly worn. The screening officer had the opportunity to high risk contact group.

In addition to reactive activities at Fort Pichaidaphak Hospital, The RTA (Royal Thai Army) Biosafety mobile unit had given proactive COVID-19 screening services in numerous locations such as schools, marketplaces, and neighborhoods. In order to proactively screen for COVID-19, officers were required to register the patient's personal information. which was used to sequence numbers for receiving the sampling device. Examination and reporting at least one registration officer was required and using an average of 1 hour and 18 minutes per 100 patients, resulting in long waiting periods and high-risk grouping because each proactive screening had a large number of patients.

Reporting of laboratory results was a redundant process and multichannel reporting was required. There were four reporting channels: Co-lab system of the Department of Disease Control, Ministry of Public Health, Uttaradit COVID-19 online of Uttaradit Provincial Public Health Office, Fort Pichaidaphak Hospital system, and other hospitals that sent specimens for testing.

This process was redundant and results in an average reporting time of 7 minutes 56 seconds per sample, and could also result

in errors such as incomplete or delayed results, etc.

The COVID-19 screening test according to the guidelines of Uttaradit Province, a repeat follow-up appointment was scheduled for high-risk contacts who were quarantined on the 7th day after contact with confirmed cases or if found to have abnormal symptoms such as fever, cough, sore throat, stuffy nose, etc. when the number of high-risk exposures increased It was difficult and incomplete to follow up for repeat examinations or follow up on abnormalities. In the period from April 15, 2021 to November 16, 2021, a total of 78 high-risk exposures were quarantined, but only 46 were able to follow up for repeat examinations, or 58.97%. The high-risk exposures that were not re-examined which might be a source of further spread of infection in the community.

Methods

The FPCDH COVID-19 system was established by the Pathology Department in two platforms: a web application platform used to report test results, view COVID-19 test results, monitor abnormal symptoms of those in quarantine, and follow up for re-testing. Line official account (Line OA) platform was used to register for COVID-19 testing by connecting to the identity verification system (Authentication Code) of the NHSO and used to view laboratory results for patients, It was also used to report symptoms for high-risk contact groups who were in quarantine.

Registration system for COVID-19 test and Record the Novelcorona2 form

Patients could register for COVID-19 screening by filling out their personal information, symptoms and risk history. Including the ability to choose the date and time of the examination in advance via Line OA so that patients did not have to wait for long history taking and the system would automatically assess the risks, divided into PUI groups, high-risk groups. and low-risk groups Connected to the identity verification system of NHSO. The information that the patient filled in could be reviewed and edited by the staff later. As well as being able to print a disease investigation form (Novelcorona2) immediately without the screening staff having to record again and patients could check the results by themselves through Line OA.

Proactive COVID-19 screening system

Proactively register for COVID-19 screening by filling in the necessary information for quick convenience, which patients were able to register themselves via Line OA. Once registered, they would receive a sample code. For contacting the staff to pick up the device for collecting samples to receive the service of collecting specimens at the RTA Biosafety mobile unit immediately without having to wait in line to fill in for a long time.

Laboratory Reporting System

Reporting system from FPCDH COVID-19 system Synchronized the results of the examination to the Co-lab system to send the examination results and number of examinations per day to the database of the Ministry of Health for real-time national daily reports. It also integrated the reporting system with the Uttaradit Provincial Public Health Office to be able to send all test results into the UTTARADIT COVID19 ONLINE system, which was an overview system of the province. If a positive result was found or an infection was found, the notification would be immediately sent to the LINE group of the Uttaradit's Communicable Disease Control Committee, for rapid investigation of the disease. The patient information included the card identification number (CID), name, surname, gender, age, address, and result. For preventing and restricting the patient

information, they were concealed with X, which 3 of 13 numbers for CID and the last word of surname. The people who were authorized to access patient information consist of Situation Awareness Team (SAT) of Uttaradit Provincial Public Health Office. Moreover, a reporting system was developed for other hospitals but restrict accessing to patient information. The medical personnel must register and using their own username and password to access the FPCDH COVID-19system.

Home isolation system

This was the system for tracking high-risk contact groups during quarantine that did not detect the infection the first time to let the patient know the date of the next examination and could report abnormal symptoms on a daily basis so that officer could monitor abnormalities and their current location for quarantine. This was useful for the next repeat examination appointment.

