Republic of Indonesia
Ministry of Education, Culture, Research and Technology

Indonesia
Additional Component of the Project for Capacity Development of ICU Using Telemedicine under COVID-19 Pandemic

Final Report

May 2024

Japan International Cooperation Agency (JICA)

JICA Expert Team

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Abbreviations

AHS		Academic Health System
ANC		Antenatal Care
ARDS		Acute Respiratory Distress Syndrome
ASIK	Aplikasi Sehat IndonesiaKu	Patient Information Recording Application for Healthcare Professionals
Bappenas	Badan Perencanaan Pembangunan Nasional	Ministry of National Development Planning
BPJS	Badan Penyelenggara Jaminan Sosial	Social Security Administration
CD		Chest Drainage
COPD		Chronic Obstructive Pulmonary Disease
CTG		Cardiotocogram
D2D		Doctor-to-Doctor
D2P		Doctor-to-Patient
Medical Service		Directorate General of Medical Service
DHO		District Health Office
DTO		Digital Transformation Office
EMR		Electronic Medical Records
ER		Emergency Room
FKRTL	Fasilitas Kesehatan Rujukan Tingkat Lanjut	Advanced Referral Health Facility
FKTP	Fasilitas Kesehatan Tingkat Pertama	Primary Health Facility
GP		General Practitioner
HFNC		High Flow Nasal Cannula
IBI		Indonesian Midwives Association
ICCU		Intensive Coronary Care Unit
ICT		Information and Communication Technology
ICU		Intensive Care Unit
IHS		IBM HTTP Server
JKN	Jaminan Kesehatan Nasional	National Health Insurance
KOMEN	Konsultasi Medis Online	Patient Information Integration System
M&E		Monitoring and Evaluation
MoCI		Ministry of Communication and Information
MoECRT		Ministry of Education, Culture, Research and Technology
MoH		Ministry of Health
MoHA		Ministry of Home Affairs
NICU		Neonatal Intensive Care Unit
NIK	Nomor Induk Kependudukan	Residence Identification Number
OPH		Ophthalmology
OB		Obstetrics
PACS		Picture Archiving and Communication Systems
PDM		Project Design Matrix
PIC		Person in Charge
PICS		Post Intensive Care Syndrome
PICU		Pediatric Intensive Care Unit
PKM	Puskesmas	Primary Healthcare Facility

PKS	Perjanjian Kerja Sama	Partnership agreements between primary health care facilities and upper-level hospitals
PMK	Peraturan Menteri Kesehatan	Ministry of Health Regulation
POC		Proof of Concept
RSCM	Rumah Sakit Dr. Cipto Mangunkusumo	Dr. Cipto Mangunkusumo Hospital
RSUD	Rumah Sakit Umum Daera	Regional Public Hospital
RSUH	Rumah Sakit Universitas Hasanuddin	Hasanuddin University Hospital
RSUI	Rumah Sakit Universitas Indonesia	Indonesia University Hospital
RSWS	Rumah Sakit Wahidin Sudirohusodo	Wahidin Sudirohusodo university Hospital
SatuSehat		Indonesia Health Service Platform
SISRUTE.	Sistem Informasi Rujukan Terintegarasi Nasional	National Integrated Referral Information System
SOP		Standard Operating Procedures
SPBE		Electronic Based Government System
TWG		Technical Working Group
UHC		Universal Health Coverage
UNDP		United Nations Development Programme
USG		Ultrasonography

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I. Project Overview

I. Project Overview

1. Background

Indonesia is the world's largest archipelago and the fourth most populated nation in the world: it consists of 17,508 islands and has a population of approximately 270 million people (2020). Although health indicators have been slowly improving over the past 20 years, life expectancy is 71.9 years and the under five mortality rate is 22.8 per 1,000 live births (each in 2020), which are worse than the Southeast Asian average (73.2 years and 15.0 per 1,000 people, respectively). The number of hospital beds per 1,000 people is as low as 1.0, with scare resources of medical personnel as low as 0.38 doctors and 2.4 nurses per 1,000 people, which are low compared to levels recommended by the World Health Organization. Furthermore, medical resources are unevenly distributed in urban areas, causing limited access to medical services in rural areas including remote islands.

Against this backdrop, the government of Indonesia has set a direction to promote universal health coverage (“UHC”) through the usage of innovative technologies, and as of 2019, more than two million people were already using some form of telemedicine services. The COVID-19 pandemic since 2020 has triggered even wider adoption of telemedicine in the country. The government positioned the expansion of health services as a cornerstone of equitable economic and social development in the National Long-Term Development Plan (RPJPN 2005-2025). This was followed by the National Medium-Term Development Plan (RPJMN 2020-2024) that calls for the use of innovative technologies such as telemedicine to strengthen medical services and referral system, as well as capacity building of health care providers in rural and remote island areas, as measures necessary to achieve the UHC.

In addition, the Ministry of Health (“MoH”) identified the optimization and quality improvement of medical human resources as a priority area in the Long-Term Health Development Policy (RPJP-K 2005-2025). The ministry has called for policy and regulatory framework development and infrastructure expansion for the digitalization of health services in its e-Health Strategy (2017), while its latest Strategic Plan (RENSTRA 2020-2024) focuses on the use of health-tech, with the specific goal of increasing the number of telemedicine-capable medical facilities to 335 by 2024. In addition, the blueprint of Digital Health Transformation Strategy (2021) was recently released, envisioning a digital health ecosystem platform called Indonesian Health Services (“IHS") Platform that provides data connectivity, analysis, and services to support and integrate various healthcare applications in Indonesia.

The IHS platform is now known as SatuSehat. SatuSehat is a platform for integrating patient information across healthcare facilities for data standardization and interoperability for the introduction of Electronic Medical Records ("EMR") to all healthcare facilities in 2023, as specified in the Minister of Health Regulation (“PMK”) No. 24 of 2022 regarding medical records.

With these supporting policies and provisional relaxation of regulations on telemedicine in the wake of the COVID-19, many private companies including startups have begun to provide health-tech solutions in Indonesia, with maintaining continuous dialogues with the government to promote telemedicine.

In order to contribute to the acute shortage of intensive care unit (“ICU”) services under the COVID-19 Pandemic, upon official request from the Government of Indonesia in March 2021, JICA had implemented the “Project for Capacity Development of ICU Using Telemedicine under COVID-19 Pandemic” in Oct, 2021, with Ministry of Education, Culture, Research, and Technology (“MoECRT”), Rumah Sakit

Universitas Indonesia (“RSUI”) and Rumah Sakit Universitas Hasanuddin (“RSUH”) (collectively, “Counterpart Hospitals”), as agreed in the Record of Discussion (“R/D”) dated Sept 20, 2021. The project has been providing regular doctor-to-doctor and nurse-to-nurse tele-consultation sessions between Japanese intensive care specialists and RSUI/RSUH ICU professionals facing critically ill patients including those suffered by the novel coronavirus infection

The Indonesian government and both hospitals have expressed their desire to expand the use of such telemedicine technology and the resulting capacity building of medical personnel in line with the Indonesian domestic healthcare system and not necessarily limited to intensive care. In addition, in FY2021, as part of the "Data Collection Survey on the Digital Health for the Covid-19 Response", JICA demonstrated the digital health solutions of private companies in Indonesia, and the potential of telemedicine was further examined.

This project will be implemented as an addition to the previous project, based on the policy of the healthcare sector in Indonesia and the results of JICA's efforts, and aims to strengthen the healthcare system, including the correction of healthcare gaps, by promoting diagnostic support and knowledge/technology sharing among medical personnel remotely, and to strengthen the healthcare system, including the correction of healthcare gaps, by enhancing the capacity of medical personnel and improving healthcare services.

2. Project Purpose and Expected Outputs

The goals and expected outputs of this project are as follows.

Table 1 Purpose and Expected Outputs of this Project

Overall Goal	
To improve quality and coverage of medical services centered on university hospitals across the country including remote areas through implementing D2D telemedicine for achieving universal health coverage including better accessibility.	
Project Purpose	
To strengthen the role of the Counterpart Hospitals, in terms of improving quality and coverage of regional health care including remote areas, through the university hospital-centered D2D telemedicine mechanism with the Partner Hospitals.	
Outputs	
1	D2D telemedicine (tele-consultation and tele-education) between the Counterpart Hospitals and the Partner Hospitals are planned and introduced, for enhancing inter-hospital collaboration in diagnosis and clinical case management support and knowledge sharing.
2	Monitoring & Evaluation (“M&E”) plan and structure are developed and utilized to assess effectiveness of D2D telemedicine at both the Counterpart Hospitals and the Partner Hospitals
3	A model of the university hospital-centered D2D telemedicine mechanism is verified and considered for further roll-out by the Counterpart Hospitals as well as for horizontal scaling-up in other university hospitals.
4	Identified challenges and opportunities in mainstreaming D2D telemedicine are widely shared for relevant policy framework development and data connectivity management by the authorities.

Source: JICA Expert Team

3. Project Implementation Policy

This project will implement a telemedicine model (Doctor-to-Doctor: "D2D") between medical personnel of different natures at RSUI and RSUH, respectively.

In RSUI, as a continuation of the previous project, the sub-component for RSUI is designed to strengthen ICU capability among medical personnel (doctors and nurses) in the Jakarta Metropolitan area. In particular,

the main activity is to develop a D2D telemedicine mechanism that promotes online teleconferences ("tele-conference"). In addition, activities to develop manuals for intensive care necessary for such working together with the target hospitals are also assumed.

The sub-component for RSUH is to extend medical areas in obstetrics ("OB") and ophthalmology ("OPH") with class C/D hospitals and Puskesmas ("PKM") in remote areas and islands in the eastern part of Indonesia where resources of specialist medical personnel are scarce ("RSUH Partner Hospitals"). In particular, the Additional Component will develop a D2D telemedicine mechanism by providing IoT devices and training utilizing the RSUH's telemedicine system that enable obstetricians / ophthalmologists to remotely help the residents (doctors who have completed their initial clinical training and are undergoing specialty training), general practitioners ("GP"), and nurses to diagnose and manage clinical cases.

II. Project Activities

II. Project Activities

1. Activities Related to Output 1 (RSUI)

1-1. Pilot Activities

(1) Overview of the Counterpart/ the Partner hospital

1) Counterpart Hospital

RSUI is a Class B state university hospital under the University of Indonesia. It is located in Depok City, West Java, Indonesia, and has 220 beds. Most of the patients are covered by the health insurance of the Social Security Agency (Badan Penyelenggara Jaminan Sosial: "BPJS"), and some are covered by private health insurance.

RSUI is a tertiary hospital that provides a wide range of medical services including general medicine, surgery, OB and gynecology, pediatrics, cardiology, neurology, oncology, etc. It accepts referrals from lower-level peripheral medical facilities (RSUD Kota Depok, RSUD Bogor, etc.) For cases that cannot be handled at RSUI, patients may be referred to upper-level hospitals such as Dr. Cipto Mangunkusumo Hospital (“RSCM”), Central General Hospital (Rumah Sakit Umum Pusat) Fatmawati, Persahabatan Hospital, and others.

The ICU at RSUI has 20 beds for critically ill patients with cardiac, pulmonary, and other diseases, as well as for patients after major surgery, and is staffed by an intensive care consultant anesthesiologist, two ICU doctors, 12 ICU GPs, and 99 nurses.

The transition from paper to digital records has begun in the ICUs of RSUI. The system is currently being used to allow doctors from RSUI outside the hospital to participate in ICU rounds and to check the status of ICU patients in remote locations. It is also being used to meet with patient families who cannot enter the ICU. However, the current monitoring system is not connected to the EMR.

2) Partner Hospital

RSUD Kota Depok is a government-owned Class C hospital in Depok, West Java, Indonesia. It was established in 2018 with nine ICU beds and has 20 GPs and 23 nurses as of 2023. Doctors also work in the inpatient and emergency room departments, and there are no GPs specializing solely in the ICU as of yet. Referrals to upper-level hospitals are necessary for continuous renal replacement therapy, percutaneous coronary intervention, stroke, etc., as they cannot be handled at the hospital, and RSUI is one of the referral sources.

The ICU department is equipped with a PC and a central monitor. As of this writing, the EMR is only being used for payment. Only a portion of the test results are integrated into the system.

The ICU department is equipped with a PC and a central monitor. Ideally, the EMR and the data modules of each department in the facility should be linked for seamless and secure sharing of patient information between medical facilities when visiting different medical facilities, including transfers, and when conducting telemedicine. However, as of yet the ICU data module and EMR are not linked . The EMR is only used for payment, and only some test results are integrated into the system.

Table 2 Overview of RSUD Kota Depok

Category	Description
Target partner hospital	RSUD Kota Depok
ICU members at partner hospital	• No ICU specialist, 3 anesthesiologist, 2 GPs, and 23 nurses in ICU with 1 head of ICU
The number of bed	9beds *After the pandemic is subsided in 2022, 7 beds for non-covid and 2 beds for covid
Needs of basic ICU training	High • RSUI will provide basic training sessions in the early phase of pilot phase
ICT capacity	Sufficient • RSUD Kota Depok can fill out patient cases into an excel file
Setting of tele-conference	Every Thursday 3pm – 4pm (subject to change) • The number of cases in a tele-conference depending on the request
Priority cases	• Stroke CPD, cardiac, and metabolic disorder, similar to RSUI • Special learning interests in cases such as Covid-19 and sepsis shocks • Priority is given to cases which RSUD Kota Depok can treat with necessary medical equipment *Referral cases are few due to patients' willingness not to move
Language for teleconference	Preferably with interpretation to Bahasa Indonesian
Monitoring & evaluation	Every month • No systematic M&E team or systems

Source: JICA Expert Team

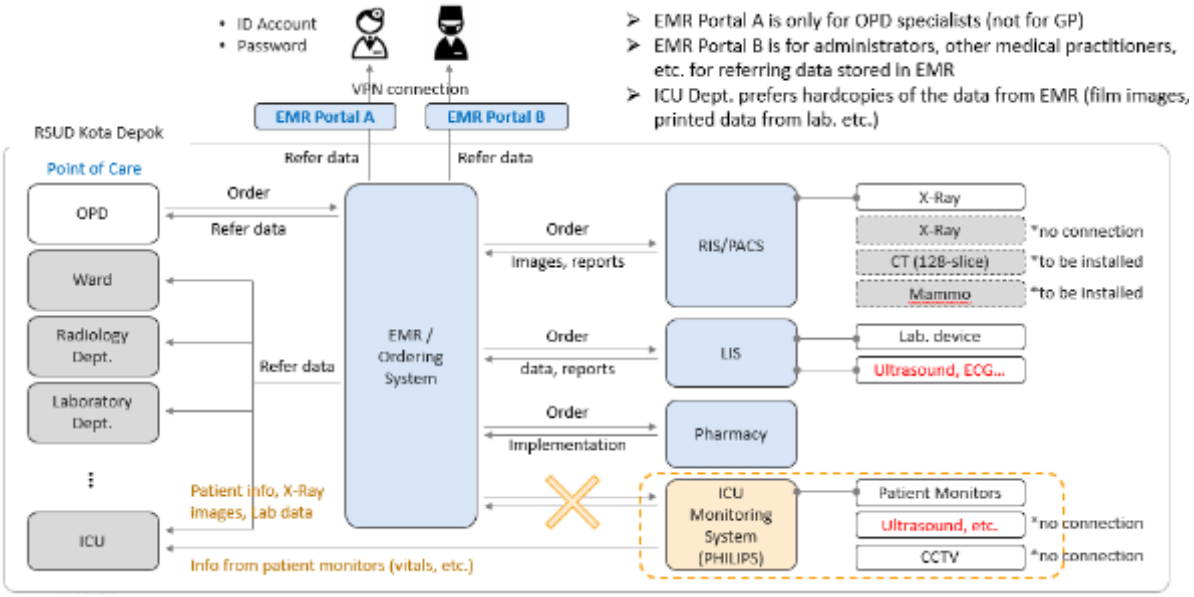


Figure 1 Patient Information System of RSUD Kota Depok

Source: JICA Expert Team

RSUD Cibinong, which participated as an observer in the pilot activity and as a partner hospital in the full-scale activity, is a Type B teaching and community referral hospital of the Bogor Regency Government, established in 1982. It has an Intensive Coronary Care Unit ("ICCU"), Neonatal Intensive Care Unit ("NICU"), and Pediatric Intensive Care Unit ("PICU") in addition to an ICU. The total number of beds is 528, of which the ICU contains the highest number. As of 2023, there are 6 GPs and 63 nurses working in these ICU departments .

The ICU at RSUD Cibinong

(2) Pilot Activity Plan

Since the project had limited time to prepare for the start of pilot activities, weekly meetings with RSUI and RSUD Kota Depok were held from late Oct 2022 to the end of Jan 2023 on Thursdays at 14:00 (including discussions on the evaluation monitoring of Output 2). Below is the agenda discussed with the hospitals during each week.

Table 3 Items Discussed at Weekly Meetings

Week	Agenda
Oct 24-Oct 28, 2022	➢ Issues and needs related to hospital systems and telemedicine models (brainstorming on systems and regulations)
Nov 7-Nov 11	➢ Quality indicator brainstorming for evaluation monitoring (Project Design Matrix: "PDM")
Nov 14-Nov 18	➢ Interviews on the status of the ICU unit at RSUD Kota Depok ➢ Interviews on the details of the telemedicine model
Nov 21-Nov 25	➢ PDM proposal, evaluation monitoring proposal, feasibility check
Nov 28-Dec 2	➢ Sharing of items to be confirmed prior to business trip, and other items to be discussed (incentive design, how to provide lateral support to the Private Partners)
Jan 9 - Jan 13, 2023	➢ Progress check of agreement documents with the Partner Hospitals, various procedures (local equipment transfer, local medical device approval application, ethics committee review, etc.) ➢ Information sharing of candidate of the Private Partners
Jan 16- Jan 20	➢ Confirmation of indicators, monitoring frequency and methods for M&E plan
Jan 13- Jan 27	➢ Identification of existing hospital information management for patient outcomes

Source: JICA Expert Team

In addition, from Dec 4 to Dec 16, 2022, a field survey was conducted and discussions were held with various parties according to the following survey items as activities related to the establishment of a telemedicine model for Output 1.

The consultation at RSUD Kota Depok

Table 4 Output 1 Survey Items

Main items	Middle items	Subitem	Stakeholders	Other related parties
Implementation System and Telemedicine Model	Detailed understanding of the target hospital's information and communication infrastructure	Internet and IT infrastructure environment details (specifications of existing equipment, etc.) IT maintenance and management policy Information security (storage and management of information data) Insufficient IT-related equipment	RSUI IT team RSUD Kota Depok IT team	
	Telemedicine implementation system, including identification of doctors and nurses engaged in telemedicine within the target hospital	Number of team members and expertise in each hospital Proficiency in the ICU area (doctors and nurses) Need for basic training Candidates for other partner hospitals (for the full-scale activity) Cooperation and communication among upper and lower-level hospitals	RSUI ICU team (doctor& nurse) RSUD Kota Depok ICU team RSCM doctors	RSUD Cibinong other Partner Hospitals
	Telemedicine solutions and equipment to be implemented	Issues and needs in ICU Functions required to meet the needs (content of patient data, sharing methods (Excel, etc.), collaboration methods, etc.) Expected support from the Japanese side Level of ICT literacy of staff	RSUI ICU team, RSUD Kota Depok ICU team RSCM doctors	RSUD Cibinong other Partner Hospitals
	Frequency of telemedicine	Shifts, hours of work, number of people Timing of scheduled care (how many times a week, what days of the week) Time required for scheduled care or number of cases	RSUI ICU team, RSUD Kota Depok ICU team RSCM doctors	RSUD Cibinong other Partner Hospitals
	Formulation of implementation flow	Existing ICU operation protocols Existing telemedicine protocols Priority cases (cases handled at RSUD Kota Depok, or cases that can be handled (due to lack of equipment, etc.), or cases that are being referred)	RSUI ICU team, RSUD Kota Depok ICU team RSCM doctors	
	Incentive design for both the Counterpart and Partner Hospitals	Positioning of RSUI educational programs and distance learning policy Possibility of granting points for renewal of medical license and inclusion in training programs for nurses, etc.	MoECRT/MoH UI Rector RSUI Director	RSUI ICU team, RSUD Kota Depok ICU team RSUD Kota Depok ICU team
Related to the Private Partners	Determination of selection method	Policy on Recommissioning	JICA	NA

	Identification Private Partner candidates	Local companies that match the telemedicine model Japanese companies that match the telemedicine model	CEXUP Allm	Docquity Indonesia startup association
	Confirmation of solution and equipment specifications	Confirmation of existing local infrastructure and equipment specifications Confirm gap between telemedicine model and equipment specifications Review of required specifications for local infrastructure and equipment specifications	Vitaars	NA
	Preparation of application guidelines, Terms of Reference, and evaluation criteria	Roles related to the telemedicine model Activities Required manpower and time commitment Frequency of support, language support, etc.	Vitaars	NA
	Various procedures (local equipment transfer, etc., local medical device approval application, ethics committee review, etc.)	Existence or non-existence of systems/regulations for the introduction of equipment/systems Existence or non-existence of internal hospital review or ethical review	MoECRT/MoH Rector UI RSUI Director	NA
	Understanding the details of RSUI's telemedicine system	Electronic medical record detail information Existing data linkage system	RSUI IT team RSUD Kota Depok IT team	
	Discussion on the possibility of introducing the system into the pilot activities (the Counterpart Hospitals, IT engineers)	Matters related to the approval process	RSUI Director RSUD Kota Depok Director	RSUI IT team RSUD Kota Depok IT team

Source: JICA Expert Team

The first Technical Working Group ("TWG") was held on Dec 12, 2022. The TWG organized the above survey items, including the status of the ICU department and IT system of RSUD Kota Depok, and together with the RSUI side members, discussed the details of the telemedicine model the TWG developed a framework of the telemedicine model for RSUI and finalized it as follows.

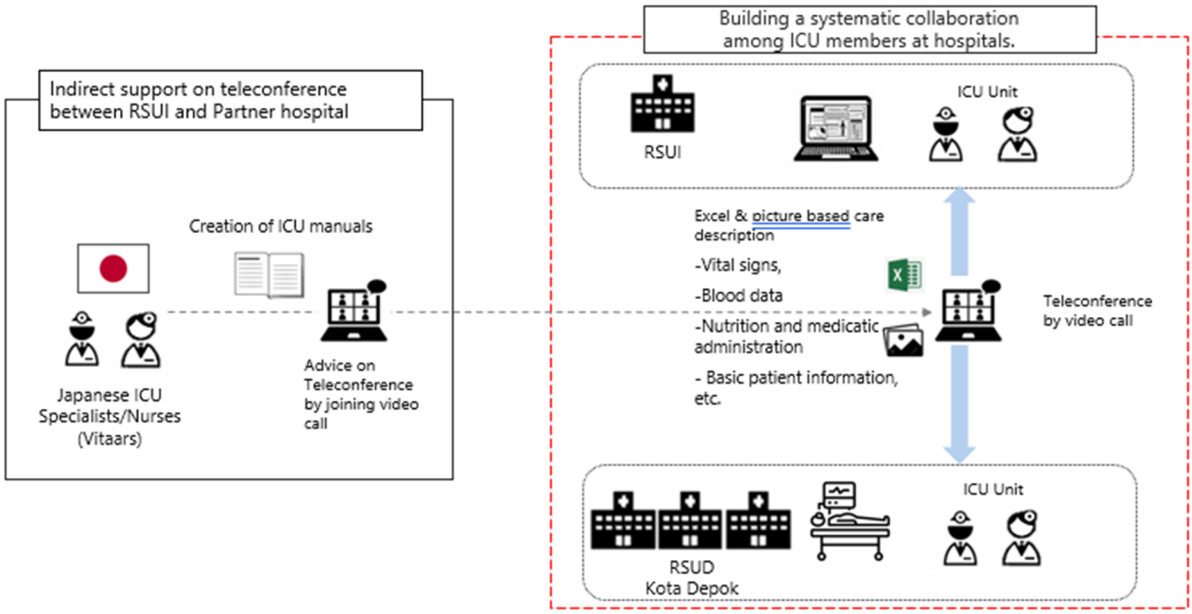


Figure 2 RSUI's Telemedicine Model

Source: JICA Expert Team

In the previous project, RSUI was on the receiving end of consultation, but this project was designed as a model that fostered more ownership by RSUI. Specifically, discussions between RSUI and Japanese intensivists and nurses who were re-consigned to the project took the form of pre-consultation and feedback, with opportunities for discussion before and after a tele-conference. This allowed the RSUI itself to provide high-quality consultation to RSUD Kota Depok while taking into account Japanese knowledge in the one-hour tele-conference itself, and also contributed to fostering leadership as an educational institution of the RSUI. The specific flow of the pre-consultation, tele-conference, and feedback is as follows.

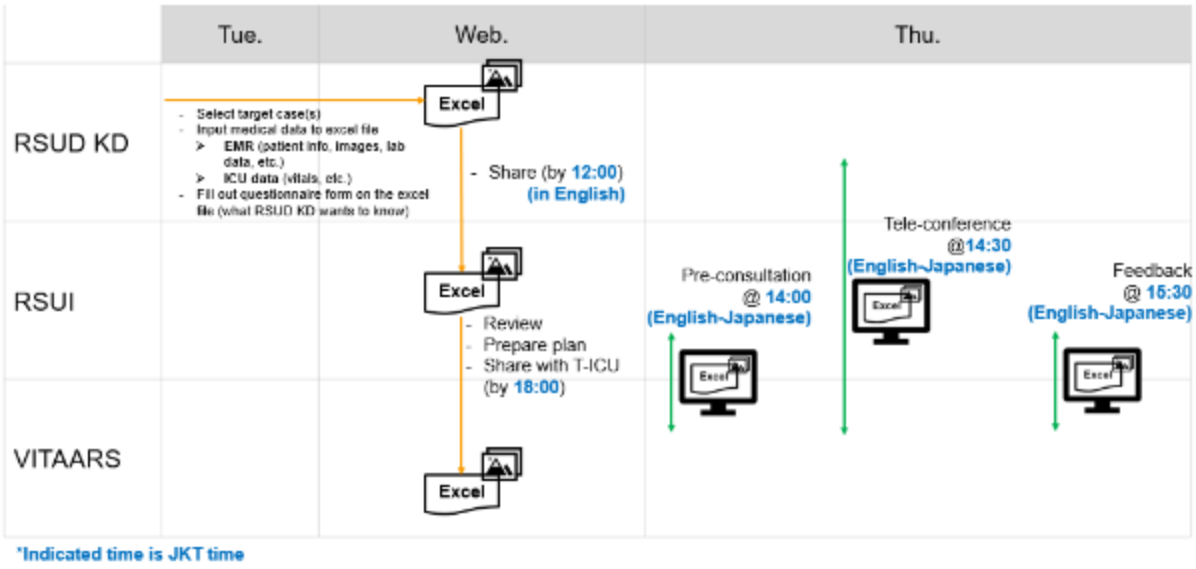


Figure 3 Flow of pre-consultation, tele-conference, and feedback on the doctors side

Source: JICA Expert Team

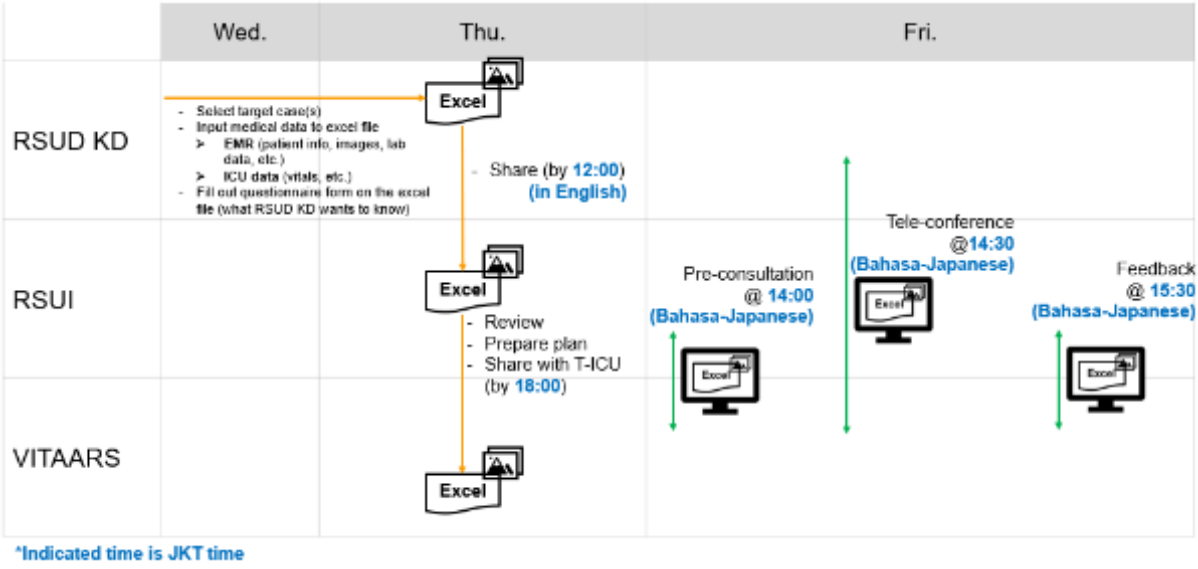


Figure 4 Flow of pre-consultation, tele-conference, and feedback on the nurses side

Source: JICA Expert Team

During the field survey, RSUD Kota Depok and others requested that basic training be conducted prior to the start of the pilot activities due to lack of expertise in intensive care. In response, in Feb 2023, prior to the start of the pilot activities, the lecture materials prepared in the preceding project were translated and basic training was conducted by RSUI doctors every Thursday from 15:00 to 16:00 (Jakarta time). The lecture results are as follows.

Table 5 Doctor's Basic Training

Date	Lecture Topics	Number of participants
Feb/9/2023	Post Cardiac Arrest Syndrome	untabulated
Feb/16/2023	Basics of Mechanical Ventilation for Non-intensivists	61 people
Feb/23/2023	Shock	6 people
Mar/2/2023	Sepsis for non-intensivists	36 people
Mar/16/2023	Nutritional Therapy in Critical Care Medicine	18 people

Source: JICA Expert Team

(3) Selection of the Private Partner

Vitaars (renamed from T-ICU in Mar 2023) was selected as the partner company for the RSUI-ICU component in Mar 2023. Vitaars was involved as the implementing partner for the ICU component in the prior project and was familiar with the RSUI doctors, and Vitaars was familiar with the ICU flow in the local hospital, the type of ICU equipment used, how the medical staff operated the equipment, and other circumstances essential to the project, and had already established a relationship of trust necessary for the smooth implementation of activities. In addition, through interviews with RSUI, it was confirmed that Vitaars possessed the high level of expertise and skills expected by RSUI. Therefore, the company was selected based on the "contract with a specific vendor" among the "non-competitive negotiated contracts" stipulated in the "Guidelines for Local Recommissioning Contracts for Consultants and Other Contracts" (Oct 2022).

(4) Implementation of the Pilot Activity

The telemedicine model in Figure 2 above was adopted and pilot activity began at the end of Mar 2023.

During the pilot activity period, eight tele-conferences were held with doctors and eight with nurses. A summary of each session follows. The purpose of the tele-conference is to provide a forum for patient care and learning for doctors through D2D telemedicine, and in fact, several cases have been confirmed in which patient conditions have improved as a result of the tele-conferences.

Table 6 Overview of Tele-conference (Doctor's session during the "pilot activity")

Date	Summary of tele-conference	Participants
30th Mar	【Hospital】 RSUD Kota Depok 【Patient Profile】17 years old, male 【Diagnosis/Suspicion】Respiratory failure (pneumothorax, tuberculosis)	30
6th Apr	【Hospital】 RSUD Kota Depok 【Patient Profile】25 years old, male 【Diagnosis/Suspicion】After cardiopulmonary arrest resuscitation, ketoacidosis, acute kidney injury	31
13th Apr	【Hospital】 RSUD Kota Depok 【Patient Profile】25 years old, male 【Diagnosis/Suspicion】Acute Respiratory Distress Syndrome ("ARDS"), acute heart failure, suspected myocarditis, disturbance of consciousness, tuberculosis	31

Date	Summary of tele-conference	Participants
11th May	【Hospital】 RSUD Kota Depok 【Patient Profile】57 years old, female 【Diagnosis/Suspicion】sepsis, severe soft tissue infection	34
25th May	【Hospital】 RSUD Kota Depok 【Patient Profile】 68 years old, female 【Diagnosis/Suspicion】ARDS, pulmonary tuberculosis	30
8th Jun	【Hospital】 RSUD Kota Depok 【Patient Profile】50 years old, female 【Diagnosis/Suspicion】Respiratory failure	40
15th Jun	【Hospital】 RSUD Kota Depok 【Patient Profile】84 years old, female 【Diagnosis/Suspicion】Epilepsy, sepsis	21
22nd Jun	【Hospital】 RSUD Kota Depok 【Patient Profile】84 years old, female 【Diagnosis/Suspicion】Epilepsy, sepsis	37

Source: JICA Expert Team

Table 7 Overview of Tele-conference (Nurse's session during "pilot activity")

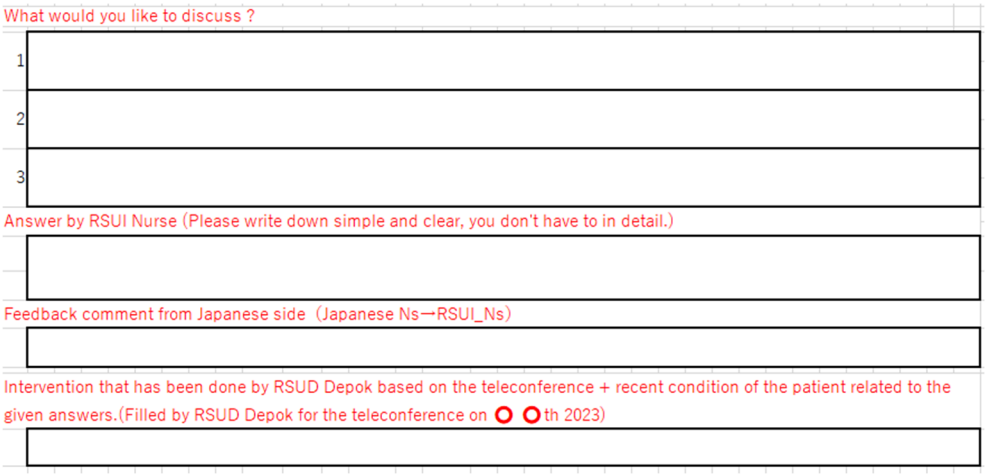
Date	Summary of tele-conference	Participants
31st Mar	【Hospital】 RSUD Kota Depok 【Patient Profile】17 years old, male 【Diagnosis/Suspicion】 Pneumothorax, pulmonary tuberculosis, coagulopathy, hypokalemia	69
14th Apr	【Hospital】 RSUD Kota Depok 【Patient Profile】25 years old, male 【Diagnosis/Suspicion】ARDS, acute liver injury, acute heart failure, suspected meningitis, sepsis	40
12th May	【Hospital】 RSUD Kota Depok 【Patient Profile】51 years old, female 【Diagnosis/Suspicion】Diarrhea, cervical abscess	30
19th May	【Hospital】 RSUD Kota Depok 【Patient Profile】24 years old, male 【Diagnosis/Suspicion】Asthma attack, ARDS, bronchitis	73
26th May	【Hospital】 RSUD Kota Depok 【Patient Profile】66 years old, female 【Diagnosis/Suspicion】Pneumonia, septic shock, ESBL infection	40
9th Jun	【Hospital】 RSUD Kota Depok 【Patient Profile】70 years old, male 【Diagnosis/Suspicion】Septic shock due to pneumonia, heart failure, acute kidney injury, chronic obstructive pulmonary disease ("COPD")	55
16th Jun	【Hospital】 RSUD Kota Depok 【Patient Profile】 84 years old, female 【Diagnosis/Suspicion】sepsis (urinary tract infection), decreased level of consciousness, convulsions	60

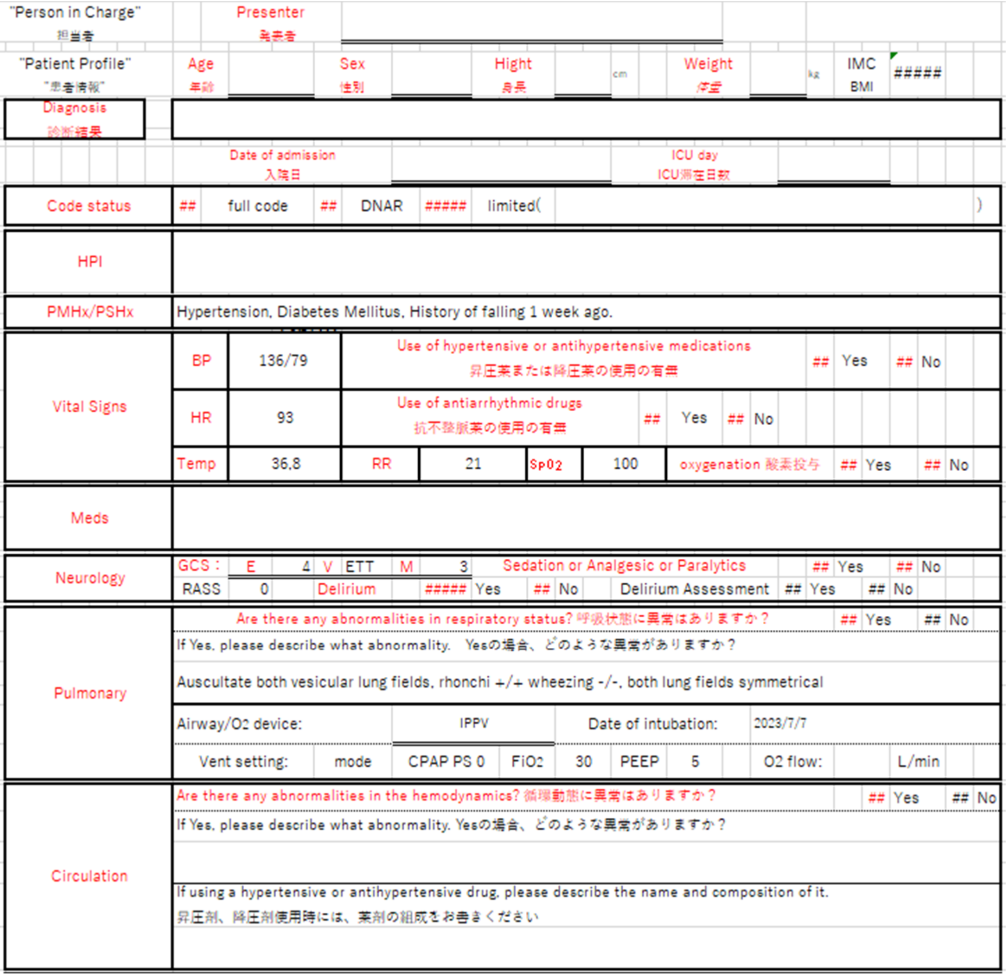
Date	Summary of tele-conference	Participants
23rd Jun	【Hospital】 RSUD Kota Depok 【Patient Profile】74 years old, female 【 Diagnosis/Suspicion 】 Meningoencephalitis, diabetes mellitus, acute kidney injury, decreased level of consciousness	54

Source: JICA Expert Team

During the pilot activity, tele-conferences were conducted based on the Excel sheet from the preceding project. Patient information from the EMR, as well as patient and image data in the ICU that were minimally needed for the tele-conferences were compiled in an Excel file, and patient information was linked to RSUI and Vitaars. The Excel file contained questions from the RSUD Kota Depok side and answers from the RSUI side and was accessible to all concerned from the shared folder of RSUI. The Excel sheet for each session was structured to be accumulated as knowledge. In addition, an agreement was signed between JICA-RSUI, JICA-RSUD Kota Depok, and RSUI-RSUD Kota Depok for the sharing of patient information.

The following is a partial example of an Excel sheet entry item.





"Person in Charge" 担当者	Presenter 発表者		
"Patient Profile" "患者情報"	Age 年齢	Sex 性別	Hight 身長 cm / Weight 体重 kg / IMC BMI #####
Diagnosis 診断結果			
	Date of admission 入院日		ICU day ICU滞在日数
Code status	## full code	## DNAR	##### limited( )
HPI			
PMHx/PSHx	Hypertension, Diabetes Mellitus, History of falling 1 week ago.		
Vital Signs	BP 136/79	Use of hypertensive or antihypertensive medications 昇圧薬または降圧薬の使用の有無	## Yes ## No
	HR 93	Use of antiarrhythmic drugs 抗不整脈薬の使用の有無	## Yes ## No
	Temp 36.8 / RR 21 / SpO2 100	oxygenation 酸素投与	## Yes ## No
Meds			
Neurology	GCS : E 4 V ETT M 3	Sedation or Analgesic or Paralytics	## Yes ## No
	RASS 0	Delirium ##### Yes ## No	Delirium Assessment ## Yes ## No
Pulmonary	Are there any abnormalities in respiratory status? 呼吸状態に異常はありますか？		## Yes ## No
	If Yes, please describe what abnormality. Yesの場合、どのような異常がありますか？		
	Auscultate both vesicular lung fields, rhonchi +/+ wheezing -/-, both lung fields symmetrical		
	Airway/O2 device: IPPV	Date of intubation: 2023/7/7	
	Vent setting: mode CPAP PS 0	FiO2 30 PEEP 5	O2 flow: L/min
Circulation	Are there any abnormalities in the hemodynamics? 循環動態に異常はありますか？		## Yes ## No
	If Yes, please describe what abnormality. Yesの場合、どのような異常がありますか？		
	If using a hypertensive or antihypertensive drug, please describe the name and composition of it. 昇圧剤、降圧剤使用時には、薬剤の組成をお書きください		

Figure 5 Excel sheet

Source: JICA Expert Team

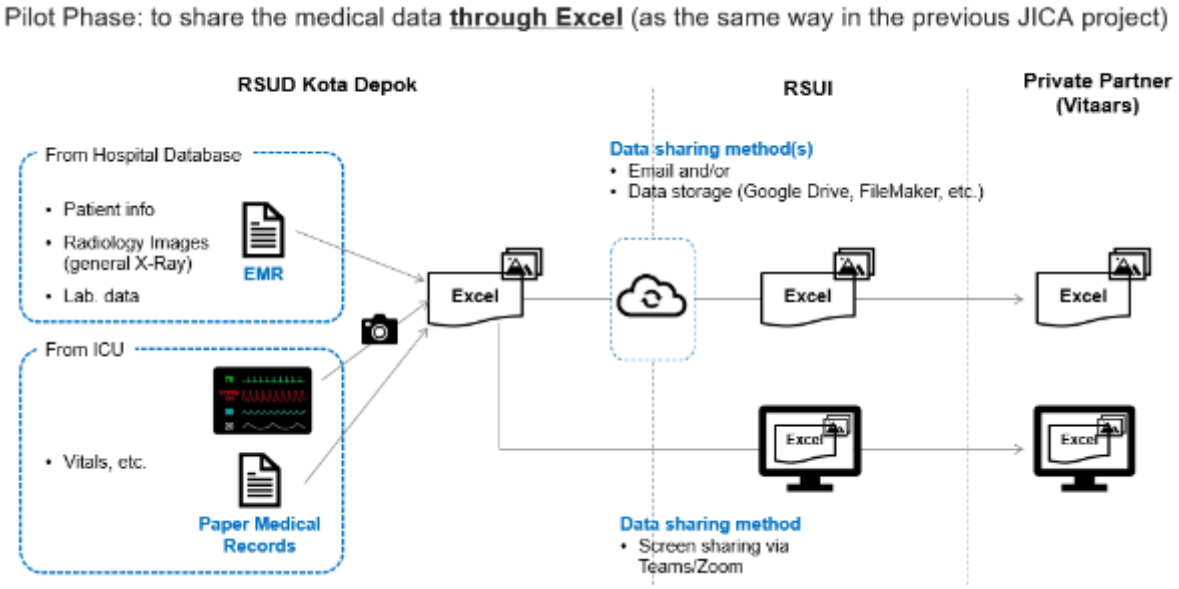


Figure 6 Patient Information Linkage Flow for Tele-conference

Source: JICA Expert Team

1-2. Full-Scale Activity

(1) Full-Scale Activity Plan

In the full-scale activities, RSUD Cibinong (Class B hospital), which had participated as an observer during the pilot activities, joined the project as a new Partner Hospital. However, there were only a few Partner Hospitals that could prepare for the tele-conferences and communicate efficiently, and RSUD Cibinong was determined to be a suitable Partner Hospital for the full-scale activities. The tele-conferences themselves were similar to the pilot activities. The tele-conference itself was held once a week as in the pilot activity, and each Partner Hospital prepared a case every other week. In addition to the regular tele-conferences, follow-up seminars were held on special themes (infectious diseases, death cases, etc.) for the full-scale activities.

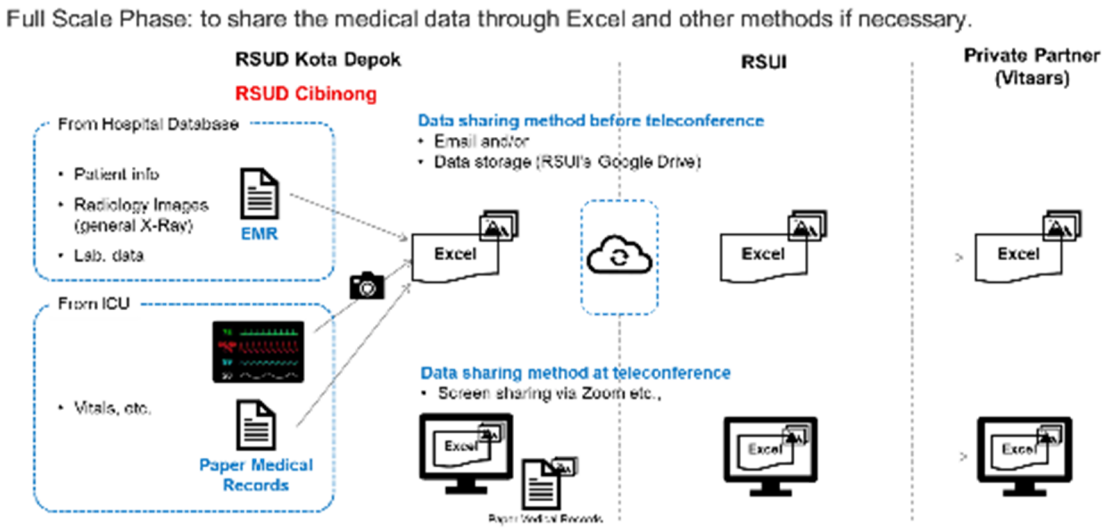
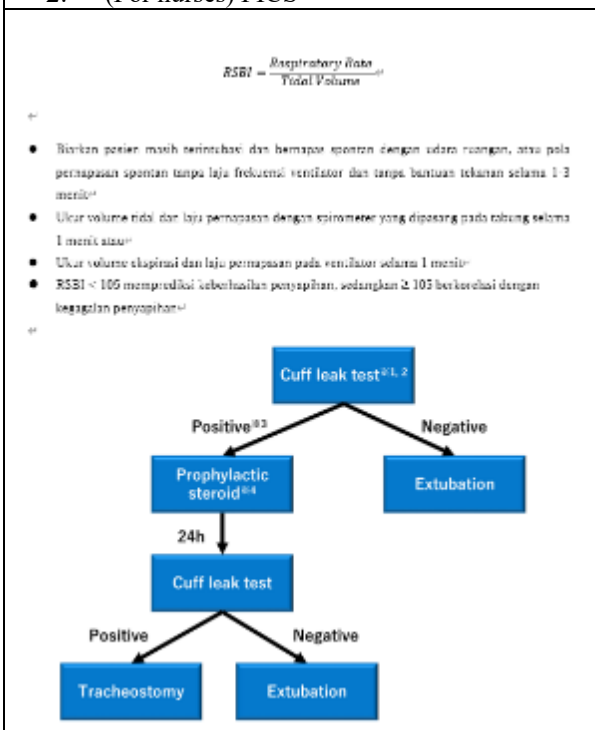


Figure 7 Telemedicine Model for RSUI Full-Scale Activities

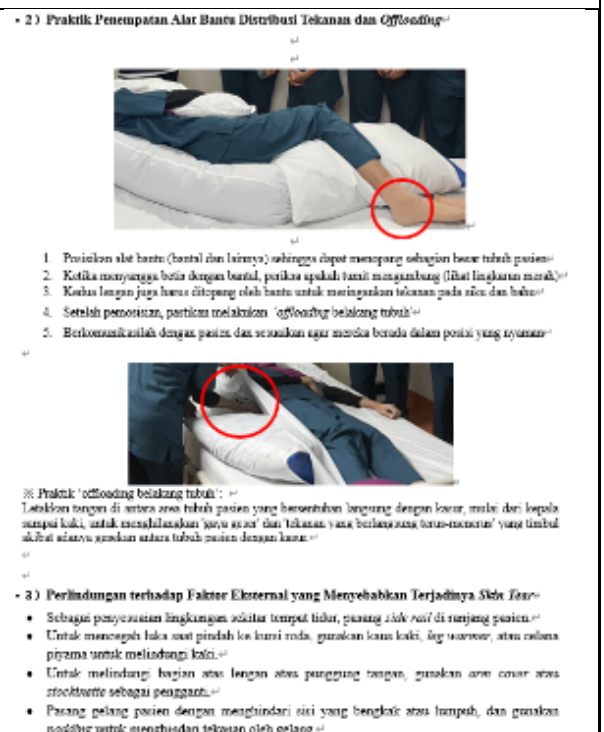
Source: JICA Expert Team

In the full-scale activity, an ICU operation manual was developed by Vitaars based on a request from the RSUI side. The topic selection for the manuals was discussed during the pilot period with the respective medical professionals from RSUI and Partner Hospitals and was finalized as follows. These manuals were intended for ICU GPs and nurses and were expected to provide basic ICU skills and knowledge to healthcare professionals who did not have ICU expertise. The manuals themselves were completed in draft form in Nov 2023, with implementation beginning in each hospital in Dec 2023.

ICU Operations Manual Theme
For doctors
1. Artificial respiration management
2. (For Doctors) Post Intensive Care Syndrome (“PICS”)
Nurse
1. Prevention of bedsores
2. (For nurses) PICS



Doctor: Part of the manual for ventilatory management



Nurses: Part of the manual for prevention of bedsores

During a visit to Indonesia from Nov 20-24, how to utilize and manage the manual with the monitoring and evaluation teams of RSUD Cibinong and RSUI was discussed. A summary of the utilization and management methods is as follows.

Table 8 Management of ICU Manuals

RSUI	Doctor Hard file: ICU manuals distributed to GPs newly assigned to ICUs Soft files: Existing standard operating procedures (“SOP”) stored on RSUI's data server
	Nurse Hard file: ICU manuals as posters or calendars to display at bedside Shared with visitors (Ns), including training participants Soft file: Stored on RSUI data server
RSUD Cibinong	Doctor Hard file: Laminated ICU manuals distributed to each room Software files: stored on ICU shared PC (online storage such as Google Drive is not acceptable)
	Nurse Hard file: printed in hard copy (Ns can access at any time) Software files: stored on ICU shared PC (online storage such as Google Drive is not acceptable)

Source: JICA Expert Team

(2) Implementation of the Full-Scale Activity

During the period of the full-scale activity, 19 tele-conferences were held with doctors and 20 with nurses. Follow-up seminars were held 11 times (5 times by doctors, 5 times by nurses, 1 as a joint seminar for doctors and nurses). A summary of each meeting is as follows.

Table 9 Overview of Tele-conference (Doctor's session during the "full-scale activity")

Date	Summary of tele-conference	Participants
6th Jul	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 50 years old, male 【Diagnosis/Suspicion】 Stroke	28
13th Jul	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 70 years old, female 【Diagnosis/Suspicion】 Disturbance of consciousness, Stroke, ARDS	24
3rd Aug	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 85 years old, female 【Diagnosis/Suspicion】 Disturbance of consciousness	30
24th Aug	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 71 years old, male 【Diagnosis/Suspicion】 Difficulty in removing a respirator, Loss of consciousness (Intracerebral bleeding, Septicemia, Hypertension)	30
11th Sep	Follow up seminar with RSUD Kota Depok Dr 【Seminar Theme for Dr】 Echo evaluation	9
12th Sept	Follow up seminar with RSUI Dr 【Seminar Theme for Dr】 Echo evaluation	11
13th Sept	Follow up seminar with RSUD Cibinong Dr 【Seminar Theme for Dr】 Echo evaluation	7
5th Oct	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 57 years old, female 【Diagnosis/Suspicion】 ARDS, Sepsis, Type 2 diabetes, Coagulopathy, Acute heart failure, Acute kidney injury, Acute liver injury	24
19th Oct	Follow up seminar 【Topic】 Respiratory management for ARDS and COPD	62
26th Oct	【Hospital】 RSUD Cibinong 【Patient Characteristics】 64 years old, male 【Diagnosis/Suspicion】 Pneumonia, Septic shock, Acute heart failure	38
2nd Nov	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 56 years old, male 【Diagnosis/Suspicion】 Decreased level of consciousness	27
9th Nov	Follow up seminar 【Seminar Theme for Dr】 Echo evaluation	27
16th Nov	【Hospital】 RSUD Cibinong 【Patient Characteristics】 56 years old, male 【Diagnosis/Suspicion】 Disturbance of consciousness, sepsis, hyperglycemia, renal impairment	23
30th Nov	【Hospital】 RSUD Cibinong 【Patient Characteristics】 56 years old, female 【Diagnosis/Suspicion】 Hand cut injuries, Severe soft tissue infections, Septic shock, Multiple organ damage, Diabetic ketoacidosis	26

7th Dec	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 41 years old, female 【Diagnosis/Suspicion】 Respiratory Failure Septic shock, Anemia gravis, Pulmonary tuberculosis on treatment, Hypoalbuminemia, coagulopathy, Acute kidney injury	21
14th Dec	【Hospital】 RSUD Cibinong 【Patient Characteristics】 27 years old, female 【Diagnosis/Suspicion】 Diabetic ketoacidosis, Acute kidney injury	25
21st Dec	【Hospital】 RSUD Cibinong 【Patient Characteristics】 69 years old, male 【Diagnosis/Suspicion】 COPD	31
11th Jan	【Hospital】 RSUD Cibinong 【Patient Characteristics】 74 years old, male 【Diagnosis/Suspicion】Post Operation THR (Total Hip Replacement), Hypertensive hearth disease	19
18th Jan	【Hospital】 RSUD Cibinong 【Patient Characteristics】 43 years old, female 【Diagnosis/Suspicion】Shock septic cholangitis, Acute kidney injury	22
25th Jan	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 38 years old, female 【Diagnosis/Suspicion】 Cerebral hemorrhage, status epilepticus superimposed, acute pulmonary edema, suspected cardiomyopathy, hypokalemia, hypertension, diabetes	26
1st Feb	【Hospital】 RSUD Cibinong 【Patient Characteristics】 31 years old, female 【Diagnosis/Suspicion】 Epilepsy (eclampsia), respiratory failure, pregnancy	26
22nd Feb	【Hospital】 RSUD Cibinong 【Patient Characteristics】 47 years old, female 【Diagnosis/Suspicion】 Pneumonia, tuberculosis, renal failure	20
29th Feb	Follow up seminar (Joint seminar with Dr and Ns) 【Topic】 M&M (Morbidity & Mortality) Conference	68
7th Mar	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 57 years old, female 【Diagnosis/Suspicion】 Respiratory failure, ARDS, COPD	22

Source: JICA Expert Team

Table 10 Overview of Tele-conference (Nurse's session during the "full-scale activity")

Date	Summary of tele-conference	Participants
7th July	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 50 years old, male 【Diagnosis/Suspicion】 Stroke	73
14th July	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 65 years old, male 【 Diagnosis/Suspicion 】 Disturbance of consciousness, Respiration failure, Septicemia, ARDS, AKI, DM, Hepatopathy	75
4th Aug	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 70 years old, male	88

Date	Summary of tele-conference	Participants
	【Diagnosis/Suspicion】 ARDS, Septicemia, Bronchial pneumonia	
25th Aug	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 70 years old, male 【Diagnosis/Suspicion】 Stroke, Septicemia	73
11th Sep	Follow up seminar with RSUD Kota Depok Ns 【Seminar Theme for Ns】 Patient's Positioning	11
12th Sep	Follow up seminar with RSUI Ns 【Seminar Theme for Ns】 Patient's Positioning	14
13th Sep	Follow up seminar with RSUD Cibinong Ns 【Seminar Theme for Ns】 Patient's Positioning	30
6th Oct	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 57 years old, female 【Diagnosis/Suspicion】 Sepsis, ARDS	45
20th Oct	Follow up seminar 【Topic】 Delirium	33
27th Oct	【Hospital】 RSUD Cibinong 【Patient Characteristics】 64 years old, male 【Diagnosis/Suspicion】 Pneumonia, Shock, Heart failure	48
10th Nov	Follow up seminar 【Topic】 Analgesia and Sedation in ICU	52
17th Nov	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 80 years old, female 【Diagnosis/Suspicion】 Stroke	40
24th Nov	【Hospital】 RSUD Cibinong 【Patient Characteristics】 67 years old, male 【Diagnosis/Suspicion】 Pneumonia, Stroke, AKI	54
1st Dec	【Hospital】 RSUD Cibinong 【Patient Characteristics】 57 years old, female 【Diagnosis/Suspicion】Cardiovascular disease, Hypertension, Diabetic Mellitus, Acidosis Metabolic	37
8th Dec	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 18 years old, male 【 Diagnosis/Suspicion 】 Decreased consciousness, Uremic coma, Respiratory failure overload, Chronic renal failure on hemodialysis, Coagulopathy, Hypertension, Anuria	31
15th Dec	【Hospital】 RSUD Cibinong 【Patient Characteristics】 51 years old, female 【Diagnosis/Suspicion】 Metabolic encephalopathy, Dyspnea, Diabetic ketoacidosis	35
12th Jan	【Hospital】 RSUD Cibinong 【Patient Characteristics】 53 years old, female 【Diagnosis/Suspicion】Stroke Non Hemoragic, Diabetic Melitus	33
19th Jan	【Hospital】 RSUD Cibinong 【Patient Characteristics】 63 years old, male 【Diagnosis/Suspicion】 Ischemic heart disease, stroke	32
26th Jan	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 38 years old, female 【Diagnosis/Suspicion】 Respiratory failure, epileptic superimposition,	34

Date	Summary of tele-conference	Participants
	encephalitis, diabetes, hypertension	
2nd Feb	【Hospital】 RSUD Cibinong 【Patient Characteristics】 67 years old, female 【Diagnosis/Suspicion】 Renal failure, diabetes, hypertension blood pressure	42
16th Feb	【Hospital】 RSUD Cibinong 【Patient Characteristics】 57 years old, male 【Diagnosis/Suspicion】 Pneumonia, sepsis, respiratory failure	40
29th Feb	Follow up seminar (Joint seminar with Dr and Ns) 【Topic】 M&M (Morbidity & Mortality) Conference	68
1st Mar	【Hospital】 RSUD Kota Depok 【Patient Characteristics】 68 years old, male 【Diagnosis/Suspicion】 COPD	28
8th Mar	【Hospital】 RSUD Cibinong 【Patient Characteristics】 No information 【Diagnosis/Suspicion】 No information	27
15th Mar	【Hospital】 RSUD Cibinong 【Patient Characteristics】 No information 【Diagnosis/Suspicion】 No information	32

Source: JICA Expert Team

In the pilot activity, an Excel sheet was used to link patient information in the tele-conference, but in the full-scale activity, existing digital technology such as Konsultasi Medis Online ("KOMEN"), a patient information linkage system released in Indonesia, were used.

KOMEN was developed as D2D telemedicine platform by the MoH in 2012. Using KOMEN, it is possible for lower-level hospitals to provide medical consultation over the Web without having to visit the upper-level hospitals in person. Currently, 111 out of 3,129 hospitals and 229 out of 10,211 primary healthcare facilities in Indonesia have KOMEN installed (as of Jun 2023). The upper-level hospitals that can apply for telemedicine by KOMEN for lower-level hospitals are those in a referral relationship. However due to the limited number of facilities where KOMEN has been introduced, it is tentatively possible for hospitals that do not currently have a referral relationship to apply for telemedicine by KOMEN. KOMEN has four functions: "tele-radiology", "tele-electrocardiography", "tele-ultrasound", and "tele-consultation". However, the regulatory framework for D2D telemedicine has not been developed yet, and telemedicine using KOMEN is currently provided free of charge as of now.

In order to understand the functions and issues that KOMEN has, the JICA Expert Team started using KOMEN in the tele-conferences in Dec 2023. Since the current KOMEN has only a 1-on-1 video call function (No more than 3 users can call at the same time), the JICA Expert Team continued to operate tele-conferences using Zoom, utilizing the screen sharing function of Zoom with appropriate consideration, and conducted tele-conferences while projecting the KOMEN operation screen to discuss issues and challenges in KOMEN's use. Tele-conference participants commented that the patient information sheets used for case review used to be Excel sheets, but KOMEN's functionality restricts the file format to PDF. Although some participants commented that the patient information sheets were more difficult to read than Excel sheets, overall, there were many positive comments about the use of KOMEN without any specific complaints.

Currently, the only file formats that can be shared on KOMEN are PDF and JPEG, so the function for attaching video files (mp4 files) to share detailed patient information was expanded in the demo account. The video attachment function was highly appreciated by the tele-conference participants, who were able to deepen their understanding of the patient's detailed condition, which is often difficult to understand through text and images alone, by sharing the patient's condition, echo images, and other information through video. On the other hand, the network infrastructure needs to be improved for D2D telemedicine by KOMEN because the network around RSUD Kota Depok and RSUD Cibinong is unstable and proved difficult to send mp4 files.

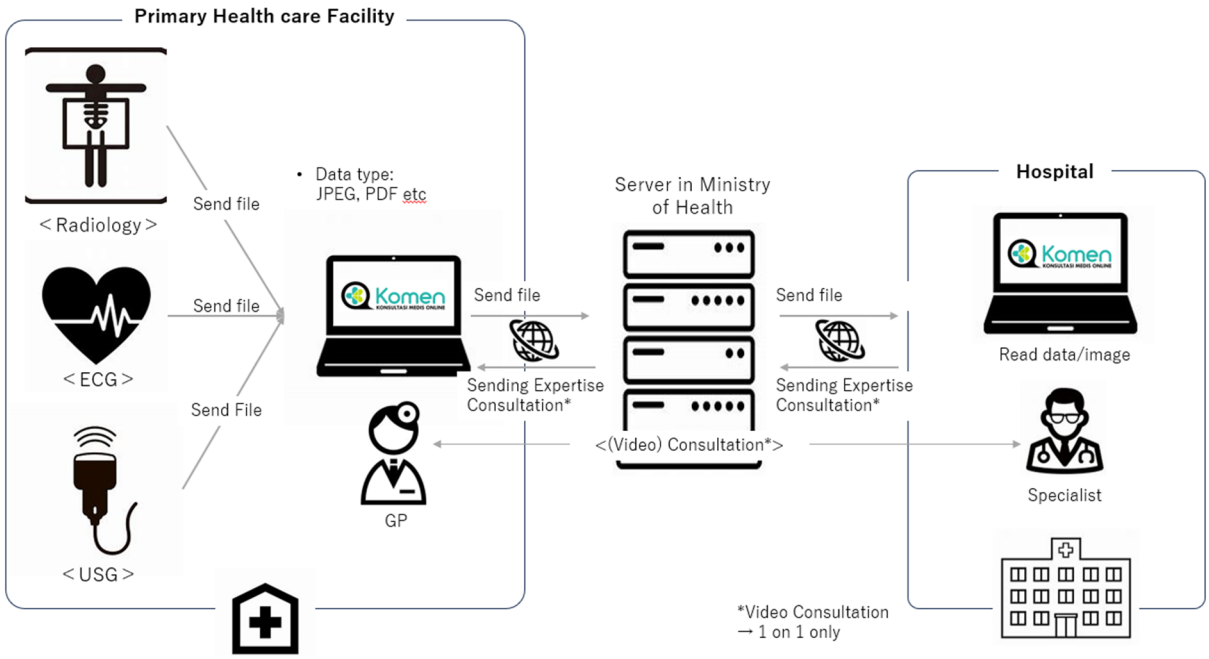


Figure 8 Image of KOMEN functions

Source: JICA Expert Team

Connecting to KOMEN with RSUI doctors

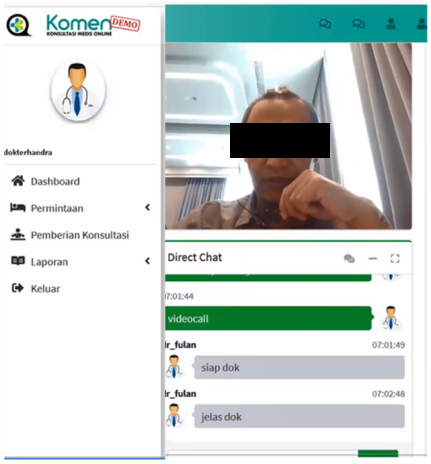


Image of video call function with KOMEN

Regarding the schedule and operation of tele-conferences after Apr 2024, based on the 6th and final TWG, it was agreed among the hospitals that tele-conferences should be continued. In response to this, hospital officials are discussing the renewal of the MoU among the hospitals signed under this project. Furthermore, the RSUI doctors are planning to collaborate with the research program by continuing the tele-conference, and the RSUI nurses are considering integrating the tele-conference into the comprehensive intensive nursing training (basic nursing training) program that the hospital is implementing with the Nursing Association of Indonesia. Specifically, the hospital plans to conduct a tele-conference with RSUI nurses for program participants as a follow-up after they complete the training (expected trial after the 11th batch of training scheduled for Apr to Jun 2024 at the earliest).

Table 11 ICU tele-conference implementation plan after completion of the Project

Description	Doctor	Nurse
Starting Date	3rd week of Apr 2024	4th week of May 2024
Schedule	Every week with the possibility of 2 times a week	Every month, conducted in the 3rd week of the month
Presenter	RSUD Kota Depok and RSUD Cibinong alternate every 2 weeks, one patient at a time	RSUD Kota Depok and RSUD Cibinong alternate every 2 months, one patient at a time
Time	Thursday, 14.30-15.30 JKT Time	Friday, 15.00-16.00 JKT Time
Preparation	Do not need to prepare a patient sheet; the patient's case will be verbally explained by the consultee.	Do not need to prepare a patient sheet; the patient's case will be verbally explained by the consultee.
Platform	Zoom+KOMEN	Zoom+KOMEN
PIC	RSUI: dr. Hafidz RSUD Kota Depok: dr. Amel RSUD Cibinong: dr. Arief & dr. Stessy	RSUI: Ns. Fitriah RSUD Kota Depok: Ns. Iwan RSUD Cibinong: Ns. Fina

Source: JICA Expert Team

1-3. Evaluation of Activities Related to Output 1

The achievement of Output 1 (Introduction and implementation of telemedicine models and plans) in the RSUI is considered to be high.

From the early stages of this project, the JICA Expert Team worked closely with RSUI and the Partner Hospitals to develop a telemedicine plan that reflected hospital input. To implement the plan, the team worked with Japanese ICU specialists to introduce a new model of telemedicine among healthcare professionals in the ICU through the pilot and the full-scale activity. The tele-conference itself was conducted as planned, with the exception of local holidays. The number of participants varied from week to week, but in addition to RSUI lecturers and presenters from Partner Hospitals, available healthcare professionals, both doctors and nurses, actively participated in the tele-conference. It is judged that Output 1 above has contributed significantly to the development of a new telemedicine model for ICUs in the country, as well as

to the strengthening of the capacity of healthcare professionals and the network between hospitals (see Output 2 for details).

Table 12 Indicators of Output 1 (RSUI)

Output 1				
D2D telemedicine (tele-consultation and tele-education) between the Counterpart Hospitals and the Partner Hospitals are planned and introduced, for enhancing inter-hospital collaboration in diagnosis and clinical case management support and knowledge sharing.				
Indicators	Pilot activity		Full scale activity	
	Doctor	Nurse	Doctor	Nurse
① Number of tele-conferences held	8	8	19	20
② Number of medical professionals involved in the D2D telemedicine				
RSUI	27	137	57	180
RSUD Kota Depok	36	58	54	113
RSUD Cibinong	7	15	87	67
③ Number of clinical cases diagnosed on D2D tele-consultation	7	8	19	20
④ Number of clinical cases discussed in tele-conference	7	8	19	20

Source: JICA Expert Team

2. Activities related to Output 1 (RSUH)

2-1. Activities related to Output 1 (OPH)

The following section reports activities and inputs implemented to facilitate Output 1, defined as: "To implement D2D telemedicine (tele-consultation and tele-education) based on discussions between the Counterpart Hospital and the Partner Hospitals". In assessing Output 1, three main indicators, along with five sub-indicators, were developed as shown below. These indicators were established based on discussions among the stakeholders.

Table 13 Indicators for Output 1 (OPH)

Output 1 To implement D2D telemedicine (tele-consultation and tele-education) between the Counterpart Hospitals and the Partner Hospitals, with the aim of enhancing inter-hospital collaboration in diagnosis, clinical case management support, and knowledge sharing	**Indicator 1: The number of clinical cases diagnosed through D2D telemedicine at the Partner Hospitals**
	Sub-Indicator 1-1: Number of cases for emergency surgical operation
	Sub-indicator 1-2: Number of patients needing to be referred.
	Sub-indicator 1-3: Number of patients needing remote consultation
	Sub-indicator 1-4: Number of patients followed-up at RSUD. (Tele-consultation is unnecessary)
	Sub-indicator 1-5: Number of patients not needing follow-up
	Indicator 2: The number of tele-conferences between RSUH and the Partner Hospitals using the data gathered by the device.
	Indicator 3: The number of medical and paramedical staff (Resident, GP, Nurses, and others) at the Partner Hospital(s) to use the telemedicine device

Source: JICA Expert Team

(1) Pilot Activity (OPH)

The schedule of activities for Output 1 during the pilot activity is shown in Figure 9 below.

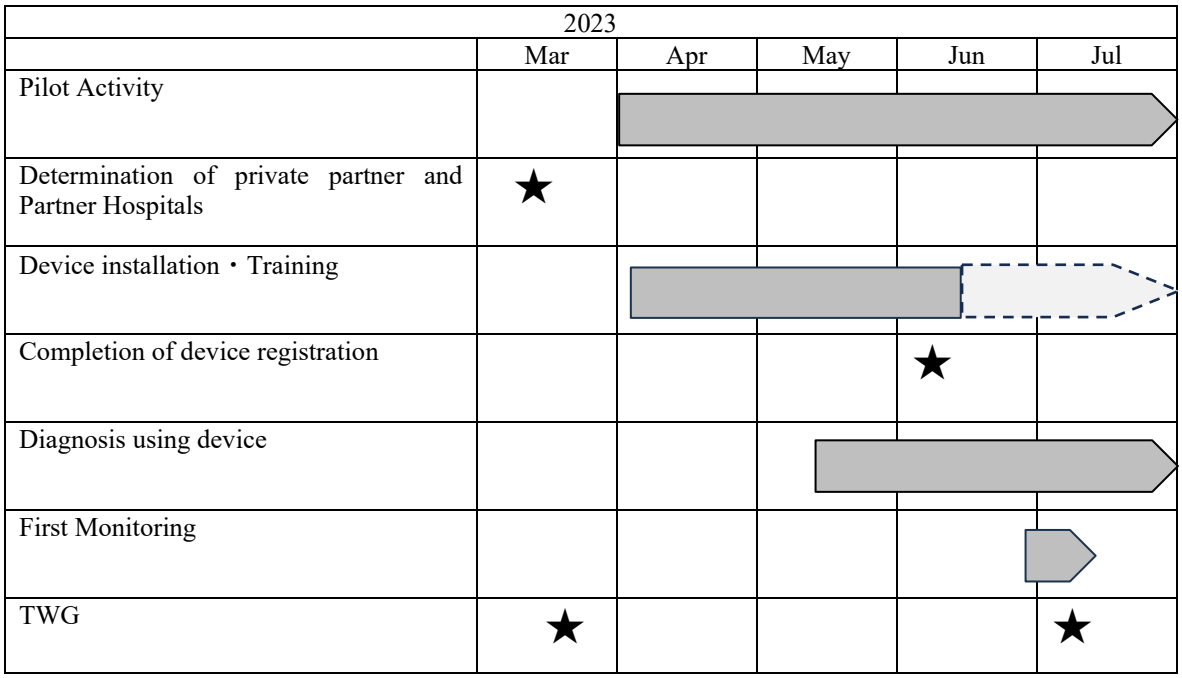


Figure 9 Schedule of the OPH pilot activity for Output 1

1) Overview of the Counterpart/ the Partner hospitals

The pilot activity was implemented by one Counterpart Hospital and two Partner Hospitals. RSUH, located in Makassar, served as the Counterpart Hospital and had been central to the D2D telemedicine of the project. At the Partner Hospitals, two medical facilities had been selected for the pilot activity following discussions held with RSUH. One was RSUD Bumi Panua, located in Gorontalo, and the other was RSUD KH Hayyung located on Selayar Island ("Selayar"). The overview of the Counterpart Hospital and the Partner Hospitals is shown below in Table 14, and their respective locations are illustrated in Figure 10.

Table 14 List of the Counterpart Hospital and the Partner Hospitals

The Counterpart Hospital: Hasanuddin University Hospital (RSUH)
RSUH, located in Makassar, South Sulawesi, is a Class B teaching hospital affiliated with Hasanuddin University. It was built near Wahidin Sudirofsod Hospital ("RSWS"), a public Class A hospital that serves the entirety of East Indonesia and is affiliated with the Academic Health Center (AHS) (detailed in 5-2 (1)). RSUH has 200 inpatient beds. It offers a wide range of services, including surgery, internal medicine, OB, pediatrics, OPH, otolaryngology, dermatology, cardiology, urology, neurology, dental and oral medicine, respiratory medicine, neurosurgery, orthopedics, psychiatry, anesthesiology, radiology, clinical pathology, anatomic pathology, forensic medicine, microbiology, and medical rehabilitation. It has a staff of approximately 550 medical personnel and 250 non-medical personnel. RSUH, as a Class B teaching hospital covering Eastern Indonesia, dispatches residents to provincial hospitals throughout Eastern Indonesia, including South Sulawesi, and provides technical guidance to these residents. Regarding the reception of patients from all of South Sulawesi and neighboring provinces, RSWS has primarily managed this responsibility. **<Overview of OPH Department>** The OPH department at RSUH furnishes both inpatient and outpatient services and encompasses 21 beds. Generally, the department is well-appointed with ophthalmic equipment, including slit lamps, ophthalmoscopes, autorefractors/refractometers, and fundus cameras. It employs 22 ophthalmologists, some of whom also hold positions as ophthalmologists at other hospitals and clinics. **<Overview of Resident System>** The RSUH training system has established a post-graduate education system in both ophthalmology and obstetrics. Around 10-20 residents from Hasanuddin University's Faculty of Medicine before qualifying as specialists are assigned to training. Residents are assigned to Class C hospitals for a period of two months to undertake the training to become a medical specialist, as well as training at RSUH, RSWS and other centers in Makassar. Residents are not assigned by the RSUH but by the Faculty of Medicine of Hasanuddin University; their assignment is decided by the education officers in each department.
The Partner Hospital 1: RSUD Bumi Panua
<Overview> RSUD Bumi Panua is the only Class C hospital in Pohwato located in Marisa City. It has 165 beds and employs approximately 150 medical personnel. There are seven GP and 90 nurses working in shifts. RSUD Bumi Panua accepts patients referred by 16 PKM in the Pohuato area and by clinics. The number of ophthalmic patients referred from the 16 PKMs and clinics was 223 in Dec 2022 and 143 in Jan 2023. The furthest patients referred were from areas 104 km from the hospital (2 hr 30 mins by car). For severe cases, patients were sent to RSUD Prof. Dr. Aloei Saboe in Gorontalo, about a 3-hour drive away (a Class B hospital). Patients with more serious symptoms were referred to Manado Hospital, a Class A hospital, about a 12-hour drive away. From Jan to Mar 2023, 33 patients were referred to Gorontalo or Manado Hospital. Patient referrals were made using communication tools such as the referral system operated by the MoH ('SISRUTE'), WhatsApp and by telephone. **<Overview of OPH Department>** The majority of ophthalmology cases in Pohuwat district are cataract cases, with other cases including myopia, hyperopia and infectious diseases. There are no ophthalmology specialists assigned to RSUD Bumi Panua, and ophthalmology care is provided by residents assigned from RSUH, who rotate every two months. Due to the limited diagnostic skills of the residents, not all cases can be treated, and serious cases are referred to Class B or Class A hospitals (see above for details).

The Partner Hospital 2: RSUD KH Hayyung
<Overview> RSUD KH Hayyung is the only Class C hospital in Selayar province, covering the entire territory of Selayar. There are at least 130 islands in Selayar and 14 PKM (five on the main island and nine on other islands). Due to Selayar's geographical location, the key transportation for patient referrals is by ferry; RSUD KH Hayyung has a speedboat that can be used for patient transport, but it is not always available due to fuel budget limitations. The main referrals destinations are RSWS, or RSUDs in different district RSUDs (RSUD H A Sulthan Dg Radja in Bulukumba, RSUD Prof. Dr. H. Anwar Makkatutu in Bantaeng). The hospital, which admits nearly 3,000 inpatients annually, has 134 beds and a staff of 575, comprising 205 civil servants, 20 probationary civil servants, and 350 contractors. Among them are 135 medical personnel, comprising nine emergency department doctors, two dentists, an internist, a pediatrician, two surgeons, an anesthesiologist, and 119 nurses. Communication tools such as SISRUTE, WhatsApp and telephones are used for patient referrals; the EMR has already installed KHANZA. **<Overview of OPH Department>** At RSUD Hayyung, more than 200 patients (219 in Jan 2023 and 212 in Feb 2023) received ophthalmic treatment using ophthalmic equipment every month. Most of the cases were cataract cases. No ophthalmologists were assigned to RSUD KH Hayyung, and ophthalmology care was provided by the residents assigned from RSUH. Due to the limited diagnostic skills of the residents, not all cases could be treated. Critical cases were referred to Class A hospitals on the main island of Sulawesi, Class B hospitals including RSUH, or private hospitals. In Jan and Feb 2023, the number of patients referred to higher-level health facilities was 8 and 10 respectively, three of whom were referred to RSUH. In addition to the resident, two nurses were assigned to the ophthalmology department. Although the ophthalmology department had a slit-lamp, it was not connected to a screen and was not equipped with a documentation function. Current images from slit lamps depend on the quality of smartphone cameras, which sometimes have lower resolution than slit lamp cameras. Other instruments used in ophthalmology included refraction, keratometry, and biometry.

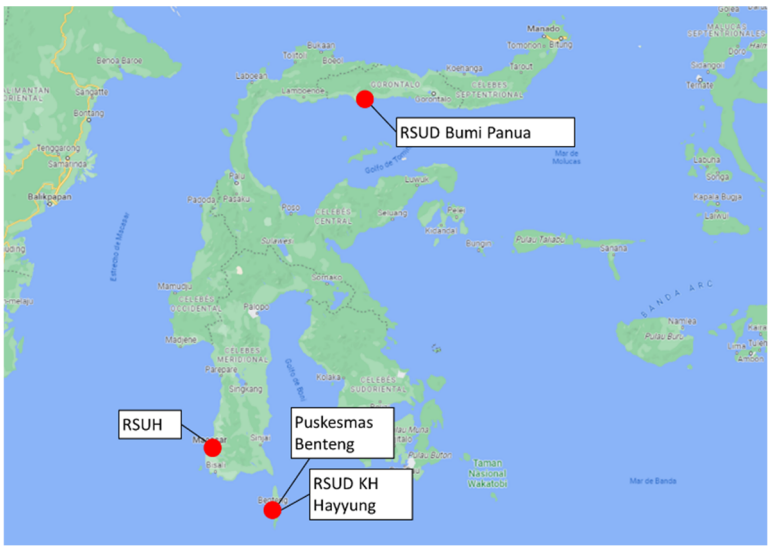


Figure 10 Location of RSUH and the Partner Hospitals

Source: Prepared by JICA Expert Team based on Google Map

2) Pilot Activity Plan

The telemedicine model for the pilot activity in the OPH component was established as shown in Figure 11 below. Specifically, the D2D telemedicine device has interconnected ophthalmologists belonging to RSUH, residents belonging to RSUD, ophthalmic nurses and GPs to facilitate teleconsultation. The pilot activity was undertaken with the aim of improving the quality of ophthalmic care in the Partner Hospitals.

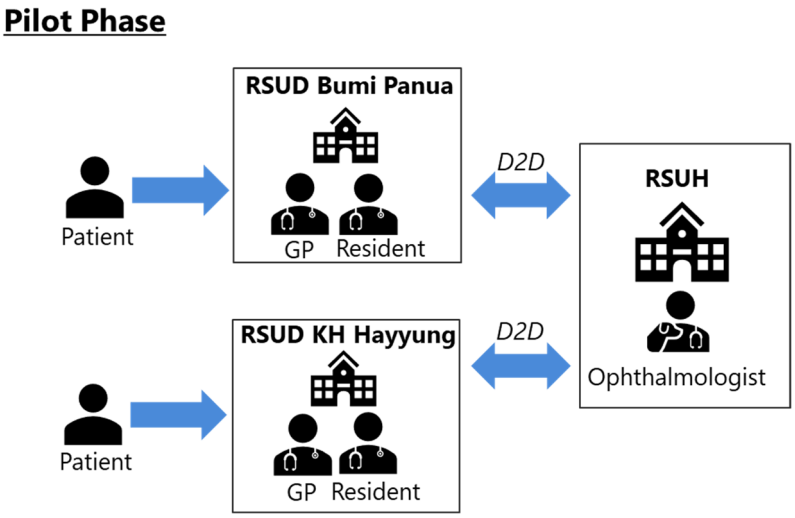


Figure 11 Telemedicine Model in the Pilot Activity (RSUH OPH)

Source: JICA Expert Team

3) Selection of the Private Partner

MITAS Medical, Inc. of Japan was selected from two candidates by Qualified Based Selection in Mar 2023.

The selection criteria were based on four points: experience and capability of the firm, devices provided, implementation system, and monitoring evaluation. Technical proposals were submitted, and presentations were made, and the selection was conducted based on the evaluation by RSUH, JICA (headquarters and Indonesian office), and the JICA Expert Team.

MITAS Medical offers the MS1. This device condenses the core function of a slit-lamp microscope into a mobile-size device that can be connected to a smartphone[1]. With this device, even those who have no experience in ophthalmology can easily take pictures or videos of patient eyes. MS1 has been introduced in remote areas and islands in Japan and in emerging countries such as Bangladesh and Mongolia. Figure 12 shows the details of the MS1.

The device was registered as medical device by the Indonesian Government in Jun 2023 during the project period. Subsequently, it was transported from Japan, calibrated in Jakarta, and delivered to the Partner Hospitals.

[1] From MITAS Medical web site: https://www.mitasmedical.com/en/pages/services.

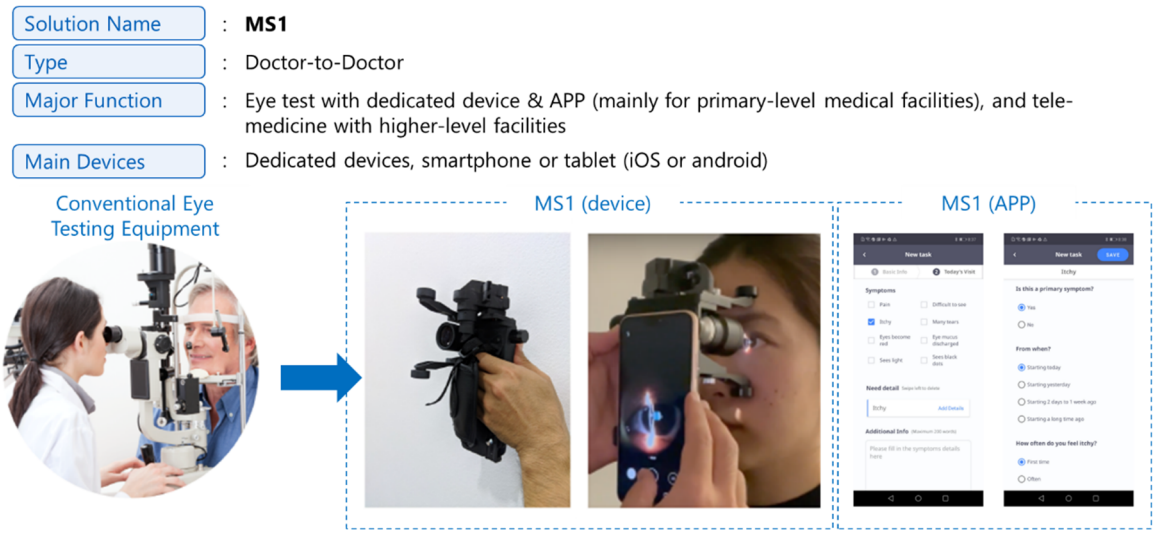


Figure 12 Outline of MITAS Medical's diagnostic device (MS1)

Source: Prepared by the JICA Expert Team based on materials provided by MITAS Medical

Data captured by the MS1 has been shared through iYobow, a D2D platform provided by MITAS Medical. When a case is uploaded by the Partner Hospital, a notification is sent to the ophthalmologist at RSUH, who diagnoses the case and provides feedback on the results to the Partner Hospital.

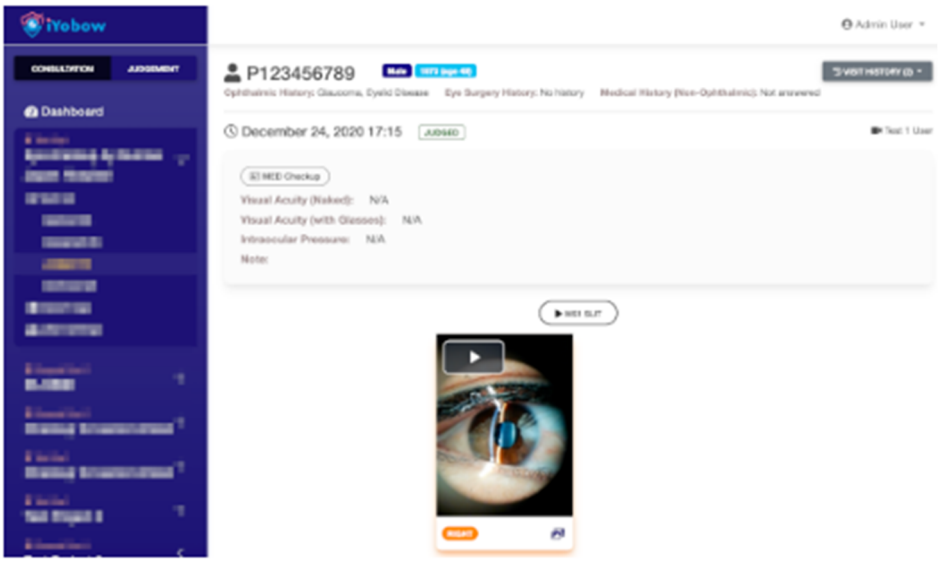


Figure 13 Image of OPH Checkup System(iYobow)

Source: Prepared by JICA Expert Team based on materials provided by MITAS Medical

4) Implementation of the Pilot Activity

With the start of the pilot activities in Apr 2023, MITAS Medical and the JICA Expert Team visited RSUH and the Partner Hospitals, and user training was provided by MITAS Medical to the target participants.

User Training at RSUD KH Hayyung

User Training at RSUD Bumi Panua

SOP were also developed during the visit, as shown in Figure 14.

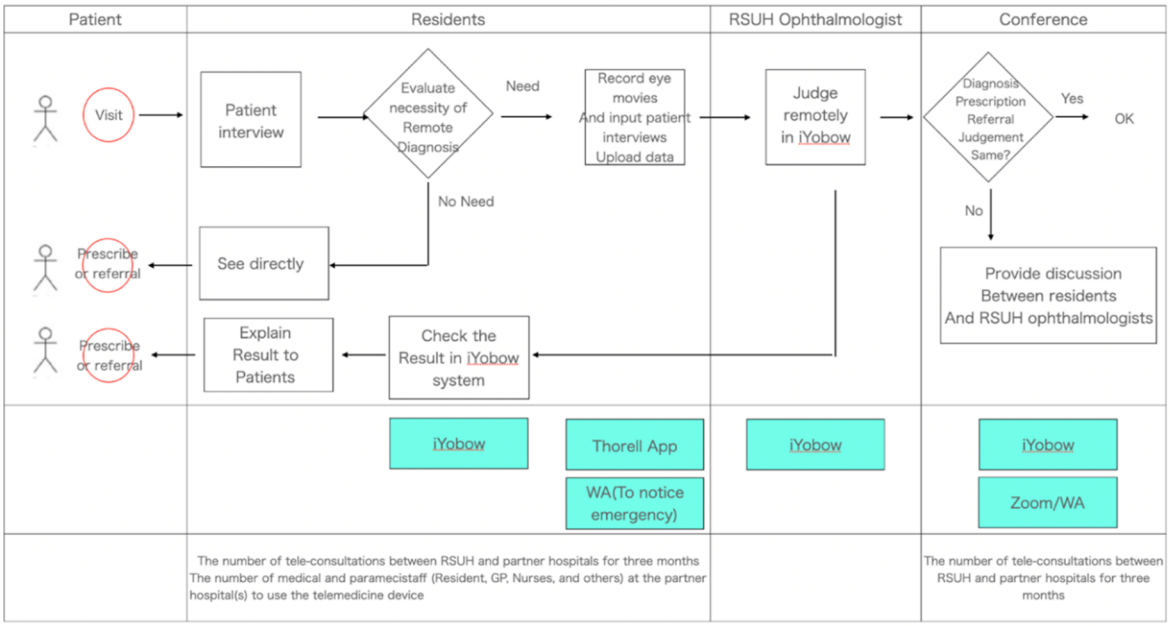


Figure 14 SOP Flow for MS1

Source: JICA Expert Team

MITAS Medical's MS1 was not registered as a medical device in Indonesia until Jun 8, 2023. Prior to the MS1 being officially registered, an agreement had been reached between JICA and RSUH for the use of the device, provided that informed consent was given to the patient and that only residents are permitted to utilize MS1 for diagnosis.