Results

In the process of reporting the laboratory results after development, officers could report results only once through the FPCDH COVID-19 system. It could eliminate redundant process which took average reporting time of 7 minutes 56 seconds (476 seconds) per 1 sample. On the other hand, the FPCDH COVID-19 system could reduce average reporting time to 34 seconds per 1 sample, which was 14 times shorter than the original method as shown in figure 1.

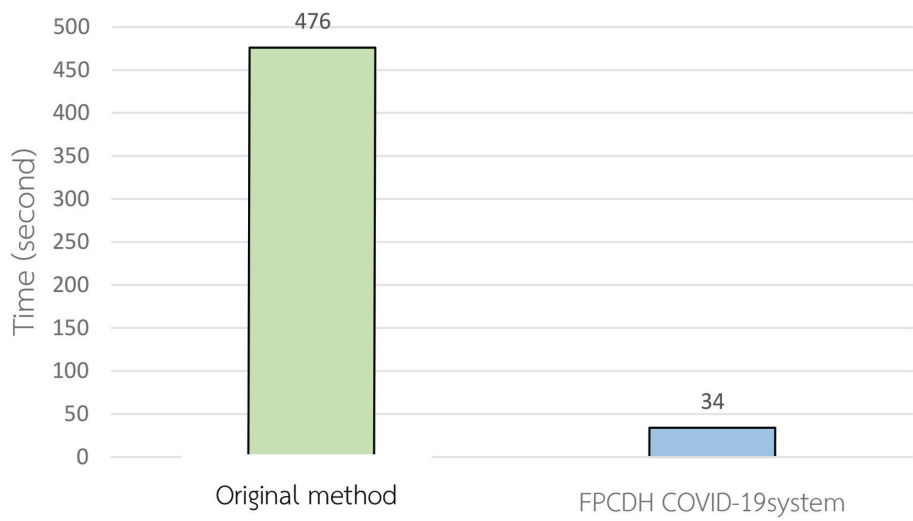

Figure 1 Time taken to report the laboratory results

The FPCDH COVID-19 system would synchronize the results of the examination to the Co-lab system, UTTARADIT COVID-19 ONLINE, Fort Pichaidaphak Hospital staff and other hospital staff who sent samples to be able to view and print the laboratory results. Currently, there were 12 hospitals registered to use the FPCDH COVID-19 system, which are: Fort Pichaidaphak Hospital (FPCDH), Uttaradit Provincial Public Health Office (UTT MOPH), Uttaradit Hospital, Laplae Hospital, Tha-Pla Hospital, Pichai Hospital, Fak Tha Hospital, Nampad Hospital, Bankhok Hospital, Thong Saen Khan Hospital, Tron Hospital and Phitsanuvej Uttaradit Hospital. The satisfaction levels of

medical personnel and patients were assessed by the questionnaire that consist of measuring the levels of difficulty and comfortability of using the application, registration process, exploring the laboratory report, and notifying symptoms in high-risk exposed groups. The satisfaction of FPCDH COVID-19 system was more than 85.00% for all hospitals as shown in figure 2.

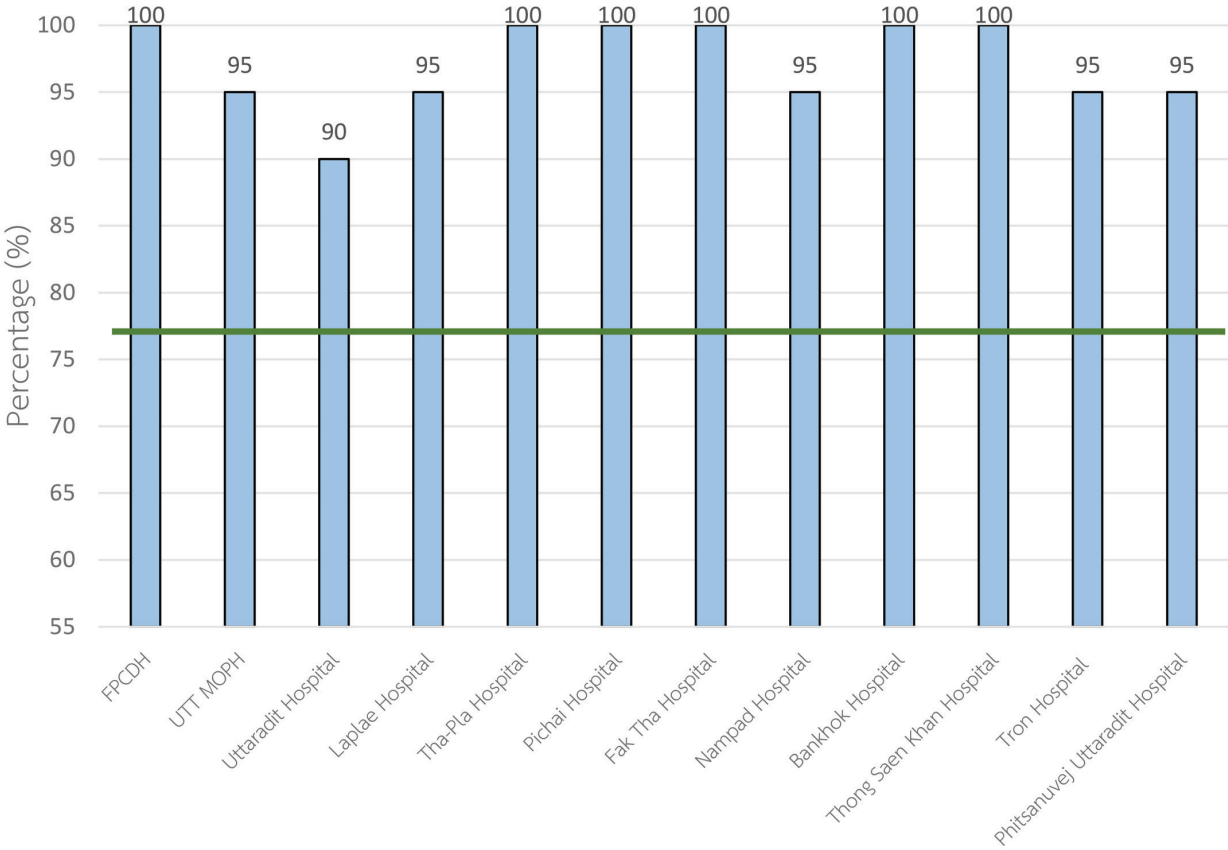

Figure 2 Percentage of satisfaction with using FPCDH COVID-19 system of community hospitals

After development, the FPCDH COVID-19 system could better facilitate patients. They could register for COVID-19 screening in advance and assess the risk accurately by themselves. In addition, officers did not need to take the history and record it in Novelcorona2 again. It could reduce the time of exposure of the personnel to screening patients or those with a history of high-risk contact group. And the patients had a level of satisfaction in using the FPCDH COVID-19 system via Line OA more than 85.00% as shown in figure 3.