During the pilot activity, a total of 28 tele-consultations were conducted using the MS1, including three patients for trauma, two patients for corneal infection/follow-up, one patient for corneal foreign body, five patients for surgical indication, 16 patients for postoperative follow-up (all cataract surgery cases), and one patient unknown.

Table 15 OPH consultation results during the pilot activity (Apr-Jul 2023)

	RSUD KH Hayyung	RSUD Bumi Panua	Total
Number of OPH patient	929	258	1187
Number of tele-consultations with RSUH (Any tele-consultation regardless using the MS1 or not)	23	10	33
Number of teleconsultations using the MS1	18	10	28

Source: JICA Expert Team

(2) Scaling-up activity (OPH)

The schedule of activities related to Output 1 in the ophthalmology scaling-up activity is shown in Figure 15 below.

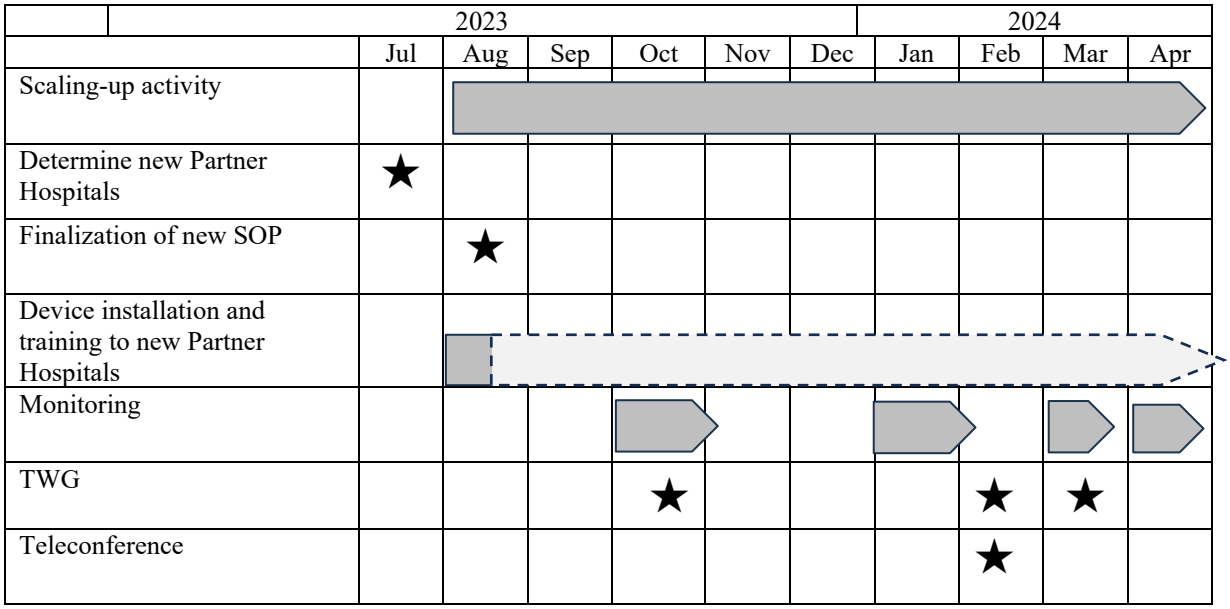


Figure 15 Schedule of the OPH scaling-up activity for Output 1

1) Overview of the Newly selected Partner Hospitals

In accordance with the scaling-up activity, four medical facilities were additionally selected as Partner Hospitals, as a result of discussions with the Counterpart Hospital and the District Health Office (DHO). In addition to the RSUD Bumi Panua, PKM Lemito and PKM Paguat were selected. From Selayar, PKM Benteng and PKM Bontomatene were selected as Partner Hospitals. The selection of the Partner Hospitals and their number was determined by four criteria: (1) staffing feasibility, (2) accessibility of location for the JICA consultant team, (3) availability of telecommunication networks and (4) medical requirements. In addition, PKM was responsible for carrying out outreach activities in the health sector in the township (Desa) of Posyandu[2].

The overview of the newly selected the Partner Hospitals (PKM) is as follows in Table 16.

Table 16 List of newly selected Partner Hospitals

New Partner Hospital 1: PKM Lemito
<Overview> PKM Lemito is around 60 kilometers, or 1.5 hours, away from RSUD Bumi Panua. It is home to about 8,000 people, including 8 Posyandu. The majority of OPH-related cases were found to be conjunctivitis, based on preliminary data collected from the Person in Charge (PIC) across three months (May–Jul 2023). In May, 36 patients from the field of OPH were referred to upper-level medical facilities; in June, 34 patients, and 32 patients in July. In PKM Lemito, there were 57 employees at PKM Lemito, including 12 midwives, 20 nurses, and 2 general practitioners. Every patient was insured by the BPJS.

[2] Posynadu is outreach activities by PKM at the village level. Activities are mainly on maternal and child health, but with recent changes in the disease structure, activities on non-communicable disease control and other health issues are also being implemented. https://surfaid.org/surfaid/posts/the-indonesian-concept-of-posyandu-and-its-kaders.

New Partner Hospital 2: PKM Paguat
<Overview> The distance between PKM Paguat and RSUD Bumi Panua is 16 kilometers, or 25 minutes' drive. The PKM covers approximately 15,200 persons, including 11 Posyandu and 11 elderly Posyandu. Based on preliminary data collected from the PIC, it was discovered that cataracts, low vision, and pterygium constituted the majority of OPH cases in the PKM. An expected six people experienced cataract surgery in May 2023, four patients experienced impaired vision in Jun 2023, and four patients experienced pterygium. The number of OPH patient referred to upper-level health care facilities was 36 May, 34 in Jun and 32 in Jul. In PKM Paguat, there are 68 staff in total including 2 GPs and 20 nurses. All patients are covered by public insurance, specifically the BPJS.
New Partner Hospital 3: PKM Benteng
<Overview> PKM Benteng is located approximately 2.5 kilometers or a 5-minute drive from RSUD KH Hayyung. The PKM covers approximately 18,900 population, including 27 Posyandu along with 16 elderly Posyandu. According to preliminary data gathered from the PIC for the period of Jan to Jul 2023, the prevalent OPH cases in this area were primarily cataracts and conjunctivitis. It was estimated that 78 individuals experienced conjunctivitis, while 37 patients were diagnosed with cataracts during this period. In May, there were 221 OPH patients referred to upper-level healthcare facilities, followed by 185 in Jun and 205 in Jul. PKM Benteng is staffed by a total of 118 medical professionals, including 4 GPs, 34 nurses, 43 midwives, four pharmacists, and 33 other healthcare workers. All patients were covered by public insurance, specifically the BPJS.
New Partner Hospital 4: PKM Bontomatene
<Overview> PKM Bontomatene is located approximately 25 kilometers or a 40-minute drive from RSUD KH Hayyung, serving a population of around 7,200 with 21 Posyandu. Based on preliminary information obtained from the PIC over a three-month period (May-Jul 2023), the predominant OPH cases in this area include suspected cataracts, conjunctivitis, and suspected refractive error. 83 patients in May, 76 in Jun, and 76 in Jul were referred from OPH to upper-level healthcare facilities. The total staff at PKM Bontomatene comprises of 90 members, including a GP, a dentist, three internship doctors, 24 nurses, 26 midwives, and 36 other healthcare personnel. All patients are covered by public insurance, specifically the BPJS.

Source: JICA Expert Team

2) Scaling-up Activity Plan

As depicted in Figure 16, the expansion model for the scaling-up activity was established to include two additional PKM under RSUD Bumi Panua and RSUD KH Hayyung. During discussions with RSUH, it was noted that one of the challenges faced by RSUH and RSUD is the high number of unnecessary referrals. Within the public health insurance system in Indonesia, patients, pregnant women and others must first be examined at PKM and cannot directly receive consultations and treatment at a upper-level hospital such as Class C. PKM has functioned as the primary care facility, serving as the initial point for accessing medical services; thus, patients who receive publicly insured treatment in RSUD are always referred patients who have been examined in PKM. Therefore, the model for the scaling-up activity is based on the hypothesis that the use of D2D telemedicine devices could reduce unnecessary referrals from PKMs to RSUD and from RSUD to higher-level hospitals, thereby facilitating adequate medical services to patients in need.

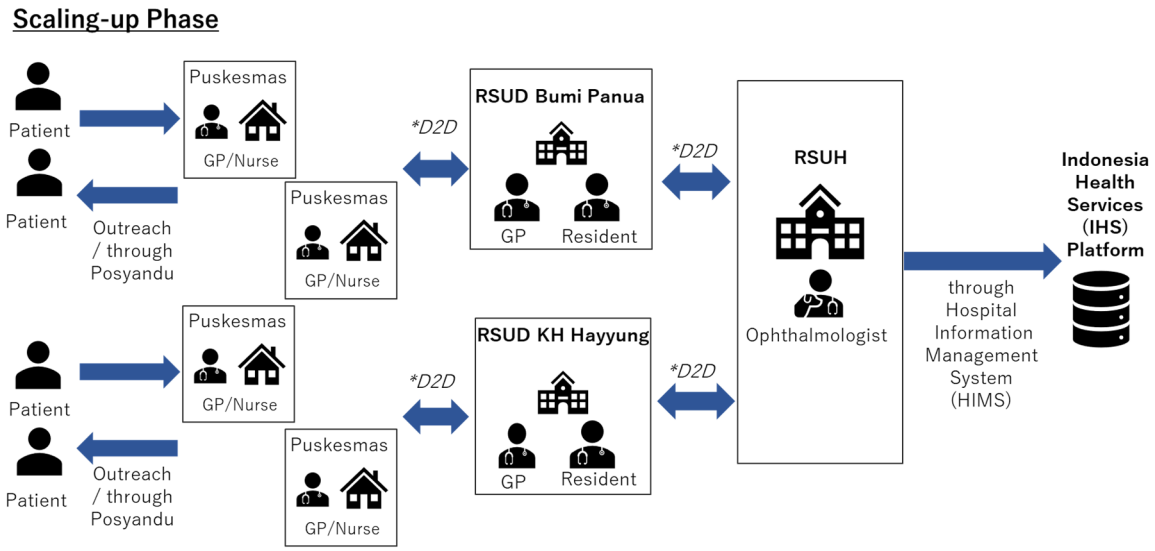


Figure 16 Scaling-up activity model of OPH

Source: JICA Expert Team

In alignment with the expansion of the scaling-up activity, a new SOP has been established, following discussions among RSUH specialists, MITAS Medical, and the JICA Expert Team. , Clinical cases from RSUD were to be assessed by RSUH specialists and remotely consulted upon, as necessary. With the scaling-up activity, cases from PKM were to be assessed by senior residents[3] at RSUH, as outlined in the new SOP (Figure 17). Additionally, this new SOP was not only intended to streamline the flow of D2D telemedicine but also to increase the number of clinical cases using MS1, which was low during pilot activities. In addition, a new local coordinator was appointed to each Selayar and Gorontalo. This measure was taken to address the issue associated with low-level clinical cases, which could be the result from insufficient support during the pilot activity.

[3] Pre-specialist doctors who have completed their residency training at a regional hospital and are engaged in work at the RSUH.

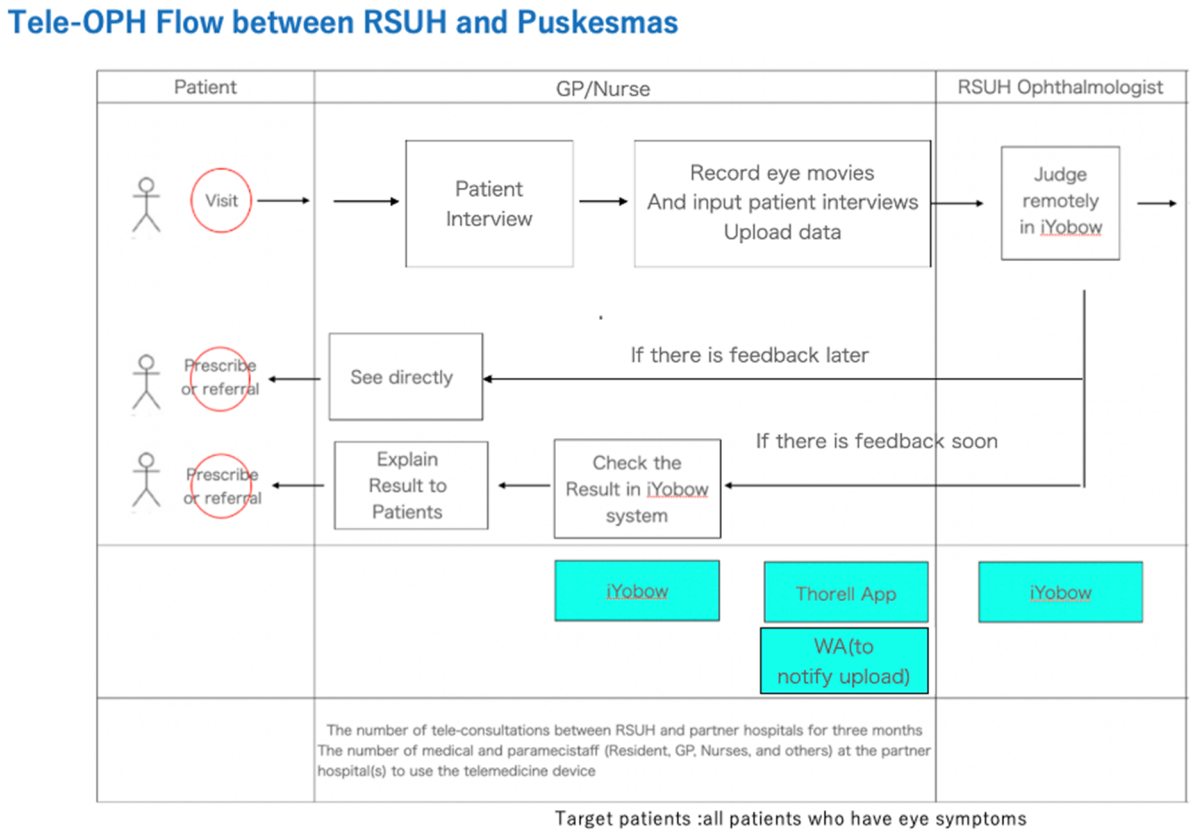


Figure 17 New SOP flow between RSUH and PKM

Source: JICA Expert Team

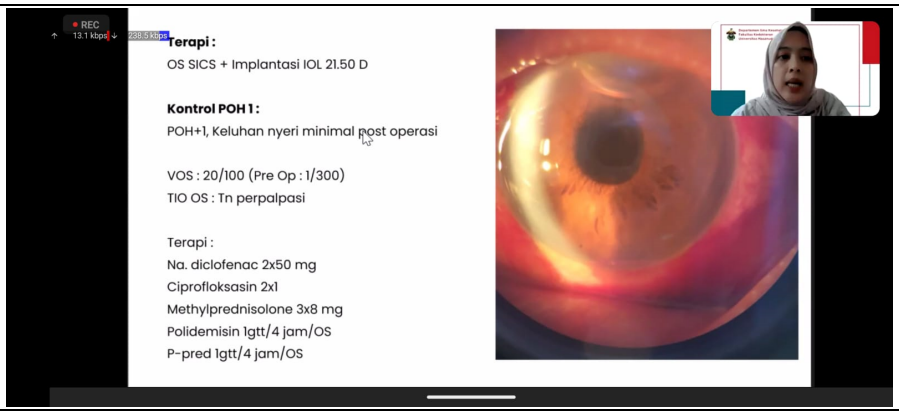
3) Implementation of the Scaling-up Activity

In accordance with the aforementioned activity planning, the scaling-up activity commenced in Aug 2023 with the introduction of the MS1 and training in the four PKM (PKM Lemito, Paguat, Benteng, and Bontomatene) by MITAS Medical. Additionally, similar to the activities associated with Output 1 during the pilot activity, the JICA Expert Team was regularly dispatched to the field to follow up on project operations.

Introducing the MS1 into additional PKM Aug 2023

Furthermore, a teleconference was also held in February 2024 to share clinical knowledge through the D2D telemedicine model and to strengthen cooperation between the medical facilities. Approximately 50 participants from RSUH, RSUD, Puskesmas (PKM) and other institutions attended this teleconference.

During the tele-conference, various case studies utilized by MS1 were introduced and discussed. Additionally, residents in RSUD KH Hayyung and RSUD Bumi Panua, as well as panelists (OPH specialists) in RSUH confirmed the efficacy of MS-1 as a tele-consultation platform. For instance, MS1 facilitates more efficient teleconsultation and referrals and aids in explaining eye diseases to patients. Moreover, the project has resulted in a decrease in unnecessary referrals, thereby reducing the costs incurred by patients. RSUH hopes the project can expand to other RSUH resident educational areas such as Morowali and other districts. The panelist said that telemedicine helped cut the referral process of patients in Selayar where the residents and doctors may decide which patient should be referred to upper-level healthcare facilities or be treated in Selayar. The teleconferences thus provided an opportunity to strengthen inter-hospital collaboration in diagnosis, clinical case management support and knowledge sharing.



Tele-conference held on 10 Feb 2024

(3) Evaluation of Activities Related to Output 1 (OPH)

As a result of the activities related to Output 1, the indicators for Output 1 (refer to Table 17) remained steady.

The total number of examinations by MS1 amounted to 430 cases throughout the entirety of the project, although there was a significant decline in Feb 2024. The breakdown by the monitoring period is as follow: 30 cases during the pilot period from Apr to Jul, 143 cases from Aug to Oct, followed by 208 cases from Nov to Jan and 49 cases in Feb and Mar. This achievement could be attributed to several inputs such as the registration of the MS1 as a medical device in Indonesia, modifications to SOP, and the assignment of senior residents and additional local coordinators.

However, as detailed below, the volume of MS1 usage decreased significantly in Feb 2024. This decrease could be attributed to the following factors:

1. In the case of PKM Paguat, there was a technical problem with the device from Jan to the beginning of Mar 2024, rendering MS1 unusable during that period (The JICA Expert Team and the Private Company addressed and resolved the issue).
2. Variation in the frequency of MS1 usage is associated with the frequency of implementing Posyandu. Additionally, during the February-March period, there were instances when there were no suitable locations for MS1 at Posyandu sites.
3. Some patients did not necessarily need to be treated by MS1 due to their medical condition, e.g. obvious trauma.
4. Some patients did not want to wait until a judgment was remotely made by the remote RSUH senior resident and often refused to be treated by MS1.

Table 17 Result of Output 1（RSUH:OPH）

<Output1>		
D2D telemedicine (tele-conference and tele-consultation) between the Counterpart Hospitals and the Partner Hospitals are planned and introduced, for enhancing inter-hospital collaboration in diagnosis and clinical case management support and knowledge sharing.		
Monitoring Indicators		**Result**
1. Number of clinical cases diagnosed through D2D telemedicine at the Partner Hospitals		**Pilot Activity** ・ Apr-Jul: 30 cases **Scaling up Activity** ・ Aug-Oct: 143 cases (RSUD: 60, PKM: 83) *6 cases could not be judged due to poor video quality. ・ Nov-Jan: 208 cases (RSUD: 64, PKM: 144) ・ Feb-Mar: 49 cases (RSUD: 15, PKM: 34)
1-1	Number of cases for emergency surgical operation (operation in RSUD) <labeled as “Emergency”>	**Pilot Activity** ・ Apr-Jul: 6 cases **Scaling up Activity** ・ Aug-Oct: 7 cases (RSUD: 7) ・ Nov-Jan: 12 cases (RSUD: 9, PKM: 3) ・ Feb-Mar: 10 cases (RSUD: 6, PKM: 4)

1-2	Number of patients needing to be referred to upper-level hospitals, not only RSUH (necessary referral) <labeled as "Refer">	**Pilot Activity** ・ Apr-Jul: 6 cases **Scaling up Activity** ・ Aug-Oct: 7 cases (RSUD: 7) ・ Nov-Jan: 12 cases (RSUD: 9, PKM: 3) ・ Feb-: 7 cases (RSUD: 5, PKM: 2)
1-3	Number of patients needing remote consultation <labeled as "Follow and Consultation">	**Pilot Activity** ・ Apr-Jul: 7 cases **Scaling up Activity** ・ Aug-Oct: 35 cases (RSUD: 12, PKM: 23) ・ Nov-Jan: 28 cases (RSUD: 10, PKM 18) ・ Feb-: 2 cases (PKM: 2)
1-4	Number of patients followed-up at RSUD and PKM (remote-consultation is unnecessary) <labeled as "Follow">	**Pilot Activity** ・ Apr-Jul: 14 cases **Scaling up Activity** ・ Aug-Oct: 69 cases (RSUD: 31, PKM: 38) ・ Nov-Jan: 60 cases (RSUD: 31, PKM: 29) ・ Feb-Mar: 12 cases (RSUD: 9, PKM: 3)
1-5	Number of patients not needing follow-up <labeled as "End">	**Pilot Activity** ・ Apr-Jul: 1 case **Scaling up Activity** ・ Aug-Oct: 26 cases (RSUD: 4, PKM: 22) ・ Nov-Jan: 101 cases (RSUD: 8, PKM: 93) ・ Feb-: 8 cases (PKM: 8)
2	Number of tele-conferences between RSUH and the Partner Hospitals using the data gathered by the device.	1 (A teleconference was organized on Feb 10, 2024)
3	Number of medical and paramedical staff (Resident, GP, Nurses, and others) at the Partner Hospital(s) to use the telemedicine device	**Pilot Activity** ・ Apr-Jul: 5 residents **Scaling up Activity** ・ Aug-Oct: 16 (RSUD: 4 residents PKM:12 medical staff) ・ Nov-Jan: 16 (RSUD: 4 residents, PKM: 12 medical staff) ・ Feb-Mar: 15 ・ (RSUD: 3 residents PKM: 12 medical staff)

Source: JICA Expert Team

2-2. Activities related to Output 1 (OB)

The following section reports activities and inputs implemented to facilitate the Output 1, defined as: "To implement D2D telemedicine (tele-consultation and tele-education) based on discussions between the Counterpart Hospital and the Partner Hospitals". In assessing Output 1, three indicators had been developed as outlined below. The development of the indicators resulted from discussions between the Counterpart Hospital and the Partner Hospitals.

Table 18 Indicators of Output 1

Output 1 To implement D2D telemedicine (tele-consultation and tele-education) between the Counterpart Hospitals and the Partner Hospitals, with the aim of enhancing inter-hospital collaboration in diagnosis, clinical case management support, and knowledge sharing.	**Indicator 1** Number of tele-conferences between RSUH and the Partner Hospitals
	Indicator 2 Number of clinical cases diagnosed through D2D telemedicine at the Partner Hospitals
	Indicator 3 Number of medical staff (resident, GP, midwife, and others) to use the telemedicine device

(1) Pilot Activity (OB)

The schedule of activities for Output 1 during pilot activity is shown in Figure 18 below.

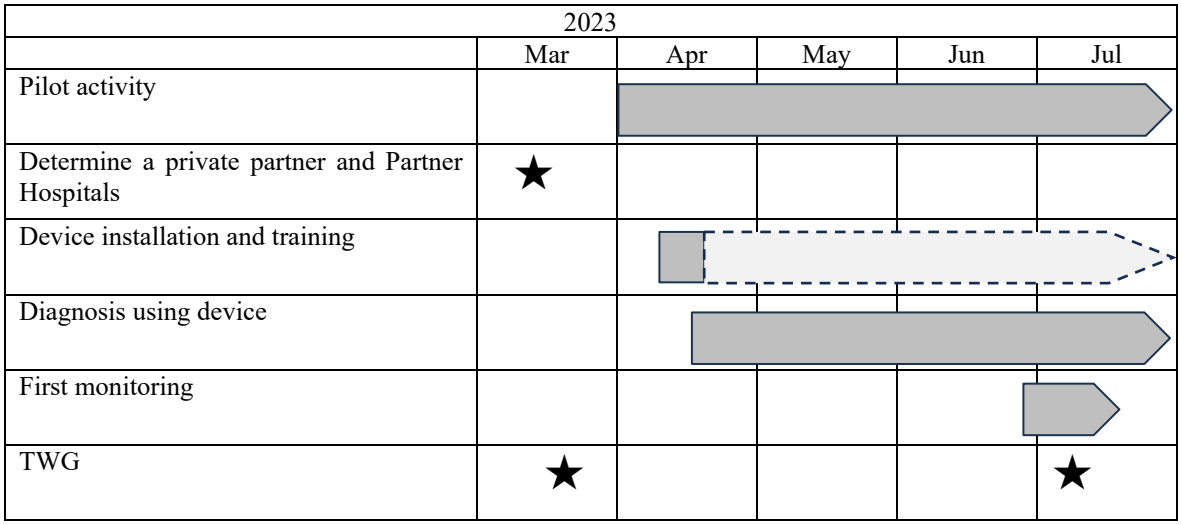


Figure 18 Schedule of the OB pilot activity for output 1.

1) Overview of the Counterpart / the Partner Hospital

The pilot activity was implemented by three medical facilities. RSUH, situated in Makassar, has served as the Counterpart Hospital and played a central role in the D2D telemedicine of the project. From discussions with RSUH, two medical facilities, RSUD KH Hayyung and PKM Benteng, were selected as Partner Hospitals.

The overview of the Counterpart and the Partner hospitals is as follows in Table 19.

Table 19 List of the Counterpart/Partner Hospital

Counterpart Hospital: Hasanuddin University Hospital (RSUH)

<Overview>

RSUH, located in Makassar, South Sulawesi, is a Class B teaching hospital affiliated with Hasanuddin University. It was built near RSWS, a public Class A hospital that serves the entirety of East Indonesia and is affiliated with the AHS.

RSUH has 200 inpatient beds. It offers a wide range of services, including surgery, internal medicine, OB, pediatrics, OPH, otolaryngology, dermatology, cardiology, urology, neurology, dental and oral medicine, respiratory medicine, neurosurgery, orthopedics, psychiatry, anesthesiology, radiology, clinical pathology, anatomic pathology, forensic medicine, microbiology, and medical rehabilitation. It has a staff of approximately 550 medical personnel and 250 non-medical personnel.

RSUH, as a Class B teaching hospital covering Eastern Indonesia, dispatches residents to provincial hospitals throughout Eastern Indonesia, including South Sulawesi, and provides technical guidance to these residents. Regarding the reception of patients from all of South Sulawesi and neighboring provinces, RSWS has primarily managed this responsibility.

<Overview OB Department>

OB department at RSUH provides inpatient, outpatient, and emergency services, with eight emergency beds, six hospital wards, four NICU beds, and two delivery rooms. The OB department is very well equipped, with ultrasound tomography ("USG"), bi USG, fetal oppler, obstetric beds, surgical instruments, vacuum extractors, etc. However, the department of OB and Gynecology relies on the neighboring RSWS for most of its obstetric care and treatment functions. Two obstetricians are also working at the RSWS. An obstetrician is the former director of RSUH and is also the obstetrician at RSWS, thus creating a division of roles between RSUH as a teaching hospital and RSWS as a top referral hospital.

<Overview of Resident System>

RSUH OB has a post-graduate education system based on a resident system. Each department has 10 to 20 residents. These residents are assigned to Class C hospitals for a two-month term to conduct training to become specialists, in addition to training at RSUH, RSWS, and other facilities in Makassar. The assignment of these residents is not handled by RSUH, but by the Faculty of Medicine of Hasanuddin University, and the assignment is determined by the educators in each department. Therefore, the RSWS is responsible for receiving obstetric patients from all of South Sulawesi and neighboring provinces, with minimal number of patient referrals to the RSUH.

Partner Hospital 1: RSUD KH Hayyung

<Overview>

RSUD KH Hayyung is the sole Class C hospital covering the entire territory of Selayar, which comprises of at least 130 islands and has 14 PKM (5 on the main island and 9 on other islands). Due to Selayar's geographical location, the key transportation for patient referrals is by ferry. RSUD KH Hayyung has a speedboat that can be used for patient transport, but it is not always available due to fuel budget limitations.

The main referrals destinations are RSWS, or RSUDs in different district RSUDs (RSUD H A Sulthan Dg Radja in Bulukumba, RSUD Prof. Dr. H. Anwar Makkatutu in Bantaeng).

The hospital, which admits nearly 3,000 inpatients annually, has 134 beds and 575 medical personnel, consisting of 205 civil servants, 20 probationary civil servants, and 350 contractors. Among them are 135 medical personnel, comprised of nine emergency department doctors, two dentists, an internist, a pediatrician, two surgeons, an anesthesiologist, and 119 nurses.

Patient referrals are made using communication tools such as the referral system operated by the MoH ('SISRUTE'), WhatsApp and telephone.

<Overview of OB Department>

Obstetric cases are handled by an obstetrician assigned in Nov 2023 and RSUH residents, with support from 64 midwives. As of June 2023, RSUD KH Hayyung has no obstetrician, but an obstetrician was assigned in Nov 2023. Approximately 20 inpatient beds are prepared for obstetric patients. There were 1023 obstetric patients who visited RSUD KH Hayyung from Jan to Mar 2023. This includes 696 visits in ante natal care (ANC), with more than 200 visits each month. In postpartum care, 80-100 patients were admitted each month.

The hospital also performs C-sections, but complex cases are referred to RSWS or other private hospitals; from Jan to Mar 2023, seven patients were referred to RSWS in Makassar because of suspected placenta accreta. In addition, the obstetrician and residents at RSUD KH Hayyung have determined the need to accept patients referred from PKM through a WhatsApp group with midwives at PKM.

Obstetricians also consult with midwives in PKM via WhatsApp groups. Before referring a patient, the

midwife sends their observations to RSUD, where the resident determines treatment and the need for patient referral.
Partner Hospital 2: PKM Benteng
< Overview> PKM Benteng is located in Benteng City, the capital of Selayar Province, a short 5-minute by car drive from RSUD KH Hayyung, and has 27 Posyandu, covering a population of approximately 19,000 people. A total of 118 health professionals work at Puskesmas Benteng, including four GPs, 34 nurses, 43 midwives, four pharmacists and 33 other health professionals. Under the BPJS, patients, pregnant and postpartum mothers, and other patient can receive medical care at PKM first, and if necessary, at upper-level hospitals such as RSUD KH Hayyung, a Class C hospital. This means that patients who receive publicly insured treatment at RSUD are always referred from PKM.

Source: JICA Expert Team

2) Pilot Activity Plan

The telemedicine model for the pilot activity in OB is shown in Figure 19. Midwives at PKM received D2D consultation from RSUD KH Hayyung, a Class C hospital. In addition, residents and midwives at RSUD KH Hayyung received D2D consultations with obstetricians at the Counterpart Hospital, RSUH. The aim of this collaboration is to establish an efficient referral system through rapid risk assessment of pregnant women.

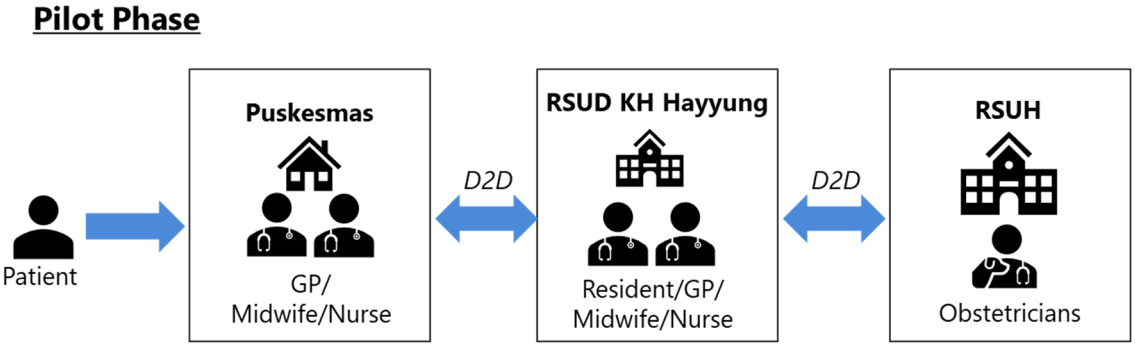


Figure 19 Telemedicine Model in the Pilot activity (RSUH OB)

Source: JICA Expert Team

3) Selection of the Private Partner

Zetta Telecetege Internasional ("Sehati"), a local Indonesian company, was selected from two candidates by QBS method in Mar 2023. Sehati offers TeleCTG, a device that enables D2D remote consultation and remote monitoring of pregnant women. This device has already been registered as a medical device in Indonesia and is confirmed to be clinically proven equipment.

Fetal cardiotocogram ("CTG") is the most common and non-invasive method for monitoring fetal health during pregnancy and the perinatal period. With traditional CTG, each patient must be seen locally by an obstetrician since a telemonitoring platform is not available and receive a diagnosis. The obstetrician can review the test results through the digital platform and provide feedback to the primary care facility. The platform will enable early detection of maternal and fetal abnormalities and planned referrals to upper-level hospitals. More information on TeleCTG is shown in Figure 20.

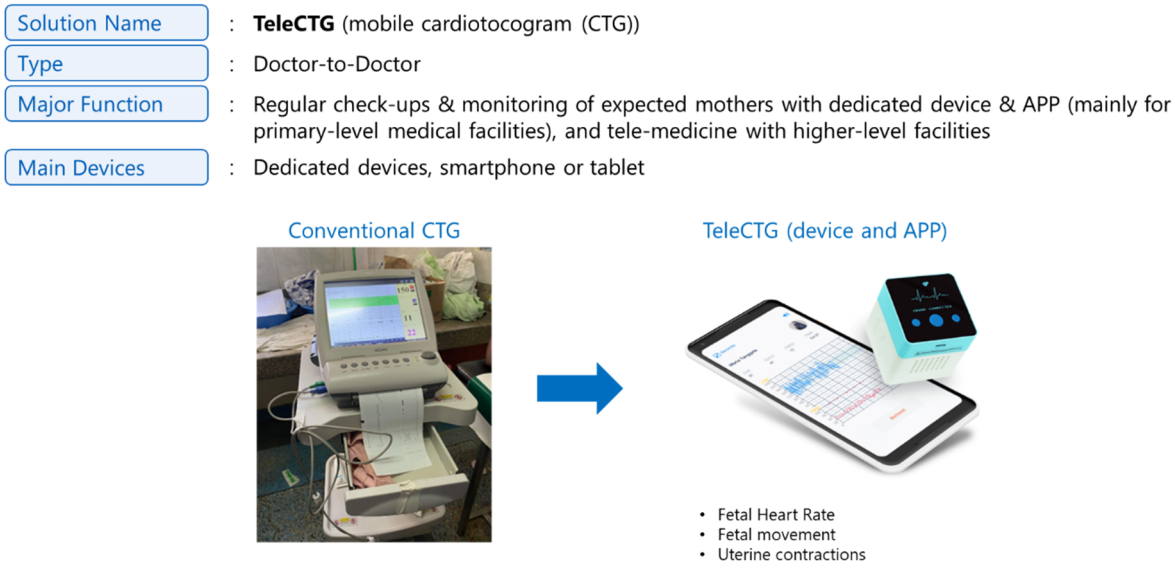


Figure 20 Outline of Sehati's Diagnostic Device (TeleCTG)

Source: JICA Expert Team

4) Implementation of the Pilot Activity

The OB pilot activities were initiated in Apr 2023 with Sehati and the JICA Expert Team visiting RSUH and the Partner Hospitals.

The devices were installed in two Partner Hospitals (RSUD KH Hayyung and PKM Benteng). Initial instruction and training was provided to residents and midwives at RSUD KH Hayyung and to midwives at PKM Benteng. By Jul 2023, 12 user trainings have been conducted at RSUD KH Hayyung and 2 at PKM Benteng.

User Training at RSUD KH Hayyung
(40 doctors and midwives)

Also, SOP for the use of TeleCTG were developed as shown in Figure 21. Additionally, information regarding equipment usage can also be accessed at any time through the dashboard shown in Figure 22.

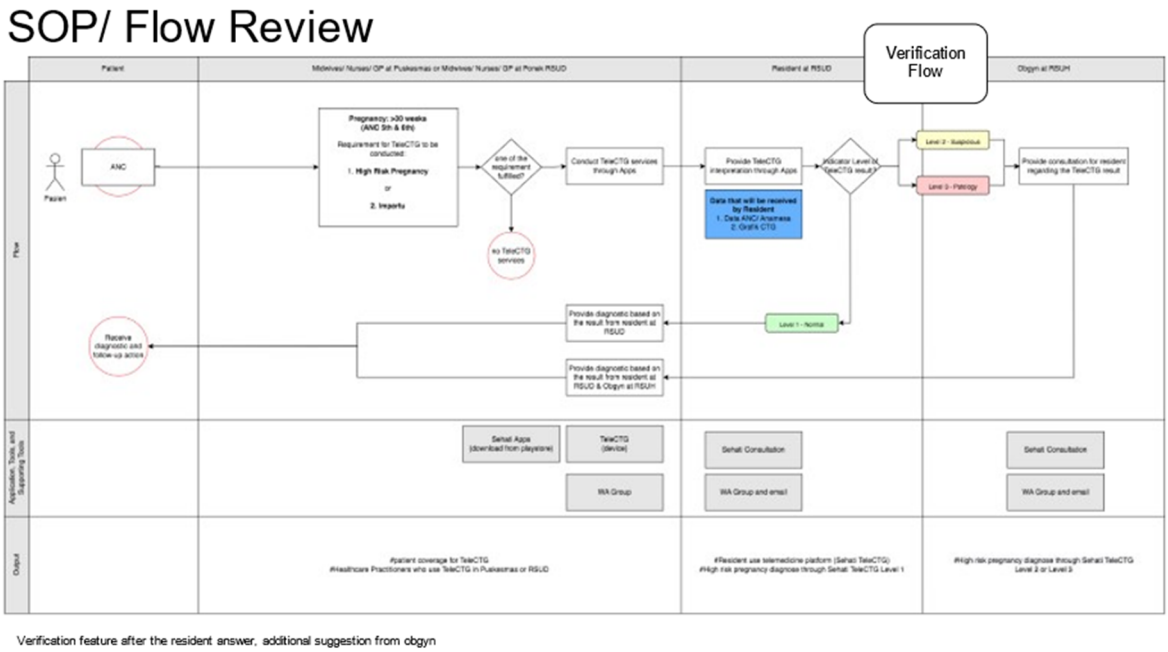
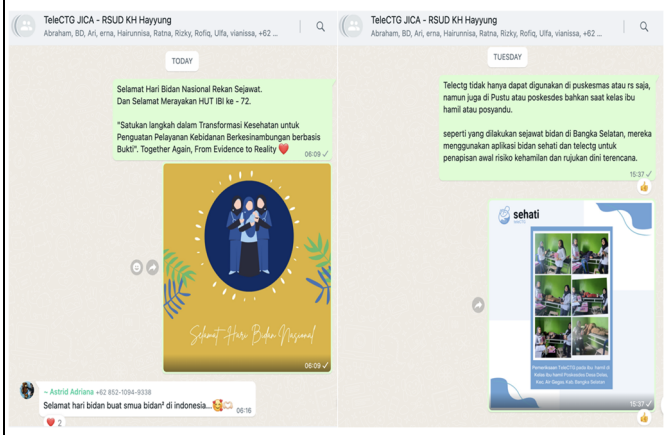


Figure 21 SOP Flow for TeleCTG

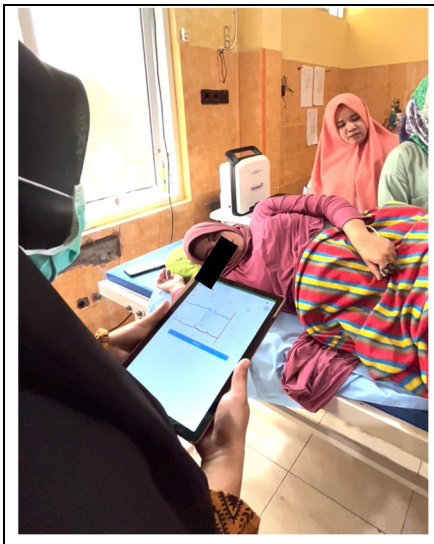
Source: JICA Expert Team

Patient using TeleCTG



Online Retention
(Information sharing via WhatsApp)

Offline Retention
(Information session on TeleCTG for expectant mothers in PKM Benteng)



RSUD KH Hayyung

PKM Benteng

Monitoring of TeleCTG utilization (Jun 23, 2023)

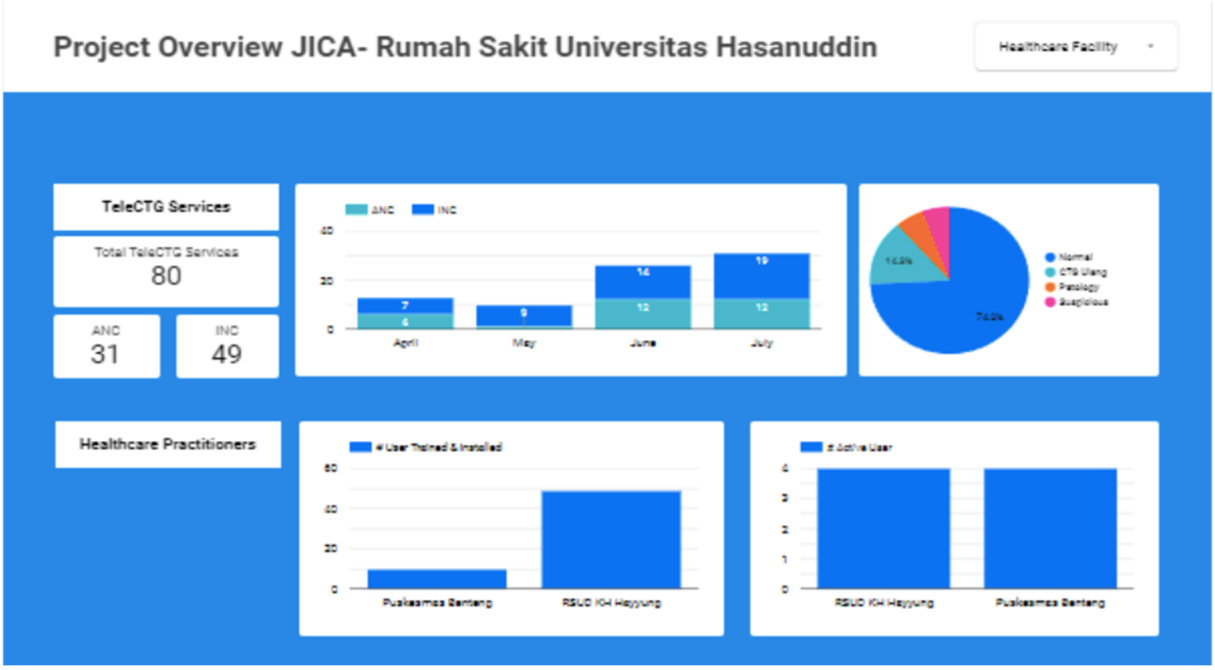


Figure 22 Monitoring Dashboard

Source: Sehati

During the pilot activities, TeleCTG was used in two facilities, RSUD KH Hayyung and PKM Benteng. In RSUD KH Hayyung, 49 medical staff were trained, and 10 medical staff were trained at PKM Benteng. Diagnostic results are shown in Table 20. The total number of infant deaths was eight from April to end-July 2023, comprising eight in RSUD KH Hayyung and 0 in PKM Benteng. There were no teleconferences between RSUH and Partner Hospitals. The cumulative number of TeleCTG use was 81 at the end of July.

Table 20 Obstetric consultation results during the pilot activity (Apr-Jul 2023)

	RSUD KH Hayyung	PKM Benteng	Total
Number of pregnant patients	1208	146	1354
Number of pregnant patients attended ANC treatment	831	548	1379
Number of 3rd trimester patients	531	133	664
Number of patients examined by TeleCTG	31	50	81
Number of referred patients	3	67	70

*3rd trimester means the period from the 25th week of pregnancy to delivery.