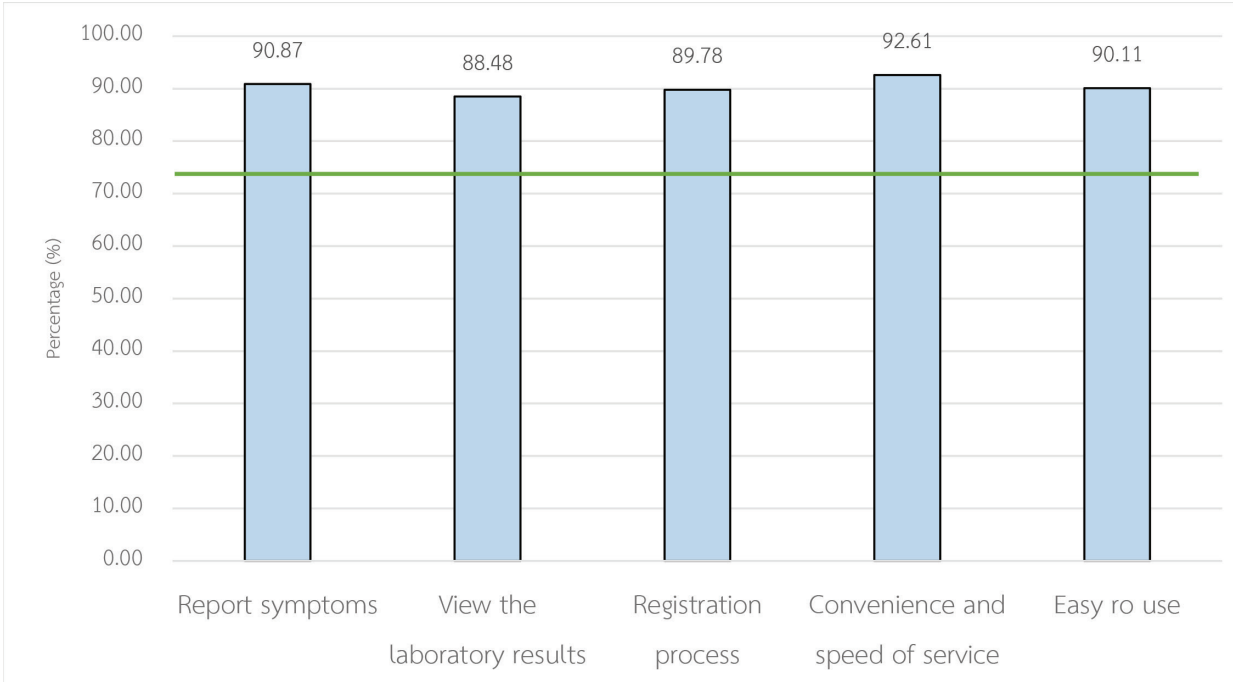

Figure 3 Percentage of users' satisfaction with using LINE OA

The RTA biosafety mobile unit was used in proactive screening. It had been developed that patients could register for screening by themselves through Line OA. Once registered, they received a sample code and brought it to contact the staff to receive the sample collection device and entered the process of collecting specimens immediately. For the original method, an average time of proactive COVID-19 screening service was 78 minutes per 100 patients. Thus, the FPCDH COVID-19 system could reduce the processing time to an average of 31 minutes per 100 patients, which was a reduction of 2.5 times from the original method, as shown in figure 4.

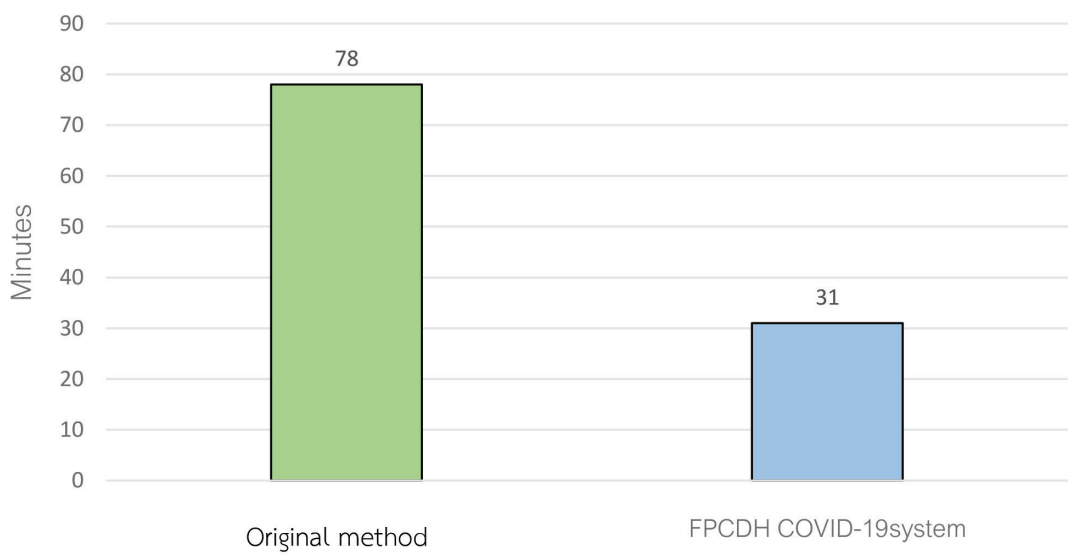

Figure 4 Duration of proactive COVID-19 screening service in 100 patients

After a home isolation system had been developed, staff could more easily monitor down symptoms of those in quarantine and had repeat follow-up examination appointments. From October 1, 2021 to October 31, 2021, a total of 614 high-risk contacts were quarantined, of which 546 were able to follow up for repeat examinations, representing 88.93%, as shown in figure 5.