Source: JICA Expert Team

(2) Scaling-up Activity (OB)

The schedule of activities related to Output 1 in the OB scaling-up activity is shown in Figure 23 below.

	2023					2024			
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Scaling-up activity									
Device installation and training at new partner hospitals									

Monitoring			→			→		→	→
TWG			★				★		★
Tele-conference							★		

Figure 23 Schedule of the OB scaling-up activity for Output 1

1) Overview of the Newly Selected Partner Hospital

In accordance with the initiation of the scaling-up activity, two medical facilities, namely PKM Bontomatene and PKM Bontosunggu, were additionally selected as the Partner Hospitals as a result of discussions with the Counterpart Hospital and DHO. The selection of the Partner Hospitals and their number were determined by several criteria, including the JICA Expert Team's budget considerations, staffing feasibility, accessibility of location for JICA Expert Team, availability of telecommunication networks, and medical requirement. The overview of the newly selected Partner Hospitals is provided in Table 21.

In addition, an obstetrician was appointed to RSUD KH Hayyung in Nov 2023 for a four-year term. This appointment is aimed at facilitating enhanced expertise through their service in regional hospitals. As of Dec 2023, the specialist has actively contributed to the preservation of maternal health in Selayar, which comprises several outlying islands, in collaboration with the resident doctors dispatched from RSUH.

Table 21 List of additionally selected Partner Hospitals

New Partner Hospital 1: PKM Bontomatene
<Overview> PKM Bontomatene is located approximately 25 kilometers or a 40-minute drive from RSUD KH Hayyung, serving a population of about 7,000 with 21 Posyandu in the area. Initial information obtained from the PIC of high-risk pregnancies that have been identified by PKM from Jan to Jul in 2023 are hypertension (3 cases), abnormal fetal presentation (1 case), and reduction fetal movement (1 case). The count of OB patients directed to more advanced healthcare facilities was eight patients between May-Jul 2023. Referrals to PKM Bontomatene's top healthcare facilities were made via WhatsApp by completing the patient data form. All patients were covered by the BPJS, which is a public insurance plan. PKM Bontomatene employs a total of 90 staff members, including a GP, a dentist, three interned doctors, 24 nurses, 26 midwives, and 36 other healthcare personnel.
Additional Partner Hospital 2: PKM Bontosunggu
<Overview> PKM Bontosunggu is located around 10 km or 15 minutes from RSUD KH Hayyung covering six villages with around 11,000 population and 29 Posyandu in this area. According to the initial information gathered from the PIC, it was found that high-risk pregnancies identified by PKM from Jan to Jul in 2023 were hypertension (20 cases), short pregnancy spacing (14 cases), mother's age below 20 or too young (11 cases), mother's age over 35 or too old (10 cases) and grand multiparity (5 cases). The number of OB patients referred to upper-level health care facilities was four patients between May-Jul 2023. PKM filled patient data forms which were sent through WhatsApp to RSUD KH Hayyung for referring patients. All patients were covered by the BPJS. In addition, there was tele-consultations between midwives and an OB in RSUD through a WhatsApp group that involved all midwives in Selayar Island Regency. There were three GPs, two dentists, 49 nurses, 81 midwives and 16 other health staff.

Source: JICA Expert Team

2) Scaling-up Activity Plan

The expansion model (Figure 24) for the scaling-up activity was established to include two additional

PKM (PKM Bontomatene and PKM Bontosunggu) under RSUD KH Hayyung following discussions between RSUH and DHO. The primary motivation for employing this model stemmed from recognizing the crucial role of improving perinatal care at the PKM level.

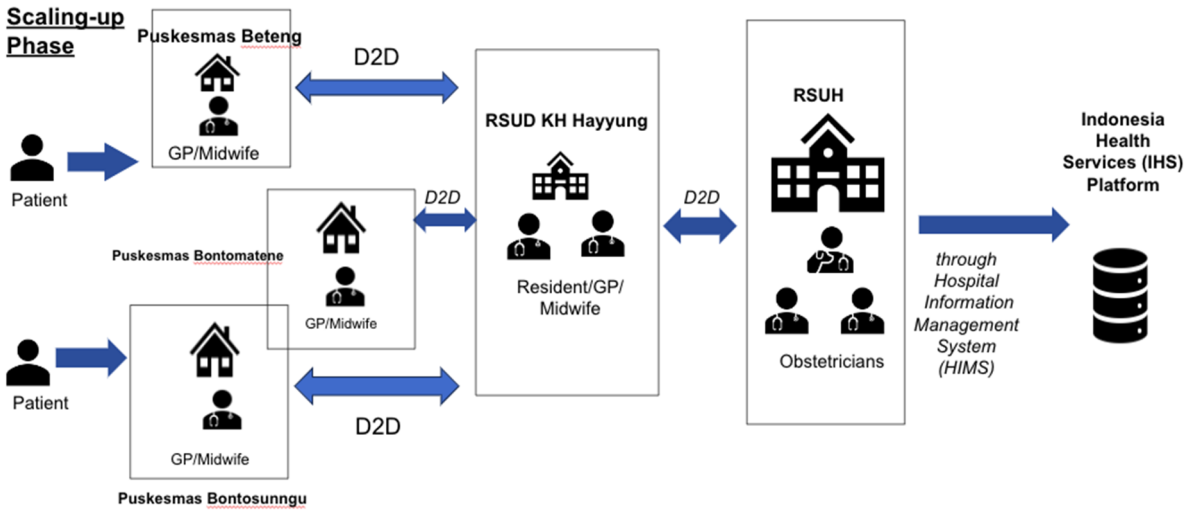


Figure 24 OB Scaling up activity model

Source: JICA Expert Team

Additionally, to ensure the project effectiveness of the scaling-up activity, a new SOP outlined in Figure 25 was developed by Sehati, confirmed by RSUH and the Partner Hospitals. As illustrated, three main flows were established within the new SOP. In option 1, patients visiting PKM could receive consultations from RSUD KH Hayyung through the D2D telemedicine system. In option 2, patients visiting RSUD KH Hayyung (including referred patients from PKM) could receive remote consultations from RSUH. In option 3, patients visiting PKM could directly receive remote consultations from RSUH. Moreover, to clarify the criteria for the utilization of TeleCTG, Sehati specified pregnant women in their third trimester who were classified as high-risk based on the Maternal and Child Health Handbook and regional health criteria.

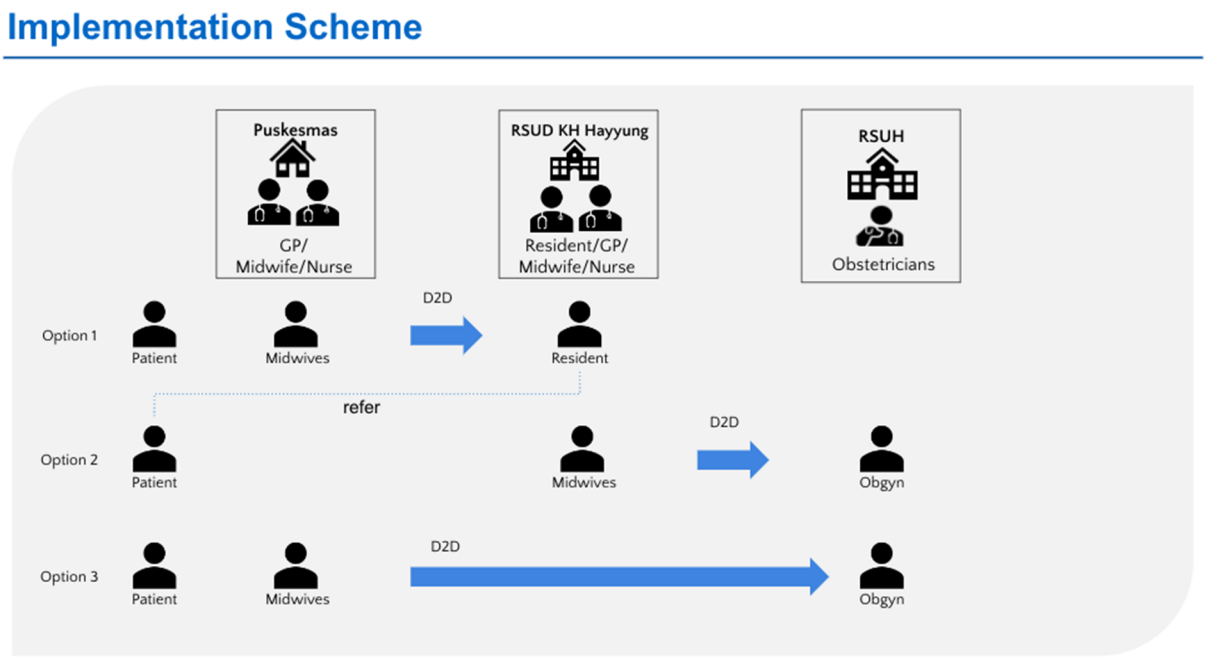


Figure 25 OB SOP in the scaling-up activity

Source: JICA Expert Team

3) Implementation of Scaling-up Activity

Based on the activity planning described above, the scaling-up activity commenced and spanned from Aug 2023 to Apr 2024, following the introduction of TeleCTG in addition to two PKM by Sehati. The scaling-up activity was operated among three PKM (PKM Benteng, Bontomatene, and Bontosunggu) and RSUD KH Hayyung, all centered around RSUH as the high-tier hospital. Additionally, as part of activities related to Output 1, the JICA Expert Team was regularly dispatched to target areas to facilitate implementation of project operations, as in the pilot activity.

Introducing TeleCTG in newly selected PKM in Aug 2023

Furthermore, a teleconference was held in Feb 2024 to share clinical knowledge through the D2D telemedicine model and to strengthen cooperation between the medical facilities. Approximately 100

participants from RSUH, RSUD, PKM and other institutions attended this teleconference.

The session consisted mainly of two case studies demonstrating the usefulness of telemedicine in prenatal care. Timely referrals of pregnancy complications in remote areas was discussed. In addition, the challenges of obtaining prophylaxis in remote areas, improving communication, training and adherence to guidelines were discussed.

RSUH obstetricians noted the importance of Tele-CTG consultations for assessment of fetal health and early detection and referral to prevent emergencies. The importance of accurate screening and prompt referrals was also stressed, particularly with regard to hypertension in pregnancy. The importance of Tele-CTG in the detection of obstetric hypoxia was also noted.

The teleconference provided an opportunity to strengthen inter-hospital collaboration in diagnosis, clinical case management support and knowledge sharing.

Tele-conference leaflet held on 21 Feb 2024

(3) Evaluation of Activities Related to Output 1 (OB)

As a result of the activity related to Output 1, such as introduction of clear examination criteria and new SOP, the indicators related for Output1 showed positive results, as demonstrated in Table 22. Regarding the number of TeleCTG instances, there were 81 cases during the pilot period from Apr to Jul, followed by 69 cases from Aug to Oct, 66 cases from Nov to Jan and 26 cases Feb to Mar. Consequently, the total number of cases of TeleCTG use reached 242 throughout the entirety of the project. Additionally, ANC screening rate for high-risk third trimester pregnant women in PKM attained approximately 90%.

However, the utilization of TeleCTG at RSUD KH Hayyung has been limited. This limitation can be attributed to several factors, such as the presence of an already installed CTG (non-portable CTG), the instruction from the obstetrician newly assigned in Nov 2023 to use the installed CTG, and insufficient pre-deployment resident training. Yet, the specialist has conducted D2D telemedicine for cases raised from PKM; thus it could not be concluded that the telemedicine model is not working due to the reduced frequency of TeleCTG usage at RSUD KH Hayyung.

Additionally, an OB teleconference was held in Feb 2024. In the tele-conference, approximately 100 participants from various medical institutions including RSUH, RSUD, PKM and others, participated. The teleconference provided an opportunity to enhance inter-hospital collaboration in diagnosis and clinical case management support and knowledge sharing.

Table 22 The Result of Output 1

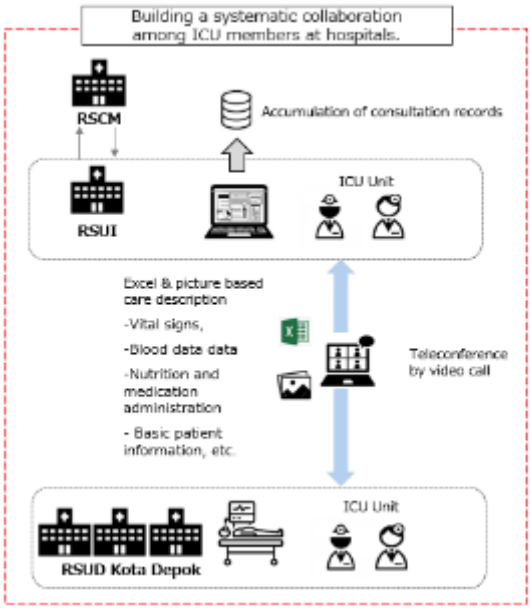
Output 1		
D2D telemedicine (tele-consultation and tele-conference) between the Counterpart Hospitals and the Partner Hospitals are planned and introduced for enhancing inter-hospital collaboration in diagnosis and clinical case management support and knowledge sharing.		
Monitoring indicators		**Result**
1	Number of tele-conferences between RSUH and Partner Hospitals	1 (it was organized in Feb 2024)
2	Number of clinical cases diagnosed through D2D telemedicine at the Partner Hospital	**Pilot Activity** ・ Apr-Jul: 81 (RSUD:31, PKM:50) **Scaling up Activity:** ・ Aug-Oct: 69 (RSUD:7, PKM: 62) ・ Nov-Jan: 66 (RSUD: 0, PKM: 66) ・ Feb-Mar: 26 (RSUD:0, PKM 26)
3	Number of medical staff (resident, GP, midwife, and others) to use the telemedicine device	Pilot activity: 59 individuals were registered and installed Scaling-up activity: 99 individuals were registered and installed

Source: JICA Expert Team

3. Activities related to Output 2 (RSUI)

3-1. Development of monitoring and evaluation plan

After consultation with RSUI and RSUD Kota Depok and other interested parties, the following monitoring and evaluation indicators were established.



Individual professional learning at RSUI& RSUD (Short term)

Indicators	Methods
• Empowerment & Confidence	• Self assessment
• Motivation	• Self assessment
• Perception among hospitals	• Self assessment

Operational improvement at ICU of RSUI& RSUD (Mid-term)

Indicators	Methods
• # of cases in which learnings from teleconferences applied and utilized	• Interviews with ICU members
• manual compliance rate	• Evaluation sheet of attached to manuals

Patient outcome at ICU of RSUI& RSUD (Long-term)

Indicators	Methods
• Patient severity score improvement	• Monitoring report
• Number of days of ventilator	• Monitoring report
• Mortality rate	• Monitoring report
• Length of ICU stay (*monthly average in severity score categories)	• Monitoring report
• Incidence rate of pressure ulcers	• Monitoring report

Figure 26 List of Monitoring and Evaluation Indicators

Source: JICA Expert Team

In addition, a monitoring approach for these indicators was planned. In order to measure these indicators, this project has established four monitoring and evaluation approaches: 1. A follow-up survey was conducted after the session via a Google Form to collect participants' impressions of the tele-conference operation itself (length, comprehension, speed) and their overall satisfaction with the session; 2. The professional learning survey was a quantitative survey of participants' internal changes in terms of motivation, empowerment, awareness, communication, etc. via Google Form. 3. The performance interview was conducted qualitatively through an online conference, in which participants were interviewed about their learning based on the tele-conference, their actual efforts, and their internal changes, etc. 4. The patient outcome monitoring collects individual patient data and measures patient outcome-related indicators. The following figure shows an image of the individual data format.

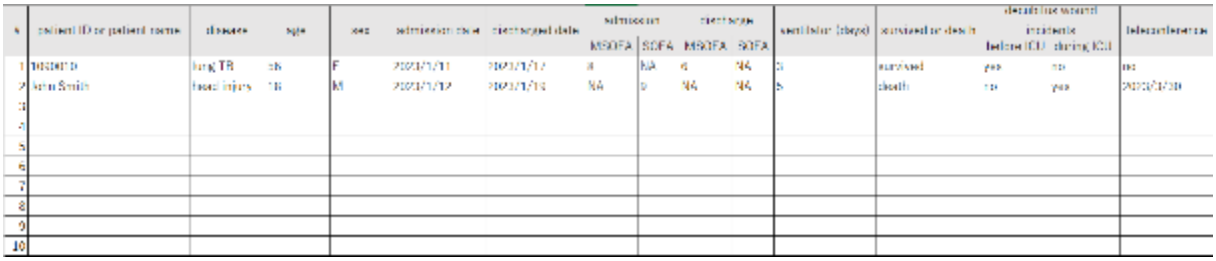


Figure 27 Individual Data Format for Reference Patient Outcome Survey

Source: JICA Expert Team

The frequency and timing of monitoring were reviewed with relevant parties based on the pilot activity and organized as follows for the full-scale activity.

Table 23 Frequency and Timing of Monitoring and Evaluation

M&E scheme	Pilot (March-June)		Full scale(July-March)		
	Baseline	2nd	3rd	4th	5th
➢ **Follow-up survey**	March 27th~	continued	continued	continued	continued
➢ **Professional learning survey**	March 1st~	June	NA	NA	NA
➢ **Performance Interviews**	NA	June	NA	November	NA
➢ **Patient outcome**	April 1st~	NA	July	November	February, 2024

Source: JICA Expert Team

The structure for conducting the monitoring evaluation was as follows: a leader and a sub-leader were assigned from the doctors and nurses of RSUI and RSUD Kota Depok, respectively, to check the progress of the monitoring and review the results. It was expected that the local members would take the lead in conducting the monitoring and evaluation and would use the lessons learned from the evaluation with their teams to improve ICU performance.

Table 24 Assignment of Leaders in Monitoring and Evaluation

Hospital		M&E Leader	M&E Sub-leader
RSUI	Doctor	dr. Noor Hafidz	dr. Dita Aditianingsih
	Nurse	Juliana Gracia	Fitriah
RSUD Kota Depok	Doctor	Dr. Annisa Layalia	Dr. Rabbani Icksan Maulanda
	Nurse	Novi Triwanto	Ade Sri Sugiarti
RSUD Cibinong	Doctor	dr. Stesy Natassa	dr. Farah Themisia Hertani
	Nurse	Fina Arfah	Fitri Indriyani

Source: JICA Expert Team

For Output 2, as described in the activities related to Output 1, brainstorming and focus group discussions were held among relevant parties on the expected effects and impact from this project through weekly meetings prior to the start of the pilot activity, and specific indicators were set. In addition, interviews were conducted with each hospital regarding the implementation status of existing evaluation monitoring. During the field survey, discussions were held with each of the relevant organizations to formulate an evaluation and monitoring plan and establish an implementation system, in accordance with the following survey items.

Table 25 Survey Items of Output 2

Main items	Middle items	Subitem	Stakeholders	Other related parties
Monitoring and Evaluation	Develop a monitoring and evaluation plan for RSUI (intensive care) (outcomes, set indicators, build hypotheses)	Additional Indicators Draft PDM ver1 proposal Existing ICU evaluation and monitoring guidelines Hypothesis building/outcomes/indicators Possibility of baseline survey (with/without) (partner hospitals)	RSUI ICU team (doctor & nurse) RSUD Kota Depok ICU team RSUI evaluation unit RSUD Kota Depok evaluation unit	RSCM doctors RSUD Cibinong Other Partner Hospitals Vitaars
	Agree on the evaluation plan with the target hospital	PDMver1 Data type and frequency of collection	RSUI director RSUD Kota Depok director	RSUI ICU team (doctor & nurse) RSUD Kota Depok ICU team RSUI evaluation unit RSUD Kota Depok evaluation unit
	Consider introducing monitoring and evaluation tools	Collection method Data tool possibilities ICT literacy for tool use	RSUI ICU team (doctor& nurse) RSUD Kota Depok ICU team RSUI evaluation unit RSUD Kota Depok evaluation unit	
	Establishment of a monitoring and evaluation implementation system	Evaluation Manager, Evaluation Administrator	RSUI ICU team (doctor& nurse) RSUD Kota Depok ICU team RSUI evaluation unit RSUD Kota Depok evaluation unit	

Source: JICA Expert Team

3-2. Conduct monitoring and evaluation

(1) Follow-up survey

The follow-up survey results (covering the second through fourth tele-conferences) are summarized below. As an overall evaluation of the tele-conferences, both doctors and nurses generally attested to a high level of satisfaction. It was also confirmed that the length of the tele-conference itself, the difficulty of the content, and the speed were appropriate.

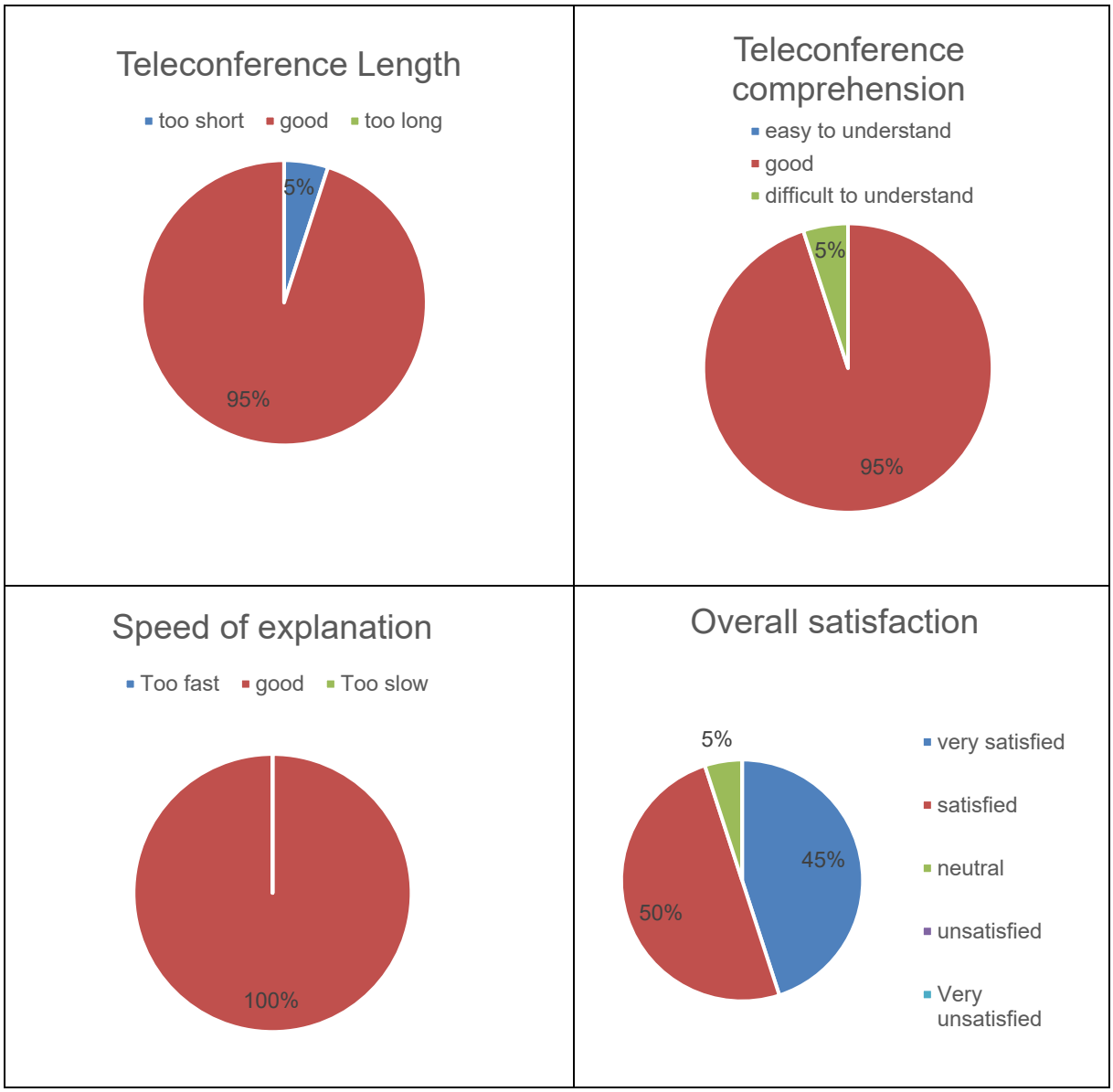


Figure 28 Results of follow-up survey on the part of doctors (20 respondents)

Source: JICA Expert Team

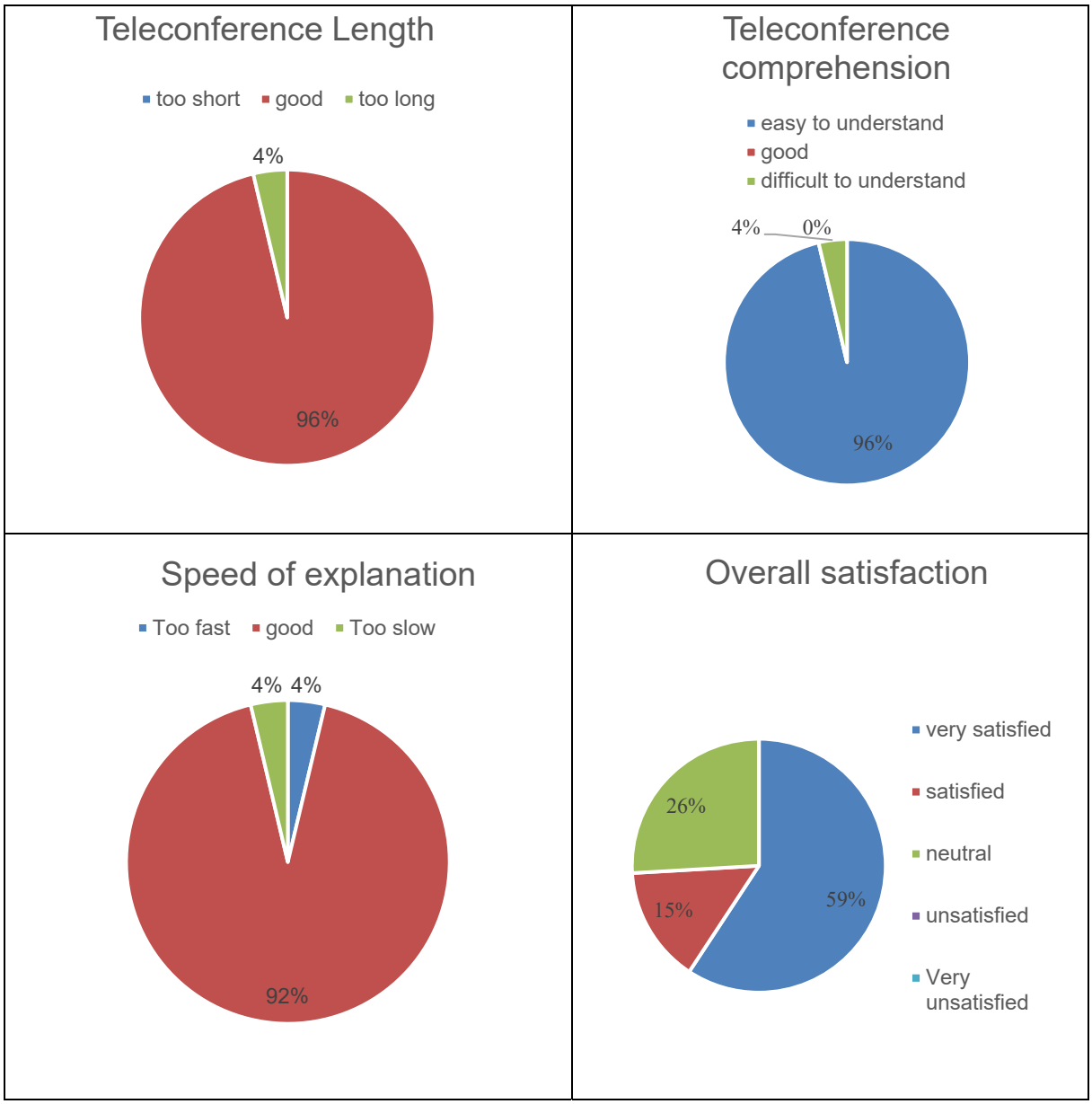


Figure 29 Results of follow-up survey on the part of nurses (27 respondents)

Source: JICA Expert Team

A summary of the survey results for the follow-up seminars (those held in Oct and Nov 2023 were included in the survey) is as follows. As with the tele-conferences, the overall evaluation of the follow-up seminars showed that both doctors and nurses were generally highly satisfied, and that there were no problems with the length, difficulty of content, or speed of the follow-up seminars themselves. Overall, it can be said that the content and quality of the tele-conferences and follow-up seminars, which were the main activities of this project, were high.

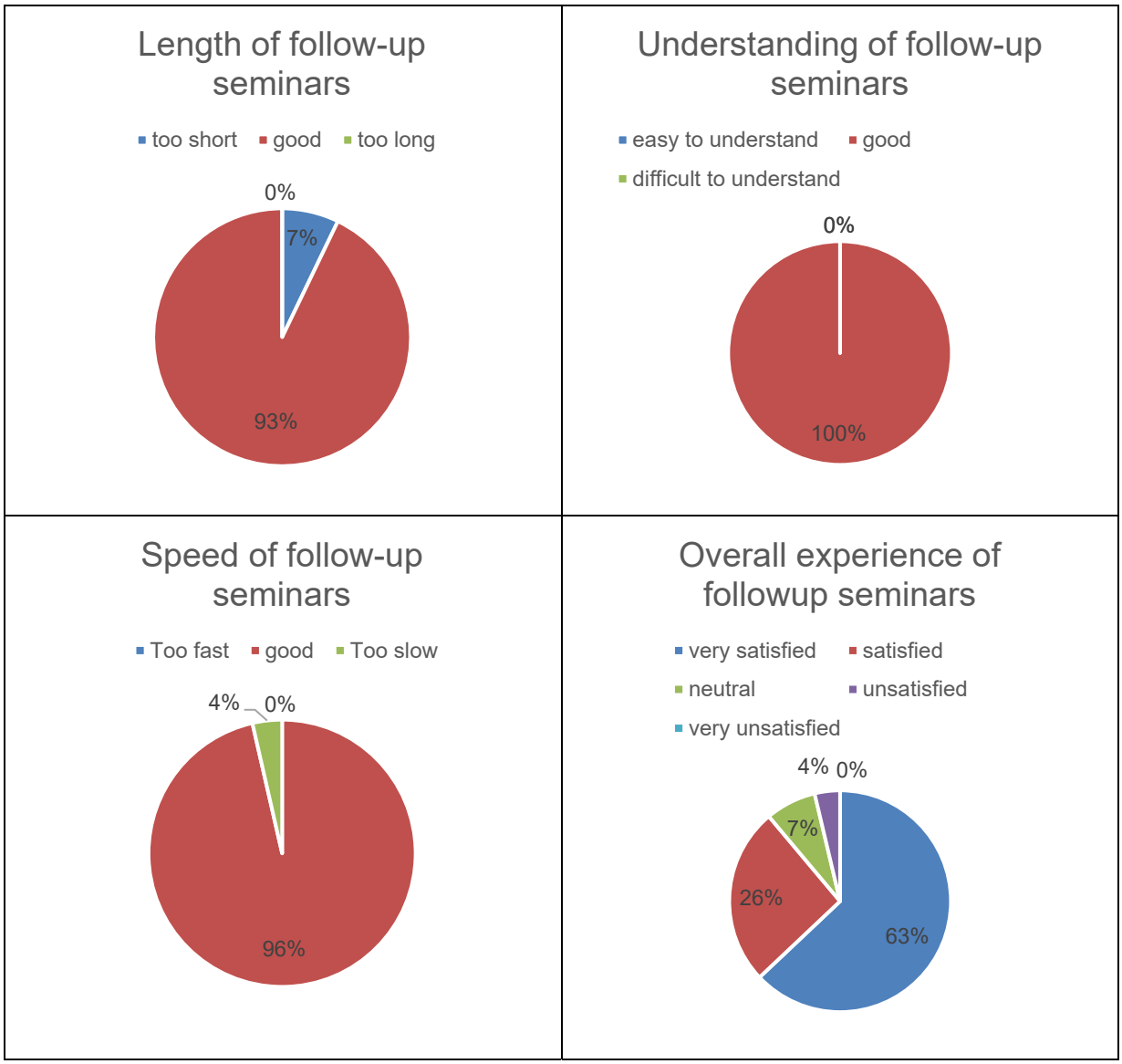


Figure 30 Results of the Doctor-side Follow-up Seminar Survey (26 respondents)

Source: JICA Expert Team

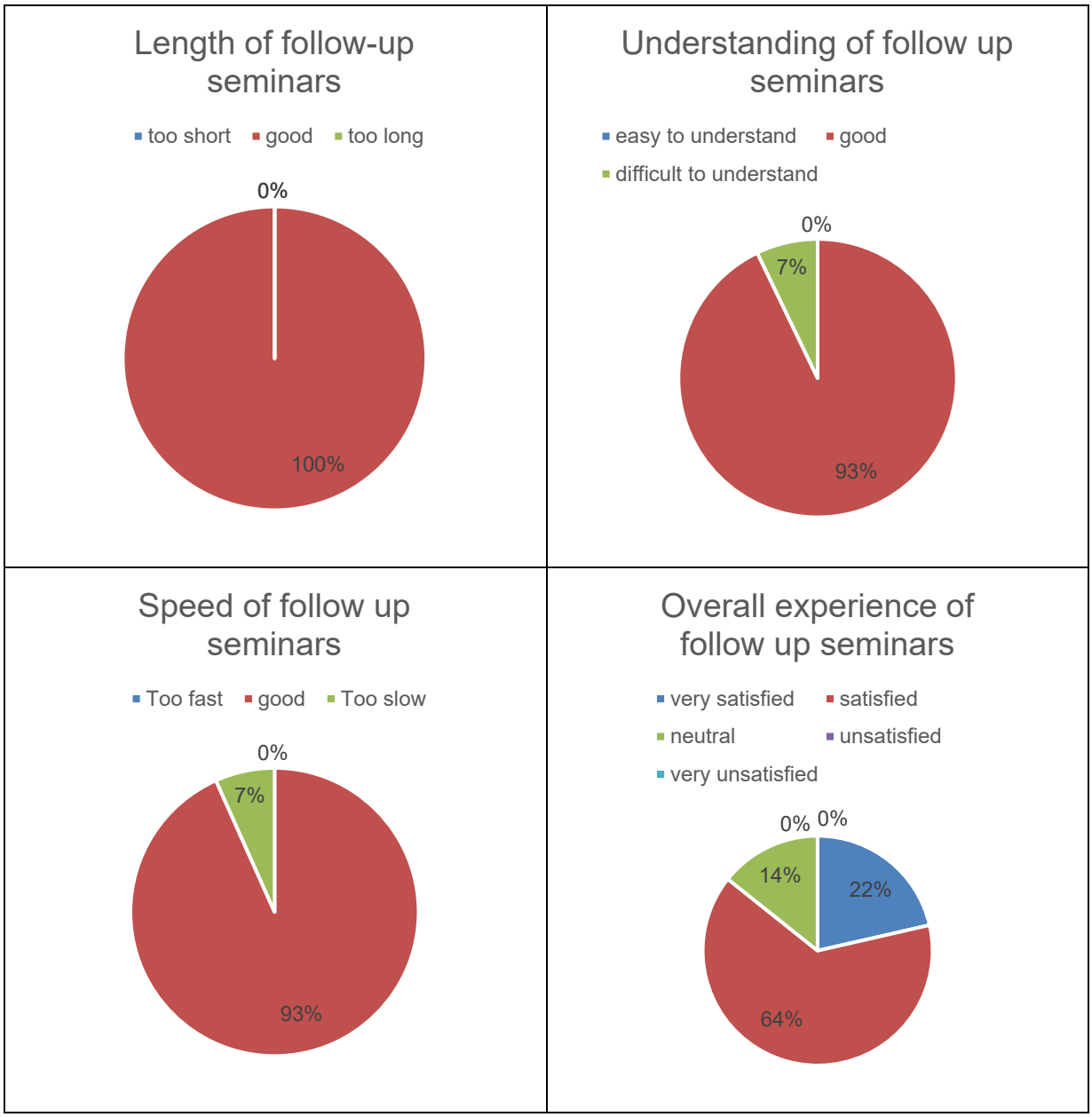


Figure 31 Results of the Nurse Side Follow-Up Seminar Survey (14 respondents)

Source: JICA Expert Team

(2) Professional learning survey

The professional learning survey, as described above, asked participants to respond on a 7-point Likert scale (1. totally disagree to 7. strongly agree) to the following questions regarding their internal change in terms of motivation, empowerment, recognition, communication, etc., and online surveys were conducted.

Table 26 Professional learning survey questionnaire

No.	Questions
1	I am confident about my ability to do my job.
2	The work that I do is important to me.
3	I have significant autonomy in determining how I do my job.

No.	Questions
4	My impact on what happens in my department is large.
5	My job activities are personally meaningful to me.
6	I have a great deal of control over what happens in my department.
7	I can decide on my own how to go about doing my own work.
8	I have considerable opportunity for independence and freedom in how I do my job.
9	I have mastered the skills necessary for my job.
10	The work I do is meaningful to me.
11	I have significant influence over what happens in my department
12	I am self-assured about my capabilities to perform my work activities.
13	I know ICU members who work at different hospitals
14	I consult with my colleagues within the same hospital about patient cases
15	I consult with ICU members who work at different hospitals about patient cases
16	I can rely on my colleagues within the same hospital when I need advice
17	I can rely on ICU members who work at different hospitals when I need advice
18	My team supports each other when someone needs advice
19	ICU department at different hospitals and our ICU department readily collaborate with each other.
20	Our ICU department exchanges opinions with ICU department at different hospitals.
21	We can refer patients to different hospitals without miscommunication
22	Referral systems among ICU hospitals work well

The baseline for the professional learning survey was conducted in Apr 2023, and the second survey was conducted in Jun 2023. The results of a simplified analysis by averaging the response values to each question are shown in figure 32 below. Overall, the results of the second survey were more favorable (higher mean values) compared to the baseline, although no significant changes were observed. In particular, with regard to the collaboration with other hospitals (questions 19, 20, 21, and 22), which was highly effective, it can be inferred that tele-conferences in this project had a certain impact. Note that the number of responses to the second survey decreased from 135 in the baseline to 70 in the second survey, which may have caused selection bias by respondents who were more actively participating in this project, and therefore, caution should be made in interpreting these results.

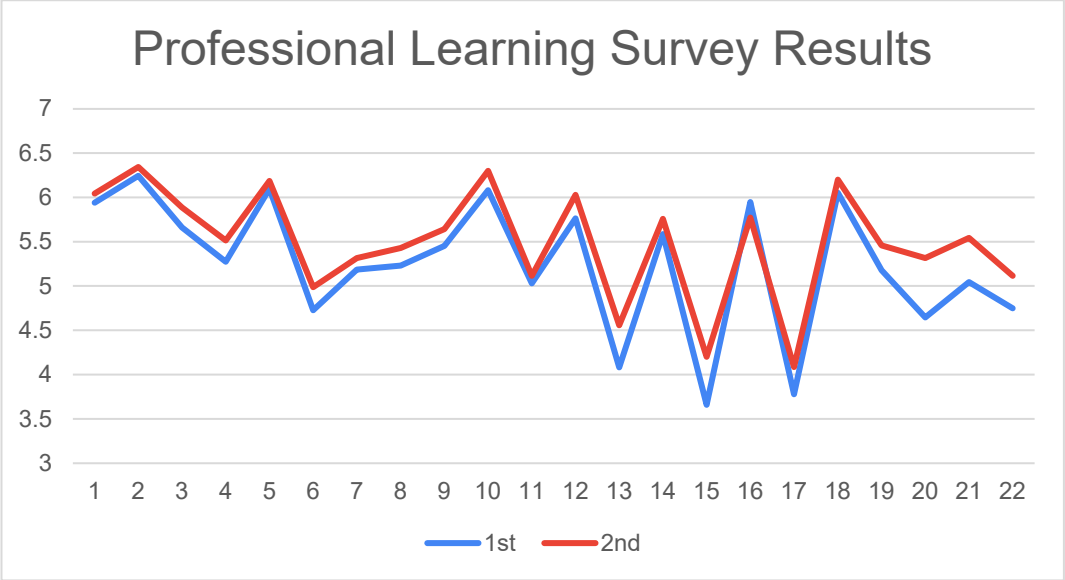


Figure 32 Baseline and Second Professional Learning Survey Results

Source: JICA Expert Team

(3) Performance interviews

While the professional learning survey described above measured internal changes in participants quantitatively, the performance interviews measured technological improvement and internal changes qualitatively. Performance interviews were conducted in Jun 2023 and consisted of individual 30-minute interviews with RSUD Kota Depok case presenters from each week and with RSUI instructors (14 in total).

First, regarding technical improvement, doctors and nurses were asked to cite specific lessons learned after the tele-conference and examples of how they werre using the information in their daily treatment. The responses obtained through the interviews are shown in the table below. It was confirmed that both doctors and nurses were actively applying the tele-conferences to their daily activities, such as improving the treatment methods they have been using and incorporating new learnings. RSUI confirmed that through preparation and discussion as lecturers for the tele-conference, the teaching side also gained new technical knowledge, such as confirming the latest treatment methods and learning about patient care approaches at other hospitals.

Table 27 Sample Responses to Technical Improvement and Learning

Respondent	Hospital	Examples of Technical Improvement and Learning
Doctor	RSUD Kota Depok	Method and importance of comprehensive diagnosis of each patient
Doctor	RSUD Kota Depok	Water seal drainage/ Process of determining the patient's treatment plan/ Testing for the root cause of the disease (finding etiology of test results)/ Treatment plan for hypoalbuminemia
Doctor	RSUD Kota Depok	Consideration of magnesium and calcium levels in the treatment of patients with recurrent seizures
Doctor	RSUI	Asthma Treatment
Nurse	RSUD Kota Depok	Need to change the patient's position after extubation
Nurse	RSUD Kota Depok	Oral Hygiene / Importance of turning stable patient's bed to the window
Nurse	RSUD Kota Depok	Diagnosis regarding airway, breathing, and circulation / weaning from ventilator

Nurse	RSUD Kota Depok	Assessment of withdrawal/pulmonary function for closed suction/ High Flow Nasal Cannula ("HFNC")
Nurse	RSUD Kota Depok	Aseptic principles / hand washing practices / suction cleaning procedures for ventilators

Source: JICA Expert Team

Interviews were also conducted on internal changes. The results are as follows. Comparing data before and after this project, many respondents confirmed that the tele-conferences provided more opportunities for communication among the nursing team, the doctor team, and also between nurses and doctors at the individual level. For example, the team worked together from the preparation stage to select cases and organize patient information for the tele-conference, which created opportunities to help each other, and even after the meeting, the team held discussions to utilize the learnings. This is thought to have increased the number of points of contact for getting to know each other through the tele-conferences. In addition, the results of the interviews suggest that although they had been performing their work routinely, the tele-conferences stimulated them to gain new perspectives and learn from each other, leading to increased motivation and initiative to improve the work.

Table 28 Sample Answers to Psychological Changes

Respondent	Hospital	Examples of Psychological Change
Doctor	RSUD Kota Depok	・ Through tele-conferences, participants recognized the importance of understanding individual patient conditions and improved their confidence in treating patients. ・ Previously, the relationship between doctors and nurses was only based on a working arrangement focused on patient care, but case conferences have provided more opportunities to discuss the patient's condition. ・ Trust between doctors and nurses was fostered and the atmosphere improved.
Doctor	RSUD Kota Depok	・ Improved decision-making (confidence) of doctors to intervene before a patient was transferred to the ICU, such as a patient presenting with respiratory distress syndrome. ・ The improvement of independence (motivation) to seek suggestions from anesthesiologists even before receiving instructions and of trust and cooperation between GP and anesthesiologists.
Doctor	RSUD Kota Depok	・ Communication between doctors and nurses had improved, and instructions from doctors to nurses regarding patient care became more comprehensive.
Doctor	RSUI	・ Through tele-conferences, relationships between the hospitals had improved. ・ Better understanding of the situation in other hospitals.
Nurse	RSUD Kota Depok	・ The nurses are responsible for one or two patients per shift, but even the nurses who are not in charge are more willing to help the nurse in charge when there is a patient with an emergency condition after the case review meeting. This has led to improved communication within ICU nursing team. ICU nurses are now able to communicate more effectively with each other and with their patients. ・ Good communication between nurses and doctors was enhanced after the tele-conference. Discussions between shifts regarding the patient's condition, development, and best treatment began to take place. ・ Knowledge and suggestions gained from the case review meetings were constantly shared within the ICU nursing team.
Nurse	RSUD Kota Depok	・ More discussion between doctors and nurses. ・ From each nurse, we began to see individual characteristics and ideas that we had not seen before.
Nurse	RSUD	・ Teamwork was strengthened by weekly discussions of cases.

	Kota Depok	・ Working with RSUI and JICA has been an honor and has given me more confidence in my daily practice. ・ Nurses noticed an increased passion for providing the best care to their patients after the tele-conference. ・ The results of tele-conference were always communicated to the nurses who could not attend. After the tele-conference sessions, a deeper sense of teamwork was felt.
Nurse	RSUD Kota Depok	・ Through the tele-conference, it was learned that each patients have different medical conditions and there was motivated to delve deeper into patients' conditions and to learn new insights and aspects.
Nurse	RSUD Kota Depok	・ Nurses had more opportunities to meet weekly and discuss patient cases they wished to present. ・ After the tele-conference, the team began actively communicating with infection control teams.
Nurse	RSUD Kota Depok	・ Although reserved, after presenting a case in front of many attendees at a case review meeting, the nurse felt a surge of confidence in speaking publicly and in expressing their own opinions. ・ Teamwork among nurses was not bad before the tele-conference, but it further improved after the nurses shared and reminded each other of the tele-conference's suggestions.
Nurse	RSUD Kota Depok	・ Tele-conferences of this project were more interesting than existing case studies and provided more motivation to learn.

Source: JICA Expert Team

Text mining of the interview results resulted in the following. The color of a word differs according to its part of speech, with blue representing nouns, red representing verbs, and green representing adjectives. A score was calculated for each word to indicate how characteristic (frequent) the word was, and the higher the score, the larger the word is illustrated with a larger font. Through this analysis, it was found that the scores for the following expressions tended to be higher: collaborate (31.40), confidence (29.70), teamwork (22.33), motivation (21.47), and communication (21.03). From the same results, it can be inferred that, overall, the tele-conferences in this project have created an impact in terms of improved collaboration and relationships with colleagues, ICU members, and other hospitals, as well as increased individual confidence and motivation in the ICU.

Figure 33 Key words representative of changes in participants from the interviews.

Source: JICA Expert Team

Performance interviews were also conducted for RSUD Cibinong in Nov 2023At the time of the Nov visit, RSUD Cibinong's tele-conference had just started, so interviews were limited to three doctors and one nurse. Regarding the technical improvement, the doctors shared their own experiences from tele-conferences, along with specific examples of the technical skills needed in the ICU and new insights gained from learning about operations in different hospitals. The nurses also confirmed through the interviews that their specific nursing care knowledge from the tele-conferences had improved. Regarding internal changes, both doctors and nurses emphasized the impact of tele-conferences on their motivation, confidence, and leadership as professionals in the ICU. Overall, doctors and nurses were eager to continue tele-conferencing, and their satisfaction with the valuable opportunity to obtain practical support from upper level health care providers was high.

Table 29 Responses for Technical Improvement and Learning

Respondent	Hospital	Examples of Technical Improvement and Learning
Doctor	RSUD Cibinong	· **Learned important technical skills:** learned from RSUI doctors about ventilator settings, antibiotic use, immunotherapy, and other drug therapies. Putting these insights into practice led to significant patient improvement. · **New knowledge about existing work**: During the tele-conference, gained new knowledge and was motivated to explore different ways to treat patients. For example, considered using echocardiography to check for heart-related problems. In addition, emphasized that tele-conferences allow for a different approach to finding solutions and providing optimal treatment. Also gained new knowledge, especially in the follow-up seminar about proper ventilator settings and echocardiography from a Japanese nurse. · **Understand different ICU operating environments**: tele-conferences are valuable for a number of reasons. First, it provides knowledge from different facilities, such as RSUI and RSUD Kota Depok, where one can learn from diverse teaching conditions. In addition, they can gain insight into technical insights, especially regarding differences in equipment within the hospital, such as the use of CT scans. The tele-conferences also allowed the participants to learn about communication to enhance cooperation among healthcare professionals.

Nurse	RSUD Cibinong	・ **Brush up on nursing knowledge according to patient characteristics**: since attending as an observer, gained valuable insights from watching the tele-conference sessions of RSUD Kota Depok. Learned the importance of treating patients with obesity and pressure ulcers, especially in the ICU where there are many obese patients. ・ Learned about ventilator wind-up, sedation, and spontaneous awakening trial, as well as practical application of this knowledge. ・ In addition, insights from follow-up seminars given by Japanese experts were valuable. Despite limited manpower, the nurses at RSUD Cibinong are working on the advice they were given, such as changing patient positions every four hours to prevent pressure ulcers. ・ Nurses also began applying Ventilator Associated Pneumonia (VAP) bundles, but were able to recognize the need for improvement to enhance patient care and reduce complications.

Source: JICA Expert Team

Table 30 Responses for Internal Change

Respondent	Hospital	Examples of internal change
Doctor	RSUD Cibinong	・ **Increased motivation and confidence**: The tele-conference significantly increased motivation and confidence and fostered willingness to try new approaches in patient care and root cause analysis. ・ **Critical thinking for the consultation**: Reminded me how important it is to find the root cause behind a patient's symptoms. He learned how to increase curiosity and understanding of the underlying problem, even if it does not lead to immediate patient improvement. ・ **Facilitated collaboration: The** tele-conference facilitated collaboration and had a positive impact on overall teamwork because it provided an opportunity to regularly discuss and share patient-related insights and practices with colleagues.
Doctor	RSUD Cibinong	・ **Reviewing old practices**: Positive changes were experienced after participating in the tele-conference. Opportunities were provided for nurses to refresh their knowledge and avoid old practices. ・ **Increased sense of responsibility and competency**: an increased belief that having all nurses present their cases is a means of increasing nurses' sense of responsibility, both in the presentation and in the care of their patients. Knowledge can be obtained anywhere, but developing a sense of responsibility and care for ICU patients can be difficult, and tele-conferences can be beneficial in improving such competencies.

(4) Patient outcome

The monitoring status of ICU patient summaries and patient outcomes for each hospital is shown below. These indicators are also set as indicators of higher-level targets. Although the results cannot be generalized, the mortality rates for RSUI continues to show improvement from the Apr 2023 baseline (33%) to Feb 2024 (16%), while those for RSUD Kota Depok and RSUD Cibinong continue to face challenges with high mortality rates of 40% and 50%, respectively. Although it is not easy to impact these outcomes through the weekly tele-conferences that were being conducted in this project, the project has also worked to improve essential patient outcomes in the ICU based on these monitoring results, for example, by discussing mortality cases as a theme in follow-up seminars.

Table 31 Patient Outcome-Related Indicators for RSUI, RSUD Kota Depok, and RSUD Cibinong

RSUI

	April 2023 (baseline)	July	October	February 2024
ICU Patient overview				
total number of patients	46	51	63	50
average age of patients	58	53	51	53
ratio of male patients	41%	47%	43%	42%
ratio of female patients	59%	53%	57%	58%
Outcome indicators				
average days of ICU stay	6	6	5	6
average SOFA at admission	6.13	5	5.4	5.7
(lowest SOFA)	0	1	1	0
(highest SOFA)	12	14	14	13
average SOFA at discharge	5.534	4	3.9	3.1
average ventilator days	7	7	4	4
(min ventilator days)	1	1	1	1
(max ventilator days)	24	32	35	40
mortality rate	33%	19%	24%	16%
decubitus wound incidents (before ICU)	7	6	10	0
decubitus wound incidents (during ICU)	7	7	6	3

RSUD Kota Depok

	April 2023 (baseline)	July	November	February 2024
ICU Patient overview				
total number of patient s	26	29	29	36
average age of patients	52	55	57	52
ratio of male patients	58%	70%	41%	52%
ratio of female patients	42%	30%	59%	48%
Outcome indicators				
average days of ICU stay	4	3	6	3.4
average SOFA at admission	6	7	5.9	5.9
(lowest SOFA)	2	1	1	1
(highest SOFA)	14	17	16	10
average SOFA at discharge	4	8	7	7.5
average ventilator days	4	4	5.6	4
(min ventilator days)	1	1	1	1
(max ventilator days)	13	18	19	17
mortality rate	42%	44%	41%	47%
decubitus wound incidents (before ICU)	5	1	2	0
decubitus wound incidents (during ICU)	1	1	1	5

RSUD Cibinong

	July 2023 (baseline)	November	February 2024
ICU Patient overview			
total number of patients	39	97	64
average age of patients	50	53	51
ratio of male patients	49%	56%	50%
ratio of female patients	51%	44%	50%
Outcome indicators			
average days of ICU stay	6	4	4
average SOFA at admission	8	NA	8
(lowest SOFA)	1	NA	1
(highest SOFA)	16	NA	14
average SOFA at discharge	11	NA	8.5
average ventilator days	8	NA	NA
(min ventilator days)	1	NA	NA
(max ventilator days)	23	NA	NA
mortality rate	53%	53%	63%
decubitus wound incidents (before ICU)	1	NA	5
decubitus wound incidents (during ICU)	6	NA	5

The Sequential Organ Failure Assessment (SOFA) is a measure of patient severity in the ICU.

Source: JICA Expert Team

3-3. Evaluation of Activities Related to Output 2

Regarding Output 2 of RSUI, it has been deemed achieved because the monitoring and evaluation plan has been developed, a monitoring and evaluation implementation system has been established, and monitoring and evaluation has been conducted for further improvement and performance feedback.

Existing evaluation indicators in RSUI and RSUD Kota Depok were identified at the beginning of this project. Since those evaluation indicators were not measures of essential ICU performance, new indicators were added. To measure these indicators, this project established an implementation system by having a leader and a sub-leader responsible for monitoring and evaluation selected from RSUI and RSUD Kota Depok, respectively. In particular, since patient outcome indicators (e.g., days on ventilator) are important measures of ICU performance, training was provided on how to monitor this information. As a result, RSUI and RSUD Kota Depok and RSUD Cibinong are now able to monitor these indicators on their own.

Table 32 Indicators and Evaluation of Output 2 (RSUI)

Output 2			
Monitoring & Evaluation (M&E) plan and structure are developed and utilized to assess effectiveness of D2D telemedicine at both the Counterpart Hospitals and the Partner Hospitals			
Evaluation Indicators in RSUI	**RSUI**	**RSUD Kota Depok**	**RSUD Cibinong**
① Existing ICU M&E reports are reviewed, and M&E plans are revised with indicators for assessing tele-ICU outcomes	Achieved	Achieved	Achieved
② Personnel for the revised M&E are assigned and trained.	Achieved	Achieved	Achieved

Source: JICA Expert Team

4. Activities related to Output 2 (RSUH)

4-1. Activities related to Output 2 (OPH)

The following section reports the development of monitoring tool, the implementation of M&E and the result of monitoring of the OPH component.

(1) Development of M&E Plan

The JICA Expert Team established an M&E tool (refer to Table 33), consisting of several indicators, including questionnaires based on several discussions with stakeholders. As it was difficult to obtain quantitative figures for indicators 2 and 3 for the project purpose, questionnaires (see Table 34 and Table 35) were developed for the Counterpart Hospital and the Partner Hospitals.

Table 33 The overview of the M&E tool

Purpose and Output	Indicator
Project Purpose: The role of the Counterpart Hospitals is strengthened, in terms of improving quality and coverage of regional health care including remote areas, through the university hospital-centered D2D telemedicine mechanism with the Partner Hospitals	**Indicator 1:** The number of the Partner Hospitals that operationalize the "university hospital-centered D2D telemedicine mechanism"
	Indicator 2: Satisfaction rate on D2D telemedicine by both the Counterpart Hospitals and the Partner Hospitals
	Indicator 3: Meaningful/sustainable knowledge transfer between residents by seamless deployment to RSUD.
	Indicator 4: Number of patients treated with D2D telemedicine using device for three months.
	Indicator 5 (from the scaling-up activity): The number of unnecessary referred patients decreased in the scaling-up activity. (5-1 Unnecessary referrals from PKM to RSUD: 5-2 Unnecessary referrals from RSUD to upper-level hospitals)
	Indicator 6 (from the scaling-up activity): The number of early screening and detecting eye diseases at the community using the D2D telemedicine device for three months. (It was decided in the fourth TWG that this indicator should be omitted since it is difficult to gather the data for this indicator.)
Output 1: To implement D2D telemedicine (tele-consultation and tele-education) between Counterpart Hospitals and Partner Hospitals, with the aim of enhancing inter-hospital collaboration in diagnosis, clinical case management support, and knowledge sharing	**Indicator 1 :** The number of clinical cases diagnosed through D2D telemedicine at the Partner Hospitals.
	Sub-Indicator1−1: Number of cases for emergency surgical operation.
	Sub-indicator1−2: Number of patients to be referred to upper-level hospitals.
	Sub-indicator 1−3: Number of patients needing remote consultation.
	Sub-indicator 1−4: Number of patients followed-up at RSUD and PKM (remote consultation is unnecessary).
	Sub-indicator 1−5: Number of patients not needing follow-up.
	Indicator 2: The number of tele-conferences between RSUH and the Partner Hospitals using the data gathered by the device.
	Indicator 3: The number of medical and paramedical staff (Resident, GP, Nurses, and others) at the Partner Hospital(s) to use the telemedicine device.

Table 34 Questionnaire to the Counterpart Hospital

No.	Questions
1	What position are you responsible for?
2	How long have you been in this position?
3	How satisfied are you with the training provided by MITAS medical for the new slit-lamp microscope project? (Select one)
4	How often do you deal with the feedback related to the new slit-lamp microscope? (Select one)
5	How would you rate the ease of use of the new slit-lamp microscope system? (Select one)
6	Which communication tools do you use to communicate with the Partner Hospitals (RSUD Bumi Pauna, RSUD KH Hayyung)?
7	How satisfied are you with the communication with the Partner Hospital (RSUD Bumi Pauna and RSUD KH Hayyung) through D2D telemedicine using the new slit-lamp microscope system?
8	How much did this project affect your workload?
9	Do you think the slit-lamp microscope project has improved the ability of the Partner Hospitals (RSUD Bumi Pauna and RSUD KH Hayyung to provide patient care? (Select one)
10	How satisfied are you with the speed and efficiency of the referral process using the new slit-lamp microscope?
11	Would you recommend the use of the new slit-lamp microscope device to your colleagues?
12	[if you are responsible for scheduling the sending out resident doctor to other hospital, please answer this]
13	What challenges, if any, have you encountered in implementing the D2D telemedicine project?
14	Please provide any suggestions or recommendations for improving the slit-lamp microscope project. (Open-ended question)

Source: JICA Expert Team

Table 35 Questionnaire for the Partner Hospitals

No.	Questions
1	Which position are you responsible for?
2	How long have you been in this position?
3	How satisfied are you with the training provided by Mitas medical, RSUH for the handheld slit-lamp microscope project?
4	How often do you use the new slit-lamp microscope device?
5	How would you rate the ease of use of the new slit-lamp microscope device?
6	How easy is it to communicate with RSUH via the new slit-lamp?
7	How satisfied are you with feedback from RSUH? （1 Low to 7 High)
8	What communication tools are you using to communicate with RSUH?
9	In an emergency, how timely was the feedback and communication via the new slit-lamp microscope?
10	In a normal (non-emergency) situation, how timely was the feedback and communication via new slit-lamp microscope?
11	How satisfied are you with the speed and efficiency of the referral process with the help of the new slit-lamp microscope?
12	Would you recommend the new slit-lamp microscope device to colleagues?
13	How has the new slit-lamp microscope device impacted patient care in your practice?
14	(Please skip to the question 16 if you are not resident doctor) [Resident only] How many days did you overlapp with previous residents?
15	[Only resident] Did the handover process of the device take place from your predecessor?
16	[Only resident] How satisfied are you with the device instruction conducted by your predecessor?
17	What challenges, if any, have you encountered during the implementation of D2D tele-medicine project? (Open-ended question)
18	Please provide any suggestions or recommendations for improving the slit-lamp microscope project. (Open-ended question)

Source: JICA Expert Team

(2) Implementation M&E activities

To monitor the project's progress, M&E activities were regularly implemented utilizing the M&E tool. The M&E activities were scheduled as follows:

- 1st M&E Jul 2023 (Period covered: Apr-Jun 2023) (With 1st questionnaire survey)
- 2nd M&E Oct 2023 (Period covered: Jul - Sept 2023) (With 2nd questionnaire survey)
- 3rd M&E Jan 2024 (Period covered: Oct - Dec 2023)
- 4th M&E Mar 2024 (Period covered: Jan - Mar 2023) (With 3rd questionnaire survey)
- 5th M&E Apr 2024 (Period covered: Mar 2024)

Table 36presents the results obtained from a series of M&E activities administered throughout the project periods.

Table 36 Monitoring results obtained from a series of monitoring (OPH)

Project goal			
The role of the Counterpart Hospitals is strengthened, in terms of improving quality and coverage of regional health care including remote areas, through the university hospital-centered D2D telemedicine mechanism with the Partner Hospitals			
Indicator			**Result**
1	Number of the Partner Hospitals that operationalize the "university hospital-centered D2D telemedicine mechanism"		Pilot Activity ・ Apr-Jul : 2 facilities Scaling-up Activity ・ Aug-Oct: 6 facilities ・ Nov-Jan: 6 facilities ・ Feb-Mar: 6 facilities
2	Satisfaction rate on D2D telemedicine by both the Counterpart Hospitals and the Partner Hospitals		Questionnaire
3	Meaningful/sustainable knowledge transfer between residents by seamless deployment to RSUD		Questionnaire
4	Number of patients treated with D2D telemedicine using device for three months		**Pilot Activity** ・ Apr-Jul: 30 cases **Scaling up Activity** ・ Aug-Oct: 142 cases (RSUD: 60, PKM: 82) ・ Nov-Jan: 206 cases (RSUD: 64, PKM: 144) ・ Feb-Mar: 24 cases (RSUD: 19, PKM: 14) *Six cases from RSUD in Oct were not be judged due to poor quality of image
5	Number of unnecessary referred patient decrease in scaling-up phase (early detection makes)	5-1 Identifying the number of potential unnecessary referrals from PKM to RSUD	Detail in Table 38
		5-2 Unnecessary referrals from RSUD to the upper level hospital	RSUD KH Hayyung Jan-Dec 2023: 10/173 total referral (5%) Jan-Feb 2024: 5/31 cases *Baseline: 23/139 (2022) (16%) RSUD Bumi Panua

			Jan-Dec 2023: 1/162 total referral (0.6%) Jan-Mar 2024: 0/38 (0%) *Baseline: 7/109 (2022) (6%)
6	Number of early screening and detecting eye diseases at the community using the D2D telemedicine device for three months		No community activities so that this indicator was omitted.
<Output1> D2D telemedicine (tele-conference and tele-consultation) between the Counterpart Hospitals and the Partner Hospitals are planned and introduced, for enhancing inter-hospital collaboration in diagnosis and clinical case management support and knowledge sharing.			
Monitoring Indicators			**Result**
Number of clinical cases diagnosed through D2D telemedicine at the Partner Hospitals			**Pilot Activity** ・ Apr-Jul: 30 cases **Scaling up Activity** ・ Aug-Oct: 143 cases (RSUD: 60, PKM: 83) ・ Nov-Jan: 208 cases (RSUD: 64, PKM: 144) ・ Feb-Mar: 49 cases (RSUD: 15, PKM: 34) *Six cases from RSUD in Oct were not be judged due to poor quality of image
1-1	Number of cases for emergency surgical operation (operation in RSUD) <labeled as “Emergency”>		**Pilot Activity** ・ Apr-Jul: 2 cases **Scaling up Activity** ・ Aug-Oct: 0 cases ・ Nov-Jan: 7 cases (RSUD: 6, PKM: 1) ・ Feb-Mar: 0 cases
1-2	Number of patients needing to be referred to upper-level hospitals, not only RSUH (necessary referral) <labeled as “Refer”>		**Pilot Activity** ・ Apr-Jul: 6 cases **Scaling up Activity** ・ Aug-Oct: 7 cases (RSUD: 7) ・ Nov-Jan: 12 cases (RSUD: 9, PKM: 3) Feb-Mar: 10 cases (RSUD :6, PKM: 4)
1-3	Number of patients needing remote consultation <labeled as “Follow and Consultation”>		**Pilot Activity** ・ Apr-Jul: 7 cases **Scaling up Activity** ・ Aug-Oct: 35 cases (RSUD: 12, PKM: 23) ・ Nov-Jan: 28 cases (RSUD: 10, PKM 18) Feb-Mar: 10 cases (PKM: 10)
1-4	Number of patients followed-up at RSUD and PKM (Remote consultation is unnecessary) <labeled as “Follow”>		**Pilot Activity** ・ Apr-Jul: 14 cases **Scaling up Activity** ・ Aug-Oct: 69 cases (RSUD: 31, PKM: 38) ・ Nov-Jan: 60 cases (RSUD: 31, PKM: 29) Feb-Mar: 12 cases (RSUD: 9. PKM: 3)
1-5	Number of patients not needing follow-up <labeled as “End”>		**Pilot Activity** ・ Apr-Jul: 1 case **Scaling up Activity**

	・ Aug-Oct: 26 cases (RSUD: 4, PKM: 22) ・ Nov-Jan: 101 cases (RSUD: 8, PKM: 93) Feb-Mar: 17 cases (PKM: 17)
Number of tele-conferences between RSUH and Partner Hospitals using the data gathered by the device.	1 (A tele-conference was organized in Feb 2024)
Number of medical and paramedical staff (Resident, GP, Nurses, and others) at the Partner Hospital(s) to use the telemedicine device	**Pilot Activity** ・ Apr-Jul: 5 residents **Scaling up Activity** ・ Aug-Oct: 16 (RSUD: 4 residents PKM:12 medical staff) ・ Nov-Jan: 16 (RSUD: 4 residents, PKM: 12 medical staff) ・ Feb-Mar: 15 (RSUD: 3 residents, PKM: 12 medical staff)

Source: JICA Expert Team

< OPH M&E Summary>

In the OPH component, the project purpose and Output 1 were generally considered achieved (Table 36).

The number of the Partner Hospitals operating D2D telemedicine through the MS1 was recorded as six facilities at the project's conclusion. RSUD Bumi Panua and RSUD KH Hayyung commenced D2D telemedicine operations by MS1 during the pilot activity in Apr 2023 (the actual clinical application commenced post-Jun, following the approval of device registration). In accordance with the scaling-up activity initiated from Aug 2023, PKM (PKM Lemito, PKM Paguat, PKM Benteng, and PKM Bontomatene) were selected as the Partner Hospitals and began utilizing MS1.

Regarding the clinical cases diagnosed by the MS1, it remained steady until Jan 2024, as Figure 34 presents. During the pilot activity period from Apr to Jul, there were 30 cases; from Aug to Oct, 143 cases; from Nov to Jan, 208 cases; and from Feb to Mar, 24 cases. As a result, the cumulative number of MS1 usage reached 430 cases at the end of the project.

Such increments in clinical cases by MS1 was primarily attributed to five factors. First, the expansion of the Partner Hospitals from two to six facilities in Aug led to the increase of clinical cases. Second, additional local coordinators were assigned to establish a stable supporting system for the Partner Hospitals. Third, the newly established SOP consistently demonstrated functionality throughout the project. Fourth, the remote diagnostic mechanism was strengthened by assigning senior residents at RSUH during the scaling-up activity. Finally, medical staff at the partner PKM generally do not transfer to other hospitals; thus, they tend to acquire more proficiency with MS1.

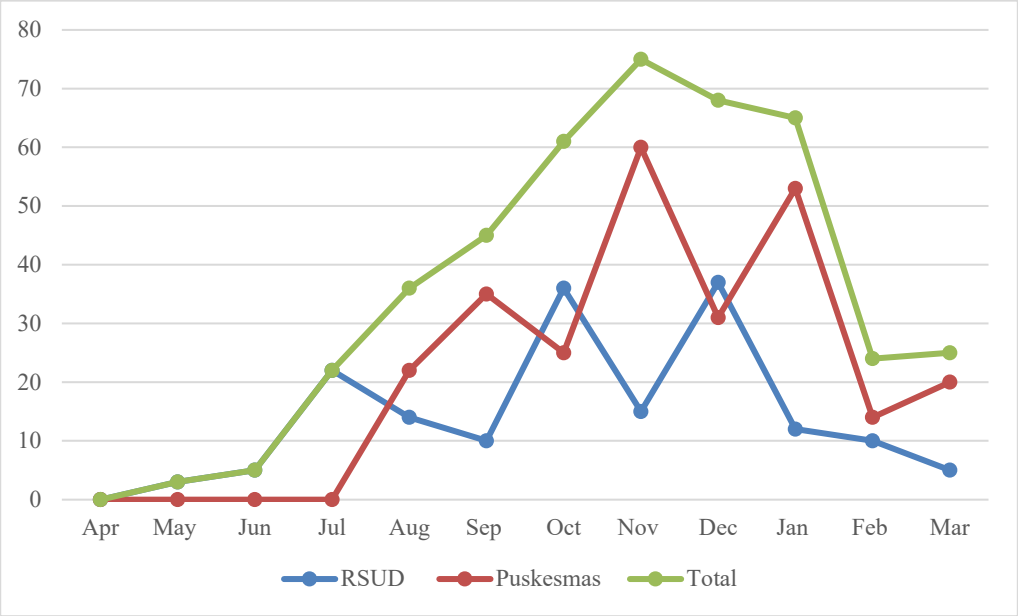


Figure 34 MS1 clinical cases by each month and result of Total, RSUD and PKM

Source: JICA Expert Team

However, the MS1 usage volume significantly declined in Feb 2024, particularly in PKM. Specifically, the decline in MS1 usage rate was notable at PKM Lemito and PKM Paguat, as shown in Table 37.

There were four primary issues contributing to such a declining trend of MS1 usage at PKM Lemito and PKM Paguat in Jan-Feb 2024 as follows:

1. In the case of PKM Paguat, MS1 was unavailable from Jan to the beginning of Mar 2024 due to equipment failure (The JICA Expert Team and the Private Partner addressed and resolved the issue during the site visit in Mar 2024).
2. Variation in the number of MS1 usage was related to the number of Posyandu conducted, and ophthalmic diagnostics in Posyandu were not routinely carried out.
3. Some patients did not necessarily need to be treated by MS1 due to their medical conditions, such as obvious trauma.
4. Some patients did not want to wait for a remote judgement made by the senior resident at RSUH and may have refused to be treated by MS1. (Issue 3 and 4 were common issues across all PKM Partner Hospitals).

Table 37 PKM MS1 usage rate for total patients each two month since Nov 2023 (MS1 usage/total patient)

	Nov-Dec 2023	Jan-Feb 2024
PKM Lemito	30% (22/72)	11% (3/28)
PKM Paguat	92% (12/13)	5% (1/17)
PKM Benteng	84% (28/33)	71% (20/28)
PKM Bontomatene	66% (29/44)	82% (43/57)

Source: JICA Expert Team

The result of the indicator 5-1 implies that as MS1 usage increased at PKM, the referral rate declined. To estimate the transition in the number of unnecessary referrals, Table 38 illustrates the MS1 usage and referral rates for the total number of OPH patients seen at PKM. As shown, MS1 use increased to 62% in Nov-Jan compared to 35% in Aug-Oct; consequently, the referral rate also decreased from 49% to 26%. Therefore, this result suggests the efficiency of MS1, indicating that an increase in MS1 usage leads to a reduction in the number of referrals, thereby minimizing potentially unnecessary referrals from PKM to RSUD. However, the causal relationship between MS1 use and reduced unnecessary patient referrals needs further validation.

Table 38 Project Goal Indicator 5-1: the number of total patient visiting PKM, "refer" judgement by the MS1 and actual referrals from PKM to RSUD

	Total patient	MS1 usage	Total referral number
PKM (Aug-Oct 2023)	213	82 (usage rate 35%)	105 (Referral rate 49%)
PKM (Nov 2023-Jan 2024)	230	144 (usage rate 62%)	60 (Referral rate 26%)

Source: JICA Expert Team

However, there were gaps between number of "Refer" judged by senior resident and the number of actual referrals to upper-level hospitals, as Table 39 indicates. For instance, between Nov 2023 and Jan 2024, although three cases were judged as "Refer" by senior resident, the actual number of referrals to upper level hospitals amounted to 60 cases. Such discrepancy could be attributed to following three factors affecting referral decisions: (i) circumstances on the part of the PKM, such as the lack of medicinal stock; (ii) GPs issuing referrals to patients before receiving feedback at the request of the patient not wanting to wait for feedback from the senior resident.

Table 39 The number of "refer" judged by MS1 and actual referral

	Total patient	MS1 usage	"Refer" judged by MS1 <total referrals>
Aug-Oct 2023	213	82	0 <105>
Nov 2023-Jan 2024	230	144	3 <60>
Feb -	53	14	2 <20>

Source: JICA Expert Team

As Indicator 5-2 showed, the number of unnecessary referrals from RSUD to upper-level hospitals decreased. In the case of RSUD KH Hayyug, there were 10 unnecessary referrals out of a total of 173 referrals, constituting a 5% rate of unnecessary referrals. This represents a positive trend compared to the baseline year 2022 which had a 16% rate of unnecessary referrals. Additionally, in the case of RSUD Bumi Panua, the unnecessary referral rate was reduced to 0.6% in 2023, with only one unnecessary referral out of 162 total referrals. The result of Output 1 sub-indicator suggested that many patients seen at PKM are essentially unnecessary for remote consultation and referral to upper-level hospitals. First, the result of the sub-indicators in Output 1 are as follows: the total number of clinical cases judged by the MS1 is 430 cases (six cases from RSUD were not be judged due to poor quality of image), "Emergency" cases are nine, "Refer" cases are 35, "Follow and Consultation" cases are 80, "Follow" cases are 155, and "End" cases are 145 in total throughout the project. Additionally, Figure 35 exemplifies the cumulative results of sub-indicators by RSUD and PKM

throughout the project. As it exhibits, "Follow" is most high frequent result of judgment in total. Additionally, cases of "End" was judged in significant high frequency at PKM, while cases of "Emergency" and "Refer" were more often judged in RSUD. Therefore, this high frequency of 'End' judgement in PKM suggests that many patients who do not require remote consultation or referral to upper-level hospital are seen in PKM.

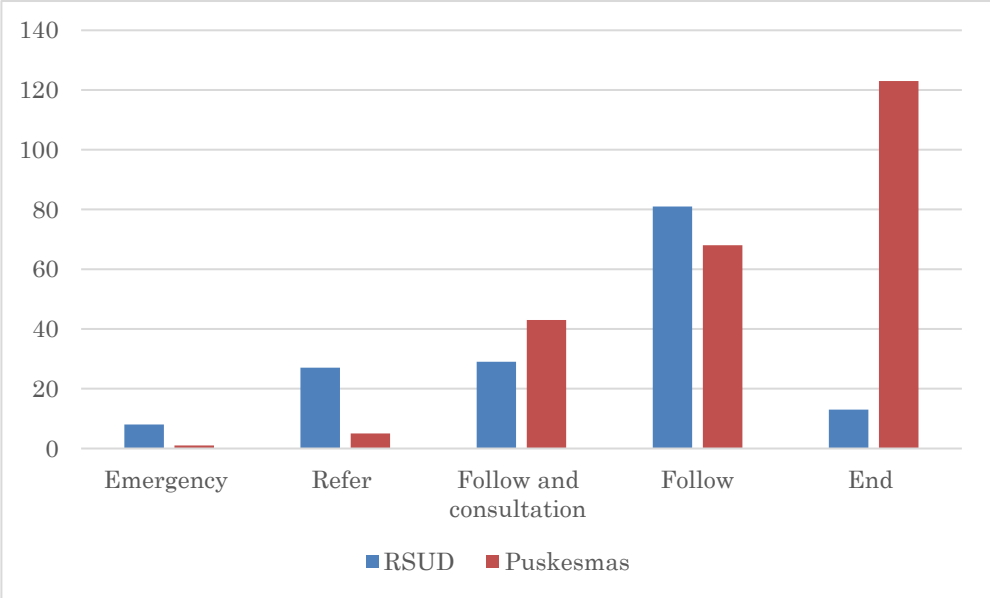


Figure 35 Cumulative result of sub-indicator by RSUD and PKM

Source: JICA Expert Team

Furthermore, concerning the teleconference, it was organized in Feb 2024. As specifically illustrated in Section 2-1, in the Activity related to Output 1, approximately 50 medical staff participated from RSUH, RSUD, PKM, and others. The tele-conference provided an opportunity for enhancing inter-hospital collaboration in diagnosis, clinical case management support, and knowledge sharing.

Regarding the medical staff using the MS1, there was no significant downward trend during the project period. During the pilot activity, three residents had operated the MS1. During the scaling-up activity, while the number of medical staff in RSUD changed due to regular resident turnover, two to three medical staff members in PKM consistently used MS1 throughout the scaling-up activity. Consequently, approximately 25 medical staff participated in operating the MS1 at the conclusion of the project.

<OPH Questionnaire Summary>

Alongside the implementation of M&E activities, three rounds of questionnaire surveys were conducted to complement Indicators 2 and 3 in the Project Purpose.

In the initial round of surveys administered upon the completion of the pilot activity, six respondents participated, including an RSUD specialist. Four respondents expressed positive feedback regarding the training provided by MITAS Medical. Furthermore, four respondents provided positive feedback regarding ease of using the MS1. In relation to the question of the contribution of the MS1 to patient care, four respondents showed positive feedback. Specialists at RSUH also showed positive feedback for patient care by MS1. Additionally, regarding the Meaningful/sustainable knowledge transfer between residents by

seamless deployment to RSUD (Indicator 3 in the Project Purpose), three respondents reported having undergone the handover, and one respondent expressed being "Very satisfied," while three respondents conveyed being “Satisfied”.

In the second round of surveys implemented in Oct 2023, seven rspondents participated from the Partner Hospitals, with many expressing both positive and negative feedback on the usability of the MS1 and its system. For instance, while all respondents expressed satisfaction with the training provided by MITAS Medical, negative feedback regarding the ease of the MS1 usage was notable. Moreover, in response to the question on how the MS1 improves patient care, four respondents answered "no change" in a negative context. In relation to Monitoring Target 3 outlined in the Project Purpose, in accordance with iYobow and the MITAS Medical weekly report, there was no significant absence of resident at both RSUD Bumi Panua and RSUD KH Hayyung. Additionally, one resident, who was assigned in Sept, had an overlap of 1-3 days with the previous resident and expressed high satisfaction with the handover instructions.

In the third and final round of surveys conducted in Mar 2024, 18 respondents participated from both Partner Hospitals (10 respondents) and the Counterpart Hospital (eight respondents), with many expressing positive feedback. Regarding satisfaction with the training provided by MITAS Medical, all respondents reported positive feedback. Furthermore, in contrast to the second round , all respondents provided positive feedback regarding how the MS1 improved patient care, except for one respondent who indicated "no change." Additionally, in relation to the reduction of unnecessary referral by MS1 system, all respondents including eight respondents from RSUH expressed positive feedback. Concerning the sustainable knowledge transfer of MS1, the JICA Expert Team confirmed that residents have not been seamlessly deployed to RSUD. In other words, the handover process of MS1 has not occurred at RSUD between the predecessor resident and the newly deployed resident. Instead, the knowledge transfer and sharing about MS1 operations have taken place at RSUH. This is because approximately 10 residents who could operate MS1 have already completed their deployment at RSUD and returned to RSUH.

This series of questionnaires had not only revealed results for the indicators 2 and 3 but was also effective in highlighting the challenges faced by both the Counterpart Hospital and the Partner Hospitals. The challenges identified from the results of these questionnaires were disseminated across various channels, including the meeting agenda of the TWG and the bi-weekly report, to facilitate discussions and explore potential solutions. The primary challenges raised from the series of questionnaires and their conceivable solutions discussed are outlined in Table 40.

Table 40 Challenges result from questionnaires and their solution

1st Round of Questionnaire	
Challenge	**Solution**
- Loading and logging in are required each time patient data is uploaded.	It is challenging to modify the settings from a security perspective.
- Being able to use the application on other cell phones.	To adjust the equipment, medical personnel can utilize MS1 by their own mobile phones. Already addressed by Mitas Medical's local coordinator.
2nd Round of Questionnaire	
- There are some patients who do not want to be examined; they just want to ask for a referral to the hospital.	Promoting patient awareness regarding the significance of receiving diagnoses at PKM.

- In cases where there are many patients, it is difficult to use the equipment efficiently.	Encouraging local coordinators to consistently follow up with the Partner Hospitals.
- Feedback from RSUH ophthalmologists should be sent on time.	Facilitating immediate information sharing and promoting senior resident correspondence to PKM through WhatsApp.
- Re-entering passwords every time the MS1 is accessed, making the whole process more inefficient.	It is challenging to modify the settings from a security perspective at this time.
3rd Round of Questionnaire	
- Indonesia's uneven internet network infrastructure is an obstacle for telemedicine service users.	Encouraging DHO to expand the budget for the development of internet infrastructure.
- Some patients refuse to be seen by MS1 and seek immediate referral to the hospital and eye clinic.	Promoting patient awareness regarding the significance of receiving diagnoses at PKM.
- More training needed	Encouraging Mitas Medical to consistently follow up.
- Feedback from RSUH should be expedited	Facilitate timely feedback from senior residents.

Source: JICA Expert Team

(3) Evaluation of Activities Related to Output 2

Given that the M&E tool was established based on discussions among stakeholders, and periodic M&E activities were implemented based on the tool, the Output 2 could be deemed highly achieved. The JICA Expert Team established a consistent monitoring system wherein monitoring data were consistently shared by the Partner Hospitals and MITAS Medical at regular intervals. This practice facilitated tracking the ongoing project's progression throughout its duration. In addition, as part of the M&E activities, periodic surveys were administered to observe satisfaction with D2D telemedicine operations by MS1 and to identify current challenges. Subsequently, potential countermeasures against issues raised from the questionnaires were discussed through various channels, ensuring the successful resolution of the project. As a result of these inputs related to Output 2, many indicators showed a positive trend, as demonstrated above.

Moreover, these results suggest some indication of how D2D telemedicine has had a positive impact on ophthalmic care in the target hospitals, particularly in reducing unnecessary patient referrals. However, it should be noted that the results of such M&E activities are based on short-term assessments within the context of a one-year project. Therefore, systematic conclusions on the effectiveness of D2D telemedicine cannot be drawn solely from the results of this project, and longer-term activities and evaluations are required in order to obtain more solid evidence.

Table 41 Indicators of Output 2（RSUH:OPH）

Output 2	
M&E plan and structure are developed and utilized to assess effectiveness of D2D telemedicine at both the Counterpart Hospitals and the Partner Hospitals	
Indicators	**Result**
・ Establishment of monitoring mechanisms to monitor the project every three months. ・ For measuring the usage status and satisfaction by users every three months, a questionnaire will be developed and monitoring will be carried out.	An M&E tool, comprising of various indicators and questionnaires, was established prior to the pilot activity. The first M&E activity was conducted in early Jul to observe project progression during the period from Apr to Jun 2023, with subsequent M&E activities taking place every three months. This series of M&E activities throughout the project not only reflects the project's progress but also yields insightful results, as demonstrated earlier.

Source: JICA Expert Team

4-2. Activities related to Output 2 (OB)

The following section reports the development of a monitoring tool, the implementation of M&E, and the monitoring result of the OB component.

(1) Development of M&E plan

The JICA Expert Team established an M&E tool (refer to Table 42), consisting of several indicators, including questionnaires based on discussions with stakeholders. Additionally, questionnaires were developed to obtain information on indicators 2 and 3 of the project purpose (refer to Table 43 and Table 44).

Table 42 The overview of the M&E tool (OB)

Purpose and Output	Indicator	
<Project purpose> To strengthen the role of the Counterpart Hospitals , in terms of improving quality and coverage of regional health care including remote areas, through the university hospital-centered D2D telemedicine mechanism with the Partner Hospitals	1	The number of the Partner Hospitals that operationalize the "university hospital-centered D2D telemedicine mechanism
	2	Satisfaction rate on D2D telemedicine by both the Counterpart Hospitals and the Partner Hospitals
	3	Meaningful/sustainable knowledge transfer between residents by seamless deployment to RSUD
	4	Number of early detections by improvement of the examination quality for a month
	5	Number of infant death cases at each Partner Hospital
<Output 1> D2D telemedicine (tele-consultation and tele-education) between the Counterpart Hospitals and the Partner Hospitals are planned and introduced, for enhancing inter-hospital collaboration in diagnosis and clinical case management support and knowledge sharing	1	Number of tele-conferences between RSUH and the Partner Hospitals
	2	Number of clinical cases diagnosed through D2D telemedicine at the Partner Hospital
	3	Number of medical staff (resident, GP, midwife, and others) using the telemedicine device

Source: JICA Expert Team

Table 43 Questionnaire to the Counterpart Hospitals

No.	Questions
1	Which position are you responsible for?
2	How long have you been in this position?
3	How satisfied are you with the training provided by Sehati for the TeleCTG project?
4	How often do you handle feedback related to the TeleCTG project?
5	How would you rate the ease of use of the newly introduced TeleCTG system?
6	Which communication tools are you using to communicate with the Partner Hospitals (RSUD KH Hayyung and PKM Benteng)?
7	How are you satisfied with communication with partner hospital (RSUD KH Hayyung and PKM Benteng) through D2D telemedicine using the new TeleCTG system?
8	How much did this project affect your workload?
9	How do you think the new TeleCTG project has improved the patient care capability of the Partner Hospitals (RSUD KH Hayyung and PKM Benteng)?
10	How satisfied are you with the speed and efficiency of the referral process by the new TeleCTG?
11	Would you recommend the use of the new TeleCTG device to colleagues? (Select one)
12	[If you are responsible for scheduling the sending out of resident doctors to other hospitals, please answer] Do you think that the seamless allocation of residents to other hospitals is taking place?
13	What challenges, if any, have you encountered during the implementation of D2D tele-medicine project? (Open-ended question)
14	Please provide any suggestions or recommendations for improving the TeleCTG project. (Open-ended question)

Source: JICA Expert Team

Table 44 Questionnaire for the Partner Hospitals

No.	Questions
1	Which position are you responsible for?
2	How long have you been in this position?
3	For which facilities are you working?
4	How satisfied are you with the training provided by Sehati, RSUH for the TeleCTG project? (Select one)
5	How often do you use the TeleCTG device? (Select one)
6	How would you rate the ease of use of the TeleCTG device? (Select one)
7	How easy is it to communicate with RSUH via the TeleCTG?
8	How satisfied are you with feedback from RSUH? （1 Low to 7 High）
9	What other communication tools are you using to communicate with RSUH after device?
10	In an emergency, how timely was the feedback and communication via TeleCTG?
11	In a normal (non-emergency) situation, how timely was the feedback and communication via TeleCTG?
12	How satisfied are you with the speed and efficiency of the referral process by the TeleCTG?
13	Would you recommend the use of the TeleCTG device to colleagues?
14	How has the TeleCTG device impacted patient care in your practice?
15	(Please skip to the question 16 if you are not resident doctor) [Resident only] How many days did you overlapp with predecessor?
16	[Only resident] Did the handover process of the device take place from your predecessor?
17	[Only resident] How satisfied are you with instruction for the device as conducted by your predecessor?
18	What challenges, if any, have you encountered during the implementation of D2D tele-medicine project? (Open-ended question)
19	Please provide any suggestions or recommendations for improving the TeleCTG project. (Open-ended question)

Source: JICA Expert Team

(2) Conduct M&E

To monitor the project's progress, M&E activities were regularly implemented using the M&E tool as illustrated. The M&E activities were scheduled as follows.

- 1st M&E Jul 2023 with questionnaire survey (Period covered: Apr-Jun 2023)
- 2nd M&E Oct 2023 with questionnaire survey (Period covered: Jul - Sept 2023)
- 3rd M&E Jan 2024 (Period covered: Oct - Dec 2023)
- 4th M&E Mar 2024 with questionnaire survey (Period covered: Jan – Feb 2024)
- 5th M&E Apr 2024 (Period covered: Mar 2024)

Table 45 presents the results obtained from a series of M&E activities administered throughout the project periods.