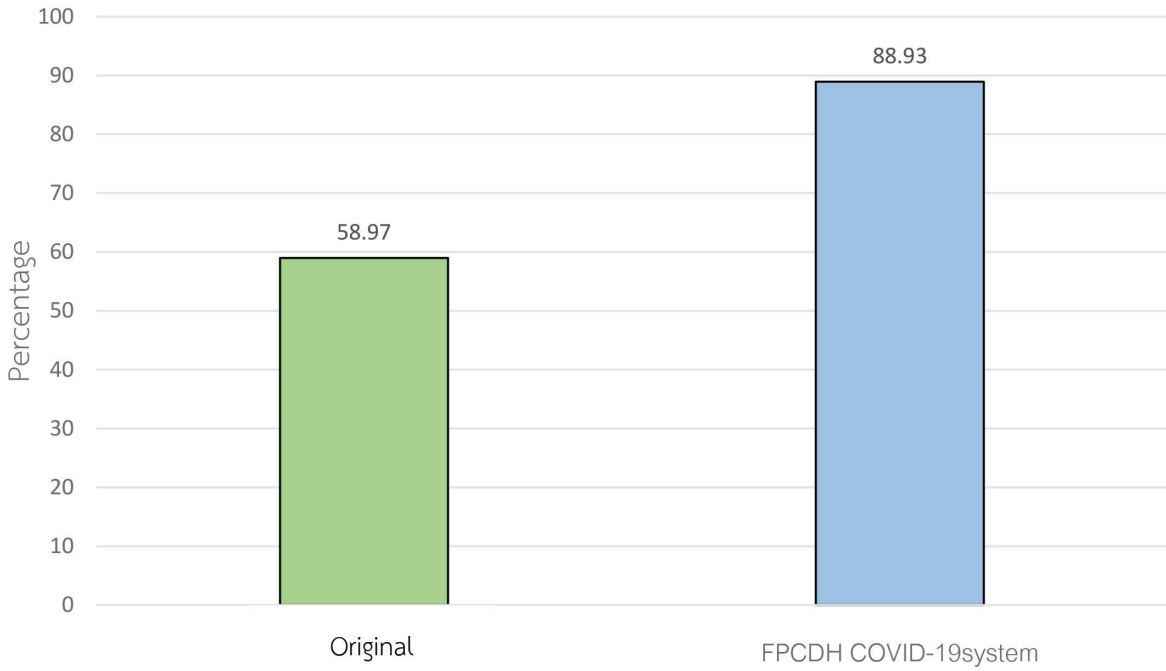

Figure 5 Percentage of repeat follow-up appointments

And patients were more than 85.00% satisfied with reporting abnormal symptoms with the FPCDH COVID-19 system via Line OA as shown in figure 3.

Conclusion

The FPCDH COVID-19 system was able to reduce the turnaround time for reactive, proactive COVID-19 screening services, and could eliminate a redundant process of reporting laboratory results. It could be used to monitor abnormal symptoms of those who are undergoing quarantine. Moreover, it could reduce the time of exposure of the personnel to screening patients or those with a history of high-risk contact group. The level of satisfaction in using the FPCDH COVID-19 system via Line OA in medical personnel and patients was more than 85.00%.

Discussion

The FPCDH COVID-19 system had many advantages such as faster screening, easy to access, reduced the contact time of the infected patient between service recipients and medical personnel. On the other hand, there were still limitations in patients who did not have smartphone or elderly patients that were unable to access FPCDH COVID-19 system.

Routine review of operating procedures for errors Look for opportunities to result in mistakes. and find redundant operational procedures until the workload was too much. Together with the use of the LEAN concept, the work process could be adjusted to be more efficient. by reducing the work process useless to provide secondary care units which had limited medical personnel who could

provide comprehensive medical services to patients. and support continuous development. As a result, it reduced operational errors and reduced unnecessary workload. In an era where digital technology and smartphones are covering more and more hospital users, applying technology to medical service systems can bring benefits in many ways such as reduce turnaround time, reduce direct contact with patients, store patient data, query or make use of databases, etc. The use of technology in the work has resulted in continuous improvement of the work.

References

1. World Health Organization. Sharing COVID-19 experience: The Thailand response [online]. 2019, https://www.who.int/thailand/emergencies/novel-coronavirus-2019 [16 Sep 2020]
2. Governor's Office of Mae Hong Son Province. Vigilant Measures Against the Spread of Coronavirus 2019 (2019-nCoV) [online].2019'https://www.covid.uttaradit.go.th/ [1 Apr 2020]