Table 45 Overall monitoring results obtained from a series of monitoring (OB)

Project purpose		
To strengthen the role of the Counterpart Hospitals in terms of improving quality and coverage of regional health care including remote areas through the university hospital-centered D2D telemedicine mechanism with the Partner Hospitals		
Indicators		**Result**
1	The number of the Partner Hospitals that operationalize the “university hospital-centered D2D telemedicine mechanism”	Pilot Activity ・ Apr-Jul: **2 facilities** Scaling-up Activity ・ Aug-Oct: **4 facilities** ・ Nov-Jan: **4 facilities** ・ Feb-Mar: **4 facilities**
2	Satisfaction rate on D2D telemedicine by both the Counterpart Hospitals and the Partner Hospitals	Questionnaire
3	Meaningful/sustainable knowledge transfer between residents by seamless deployment to RSUD	Questionnaire
4	Number of early detections by improvement of the examination quality for a month	This indicator was removed because TeleCTG itself serves as a device for early.
5	Number of infant death (change to neonatal) cases at each Partner Hospital	Pilot Activity ・ Apr-Jul: 7 **cases** (RSUD:7, PKM Benteng 0) Scaling-up Activity ・ Aug-Oct: **3 cases** (RSUD: 2, PKM Bontosunggu 1) ・ Nov-Jan: **2 cases** (RSUD:2) ・ Feb- Mar: **1 case** (RSUD:1)
Output 1		
D2D telemedicine (tele-consultation and tele-conference) between the Counterpart Hospitals and the Partner Hospitals are planned and introduced, for enhancing inter-hospital collaboration in diagnosis and clinical case management support and knowledge sharing.		
Monitoring indicators		**Result**
1	Number of tele-conferences between RSUH and Partner Hospitals	1 (A tele-conference was organized in Feb 2024)

2	Number of clinical cases diagnosed through D2D telemedicine at the Partner Hospital	Pilot Activity ・ Apr-Jul: **81 cases** (RSUD: 31, PKM:50) Scaling-up Activity ・ Aug-Oct: **69 cases** (RSUD: 7, PKM:62) ・ Nov-Jan: **66 cases** (RSUD:0, PKM: 66) ・ Feb-Mar: **26 cases** (RSUD:0, PKM: 26)
3	Number of medical staff (resident, GP, midwife, and others) to use the telemedicine device	Pilot activity: 59 individuals were registered and installed Scaling-up activity: 99 individuals were registered and installed

Source: JICA Expert Team

<OB Monitoring Summary>

As demonstrated in Table 45, the Project Purpose and Outcome 1 were generally achieved in the RSUH OB component.

The number of partner hospitals operating TeleCTG amounted to four facilities at the project's conclusion. RSUD KH Hayyung and PKM Benteng commenced D2D telemedicine operations through TeleCTG during the pilot activity in April 2023. In accordance with the scaling-up activity initiated in Aug 2023, an additional two PKM, PKM Bontomatene and PKM Bontosunggu, were selected as Partner Hospitals and utilized TeleCTG.Regarding the number of neonatal deaths, a decrease was observed throughout the project period, although not statistically significant. During the pilot activity, seven cases of neonatal death were recorded. Subsequently, three cases were observed between Aug and Oct, two cases between Nov and Jan, followed by one case between Feb-Mar.

TeleCTG has been effectively operated with high usage throughout the project period. The volume of TeleCTG utilization (Indicator 2 in Output 1) had consistently been high throughout the entirety of the project. As Table 45 illustrated, 81 cases of TeleCTG utilization were recorded during the pilot activity, followed by 69 cases between Aug to Oct, 66 cases between Nov and Jan, 26 cases between Feb-Mar. Furthermore, the rate of ANC testing using TeleCTG among high-risk third-trimester pregnant women in PKM remained high throughout the project period. As Table 46 shows, the total coverage of high-risk 3rd trimester women for ANC was recorded at approximately 90%. Additionally, each PKM's coverage stands as follows: PKM Benteng at 98.7%, PKM Bontomatene at 89.2%, and PKM Bontosunggu at 84%.

Table 46 TeleCTG coverage for high-risk 3rd trimester women in ANC at PKM

PKM TeleCTG coverage for high-risk 3rd trimester women in ANC			
	High-risk 3rd trimester for ANC	TeleCTG usage	Coverage
Pilot activity	26	28	107%[4]
Aug-Oct	63	58	92%
Nov-Jan	54	54	96%
Feb-Mar	41	27	65%
Total	170	162	89.7%

Source: JICA Expert Team

However, since a specialist has been assigned at RSUD KH Hayyung in Nov 2023, TeleCTG has not been utilized, while the number of conventional CTG usages has increased. When a specialist has been assigned,

[4] The number above 100% is due to the fact that in some cases, multiple tests are performed on a single pregnant woman and treating pregnant women without risks

the necessity of D2D remote diagnosis with upper-level hospitals via TeleCTG is decreased. Therefore, consideration should be given to reallocating the TeleCTG at RSUD KH Hayyung to other PKM. Additionally, the specialist has conducted D2D telemedicine for cases raised from PKM (Option 1 on the OB SOP); thus, it could not be concluded that the telemedicine model is not working due to the reduced frequent of TeleCTG usage at RSUD KH Hayyung.

Figure 36 demonstrates the satisfaction level regarding feedback from RSUD and RSUH[5]. As indicated, more than 70% of respondents highly value the feedback from the RSUD. Therefore, although TeleCTG has not been used at RSUD KH Hayyung, it has been playing an important role as the service delivery hub in Selayar.

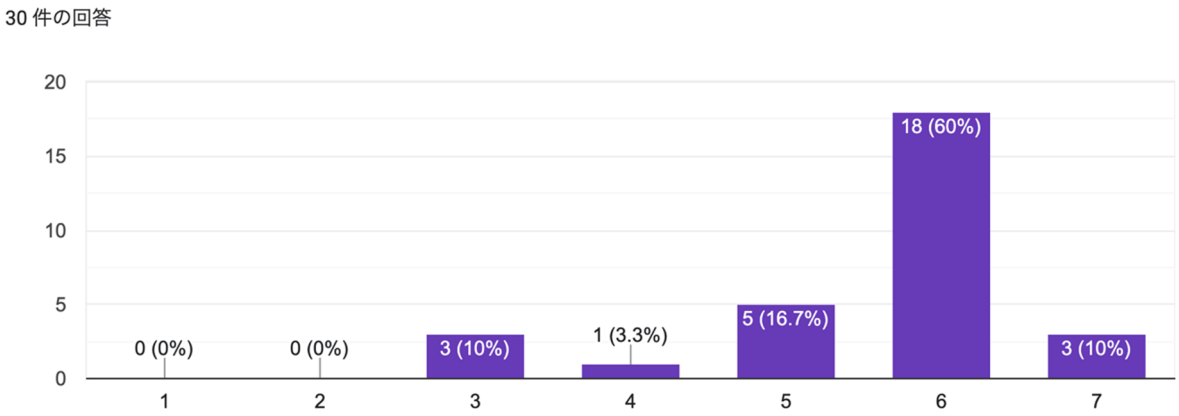


Figure 36 Satisfaction for feedback speed from RSUD and RSUH (1 low to 7 high)

Source: JICA Expert Team

<OB Questionnaire Summary>

Alongside the implementation of M&E activities, three rounds of questionnaire surveys were conducted during the project period to complement Indicators 2 and 3 in the Project Purpose.

In the initial round of questionnaires administered upon the completion of the pilot activity, with 18 respondents from both the Partner Hospital and the Counterpart Hospital, many expressed positive feedback. First, all respondents gave positive feedback regarding the ease of TeleCTG use and training provided by Sehati. Nine respondents reported "Significantly improved" and six respondents stated "Somewhat improved" regarding the contribution of TeleCTG to patient care. Regarding satisfaction in the TeleCTG handover process, pertaining to Indicator 3 in the Project Purpose, a respondent reported having undergone the handover and expressed being "Satisfied". Additionally, the JICA Expert team confirmed that the RSUH supervisor/specialist kept in consideration the seamless deployment of residents to the RSUD from the result of questionnaire.

The second round of the questionnaire was administered in Oct 2023 as a part of the second M&E activity, with 19 respondents participating, including a RSUH specialist. The result of the questionnaire showed many positive responses. For example, all respondents expressed high satisfaction with the training provided by Sehati. Moreover, 15 respondents expressed satisfaction for the speed and efficiency of the referral process,

[5] The interviews revealed that most of the feedback to PKM came from RSUD KH Hayyung.

while four respondents selected "neutral". In relation to, meaningful and sustainable knowledge transfer among residents (Monitoring Target 3 in the Project Purpose), an RSUH specialist indicated that they have continuously kept in mind seamless deployment of residents to RSUD.

As a part of fourth M&E, the third and final round of surveys were conducted in Mar 2024, with 40 respondents participating, many of whom expressed positive feedback. First, all respondents showed positive feedback for training provided by Sehati. Moreover, as Figure 36 illustrated, 70% of respondents provided a highly positive evaluation for satisfaction with the feedback from upper level hospitals. In response to the question on how the MS1 improves patient care, all respondents showed positive feedback. In addition, all nine respondents from RSUH expressed positive feedback regarding the efficacy of the referral process facilitated by D2D telemedicine through TeleCTG.

This series of questionnaire not only revealed results for Indicators 2 and 3 but was also effective in extracting the challenges from both the Counterpart and the Partner Hospitals. The challenges identified from these questionnaires were disseminated across various channels, including the meeting agenda of the TWG and the bi-weekly report, to facilitate discussions and explore potential solutions. The primary challenges raised from the series of questionnaires and their conceivable solutions discussed within the various channels are outlined in the following table.

Table 47 Challenges result from questionnaires and their solution

1st Round of Questionnaire	
Challenge	**Solution idea**
- Patients and families are not cooperative in recording TeleCTG data.	- Sehati has conducted awareness workshops for patient.
- Data transfer is problematic due to poor quality communication lines.	- Development of equipment capable of asynchronous transfer by Sehati. - Conducting tests on the quality of satellite links.
- There are too many data entry items about patients.	- Currently, simplification for entry data cannot be done because this data is supporting data in reading TeleCTG graphs sent to the consultation center → Continuous following up is significant in this issue.
2nd Round of Questionnaire	
- Network	Sehati has tried several providers and recommended Telkomsel and IM3
- Needing time for data filling	Implementing continuous training and follow-up.
- Untimely feedback from specialists	- Facilitating immediate information sharing through WhatsApp. - Sehati recommended to implement Service Level Agreement ("SLA") cloud service, but not yet in Selayar district.
- Uncooperative patient	Recommended community education through Posyandu activities (outside project activities). Recommended organizing perinatal care awareness workshops for pregnant and nursing women.
<Challenge of equipment> - Add more TeleCTG for outreach activities - Lack of spare batteries	Not covered by this project. New project plan targeting Selayar.
<Issues of SOP> - In RSUDs, midwives cannot follow the procedure as per the SOPs as midwives are	Ensuring SOPs for RSUD resident.

not authorized to use tools in the absence of a doctor's order.	
All midwives should receive TeleCTG training without exception	All midwives can receive trainings through inquiring Sehati.
TeleCTG should be included in the BPJS as an adjunct to USG and other testing equipment	BPJS policy on D2D telemedicine not yet finalized, but reporting the issue to relevant ministries such as the BPJS and the Ministry of Health.
3rd Round of Questionnaire	
- Addresses at outer island have not been synchronized	Sehati addresses this issue.
- Uncooperative patient	- TeleCTG connection to Satusehat reduces data entry time and shortens examination time. Population education through Posyandu activities is recommended (out of this project activity).
- Request additional TeleCTG for outreach	Not covered by this project. New project plan targeting Selayar.

Source: JICA Expert Team

(3) Evaluation of Activities Related to Output 2

Given that the M&E tool was established based on discussions among stakeholders, and periodic M&E activities were implemented based on the tool, the Output 2 can be considered highly achieved. A cohesive monitoring system was established throughout the project duration, with monitoring data consistently shared by the Partner Hospitals and Sehati. This practice facilitated ongoing monitoring of the project's progress. Additionally, questionnaire surveys conducted as part of the M&E activities played a significant role in operationalizing the project. They identified current challenges and helped formulate appropriate measures to address them.

It should be noted the results of such M&E activities were based on short-term assessments within the context of a one-year project. Therefore, systematic conclusions on the effectiveness of D2D telemedicine cannot be drawn solely from the results of this project, and longer-term activities and evaluations are required to obtain more solid evidence.

Table 48 Indicators and Evaluation of Output 2（RSUH:OB）

Output 2	
M&E plan and structure are developed and utilized to assess effectiveness of D2D telemedicine at both the Counterpart Hospitals and the Partner Hospitals	
Indicators	
・ Establishment of monitoring mechanisms to monitor the project every three months. ・ For measuring the usage status and satisfaction by users every three months, a questionnaire will be developed and initial monitoring will be carried out.	With the commencement of the pilot activity, an M&E tool comprising various indicators and questionnaires was established. The initial M&E activity occurred in early Jul and was subsequently conducted every three months throughout the duration of the project . This sequence of M&E activities not only detailed the project's advancement but also yielded insightful results, as previously indicated.

Source: JICA Expert Team

5. Activities related to Output 3

5-1. Organizing Lessons Learned on Telemedicine with a Focus on University Hospitals

At the completion of the pilot activities and at three months and six months after the start of the full-scale activities, the JICA Expert Team had been organizing issues and lessons learned as well as monitoring and evaluation of each component. The JICA Expert Team organized the lessons learned through discussions with the Counterpart Hospitals, the Partner Hospitals, the Private Partners, and other telemedicine-related organizations. The details are described in "VII Challenges, ideas, and lessons learned in project implementation and operation".

5-2. Conducting Discussions with Related Organizations for the Dissemination of Telemedicine Centered on University Hospitals.

During the full-scale activities, the AHS, telemedicine-related organizations (FORKOMTIKNAS, ATENSI, AHI etc.) held discussions in accordance with the above policies.

(1) MoECRT（AHS）

1) AHS Overview

AHS is a network of "faculty of medicine" among Indonesian universities, jointly promoted by MoECRT and MoH, that conducts activities to improve the status of medical personnel deployment in Indonesia. The main goals of the activities were to strengthen the allocation of doctors and other medical personnel to PKM and Class C and D hospitals (e.g., allocation of doctors to all PKM) and to improve the number of doctors per population (1 doctor/1,000 population, 0.28 specialist doctor/1,000 population) through enhanced allocation.

AHS is composed of three major networks: a network of faculty of medicine in university training doctors, nurses, pharmacists, and other health care professionals; a network of hospitals, mainly educational hospitals6; and finally, a network of health departments that manage secondary health care facilities (e.g. RSUDs) and PKM. The roles of each organization are described below. The roles of each organization are shown in the table below.

[6] Educational hospitals is composed of university hospitals, such as RSUI and RSUH, and teaching hospitals (e.g. RSCM) that serve as teaching centers to university hospitals.

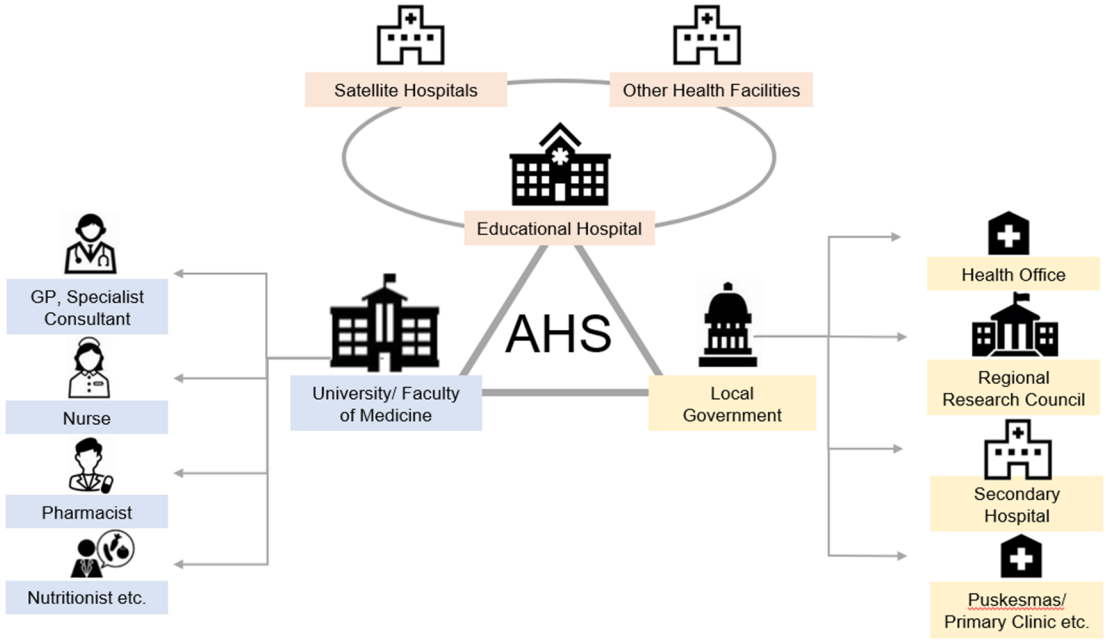


Figure 37 Image of AHS composition

Source: AHS-Universitas Gadjah Mada Website7

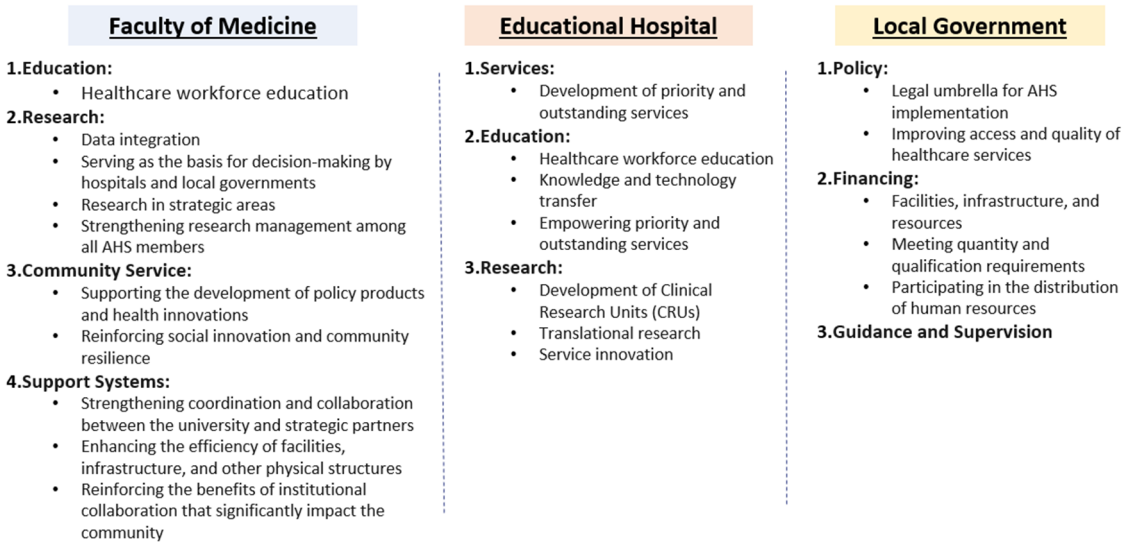


Figure 38 Overviews of AHS activities

Source: JICA Expert Team

AHS is based on the faculty of medicine among six universities, and each hospital is assigned an area throughout Indonesia. For example, in the case of AHS-UI, covering Jakarta Special Province and Papua Province, the faculty of medicine, educational hospitals, and health departments included in the area are working together to achieve the goals set by AHS.

7 https://ahs.ugm.ac.id/tentang-ahs-ugm/academic-health-system/

AHS[1]	Covered Regions	Number of Faculty Medicine
USU & UNAND	1) DI Aceh, 2) North Sumatera, 4) West Sumatera, 4) Riau, 5) Riau Island, 6) Jambi	14 Faculty of Medicine
UI	1) DKI Jakarta, 2) Papua	14 Faculty of Medicine
UNPAD	1) Bengkulu, 2)South Sumatera, 3) Bangka Belitung Island, 4) Lampung, 5)Banten, 6) Java Barat	11 Faculty of Medicine
UGM	1) Central Java, 2) DI Yogyakarta, 3) West Kalimantan, 4) East Kalimantan, 5) Central Kalimantan, 6) South Kalimantan, 7) North Kalimantan	18 Faculty of Medicine
UNAIR	1) East Java, 2) Bali, 3) West Nusa Tenggara, 4) East Nusa Tenggara	16 Faculty of Medicine
UNHAS	1) North Sulawesi, 2) Gorontalo, 3) West Sulawesi, 4) Central Sulawesi, 5) South-East Sulawesi, 6) South Sulawesi, 7) Maluku, 8) North Maluku, 9) West Papua	14 Faculty of Medicine

Note: [1] Commonly AHS is named based on the Academic Hospital name.

List of abbreviation:

Academic Hospital:
- USU: University of Sumatera Utara
- UNAND: Andalas University
- UI: University of Indonesia
- UNPAD: Padjadjaran University
- UGM: Gadjah Mada University
- UNAIR: Airlangga University
- UNHAS: Hasanuddin University

Teaching Hospital:
- RSUP HAM: H. Adam Malik General Hospital
- RSMDJ: Dr. M. Djamil General Hospital
- RSCM: Cipto Mangunkusumo Hospital
- RSHS: Dr. Hasan Sadikin General Hospital
- RSS: Dr. Sardjito General Hospital
- RSDS: Dr. Soetomo Hospital
- RSWS: Dr. Wahidin Sudirohusodo Hospital

Region Coordinator

- Region I: USU — RSUP HAM & UNAND — RSMDJ
- Region II: UI — RSCM
- Region III: UNPAD — RSHS
- Region IV: UGM — RSS
- Region V: UNAIR — RSDS
- Region VI: UNHAS — RSWS

Figure 39 Activity area educational hospital of each AHS

Source: Pokjanas AHS, 2023

AHS has a strategic plan to achieve its goals as shown in the table below. The short-term plan is to increase the number of quotas at the faculty of medicine; the medium-term plan is to increase the number of students in GP and specialist courses at the faculty of medicine and increase the number of educational hospitals; and the long-term plan includes establishing a new faculty of medicine and increasing the number of faculty of medicine.

	Short-term: University Students	Medium-term: Lecturer	Medium-term: Educational Hospital	Long-term: Faculty of Medicine
Target	Increase in the quota for medical students and specialist doctors	Increase in the number of lecturer	Increase in the number of Educational hospitals	Increase in the number of new medical programs or faculties
Initiatives	**For General Practitioners (GP) education:** • >20% increase in the quota for "Accredited A" medical faculties • 10% increase for "Accredited B" medical faculties.	Increase in lecturer members: • 1.5 times from General Practitioners • 2 times from specialist doctors.	Expansion of Educational Hospitals through a collaboration scheme.	Establishment of new medical faculties for General Practitioners
	For Specialist Doctors education: • Increase in the lecturer-to-student ratio to 1:5	Enhancement of lecturer' capabilities	Addition of around 260 Educational Hospitals through the Ministry of Health.	Opening of new specialist doctor programs in either new medical faculties or those that already have specialist programs.

Figure 40 Strategy of AHS

Source: JICA Expert Team

Regarding educational hospitals included in the strategy of AHS, each AHS has an educational

coordinating committee ("Komkordik") chaired by a representative from educational hospitals, whose membership is outlined in the figure below.

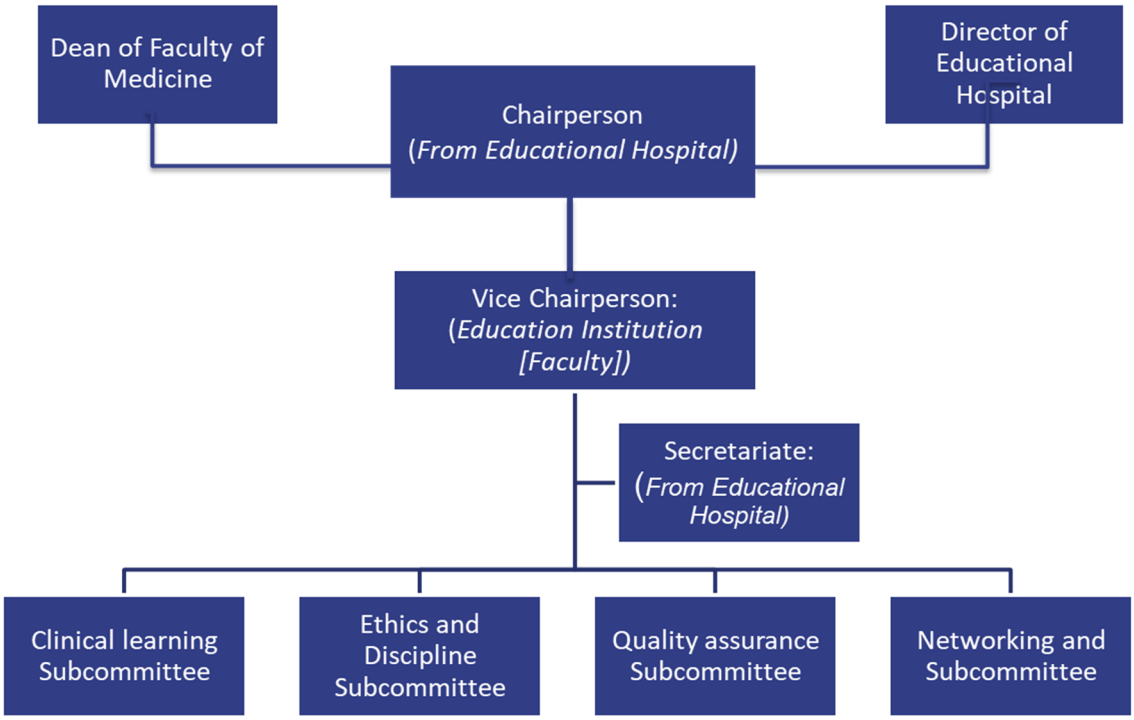


Figure 41 Organization chart of Komkordik

Source: JICA Expert Team

Komkordik is responsible for coordinating all clinical learning processes at educational hospitals and is implementing the activities listed in the table below to provide high quality educational services, improve health care services, and provide high quality health care services. The scheme of health service delivery by AHS is shown in the figure below.

Table 49 The role of Komkordik

1	Providing administrative support for the clinical learning process at educational hospitals
2	Developing plans for activities and annual budget expenditures for clinical learning
3	Planning the required facilities and infrastructure for students
4	Establishing an integrated information system to support the functions of medical, dental, and other health-related education, services, and research
5	Coordinating to facilitate all students involved in clinical learning, as well as teachers and supervisors providing guidance and supervision in the clinical learning process at educational hospitals
6	Supervising and coordinating performance assessments of teachers for all services provided
7	Monitoring and evaluating the implementation of the clinical learning process for students
8	Reporting work results periodically to the director of educational hospitals and the director of educational institutions

Source: JICA Expert Team

2) Discussion with AHS

For the expansion and sustainability of project activities, the JICA Expert Team is considering

collaboration with AHS using the D2D telemedicine model and has had the following discussions with MoECRT, the operating organization of the AHS.

Table 50 Discussion with AHS

Date	Meeting Overview	Participant
27th Oct	[Agenda] • The lessons learned from this project • Collaboration with the AHS in this project • Suggestions for future collaboration [Summary] The schedule for discussions with the AHS shall be as follows. • 1st meeting （Nov 2023） ① JICA Expert Team: Project overviews ② MoECRT: Collaboration with the MoECRT in this project. Possibility of collaboration between the AHS and the JICA. • 2nd meeting（Dec 2023） ➢ The issues of D2D telemedicine system and the policy • 3rd meeting（Jan 2024） • Policy recommendation for promoting D2D telemedicine.	• MoECRT ➢ Director General of Higher Education ➢ Director of Resources ➢ Directorate of Learning and Student Affairs ➢ Directorate of Resources ➢ Secretary for DGHE • JICA Indonesia Office • JICA Expert Team
10th Nov	[Agenda] • Outputs by this project • Policy recommendations • Collaboration between the JICA and the AHS [Summary] • The MoECRT expressed high interest in one of the project's policy recommendations, the possibility of collaboration with the AHS. In policy recommendations, the ministry's area of expertise should be kept in mind (MoH: Health field, MoECRT: Education field)	• MoECRT (Academic Staff for Director General of Higher Education) • JICA Indonesia Office • JICA HQ • JICA Expert Team
26th Jan	• Discussion draft policy recommendations [Summary] ➢ MoECRT generally agree with the draft policy recommendations from the JICA Expert Team, however the JICA Expert Team should consider how Indonesian government can incorporate activities toward Telehealth with a focus on education as well as clinically focused Telemedicine. ➢ With regard to the use of telemedicine platforms, there are public applications (KOMEN) as well as those developed by private companies. Currently, RSUI, RSUH, and other university hospitals have not reached consensus on the use of a specific application, but ideally it should be KOMEN. ➢ MoH, MoECRT believes that KOMEN should be introduced as a telemedicine platform to all educational hospitals, including university hospitals, and would like to first reach a consensus with hospital officials on the introduction of KOMEN, and in the future, standardize the telemedicine	• MoECRT ➢ Academic Staff for Director General of Higher Education • AHS • AHS-UI • AHS-UGM • JICA Expert Team

Date	Meeting Overview	Participant
	platform, not only KOMEN, but also change to other applications.	
14th Mar	• Report and discussion policy recommendations (based on discussion of 26th Jan 2024) [Summary] ➢ The policy of expanding clinically focused telemedicine (Telemedicine) to the educational field (Telehealth) was discussed by the Joint Committee of the MoH and MoECRT, and the MoH expressed its support for this policy. ➢ As for departments participating in the telemedicine model, involving internal medicine, which deals with a variety of diseases, is expected to lead to collaboration and development with various medical departments. ➢ MoECRT has a matching funds program called "Kedai Reka". This program aims to support research, innovation, and startups, including partnerships with foreign organizations. Donors participating in this program include the British Council and USAID.	• MoECRT • Academic Staff for Director General of Higher Education • AHS • AHS-UI • JICA Indonesia Office • JICA Expert Team

Source: JICA Expert Team

(2) Telemedicine-related organizations

The JICA Expert Team selected and discussed the following three organizations. The below table shows the meeting overviews.

Table 51 Discussion with telemedicine-related organizations

Agenda	
• Introduction for the organization overview	
• JICA project overview	
• Discussions on model development for the promotion of telemedicine centered on university hospitals	
Date	**Organization name, overview, summary**
9th Nov	[Name] FORKOMTIKNAS [Overview] • FORKOMTIKNAS was established in 2018 to collect data at the individual level and to improve the efficiency of multiple data platforms for data integration into SatuSehat. It is composed of stakeholders in policymaking related to health data, including healthcare professionals, healthcare IT professionals etc. • FORKOMTIKNAS is actively involved in advocating and promoting SatuSehat, including the SatuSehat Health Data Roadmap, and is also involved in developing regulations on telemedicine such as Regulatory Sandbox. [Summary] • Various issues remain in the promotion of telemedicine, including gaps in the knowledge of healthcare professionals regarding the collaboration between medicine and digital technology. The lack of standardized methods required to connect with hospital data and the lack of clear guidelines for data connection are also concerns that may prevent the promotion of telemedicine in Indonesia. In addition, telemedicine does not cover detailed information on hospital capacity,

	making it difficult to determine whether or not a lower-level hospital can handle telemedicine when it is implemented. • From a regulatory perspective, D2D telemedicine should not be treated as a stand-alone telemedicine service, but as part of a patient referral service. • To promote telemedicine, a comprehensive approach that promotes the enhancement of technology and human resources should be taken, and the use of existing systems and platforms such as SatuSehat and KOMEN is recommended. • If BPJS is adapted to telemedicine, it must be possible to demonstrate cost savings for the entire health care system as a result of BJPS adaption. • To promote telemedicine, the benefits of implementing telemedicine should be emphasized, such as the improvement of maternal mortality rates through the use of telemedicine tools (e.g., TeleCTG), in addition to cost savings.
15th Nov	[Name] AHI (Association of Health Technology Indonesia) [Overview] • AHI was established in 2018 and serves as a third-party stakeholder to facilitate communication between governments and businesses. AHI is involved in Indonesian AI national strategy and has been particularly active in the implementation of the COVID-19 Task Force and the Regulatory Sandbox. AHI also emphasizes the benefits of implementing electronic health records, and has more than 107 million electronic health records installed in 22,000 healthcare facilities. • AHI members specialize in a variety of healthcare disciplines, including AI, IoT, and genetics, and AHI's expertise in a wide range of fields, including telemedicine, medical tourism, and blockchain-based personal health records, allows for comprehensive support in many different fields of the healthcare industry. [Summary] • One of the issues in D2D telemedicine is the lack of guidelines for D2D telemedicine and specialist reimbursement. • KOMEN has been developed by the MoH as a D2D telemedicine tool. However, it is not limited to government-developed tools, and the introduction of tools by private companies that are expected to be flexible should also be included as an option. • AHI highlighted Collaboration with international organizations, such as USAID, and AHI's emphasis on digital health startups. Additionally, AHI expressing openness to collaboration with JICA through inter-university partnerships and research grants.
17th Nov	[Name] ATENSI (Aliansi Telemedik Indonesia/Indonesia Telemedicine Alliance) [Overview] • ATENSI is involved in the development and implementation of the Regulatory Sandbox on telemedicine. • ATENSI's members are composed of startups from a variety of digital companies and are currently focused on general digital health, including educational platforms and home health care. However, in the future, they intend to expand their activities with Doctor to Patient or Doctor to Customer. [Summary] • Despite the inclusion of telemedicine within the framework of Law No. 17/2023 on Health, there is no implementing regulation yet for D2P implementation. While waiting for the implementing regulation to be issued, ATENSI is collaboratively engaging the government to establish the Regulatory Sandbox for D2P telemedicine. • All hospitals are expected to follow the plan on implementing EMR on Dec 31 , 2023. However, specific details about the minimum requirement level for EMR that satisfies the SatuSehat integration criteria are not yet defined. • Currently, ATENSI does not collaborate with any international organizations. But there was partnership research with UNDP on telemedicine. However, ATENSI is open to any opportunities.

Source: JICA Expert Team

5-3. Planning and Operation of Seminars to Promote Telemedicine

(1) Telemedicine Promotion Seminar (1st)

1) Overview

On Aug 2, 2023, a seminar was planned and conducted to share challenges and lessons learned from the pilot activities and to promote telemedicine centered on university hospitals, etc. To strengthen collaboration among university hospitals through the AHS network jointly promoted by the MoECRT and the MoH, other AHS participating university hospitals and RSUI and RSUH participating the AHS regional medical network hospitals were invited to participate. The outline of the seminar is shown in Table 52.

Table 52 Outline of 1st Telemedicine Promotion Seminar

Date and Time	Wednesday, Aug 2, 2023 Japan time 15:00-18:00 Indonesia time 13:00-16:00
Location	Online (Zoom)
Invitees	Ministry of Communication and Information (“MoCI”) Ministry of National Development Planning (“Bappenas”) Ministry of Villages, Development of Disadvantaged Regions, and Transmigration (“Kemendes PDTT”) Indonesian Society of Intensive Care Medicine (“PERDICI”) Indonesian Midwives Association (“IBI”) Organization of OB and Gynecology Specialists (“POGI”) Indonesian Ophthalmologists Association (“PERDAMI”) University Hospitals Participating in AHS └USU, UNPAD, UNAIR, UGM, UI, UNHAS RSUD Kota Depok, RSUD Cibinong, RSCM (oph) RSUD KH Hayyung, RSUD Bumi Panua, PKM Benteng DHO Selayar DHO Pohuwato, Gorontal BPJS etc.

Source: JICA Expert Team

Table 53 Time Table of the 1st Telemedicine Promotion Seminar

Agenda	Speaker	Duration
Opening Remarks	JICA MoECRT	5 min 5 min
Project Overview Presentation	Consultant Team	10 min
Participation of AHS Universities in the Development of Telemedicine	MoECRT	10 min
MoH Policy on telemedicine development	MoH (Medical Service DG)	10 min
DTO program on telemedicine development	DTO	10 min
The BPJS financing & claim mechanism for telemedicine	BPJS	10 min
Q&A Session		15 min
RSUI Component: The Pilot Activity Report by RSUI	RSUI	10 min
RSUI Component: The Pilot Activity Report by Vitaars	Vitaars	10 min
Q&A Session		10 min

RSUH Component: The Pilot Activity Report by RSUH OPH	RSUH OPH	10 min
RSUH Component: The Pilot Activity Report by MITAS Medical	MITAS Medical	10 min
RSUH Component: The Pilot Activity Report by RSUH Obsgyn	RSUH OB	10 min
RSUH Component: The Pilot Activity Report by Sehati	Sehati	10 min
Q&A Session		10 min
Closing Remarks	RSUI Director RSUH Director	5 min 5 min

Source: JICA Expert Team

2) Participants

A total of 93 participants were confirmed after inviting the above-mentioned invitees to participate. A summary of participants is as follows.

Table 54 List of participants in the 1st Telemedicine Promotion Seminar

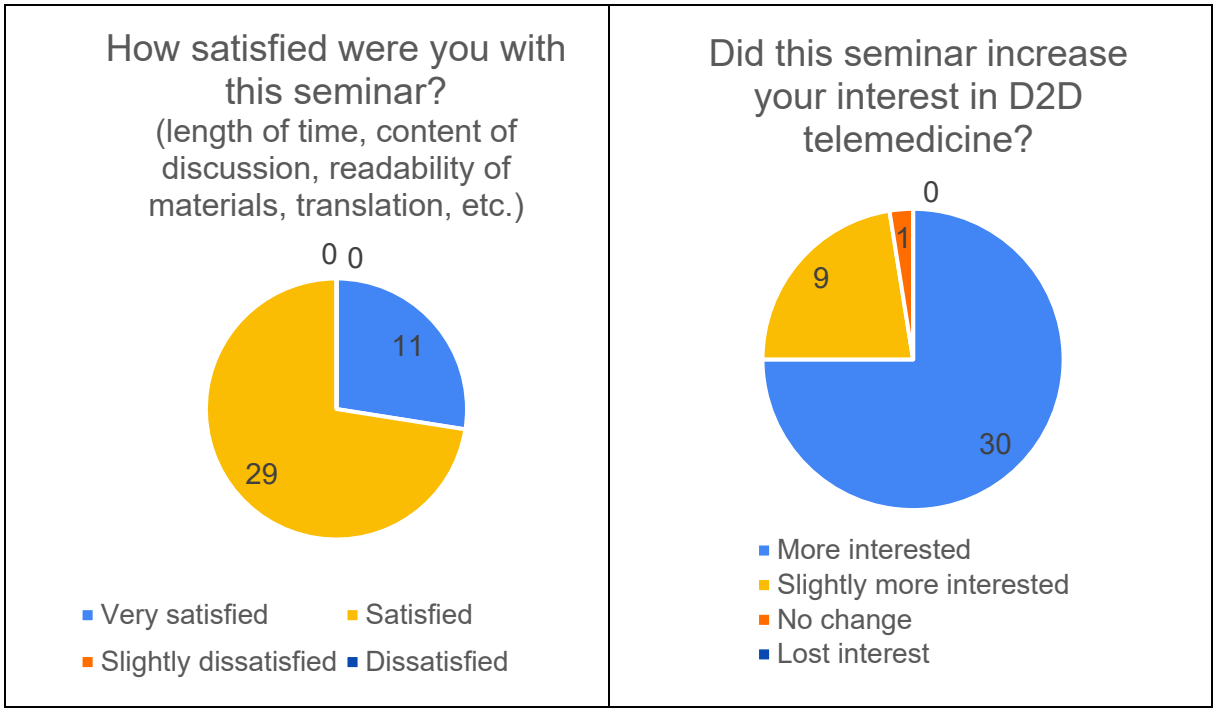
Categories	Organizations	Participants
Central Government	MoH (Medical service DG, DTO)	3
	BPJS	1
	Ministry of Communication and Information (“MoCI”)	3
	Ministry of Home Affairs (“MoHA”)	2
Health Association	Indonesian Midwives Association (“IBI”)	2
AHS	USU	1
	UNAIR	2
	UGM	1
	UI	2
	UNHAS	2
AHS Coordinator	Region I (USU Faculty of Medicine)	1
	Region III (UNPAD Faculty of Medicine)	1
Health Facilities	RSUI	7
	RSUD Kota Depok	8
	RSUH	5
	RSUD KH Hayyung	4
	RSUD Bumi Panua	1
	PKM Benteng	1
	RS Brawijaya University	1
	RS Universitas Sebelas Maret	1
	RS Airlangga University	1
District Health Office	DHO Selayar	1
Private Partner	Vitaars	3
	Sehati	5
	MITAS Medical	2

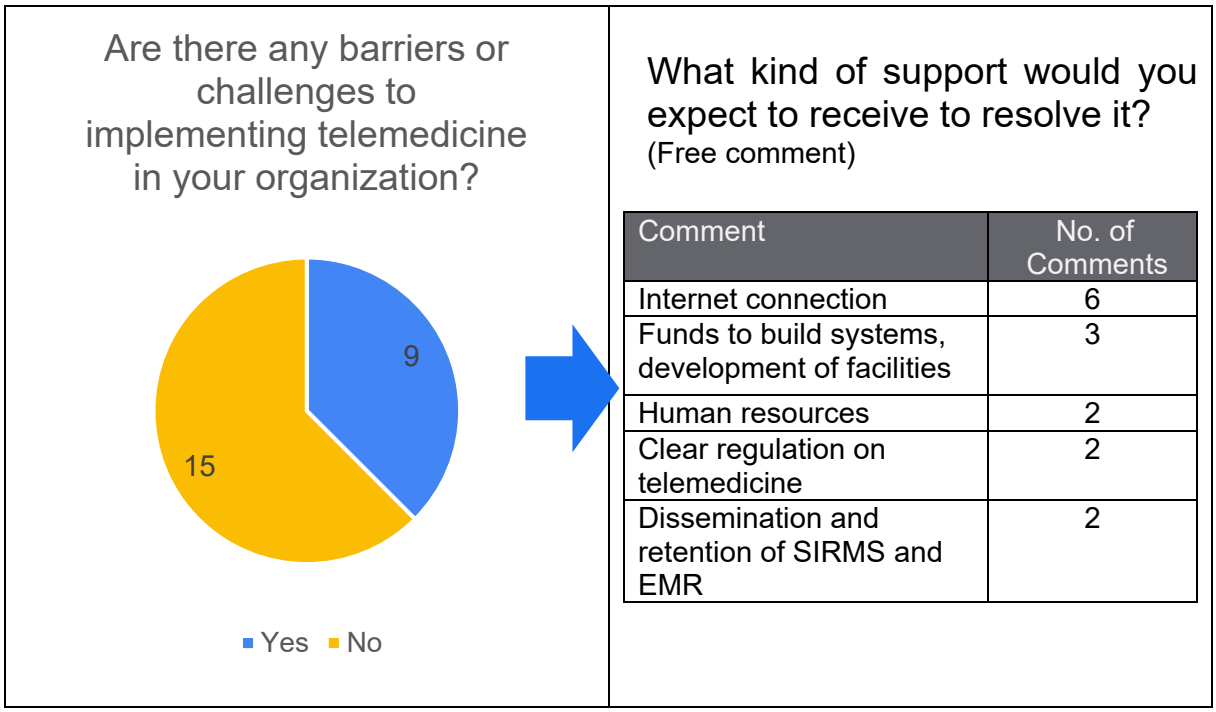
JICA	JICA HQ	1
	JICA Indonesia	1
Others	JICA Consultant Team	13
	No Information on Institution	17
	Total	93

Source: JICA Expert Team

3) Questionnaire Results

An online questionnaire was sent to seminar participants using Google Forms, and 40 people responded. Details are shown in Figure 42 below. Overall satisfaction with the seminar was high, indicating that the seminar increased participants' interest in D2D telemedicine. While many participants showed increased interest, others identified barriers and challenges to implementing telemedicine, and asked for internet access, funding for system construction and equipment, human resources, and appropriate legislation.





Comment	No. of Comments
Internet connection	6
Funds to build systems, development of facilities	3
Human resources	2
Clear regulation on telemedicine	2
Dissemination and retention of SIRMS and EMR	2

Figure 42 Result of the 1st Telemedicine Promotion Seminar Questionnaire

Source: JICA Expert Team

(2) Telemedicine Promotion Seminar (2nd)

1) Overview

The second seminar was held for Apr 25, 2024, at the end of the full-scale activities. The overview is shown in Table 55.

Table 55 Outline of 2nd Telemedicine Promotion Seminar

Date and Time	Thursday, Apr 25, 2024 Japan time 15:00-18:00 Indonesia time 13:00-16:00
Location	Online (Zoom)
Invitees	・ Center for Global Health Policy and Health Technology (KGTK), Health Development Policy Agency (BKPK), Ministry of Health ・ Information Technology and Data Center (PUSDATIN), Ministry of Health ・ Planning and Development, Social Health Insurance Administration Body (BPJS Kesehatan) ・ Health Service Guarantee, BPJS Kesehatan ・ Telecommunication and Information Accessibility Agency (BAKTI), Ministry of Communication and Information ・ Digital Economy, Directorate General of Informatics Applications, Ministry of Communication and Information ・ Regional Planning, Evaluation, and Information, Directorate General of Regional Development, Ministry of Home Affairs ・ Health and Public Nutrition, Deputy for Human Development, Society and Culture, Ministry of National Development Planning (Bappenas) ・ Village and Rural Infrastructure Development, Disadvantaged Regions, and Transmigration, Directorate General of Village and Rural Development, Ministry of Village, Development of Disadvantaged Regions and

	Transmigration ・ AHS Coordinator (USU, UNAND, UI, UNPAD, UGA, UNAIR, UNHAS) ・ Indonesian Education Hospitals Association (ARSPI) ・ State University Hospitals Association (ARSPTN) ・ Indonesian Society of Intensive Care Medicine (PERDICI) ・ Indonesian Midwives Association (IBI) ・ Organization of Obstetrics and Gynecology Specialists (POGI) ・ Indonesian Ophthalmologists Association (PERDAMI) ・ Association of Healthtech Indonesia (AHI) ・ National Health Information Technology Communication Forum (Forkomtiknas) ・ Indonesia Telemedicine Alliance (ATENSI) ・ DHO Selayar Island ・ DHO Pohuwato etc.

Source: JICA Expert Team

Table 56 Time Table of 2nd Telemedicine Promotion Seminar

Agenda	Speaker	Duration
Opening Remarks	JICA HQ	5 min
1st session		
RSUI Component: Project Report (ICU)	RSUI ICU Team	10 min
RSUI Component: Project Report by VITAARS	VITAARS	10 min
RSUH Component: Project Report (Ophthalmology)	RSUH (OPH)	10 min
RSUH Component: Project Report by MITAS Medical	MITAS Medical	10 min
RSUH Component: Project Report (Obstetric)	RSUH (OB)	10 min
RSUH Component: Project Report by Sehati	Sehati	10 min
Q&A Session		10 min
2nd session		
Project achievement: Ideas to improve the issue for D2D telemedicine	JICA Consultant Team	10 min
Participation of AHS Universities in the Development of Telemedicine	MoECRT	10 min
Policy and Regulation Update on Telehealth and Telemedicine	MoH (Medical Service)	10 min
DTO Activity Plan for Telemedicine	MoH (DTO)	10 min
Telemedicine Pilot Project Progress and Challenges	BPJS Kesehatan	10 min
Learning from JICA's Co-Creation Program: Improvement of Community Health and Medical Systems with Telemedicine Services through Case Study of Advanced Telemedicine Region in Japan	MoECRT, MoH, RSUI	15 min
Q&A Session		25 min
Closing Remarks	MoECRT	5 min

Source: JICA Expert Team

2) Participants

A total of 122 participants were confirmed after inviting the above-mentioned invitees to participate. A summary of participants is as follows.

Table 57 List of participants in the 2nd Telemedicine Promotion Seminar

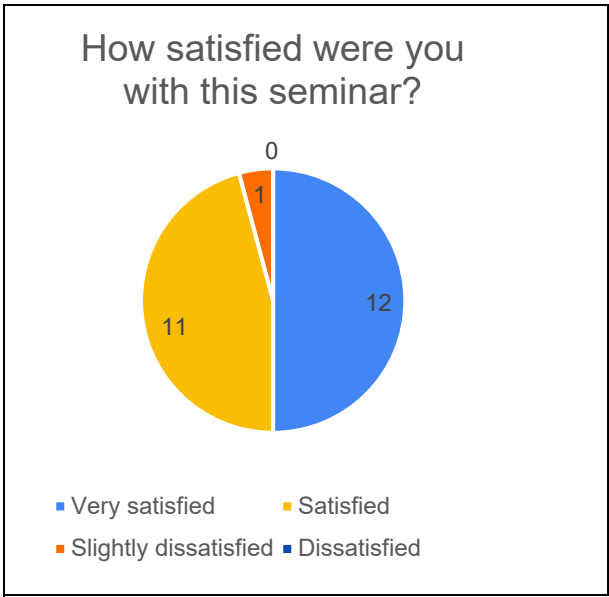
Categories	Organizations	Participants
Central Government	MoH (Medical Service, DTO)	4
	MoECRT	2
	BPJS	4
	MoCI	3
	Otorita Ibu Kota Nusantara (New government body for the New Capital City of Indonesia)	1
Health Association	Indonesian Midwives Association (IBI)	4
	FORKOMTIKNAS	1
	Organization of Obstetrics and Gynecology Specialists (POGI)	1
	Indonesian Ophthalmologists Association (PERDAMI)	1
	Indonesian Pediatric Society	1
	Association of Healthtech Indonesia (AHI)	1
Academic Health System (AHS)	USU	2
	UNAIR	1
	UGM	1
	UNAND (Andalas University)	1
Working Group Team (Tim POKJANAS)	Tim Pokjanas AHS UGM	1
Health Facilities	RSUI	3
	RSUD Kota Depok	4
	RSUD Cibinong	4
	RS UNHAS	3
	RSUD KH Hayyung	2
	PKM Benteng	1
	PKM Bontomatene	4
	PKM Lemito	1
	PKM Bontosunggu	1
Development Agency (Donor)	USAID	3
Private Partners	VITAARS	2
	Sehati	4
	MITAS Medical	2

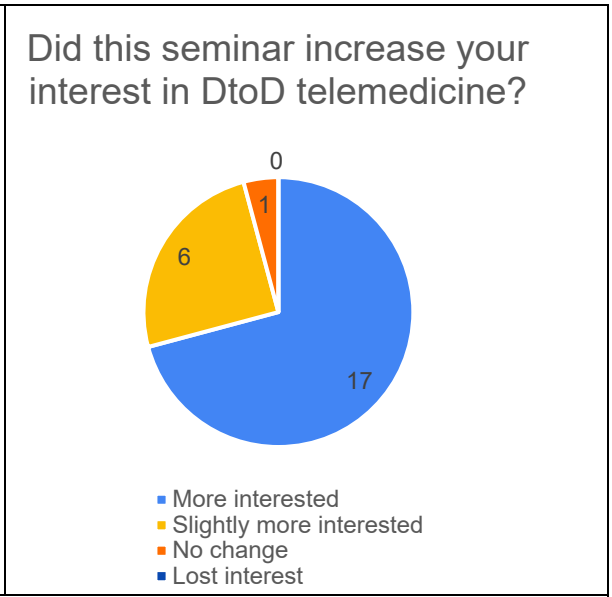
JICA	Headquarter	2
	Indonesia Office	3
Others	JICA Consultant Team	13
	DHO Selayar, Brawijaya University, Batam University, Husada Hospital, University of Muhammadiyah Surabaya, RS Hasan Sadikin, Panti Rapih Hospital Jogjakarta, PT. Layanan Medik, Tonny Blaire Institute, PDMI, Klik Dokter, Ara Foundation, Mensa Medika, PeriksaDulu.com PT Sedayu Sehat Teknologi, PT Farma Global Teknologi, Klinikgo, Lintasarta, MDI, PT Layanan Medik Indonesia, Good Doctor, etc.	41
	Total	122

Source: JICA Expert Team

3) Questionnaire Results

An online questionnaire was sent to seminar participants using Google Forms, and 25 people responded. Details are shown in Figure 43 below. Overall satisfaction with the seminar was high, indicating that the seminar increased participants' interest in D2D telemedicine.





What are the expected future projects and expected support in promoting telemedicine?? (Free comment)

- Capacity building for medical personnels to actively utilize telemedicine
- Commitment of each party for the sustainability of the program (especially from the Local Government).
- Difficulties in insight or understanding in HR and relationships between units. It is difficult to change old patterns. To overcome this, socialization, training (if needed) and support from management are needed.
- There are no actual regulations related to telemedicine and BPJS services supported by the central government. New regulations need to be established.
- Delegation of authority and task shifting to midwives is needed.
- Stable Internet access in all areas

Figure 43 Result of the 2nd Telemedicine Promotion Seminar Questionnaire

Source: JICA Expert Team

5-4. Evaluation of Activities Related to Output 3

As for Output 3, the level of achievement is considered to be high, since the team was able to contact the AHS and other related organizations in full-scale activities and hold discussions to expand telemedicine initiatives. Both telemedicine promotion seminars were attended by many external stakeholders, including not only the Counterpart Hospitals and the Partner Hospitals, but also other university hospitals and regional hospitals, and the seminars also raised interest in D2D telemedicine for the stakeholders, and contributed to the formation of a foundation for the expansion of D2D telemedicine in Indonesia. The JICA Expert Team has had continuous discussions with AHS, not only at seminars, and AHS has shown a high level of interest in the JICA Expert Team's ideas for the horizontal development of telemedicine using AHS.

Table 58 Indicators and Evaluation of Output 3

Output 3	
A model of the university hospital-centered D2D telemedicine mechanism is verified and considered for further roll-out by the Counterpart Hospitals as well as for horizontal scaling-up in other university hospitals.	
Indicators	**Evaluation**
① Number of seminars / dialogues held with external stakeholders to explain and disseminate the university hospital-centered D2D telemedicine mechanism	Telemedicine promotion seminar (2) AHS (4) FORKOMTIKNAS (1) AHI (1) ATENSI (1)
② Number of other university hospitals and regional hospitals participated at seminars/dialogues	AHS Hospital:5 (USU, UNAIR, UGM, UI, UNHAS) Regional Hospitals: 4 (RSUI, RSUD Kota Depok, RSUH, RSUD KH Hayyung, RSUD Bumi Panua, PKM Benteng, RS Brawijaya University, RS Universitas Sebelas Maret, RS Airlangga University)
③ Number of other university hospitals and regional hospitals interested to join in the D2D telemedicine mechanism (leveraging AHS initiative)	AHS Hospitals: 5 (See above for details) Regional Hospitala: 4 (See above for details)

Source: JICA Expert Team

6. Activities related to Output 4

6-1. Support for connecting medical data to SatuSehat platform for telemedicine activities

(1) Current Status of Health Service Platform in Indonesia

1) MoH Policy Overview

(a) Current Status Related to Digital Health

In 2021, the MoH published the Blueprint for Digital Health Transformation Strategy 2024, which outlines a strategic transformation vision for Indonesia until 2024 based on the current challenges. Among the challenges related to digital health, there are more than 400 health and medical applications developed by central and local governments scattered across the country, and healthcare providers are unable to collect information in a centralized manner but only as fragmented data. In addition to the lack of integration of information systems used by individual healthcare providers, the systems and applications provided by the MoH are not integrated with the databases of the BPJS, the Food and Drug Administration ("BPOM"), and the National Population and Family Planning Agency ("BKKBN"), and there is a lack of cross-sectoral management of national information related to the medical health sector within the government. This means that the government is not able to manage and utilize the public information related to the medical and health sectors in a cross-sectional manner. On the regulatory side, the health sector does not have adequate regulations in place for data protection management, standardization, patient rights, and privacy, and health policies are not based on comprehensive information, resulting in ineffective implementation of health services. These unintegrated data on medical health and related regulations should be considered for integration and development of national health care data.This is crucial given that more than 80% of Indonesian domestic medical facilities are not yet compatible with digital technology as of 2021.

Table 59 Key systems operated by the MoH and the BPJS

Category	System-name	Organization	Services and Key Features
D2D	KOMEN	MoH	D2D's telemedicine web service. Four functions implemented: radiology, EKG, ultrasound, and consultation. Used by 2,413 hospitals, 2,692 PKMs (as of Feb 2024).[8]
D2D	SISRUTE	MoH	Patient Referral Management Web Service, implementing Referral system, Telemedicine, Medical Resume, Ambulance Tracking, Hospital Personnel Information, Monitoring and Evaluation reporting and dashboard functions. MoH reports 15,450 healthcare professionals use it (as of Dec 2023).
D2P	SehatPedia	MoH	Medical information service application. Medical consultation through live chat with doctors, outpatient appointments at the MoH-affiliated hospitals, and access to medical articles and medical journals on medicine and health are available. More than 10,000 users (as of Dec 2021).[9]
D2P	SatuSehat mobile	MoH	COVID-19 information management application (follow-up application to the former "PeduliLindungi"). Allows download of vaccination certificates, registration of visit

[8] MoH Website: https://komen.kemkes.go.id/fasyankes

[9] Adiwibowo et al. (2021) "PEMETAAN EKOSISTEM TEKNOLOGI DIGITAL UNTUK MEMBANTU PENANGANAN COVID-19 DI DAERAH ISTIMEWA YOGYAKARTA DAN DAERAH KHUSUS IBUKOTA JAKARTA", Journal of Information Systems for Public Health, Vol. 6, No. 3 Dec 2021

			locations and contacts, access to medical service information from the MoH, and electronic medical records. PeduliLindungi has approximately 1 million users, and a similar number of users are using this application (as of Mar 2023).[10]
D2P	PCare	BPJS	A web system to manage patient information for patients who wish to be treated with the BPJS JKN at a primary health care facility ("FKTP"). The system can be viewed by patients and healthcare providers. Functions include registration of patient information, facility search, and registration of diagnosis, examination, and treatment details. 23,639 FKTPs are in use (as of Dec 2023)[11]
D2P	Mobile JKN	BPJS	The BPJS Information Service application with functions to view information about BPJS, register and manage user information, search for users by NIK number, search for medical facilities, check user payment information, and bill notification. Approx. 16.35 million people (44% of the Indonesian population) use it (as of May 2022).[12]

Source: JICA Expert Team

(b) Blueprint of Digital Health Transformation Strategy 2024 Roadmap

In the Blueprint of Digital Health Transformation Strategy 2024, the MoH has designed a roadmap for health technology transformation from the national to the local level, divided into three main activities. One of the key activities, "Integration and Development of Health Data System," involves the integration of national health and medical information systems and the development of big data analysis systems to help formulate policies based on accurate information. The "Integration and Development of Healthcare Application System" will develop integrated medical applications, train personnel with medical information skills, and establish a central help desk in the MoH to deliver efficient medical services to PKM, clinics, hospitals, laboratories, and pharmacies. The "Development of Health Technology Ecosystem" will promote the MoH's key programs: expansion of telemedicine, development of an innovative product development ecosystem, integration of health biotechnology research, and collaboration and ecosystem building with industry, government, academia, and the general public. As part of the innovative product development ecosystem, the MoH has introduced the Regulatory Sandbox[13] to scrutinize current regulations, promote the needs of the digital health industry and innovation creation, and provide investment opportunities for startup companies.

[10] Website regarding PeduliLindungi: https://katadata.co.id/desysetyowati/digital/63fde766013d4/pedulilindungi-ganti-nama-jadi-satu-sehat-berapa-jumlah-pengguna

[11] BPJS Kesehat Website: https://bpjs-kesehatan.go.id/#/

[12] Bahri et al. (2022) "ANALISIS KUALITAS PELAYANAN APLIKASI MOBILE JKN BPJS KESEHATAN MENGGUNAKAN METODE SERVICE QUALITY (SERVQUAL)", Industrial Engineering Journal Vol.11 No.2 (2022)

[13] Web site for Regulatory Sandbox: https://regulatory-sandbox.kemkes.go.id/

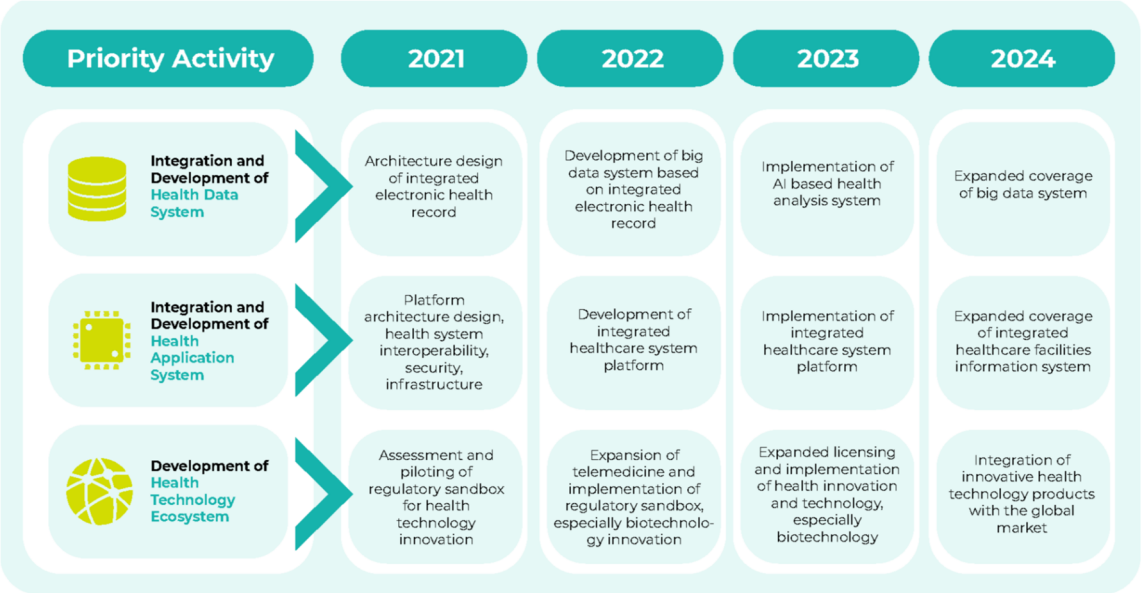


Figure 44 Blueprint of Digital Health Transformation Strategy 2024 Roadmap Overview

Source: MoH Blueprint of Digital Health Transformation Strategy 2024

(c) Resolution on the Promotion of Digital Health Transformation

In addition to the Blueprint of Digital Health Transformation Strategy, the MoH has six resolutions that more specifically promote digital health innovation in Indonesia.

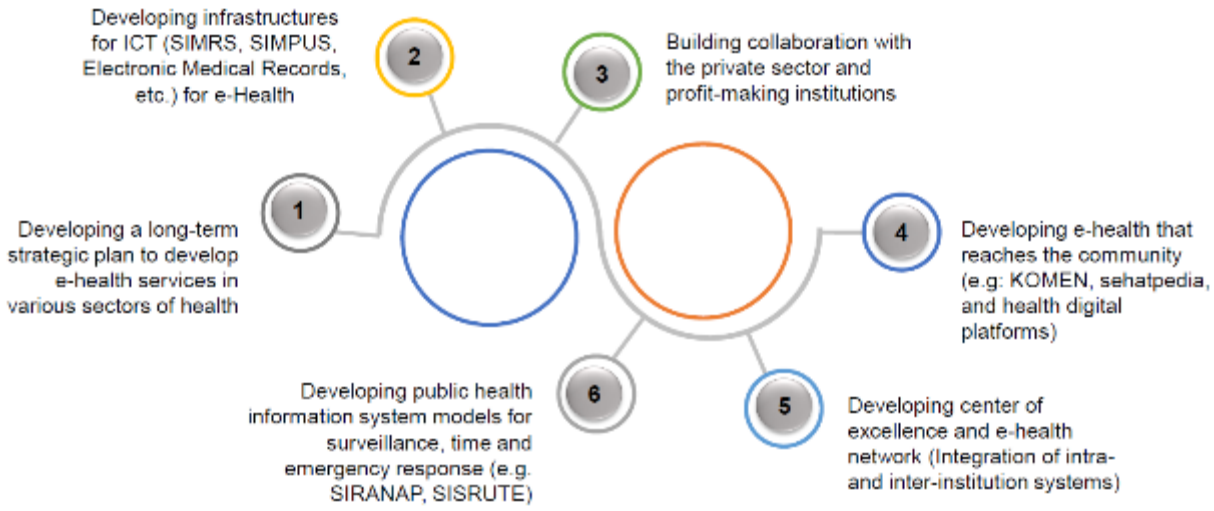


Figure 45 Digital Health Transformation Resolution

Source: MoH

1) Develop a long-term strategic plan to develop digital health in various health sectors and identify areas where digital health can be effectively implemented to improve health services. 2) Development of medical ICT infrastructure including SIMRS, SIMPUS, EMR and other systems. 3) Developing partnerships with private companies and for-profit organizations to support the adoption of digital health services in various medical settings. 4) Developing digital health services that allow communities to access healthcare platforms

such as KOMEN and SehatPedia. 5) Establishment of Centers of Excellence and deployment of digital health networks to integrate systems within and between institutions and improve health services throughout the country. 6) Development of emergency response public health information systems such as SIRANAP and SISRUTE.

2) SatuSehat as Indonesia Health Service (“IHS”) Platform

The Blueprint of Digital Health Transformation Strategy 2024 establishes the implementation of IHS platform as an urgent initiative. IHS is the Indonesian word SatuSehat, hereafter referred to as SatuSehat. SatuSehat is a health information exchange platform developed by the MoH that links systems and applications among stakeholders in Indonesia's digital health ecosystem, including healthcare institutions, regulators, insurance companies, and digital service providers. As a platform that connects the entire ecosystem of all these stakeholders in the insurance and healthcare industry, it provides standardized specifications and mechanisms in terms of business processes, data, technology, and security. The Digital Health Transformation Strategy Indonesia 2025-2029 overview describes the objectives of a national health information system that will be based on the SatuSehat platform: to manage identity and access of the stakeholders of digital health ecosystem, to detect disease outbreaks and endemics and other public health issues, to maintain and provide decision support by analyzing aggregated datasets, and to provide Accessible Electronic Medical Records for patients and an Interoperable Service Delivery Platform for caregivers and care facilities.

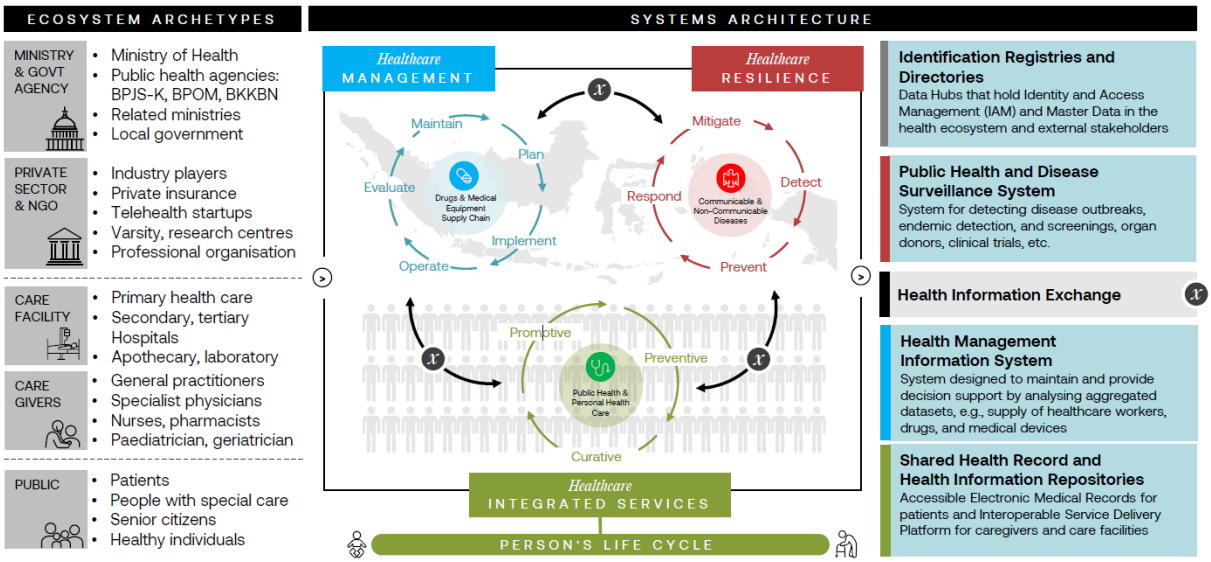


Figure 46 Overview of the national health information system centered on the SatuSehat platform

Source: MoH

Current challenges related to digital health stem from the lack of data standardization and integration. The lack of interoperability and integration of medical data also makes it difficult for medical facilities to quickly and accurately analyze data and predict illness and patient care when implementing continuous care and staged referrals. Establishing data exchange between medical information platforms (“SatuSehat platform”)

that can centrally manage diverse medical information systems will reduce the risk of data duplication, reduce the administrative workload of medical personnel at medical facilities, and enable integrated data-based policies (evidence-based policies). Data standardization is needed so that data can be used by institutions at the city, state, national, and international levels.

In addition, in an interview with the Digital Transformation Office ("DTO"), an agency established by the Indonesian government for policy making and regulatory development in the area of digital health, the DTO identified the top priorities in digital health as data integration and standardization of medical data, simplification and efficiency of government-operated applications and information systems, and uniformity and consistency of protocols in the exchange of medical information. The SatuSehat platform is expected to lead to a leap forward in the digitalization of the healthcare sector in Indonesia.

Table 60 Expected Benefits of Introducing the SatuSehat Platform

Officials	Expected Benefits
Patient	・ Patient information, including history and past treatment, can be linked between different hospitals, eliminating the need to carry physical medical records ・ The application version, SatuSehat mobile, allows access to patient information on the SatuSehat platform
Health care provider	・ Patient information can be referenced during patient transfer and emergency situations, allowing physicians to make appropriate decisions and take appropriate action. ・ Patient information can be linked between medical facilities, eliminating the need to repeatedly input patient information into different applications for each health care facility.
Government	・ Develop evidence-based health policy based on integrated patient information ・ Support early detection, prevention, and response to infectious and other diseases
Medical industry (Pharmacy, Laboratory, Insurance, Private companies, etc.)	・ Strengthen cooperation with various related facilities and institutions ・ Development of an environment for secondary use of medical information

Source: JICA Expert Team

(a) Functions/Services

The SatuSehat platform has the following three objectives:

- Provide standardized specifications and mechanisms from business, data, technical, and security perspectives
- HL7 FHIR, a standard for medical information exchange, and HTTPS REST API for data integration to enable application development using different languages
- Provide sustainable healthcare services to all Indonesian citizens by numbering them with a SatuSehat number that identifies patient information

The data, systems and applications integrated within the SatuSehat platform must adhere to defined business process specifications, specific mechanisms for data federation (HL7 FHIR and HTTPS REST API), and security specifications (authentication, encryption).

The available user functions/services of the SatuSehat platform are as follows. Note that as of Jan 2024, the SatuSehat platform only has the function to receive and store data from users and does not have the

function to transmit information registered on the SatuSehat platform to external systems. Although the DTO plans to add the function to send and receive data in both directions in the future, a definite start date has not yet been determined.

Table 61 SatuSehat Platform User Features/Services

Services	Summary
Patient ID master data registration	Health care providers may obtain a patient's SatuSehat number by registering the National Identification Number ("NIK") and other demographic parameters of the individual patient
Healthcare Professional ID Master Data Registration	Health care professionals may obtain the SatuSehat number of a health care professional by registering the NIK and other demographic parameters of the health care professional
Patient Registration	Health care providers can register information about a patient's visit to a health care facility
Transmission of patient diagnostic data	Health care providers can register the results of a patient's diagnosis

Source: SatuSehat Guidebook V2.2

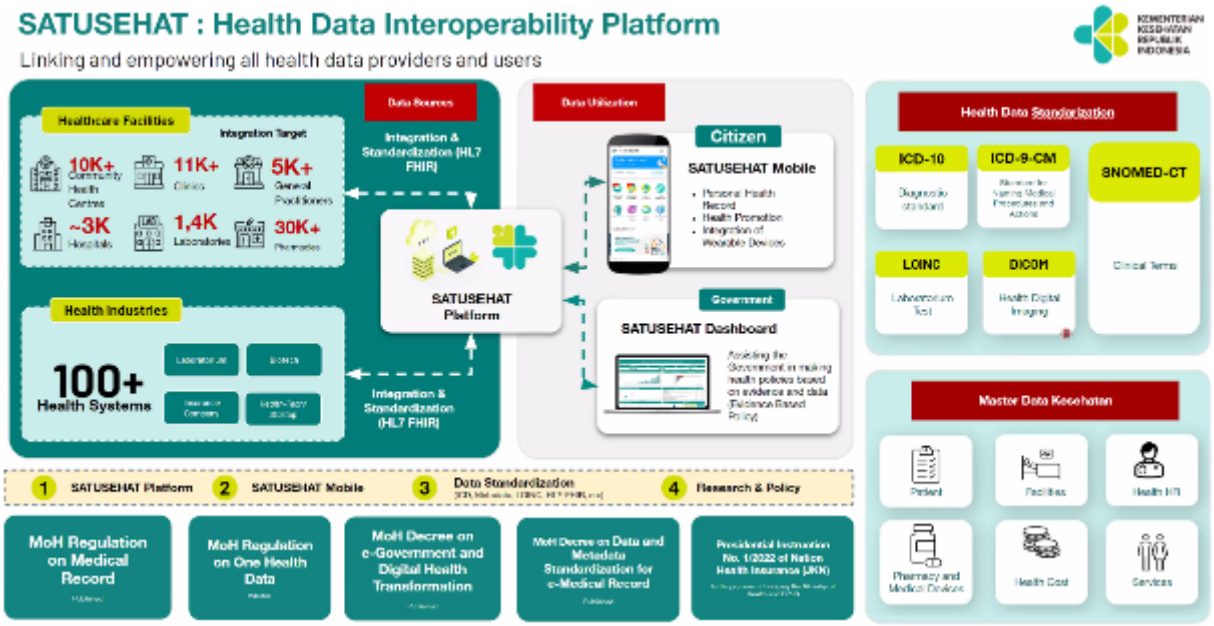


Figure 47 SatuSehat Interoperability Overview

Source: MoH

3) Progress on the Blueprint of Digital Health Transformation Strategy 2024

(a) SatuSehat Platform Integration Status[14]

As of February 2024, there are 23,380 medical facilities (41.9% of all medical facilities in Indonesia) that have completed registration with SatuSehat, and 20,109 facilities (36.03%) have been provided API information from the MoH to SatuSehat after registration application, 8,195 (14.7%) facilities have sent data to SatuSehat.

[14] Website for SatuSehat: https://SATUSEHAT.kemkes.go.id/

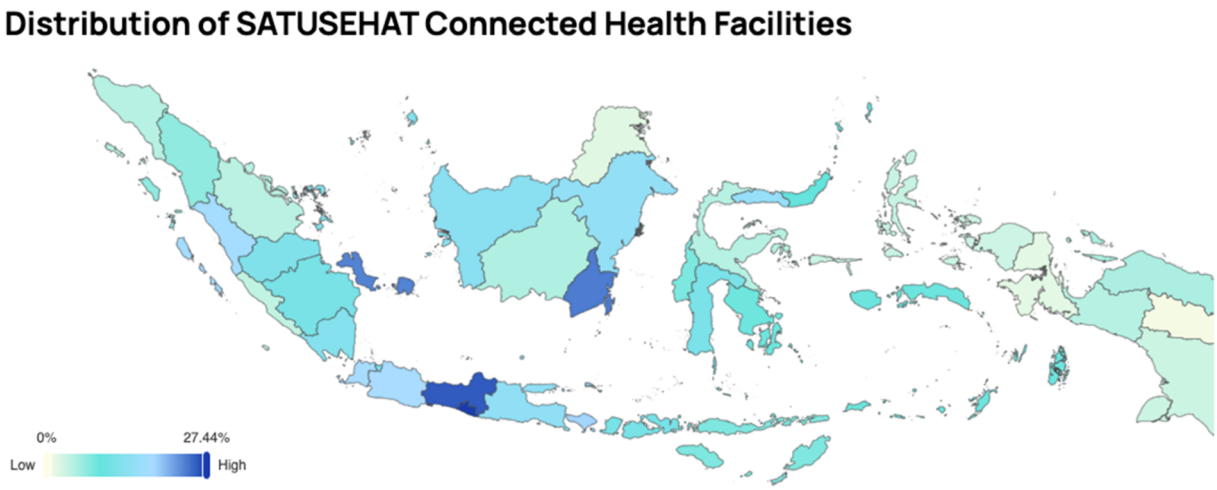


Figure 48 Distribution of SatuSehat platform introduction in February 2024

Source: MoH

(b) SatuSehat Dashboard Development Status

The SatuSehat dashboard[15] provides COVID-19 development data that can be referenced by health facilities and researchers from state health departments, regions/municipalities, PKM, etc., for use by health professionals in evidence-based policy making. Data integrated into the SatuSehat platform will be displayed on the dashboard, and the results of data analysis by the MoH will also be linked to the dashboard. The integrated EMR data is also used by the health services and government hospitals to monitor the progress of the integration of health facilities into SatuSehat.

[15] SatuSehat dashboard website: https://satusehat.kemkes.go.id/dashboard/dasbor-publik.html

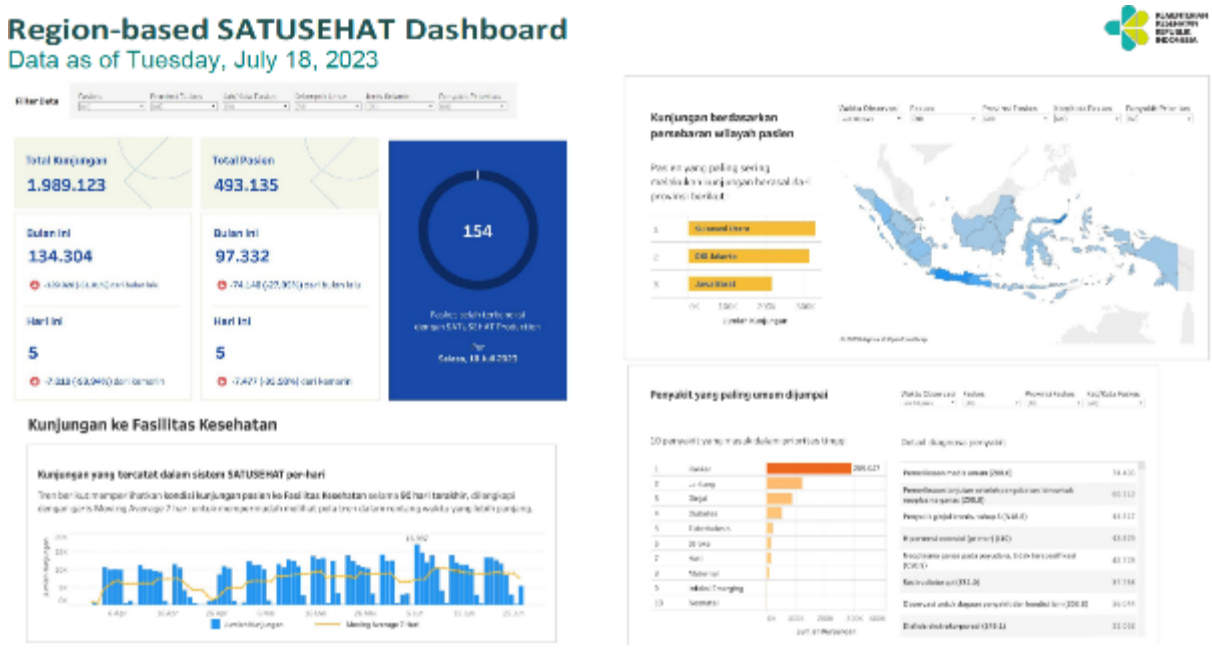


Figure 49 Example of the SatuSehat Dashboard Screen

Source: MoH

(c) SatuSehat Mobile Development Status

SatuSehat mobile is a health management application available to citizens, migrated from SatuSehat's predecessor, PeduliLindungi, a COVID-19 management application, which is used by 3 million users daily. New features such as a physician catalog, medication reminders, health diary, non-COVID-19 immunization registry (polio, meningitis, yellow fever), antigen self-test entry, cancer drug catalog, emergency contacts, and health news are under development.

(d) Progress in Health Technology Transformation of Primary Services

Aplikasi Sehat IndonesiaKu ("ASIK") is an application provided by the MoH for Posyandu, Posbindu and other health care providers to record patient information, and ASIK and WhatsApp Chatbot are essential to the transformation of primary health services. More than 90% of PKM use ASIK for various primary services, including PTM screening (95.5%), National Childhood Immunization Month (93.6%), and routine immunizations (95.4%). WhatsApp chatbot assists Posyandu executives with stunting reports. The digitization of primary service registration through ASIK has also led other countries, such as Ghana, to express interest in studying Indonesia's digital immunization registration system.

(e) BGSi Advances in Health Technology Transformation

Biomedicine is one of the focus areas in the Blueprint of Digital Health Transformation Strategy 2024, and the MoH is promoting the Biomedical and Genome Science Initiative ("BGSi") as the country's first biomedical initiative to jumpstart precision medicine in Indonesia by integrating genome analysis into medical services. Through mid-2023, clinical data from more than 1,100 patients have been collected at nine hospitals, 946 patient consent forms have been obtained, and patient data has been stored in the RegINA system. Participating hospitals are Friendship Hospital, RSPI Sulianti Saroso, Dharmais Cancer Hospital,

RSUPN dr. Cipto Mangunkusumo, Dr. Sardjito, National Brain Center Hospital, Prof. Dr. IGN.G Ngurah, Harapan Kita Hospital, and Harapan Kita Heart Hospital.

(2) Current Status of Target Medical Facilities

During the pilot activities, the JICA Expert Team visited the target medical facilities to inspect the medical information systems in use; RSUH and RSUD have the necessary networks to implement telemedicine, but EMR has not been implemented in PKM, and in some areas the networks are underdeveloped.

Table 62 Current Status of In-Hospital Systems

Target Facilities		Details
RSUH		In Jan 2023, RSUH has introduced a medical information system, KHANZA (developed by Indonesian company YASKI in 2017; as of Dec 2022, used in more than 340 medical facilities). As of Mar 2024, approximately 90% of patient information, including OB and OPH, is managed by KHANZA, and the system is linked to a medical image management system (PACS) that includes both departments. External systems are linked with the BPJSetc. A trial test was conducted with SatuSehat to the end of Dec 2023, and data linkage officially started in Jan 2024.
RSUD	Bumi Panua (Gorontalo)	RSUD Bumi Panua uses Simrs Klikmedic, a medical information system provided by a private company. For referrals, they use SISRUTE and other communication tools (WhatsApp, phone calls, etc.). A SatuSehat connection application was submitted to the MoH in Jun 2023, but as of Jan 2024, the MoH has not responded.
	KH Hayyung (Selayar)	The medical information system being used is KHANZA . Patient transfer destinations are determined by SISRUTE, and patient information is shared with upper-level hospitals. As in RSUD Bumi Panua, an application for a SatuSehat connection was submitted to the MoH in Jun 2023, however due to waiting list for registration starting with the higher level of hospitals,as of Jan 2024, the MoH had not yet responded.
PKM	Lemito (Gorontalo)	EMR not implemented. SISRUTE is used only for emergency patient referrals. When referring, bed availability is confirmed with RSUD in advance via WhatsApp.
	Paguat (Gorontalo)	EMR not implemented. SISRUTE is used only for emergency patient referrals. When referring, bed availability is confirmed with RSUD in advance via WhatsApp.
	Benteng (Selayar)	EMR not implemented. Patients deemed unresponsive at PKM are referred to RSUD KH Hyyung. Doctor availability is verified via PCare, phone, and WhatsApp.
	Bontomatene (Selayar)	EMR not implemented. RSUD is consulted for responses through a WhatsApp group in which all midwives in Selayar participate. At the time of referral, it is confirmed in advance via WhatsApp and through PCare. An account of SISRUTE has already been created but has not been used.
	Bontosunggu (Selayar)	EMR not implemented. RSUD is consulted for responses through a WhatsApp group in which all midwives in Selayar participate. An account of SISRUTE has already been created but has not been used.

Source: JICA Expert Team

1) Replacement of hospital system in RSUH

At the start of this project, RSUH was using an EMR called SIMPEL to collect patient information. However, the data was managed by each department, and there was no data linkage with other departments and there was no function to store medical images, so there was no linkage to external systems. Therefore, by replacing KHANZA with PACS from Jan 2023, data integration including medical images across all departments within RSUH became possible. RSUH is also promoting data exchange with external systems

such as the existing telemedicine web system, the BPJS and other hospitals' EMRs.

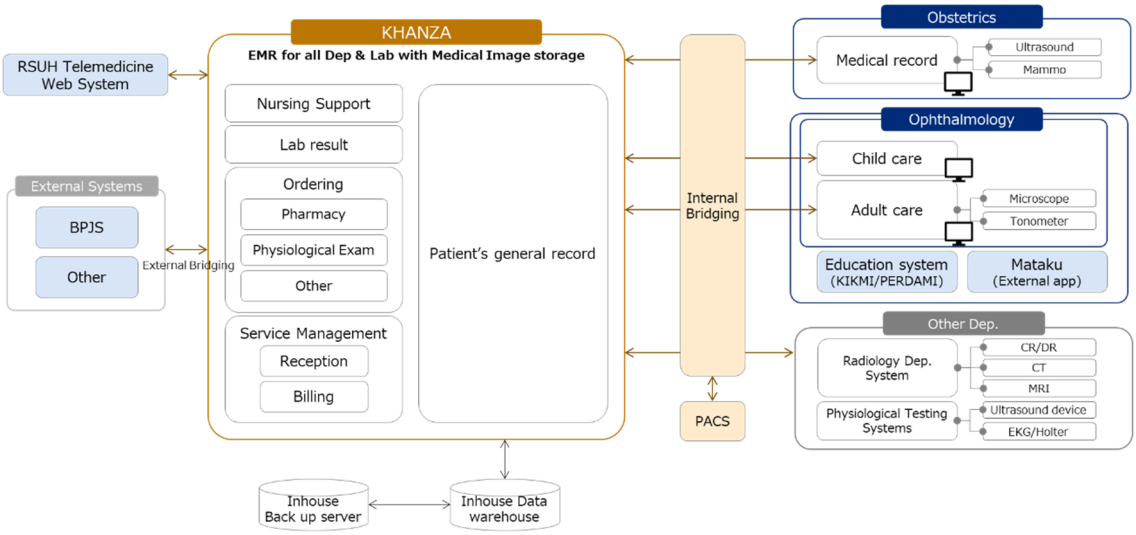


Figure 50 Current RSUH System Overview

Source: JICA Expert Team

(3) Support for connecting medical data to SatuSehat platform for telemedicine activities

1) SatuSehat Connection Strategy

As mentioned above, the current SatuSehat platform can receive data but does not have the function to transmit it externally. Therefore, the definition of SatuSehat connectivity in this project is sending and storage of patient information collected to the SatuSehat platform.

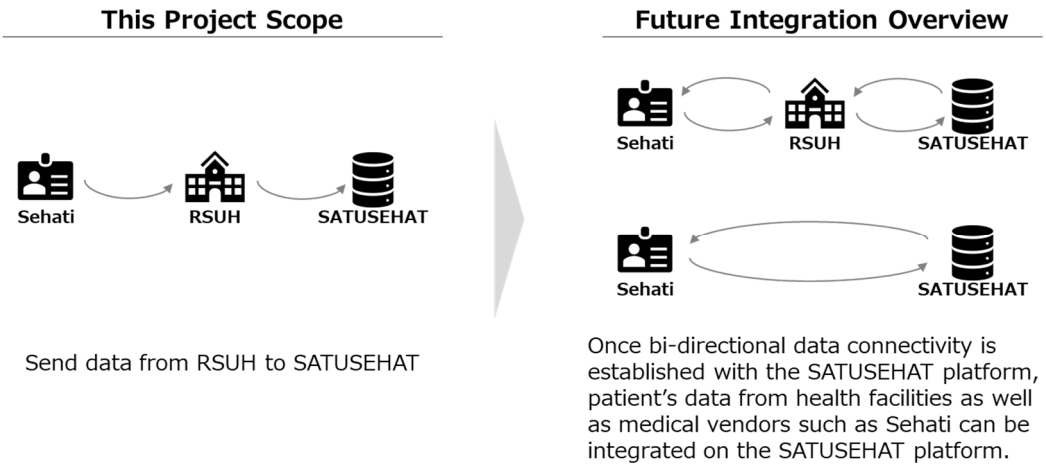


Figure 51 Scope of connecting to the SatuSehat Platform in this Project

Source: JICA Expert Team

At the start of this project, the data linkage model assumed the aggregation of patient data from lower-level hospitals to RSUH and the connection from RSUH to the SatuSehat platform. As described in Chapter 6-2 (1) 1), since the MoH regulation (PMK24/2022) stipulates that all medical facilities must have an EMR and data linkage from each facility to the SatuSehat platform by the end of 2023, the consulting team

considered developing a model that anticipates data linkage from each health care facility.

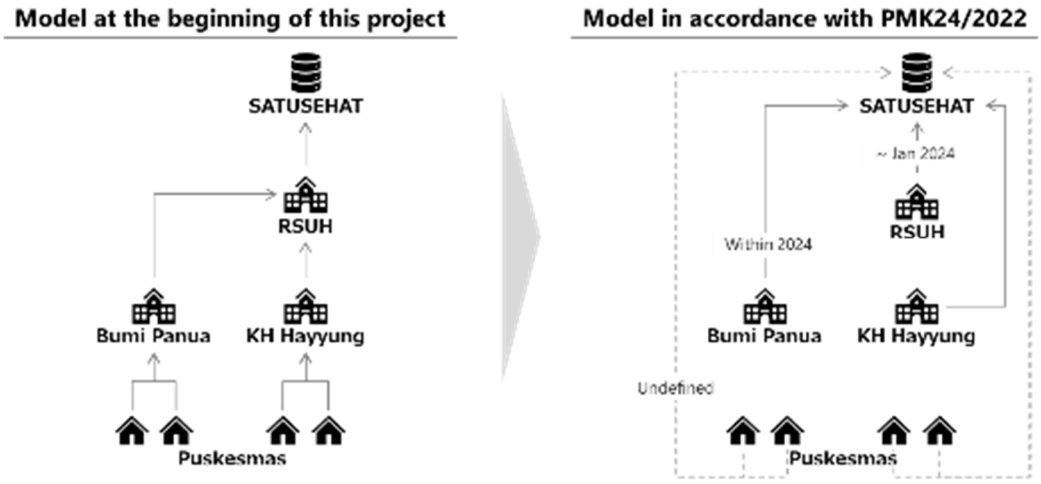


Figure 52 Overview of the data model to the SateSehat platform

Source: JICA Expert Team

During this project period, data integration from medical facilities other than RSUH to the SatuSehat platform has not been expected. T The data linkage model utilized by Sehati and MITAS Medical systems stands out as the preferred patient data platform. Agreement has been reached among the involved hospitals during the 4th TWG held in Oct 2023 to integrate targeted patient data from RSUH into the SatuSehat platform. However, due to subsequent regulatory changes, only the data of patients seen at each hospital are eligible for data linkage to the SatuSehat platform. Therefore, in obstetrics and ophthalmology, only the data on patients referred from RSUD KH Hayyung to RSUH are integrated from Khanza in RSUH to the SatuSehat platform. Since Jan 2024, there have been no obstetric patients referred from RSUD KH Hayyung to RSUH and six referred patients for ophthalmology. Other patient data seen at RSUD and PKM will be integrated from each RSUD and PKM to the SatuSehat platform.

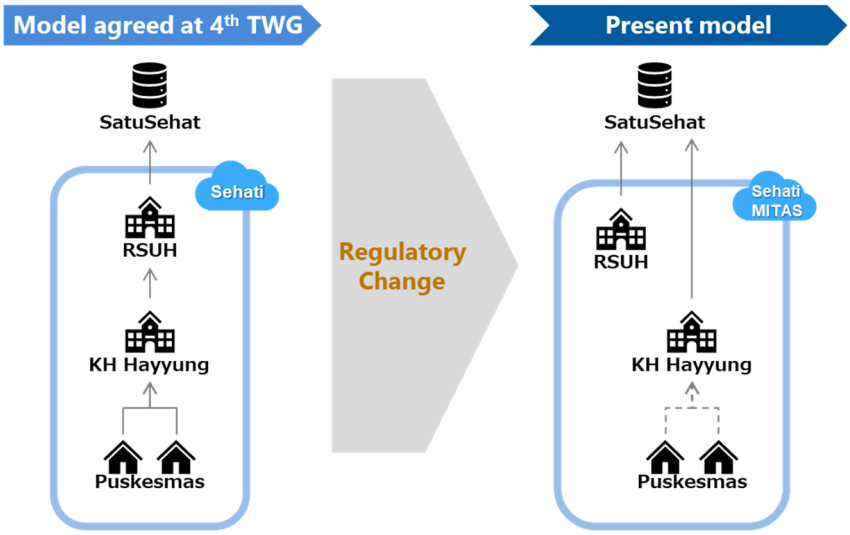


Figure 53 Data integration model after regulatory change

Source: JICA Expert Team

2) Support of SatuSehat Connection: OB

The data linkage model for OB uses the Sehati system as an information linkage platform between the target medical facilities, and the collected patient data was expected to be linked to RSUH and then from RSUH to the SatuSehat platform. In the future, data linkage will be made from both RSUD hospitals to SatuSehat, and then information linkage between RSUH, RSUD, and Sehati will be realized on the SatuSehat platform.

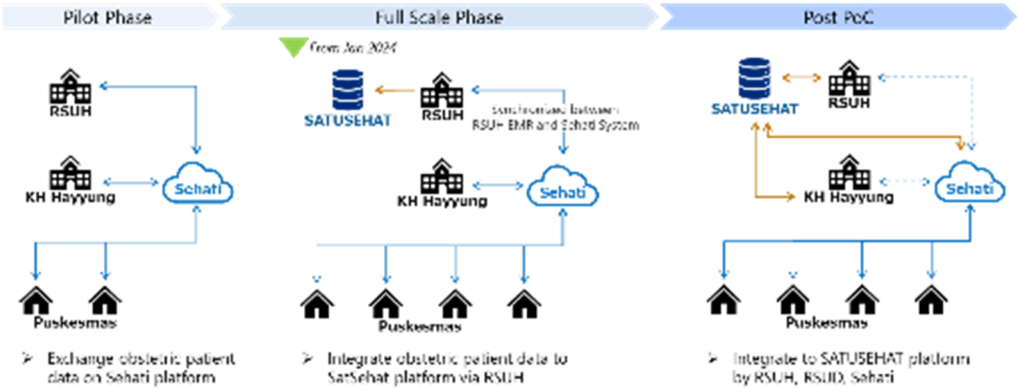


Figure 54 OB Data Linkage Model

Source: JICA Expert Team

During this project, a system for registering and updating patient data between RSUH and Sehati was developed, ensuring readiness for formal collaboration with SatuSehat by January 2024. The synchronization of patient data between Sehati and RSUH was successfully accomplished between November and December 2023. Sehati has also completed the connection with PCare and has linked patients' BPJS information to RSUH. Sehati has collected 242 patient data during the project by the end of Mar 2024, and these patient data was planned to be linked to the SatuSehat platform via RSUH. However, due to the regulatory change

explained above, only the patient data seen at RSUH would be integrated to the SatuSehat platform, and therefore, there are no patients referred to RSUH and no obstetric patient data could be linked to the platform. In addition, the obstetric patient data collected in this project cannot not directly integrated from Sehati's system to SatuSehat platform because this data model of direct linkage was not planned and there has been no electronically and systematically preparation within this project. Sehati was selected for the Regulatory Sandbox, as a measure of MoH. Data linkage is expected after this project.

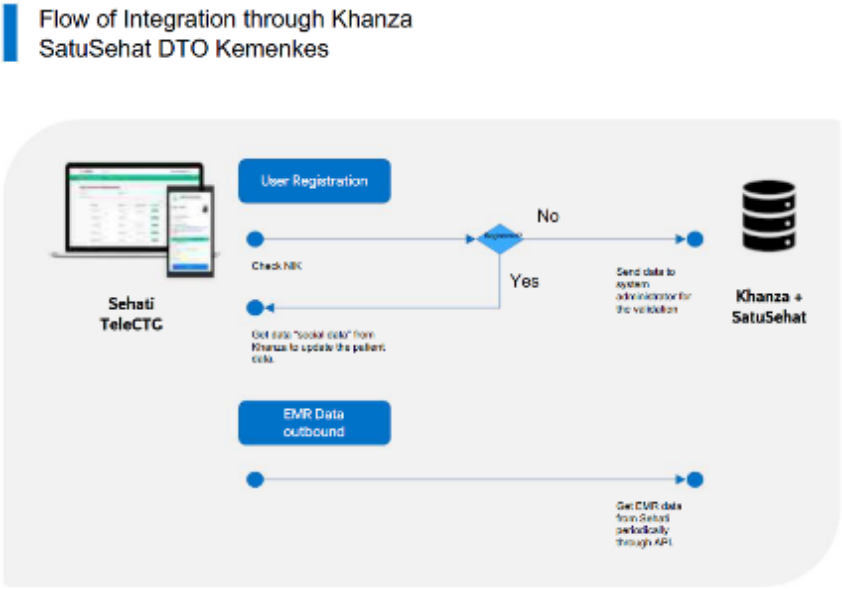


Figure 55 Sehati, RSUH data connection method

Source: JICA Expert Team

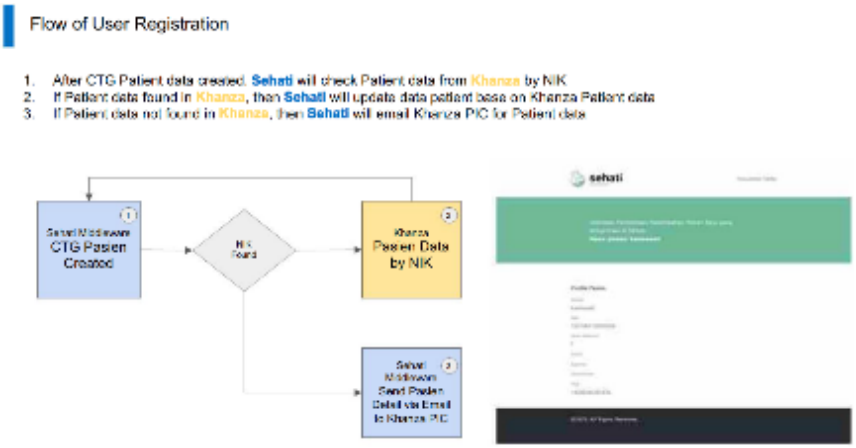


Figure 56 Sehati Data Connection Flow

Source: JICA Expert Team

3) Support of SatuSehat Connection: OPH

Similar to OB, the data collaboration model for OPH also uses MITAS Medical system as an information collaboration platform. As stated in Chapter 6-2 (1) below, the data collected by MITAS Medical does not

comply with the SatuSehat data items stipulated by the DTO, and data linkage to the SatuSehat platform is not available with the data collected by MITAS Medical alone. Therefore, the patient data related to OPH in this project are merged from the data collected by MITAS Medical and the data collected at RSUD KH Hayyung of patients who were referred to RSUH from RSUD KH Hayyung, are linked to SatuSehat platform. In addition, MITAS Medical does not expect to continue using its products after the completion of this project, and will adopt a model whereby each health care facility will link to the SatuSehat platform after this project. Since RSUH and RSUD KH Hayyung, which have a referral relationship, will need to continue data exchange after this project, a new cloud server will be installed and data exchange will be conducted as an interim measure until RSUD KH Hayyung connects to the SatuSehat platform.

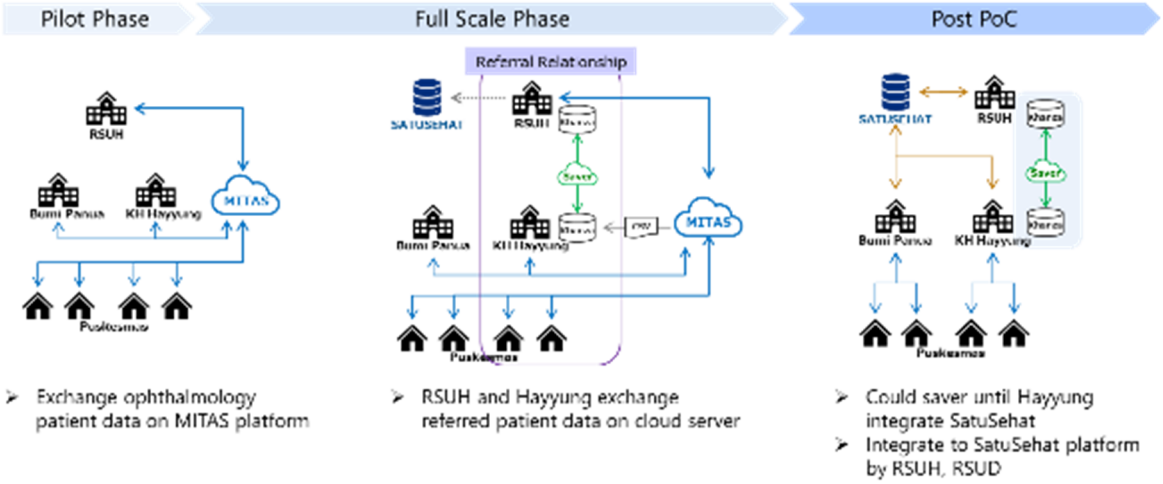


Figure 57 OPH Data Connection Model

Source: JICA Expert Team

Since both RSUH and RSUD KH Hayyung use KHANZA as their EMR, a cloud server that allows data upload and download directly from KHANZA was adopted. In addition, from the viewpoint of data size and data items necessary for diagnosis, the patient data exchanged on the cloud server will be data other than images of patients actually referred from RSUD KH Hayyung to RSUH. Once the referred patient data is registered in the MITAS Medical system, MITAS Medical will share the patient information items managed by the MITAS Medical system to RSUD KH Hayyung in CSV format, and the remaining patient information items will be matched and data integration is performed by RSUD KH Hayyung's IT personnel. The integrated patient data will be integrated into a data format that can be imported into KHANZA, and can then be imported into the respective KHANZA systems of RSUH and RSUD KH Hayyung. This data integration method is a temporary measure until RSUD KH Hayyung connects to the SatuSehat platform, after which the cloud server will be shut down. The cloud server will be managed by RSUH until then.

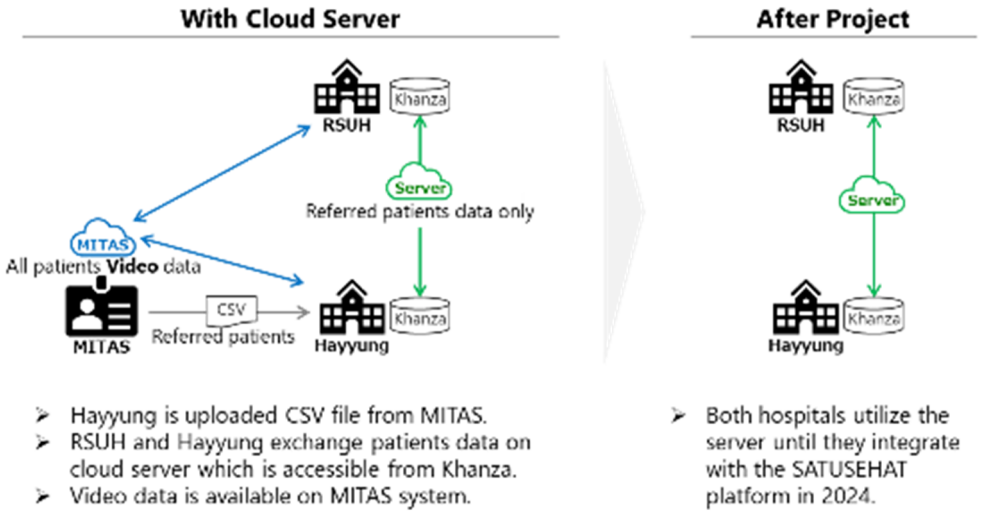


Figure 58 RSUH, RSUD KH Hayyung OPH data flow

Source: JICA Expert Team

6-2. Organize lessons learned from policies and regulations, including reimbursement mechanisms and data linkages to telemedicine

(1) Policies and regulations related to SatuSehat

1) Regulations related to SatuSehat

The MoH has announced a series of policies to the efforts of implementation of the SatuSehat platform throughout 2022 to improve health services through the provision of accurate, up-to-date, integrated, and reliable health care data. There are four main regulations directly related to the connection to the SatuSehat platform, in particular PMK 24/2022, which stipulates that all healthcare facilities must have an EMR and connect their EMR to the SatuSehat platform by the end of Dec 2023, as per the relevant provisions below.

- Health Facilities are obliged to implement EMR (article 3), including telemedicine services by health facilities (article 4) and EMR is implemented no later than Dec 31, 2023 (article 45).
- The developed EMR must be connected to SatuSehat (article 21) and transfer of EMR data for referral services must go through SatuSehat (article 24)
- Interoperability standards refer to standards set by the MoH (article 10 paragraph (4), as well as variables and metadata refer to those set by the MoH (article 11)

Table 63 Digital Health Regulations

		Relevant rule sections	Main contents
Digital health transformation	Related to SatuSehat	Health Regulation 24/2022 Peraturan Menteri Kesehatan Nomor 24 Tahun 2022	About Medical Information and Electronic Medical Records
		Law 27/2022 Undang-undang Nomor 27 Tahun 2022	Privacy Policy
		Health Regulation Article 28/2022 Peraturan Menteri Kesehatan Nomor 28 Tahun 2022	Management of medical information through medical information systems One Data for Health, data governance policy for the healthcare sector
		Regulation of the Minister of Health (KMK) HK.01.07/MENKES/1423/2022	Guidelines for Related Variables and Metadata in Electronic Health Record Implementation Standardization of medical electronic systems, SatuSehat requirements
		Law 36/2009	General laws concerning the health of the people

		Undang-undang Nomor 36 Tahun 2009	Health care through health information (No. 167) Effective health-related activities require health information (No. 168). Public access to health information (No. 169)
		Law 23/2014 Undang-undang Nomor 23 Tahun 2014	General laws on local government MoH and local government manage national health care (UKP: Upaya Kesehatan Perorangan) and public health
		Government Regulation 46/2014 Peraturan Pemerintah Nomor 46 Tahun 2014	Regulations for health information and systems and general governance
		Law 19/2016 Undang-undang Nomor 19 Tahun 2016	Laws concerning electronic information, information technology and electronic transactions in general
		Ministry of Information and Communication Regulation 20/2016 Peraturan Menteri Kominfo Nomor 20 Tahun 2016	Rules for the protection and handling of personal information in electronic information and electronic systems
		Government Regulation 71/2019 Peraturan Pemerintah Nomor 71 Tahun 2019	Regulations on the use of information technology and electronic transactions
		Presidential Regulation 95/2018 Peraturan Presiden Nomor 95 Tahun 2018	Regulations on the Electronic Public Administration System (SPBE: Sistem Pemerintahan Berbasis Elektronik)
		Regulation of KMK HK.01.07/MENKES/3605/2021	Establishment of the Office of Bureaucratic Reform and the Central Reform Office of the MoH
		Regulation of KMK HK.01.07/MENKES/635/2022	Establishment of the DTO of the MoH

Source: JICA Expert Team

2) Regulations related to digital health transformation

The provision of health information to the public is an implementation obligation of the MoH, as stated in Article 36.168.2 of the 2009 law, and is communicated through an information system across departments from both central and local governments. The information system is described in Government Regulation ("PP") No. 46 of 2014 on Health Information Systems, which stipulates that health data and information management systems shall be implemented at all levels of government. To improve health services to the community, health management support will be implemented in a systematic and integrated manner.

In connection with the implementation of PP No. 46 of 2014 and PP No. 39 of 2019, the MoH issued PMK No. 18 of 2022 as a regulation on the centralization of data in the health sector through the Health Information System. This regulation serves as the initial basis for implementing the development and implementation of the SatuSehat platform.

The use of medical records as an auxiliary element in basic health services to the public and the community is provided for in Article 12 of Law No. 23 of 2014 on Local Government.

To encourage the implementation of EMR in all healthcare facilities in Indonesia, the MoH issued PMK No. 24 of 2022, an update of PMK No. 269 of 2008 on medical records, on Aug 31, 2022. This updated regulation was distributed to all medical facilities through provincial/provincial/municipal health departments to encourage the implementation of EMRs and information systems integrated with the SatuSehat platform.

EMR itself is classified as a specific type of personal data, including data and information related to health, as stated in Article 4 of the Law on the Protection of Personal Data (Law No. 27 of 2022). According to this law, the owner of the EMR data is the individual citizen, which guarantees the protection of personal information and rights.

To facilitate efforts to introduce EMR, the MoH enacted Decree HK.01.07/MENKES/1559/2022 on the introduction of the Electronic Based Government System ("SPBE") in the health sector and the Digital Health Transformation Strategy /MENKES/1559/2022. This resolution was issued as part of the implementation of PP No. 95 of 2018 on the e-Based Government System, PMK No. 24 of 2022 and the implementation guidelines of the Blueprint of Digital Health Transformation Strategy 2024. Note that SPBE or e-government

is the MoH initiative to utilize information and communication technology to improve services and governance. This resolution also describes the development of the SatuSehat application by the MoH.

(2) Lessons learned from policies, regulations, etc. related to SatuSehat connections

1) Difficulty of compliance by foreign companies with standardized specifications

When connecting data to the SatuSehat platform, it is necessary to comply with the regulations of KMK HK.01.07/MENKES/1423/2022. This regulation specifies the data items, related variables, interoperability standards, coding standards, etc. required to connect to the SatuSehat platform, all written in Indonesian. Although MITAS Medical's system does not require the registration of patients' personal information and can operate using only patient IDs, one of the requirements for connecting to the SatuSehat platform is the need for patients' personal information, which required significant modifications to the foundation of MITAS Medical's system. Therefore, existing data could not be made compliant with the relevant regulations during the project period, and patient data could not be connected to the SatuSehat platform, and operation could not be continued after the completion of the project without modifications to comply with Indonesian regulations.

In addition to the above medical regulations, private companies that provide system operations in Indonesia must also comply with the Ministry of ICT's "Regulation No. 5 of 2020 on Private Electronic System Operators". Not only Indonesian companies, but also foreign companies such as MITAS Medical must meet all requirements and submit the designated registration form.

For foreign companies to enter the digital health market, connection to the SatuSehat platform will be essential, and compliance with the above regulations will be necessary. However, since SatuSehat itself is still under development and the related regulations are still in the process of being put in place, it is expected that revisions and new policies and regulations will be added in the future. Foreign companies need to overcome the language barrier and promptly understand and adopt new regulations. The DTO is also considering the participation of foreign companies in the Regulatory Sandbox, and further cooperation is required to enable testing of medical devices from outside Indonesia.

2) Personalization of Medical Information Management for Digital Health Dissemination

The MoH regulation PMK24/2022 stated that all medical facilities should have an EMR that can be connected to the SatuSehat platform by 2023, but in PKM, the project target, the EMR has not been implemented and the infrastructure, including stable internet and hardware such as PCs, is not sufficient. In addition, as the DTO recognizes as an issue at hand, there is a shortage of IT human resources with sufficient skills in Indonesia, and since specialized human resources are concentrated in urban areas, there is a chronic shortage of IT human resources in rural areas.

The DTO is working with the Ministry of Communications to study internet penetration in all areas of Indonesia[16] and with the Ministry of Interior to study budget and resource allocation policies to introduce EMRs to medical facilities. It is also developing a comprehensive training program and regional team structure for IT human resource development.

While these ongoing activities of the DTO are necessary, the introduction of sufficient infrastructure and

[16] Internet environment survey in collaboration with the Ministry of Communications: https://satusehat.kemkes.go.id/dashboard/dasbor-pendataan-kualitas-internet-puskesmas.html

EMRs at PKM level requires time and budget, and when EMRs are introduced, each facility also needs IT staff to manage the related systems, including hardware. In this project, medical equipment that is small and easy to manage was introduced to PKM, but there are many challenges to its sustainable use due to data communication failures, difficulty in using the equipment, and lack of reimbursement for medical services.

With many rural medical facilities still not digitizing their medical information, an approach that not only aims at long-term operational implementation of EMR and equipment in medical facilities, but also allows patients themselves to manage and operate their personal medical data and connect to the SatuSehat platform to perform data linkage across medical facilities is also necessary to promote telemedicine. This includes the widespread use of applications that allow individual patients to manage their medical information, such as SatuSehat mobile, as well as the introduction of security technologies that can secure patients' personal information and the development of regulations regarding the protection of personal information. Future demonstrations are also expected to consider the introduction of medical devices that can be linked to data managed by individual patients, such as SatuSehat mobile.

3) Linking Telemedicine and Reimbursement Mechanisms

The BPJS and the MoH are currently implementing a pilot telemedicine project, which has expanded to 101 targeted medical institutions throughout Indonesia, but only about 30 institutions are actually engaged in the project. The pilot was supposed to be completed by the end of 2023, however it is still ongoing.

The three medical services covered by the pilot project are "Tele consultation[17]," "Tele ECG," and "Tele ultrasound," and the prices for each service are shown in the below table.

The reimbursement structure in the pilot project is divided into two patterns: "No physical reference" and "Physical reference". In the telemedicine adoption flow, at first, a patient visits FKTP, and if GP in FKTP determines that the patient needs medical support from a higher-level hospital (“FKRTL”), telemedicine is performed using a D2D telemedicine tool (e.g., KOMEN). If the telemedicine is completed online, the "No physical reference" fee will be referenced, but if the patient needs to visit to FKRTL in-person as a result of examination, the "Physical reference" fee will be referenced.

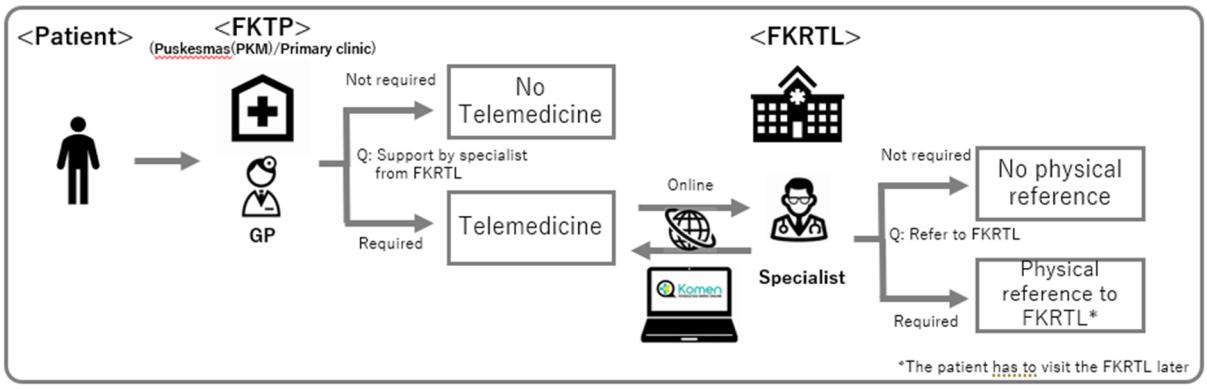


Figure 59 Image of telemedicine adoption flow in the BPJS pilot project

Source: JICA Expert Team

[17] Teleconsultation on this page is intended for the clinical field (Telemedicine). (*Educational field: Telehealth)

Table 64 Medical fee of the BPJS pilot project

BPJS Kesehatan

TELEMEDICINE RATE during Pilot

RATES _ TELEMEDICINE HOSPITAL BASED (Patient has no physical reference)	PKM			PRIMARY CLINIC		
	TOTAL RATES	FKTP	FKRTL	TOTAL RATES	FKTP	FKRTL
CLINICAL TELECONSULTATION	40,000	10,000	30,000	40,000	10,000	30,000
TELE ECG*	60,000	25,000	35,000	65,000	30,000	35,000
TELE ultrasound*	65,000	30,000	35,000	70,000	35,000	35,000
RATES _ TELEMEDICINE HOSPITAL BASED (Patient has physical reference)	PKM			PRIMARY CLINIC		
	TOTAL RATES	FKTP	FKRTL	TOTAL RATES	FKTP	FKRTL
CLINICALTELECONSULTATION	15,000	0	15,000	15,000	0	15,000
TELE ECG*	32,500	15,000	17,500	37,500	20,000	17,500
TELE ultrasound*	37,500	20,000	20,000	42,500	25,000	17,000

Source: BPJS, 2023

Currently, telemedicine is not covered by National health security ("JKN") in Indonesia. Although telemedicine tools such as KOMEN have been developed, there is no collaboration between telemedicine and JKN, and D2D telemedicine using KOMEN is currently provided without payment. The MoH will decide whether to include JKN in telemedicine in the future, based on the results of the pilot project mentioned above.

Currently identified bottlenecks in the collaboration between telemedicine and the reimbursement mechanism include the following.

- As a requirement for participation in the BPJS payment mechanism, FKTPs and FKRTLs must form a partnership agreement ("PKS") between the hospitals. However, several FKTPs have not conducted PKS with FKRTL due to distance and area zoning constraints.

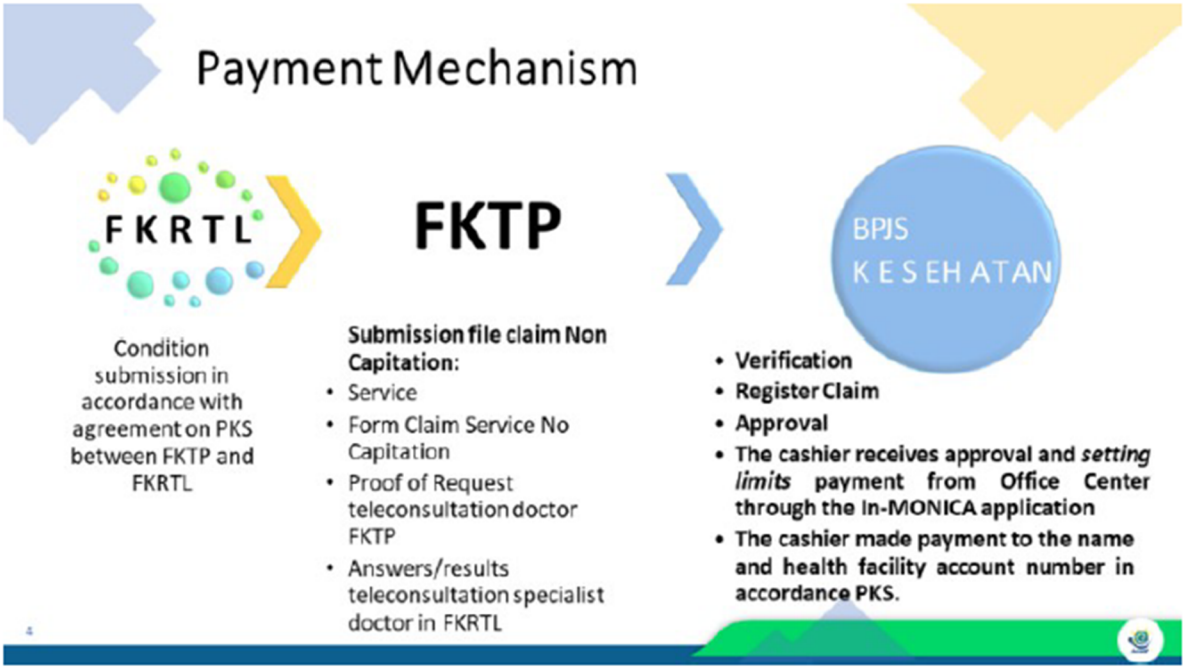


Figure 60 Image of the BPJS reimbursement system

Source: BPJS, 2023

- FKTPs in remote areas frequently experience data communication network problems.
- The response time for the doctor's answer has not met the target (more than 2 hours)
- Telemedicine rates are considered unattractive by FKTP and FKRTL.
- The interoperability of third-party information systems (e.g. medicine delivery system) with the BPJS is still in the process of being developed.

The above issues are only a part of the challenges in telemedicine and reimbursement coordination. In order to expand and establish telemedicine in the future, it is expected that a wide range of approaches will be required, including the development of an ecosystem to generate synergic effects among the MoH, various medical facilities, and the BPJS regarding policies and mechanisms related to telemedicine reimbursement, and the revision of medical fee structures based on geographical locations of medical facilities.

6-3. Conduct discussions with relevant organizations based on (2) above.

The MoH is the main government agency involved in telemedicine, but the establishment of a D2D telemedicine model will require the involvement of other relevant organizations and institutions in addition to government agencies, such as donors who support telemedicine activities, BPJS as an insurer in the public insurance system for telemedicine reimbursement, private companies and organizations representing private companies with telemedicine-related solutions (e.g., ATENSI), etc. It is necessary to consider feasible and effective solutions in accordance with local conditions, involving other related organizations and institutions, such as ATENSI, etc. The results, issues, and proposed solutions will be discussed at an early stage with the MoECRT in the JCC, relevant government agencies such as the MoH, and other related agencies and organizations, and will be finalized as policy recommendations in a final report.

(1) Discussions with the BPJS (Jul and Nov, 2023, Mar, 2024)

As mentioned in 6-2 (2) (3), the pilot project is being implemented in collaboration with the BPJS and the MoH, however the pilot project is not progressing well. Reasons for not progressing well in the pilot project using the BPJS include regulations on payment of medical fees between PKM and hospitals, difficulties in delivering medicines prescribed through telemedicine to remote areas, and the burden on the BPJS staff to manage this project in parallel with other daily operations.

In addition, the lack of sufficient network infrastructure and unstable internet access in rural areas of Indonesia is one of the problems interferring with the promotion of telemedicine, and one of the proposals for Japanese support in promoting telemedicine was the development of network infrastructure.

The BPJS is planning to expand its telemedicine services nationwide in the future, and as a first step, the BPJS expects to deal with various restrictions that prevent the promotion of telemedicine, such as issues learned from the pilot project and current related regulations. Although the pilot project is still ongoing (as of Mar 31, 2024), issues that have been raised so far include "data sharing among medical institutions," "D2D telemedicine tools," "internet infrastructure," and "digital literacy among medical personnel". In order to expand insurance coverage of D2D telemedicine in the future, medical evidence is required to prove the benefits for health by implementing D2D telemedicine.

In addition, lower-level hospitals (RSUD, PKM etc.) are under the DHO. Therefore, future expansion of telemedicine to medical facilities throughout Indonesia will require cooperation not only with the MoH but also with the DHO.

(2) Discussion with the MoH (DG) (Jul 3, 2023)

- About SatuSehat

The DTO is developing the SatuSehat platform, including a mobile application (SatuSehat mobile), and aims to link medical information with 30,000 medical facilities by the end of 2023. Currently, of the approximately 7,000 medical facilities registered with the DTO, only about 200 are actively sending data. SatuSehat mobile, on the other hand, has approximately 180,000 users who use the application on a daily basis.

The current SatuSehat platform only functions to receive and store data, and the SatuSehat platform by itself cannot send data to external medical facilities. Therefore, when linking patient information between medical facilities, a system with functions to integrate data, such as dashboards and applications, is necessary.

(3) Discussion with MoH (DTO and Medical Service) (Aug, 2023)

1) About Regulatory sandbox program

Currently, 15 companies are participating in the Regulatory sandbox, which is expected to be completed by Dec 2023. The DTO expects the next Regulatory sandbox to expand in the following three phases:

(1) Innovation sandbox to test technologies
(2) Industrial sandbox to evaluate user acceptance
(3) Traditional Regulatory Sandbox to assure compliance

2) Patient Information in Telemedicine

Regarding the use of tools such as Zoom and Excel for telemedicine, the MoH stated that any platform is allowed as long as appropriate data management and security measures are in place. Electronic medical data is treated in the same way as physical medical data.

3) Current Challenges

The main challenges are standardization in the areas of technology, medicine, and governance. To address this challenge, the DTO is working on standardization through the development of the International Classification of Diseases ("ICD-10"), International Classification of Diseases and Clinical Modifications ("ICD-9-CM"), Logical Observation Identifiers Names and Codes ("LOINC"), Digital Imaging and Medical Communications ("DICOM"), Systematized Medical Nomenclature-Clinical Terminology ("SNOMED-CT").

The DTO, the BPJS, and the Medical Service ("Pelayanan Kesehatan/Yankes") have systems operated by their respective agencies, but their information is not integrated because there is no common data platform among the agencies. For example, the BPJS has its own system that covers only its members, and JKN information on patient transfers between medical facilities is not linked to SISRUTE operated by the MoH. There is a need to introduce the SatuSehat platform, including revision of relevant regulations, so that information within Indonesia can be integrated.

4) Initiatives for Rural Areas

There is no specific policy to introduce EMR by the end of Dec 2023 for rural health facilities that do not have adequate infrastructure. However, the MoH is working with the MoCI to increase internet bandwidth, especially in remote areas. It is also coordinating with the MoHA regarding a regional budget to improve the quality of facilities and medical resources to operate the medical information system.

(4) Discussion with MoH (DTO and Medical Service) (Dec 2023)

Participants: DTO、Medical Service、Center for Data and Information Technology ("Pusdatin")、Center for Global Health Policy and Health Technology ("Pusjak KGTK")

The Digital Health Transformation Strategy 2025-2029 is currently in progress and is expected to continue through mid-2024. The focus is currently on building the foundation, and the next steps will address data governance, policy, and ecosystem development at the national, provincial, and international levels. The Digital Health Transformation Strategy will play a role with a guideline as a comprehensive strategy and serve as a guideline.

- Assisting Development Partners in Developing the Digital Health Transformation Strategy

The collaboration is in progress with partners for the Digital Health Transformation Strategy 2025-2029, including the Tony Blair Institute as the main consultant, PWC, and the University of Indonesia. In the previous Health Transformation Strategy for 2021-2024, UNDP assisted in its development. The partner decisions will be discussed and coordinated by the Center for Global Health Policy and Health Technology. In addition, the MoH has a consortium focused on primary health care with multiple stakeholders, however there is no confirmation or information regarding JICA's participation, so JICA's involvement is unclear.

・ Government Regulation 17/2023 and its relationship to the development of data governance

Discussions are ongoing with the National Cyber Cryptography Agency (“BSSN”) and the Ministry of ICT on the protection of personal data regarding Government Regulation 17/2023. It is also developing a data governance strategy focused on health data.

・ Regarding D2D telemedicine provider standards and capabilities.

Medical services must be provided by a officially registered doctor or a specialist with a license. In addition, the systems must be integrated to ensure the security of patient data and maintain information.

・ Incentive Mechanisms in D2D Telemedicine

To development the incentive and mechanism in D2D telemedicine, it is expected that discussions with Health Financing and Decentralization Policy Center in the MoH will be required. There are several issues regarding the use of KOMEN, including no cover by JKN (= free of charge), the difficulty of scheduling specialists, limited access to networks and electricity in rural areas, and the preference for simpler applications.

(5) Discussion with MoH (DTO and Medical Service) (Mar, 2024)

Participants: DTO、Medical Service、Center for Data and Information Technology (Pusdatin)、Center for Global Health Policy and Health Technology (Pusjak KGTK)、Health Development Policy Agency (BKPK)

➢ Regulation of D2D telemedicine

MoH's D2D telemedicine can be categorized into two types: "Telemedicine" and "Telehealth". The former is telemedicine that focuses mainly on clinical practice, and medical treatment and diagnosis using telemedicine tools is in Telemedicine category. On the other hand, Telehealth includes activities in the field of education, such as training of medical personnel and research, and activities related to preventive medicine, such as educational activities. MoH has expressed its intention to establish new regulations for Telemedicine and Telehealth to promote D2D telemedicine, and although discussions at the ministerial level are underway, they have not yet been launched and are currently in the establishment phase. In addition, the JICA Expert Team confirmed that MoH intends to develop regulations for telemedicine not only in the D2D field, but also in the D2P field in the future.

➢ Introduction of EMR

As mentioned in 6-2. (1), MoH mandates that all medical facilities must introduce EMR and connect their EMR to the SatuSehat platform by 2023. However, the introduction to all medical facilities has not been completed at present. Therefore, MoH is providing the following health information system, including the EMR module, free of charge to promote the introduction of EMR and connection to the SatuSehat platform at each health care facility.

- SIMRS GOS：Health information system for hospitals
- SIMGOS：Health information system for clinics
- SIKDA Generik：Health information system for PKMs
- ASRI：Health information system for independent doctors/dentists

However, there are still some remaining issues regarding the introduction of EMR in PKM, such as the incompatibility between existing medical equipment and EMR as well as the lack of digital literacy among

healthcare personnel, in addition to the development of an internet environment. Therefore, the government is required to continue its efforts to promote D2D telemedicine. Also, the activities of the RSUH component in this project include remote islands and other areas where the internet is inadequate, and the JICA Expert Team confirmed their intention to refer to the activities of this project in future policy making for D2D telemedicine.

- Insurance coverage and functional expansion of KOMEN

Currently, BPJS pilot project covers only 9 priority diseases: 1) Diabetes Mellitus, 2) Hypertension, 3) Heart disease, 4) Asthma 5) Chronic Obstructive Pulmonary Disease (COPD), 6) Epilepsy, 7) Schizophrenia, 8) Stroke, and 9) Lupus Erythematosus Syndrome) as well as maternal disease with Time, Age, Comorbidity, Complication (TACC) criteria, piloted in 101 locations. However, beyond that, there is still no payment mechanism, relying on agreements between healthcare facilities. Also, as for the limited function of KOMEN, the government currently has no policies or other plans for functional expansion.

6-4. Evaluation of Activities Related to Output 4

For the RSUH component subject to Output 4, the assumption of the data linkage model at the beginning of this project was not in line with Indonesian regulations, and based on discussions with the DTO, the model was reviewed to be in line with the regulations. In addition, the data linkage model was restructured to take into account the progress status of connecting to SatuSehat platform from the medical facilities covered by this project especially RSUH.

In the departments of OB, the data integration operation processes between RSUH and Sehati was designed and the data integration system to the SatuSehat platform was established, without any major problems during the test period and after the official connection to the SatuSehat platform. Due to the regulatory change near the end of this project, the data to be linked to the SatuSehat platform was limited to patients referred to RSUH from other related health facilities, and although there is no target patient in obstetrics, the operational method and model for data linkage could be reached to establishment.

For OPH, patient data connection to the SatuSehat platform requires compliance with the data items specified by the DTO, however the regulations were not taken into account when selecting the Private Partner, and the requirements for patient data connection were not included in the criteria for selecting the Private Partner. As a result, the data collected by MITAS Medical alone could not meet the requirements, and the data managed by MITAS Medical was merged with the data from related medical facilities to achieve patient data connection to the SatuSehat platform. In OPH, the eligible six patient cases have been linked to the SatuSehat platform.

In addition, discussions were held with the MoECRT, the MoH, the BPJS, the Counterpart Hospitals, the Partner Hospitals, and other external stakeholders for policy recommendations in the full-scale activities. During the discussions, the vision and current activities of each agency and organization were identified, and issues and lessons learned through this project were discussed with a view to developing a policy framework. Based on the issues and needs of external stakeholders obtained through the consultations, policy recommendations for the expansion and promotion of D2D telemedicine in Indonesia has been shown to stakeholders, and the contents were widely shared with the Indonesian government and other stakeholders.

Table 65 Indicators and Evaluation of Output 4

Output 4	
Identified challenges and opportunities in mainstreaming the D2D telemedicine are widely shared for relevant policy framework development and data connectivity management by the authorities.	
Indicators	**Evaluation**
① Amount of accumulated medical dataset to be connected with IHS Platform	OPH: 6 cases[18] OB: 0 cases
② Number of seminars / dialogues held with external stakeholders to share lessons learnt from the project regarding the policy framework and data connectivity in D2D telemedicine	MoECRT/AHS(4) MoH(4) BPJS(3) FORKOMTIKNAS (1) AHI (1) ATENSI (1)
③ Submission of Policy recommendation paper for D2D telemedicine mainstreaming is shared to related stakeholders	Completed

Source: JICA Expert Team

[18] For OPH, as described in 6-1.(3)(3), since it was not possible to connect to SatuSehat platform with the data collected by the partner companies alone, the number of data set was that the patient who were referred to RSUH and whose data was merged on the newly introduced cloud server.

III. Input by JICA

III. Input by JICA

1. JICA Consultant Team

1-1. RSUI

The JICA Expert Team attended every tele-conference and conducted review sessions with Vitaars. The team also supported the monitoring and evaluation of RSUI, RSUD Kota Depok and RSUD Cibinong.

The results of the team's field trips are shown in Table 66.

Table 66 Results of RSUI Team's Field Trips

	Date	Visitor	Destination
1	5th - 16th Dec 2023	Team Leader Telemedicine Model Planning 1 (RSUI Component Leader) Digital Health & Data utilization 1	MoH、MoECRT、RSCM、RSUI、RSUD Kota Depok, etc.
2	6th - 11th Mar 2023	Team Leader Telemedicine Model Planning 1 (RSUI Component Leader) Medical Advisor 1	RSUI、RSUD Kota Depok RSUD Cibinong, etc.
3	30th Jul - 5th Aug 2023	Team Leader Digital Health & Data utilization 1 Training & Seminar Planning	MoH 、 MoECRT 、 RSUI 、 RSUD Kota Depok 、 RSUD Cibinong, etc.
4	20th - 24th Nov 2023	Telemedicine Model Planning 1 (RSUI Component Leader) Digital Health & Data utilization 1	RSUI、RSUD Cibinong, etc.
5	11th - 16th Mar 2024	Digital Health & Data utilization 1 Medical Advisor 1 Training & Seminar Planning	MoH、MoECRT、BPJS、RSUI、RSUD Kota Depok 、RSUD Cibinong

Source: JICA Expert Team

1-2. RSUH

The JICA Expert Team attended every tele-conference and conducted review sessions with Vitaars. The team also supported the monitoring and evaluation of RSUI, RSUD Kota Depok and RSUD Cibinong.

The results of the team's field trips are shown in Table 67.

Table 67 Results of RSUH Team's Field Trips

	Date	Visitor	Destination
1	5th - 16th Dec, 2023	Team Leader Telemedicine Model Planning 2 (RSUH Component Leader) Digital Health & Data utilization 2	RSUH、Faculty of Medicine UNHAS（Residency Program） 、Sehati、MoH、MoECRT、RS Bumi Panua、Pohuwato DHO, etc.
2	2nd - 14th Mar, 2023	Team Leader Telemedicine Model Planning 2 (RSUH Component Leader)	RSUH、RSUD KH Hayyung、RSUD Bumi Panua、DHO、PKM Benteng, etc
3	3rd - 14th Jul 2023	Team Leader Telemedicine Model Planning 2 (RSUH Component Leader)	MoECRT 、 DTO 、 BPJS 、 RSUH、RSUD KH Hayyung、RSUD Bumi Panua 、 DHO 、

		Digital Health & Data utilization 2	PKM Benteng、Candidate 4 PKMs for scaling-up-activities
4	3rd - 16th Dec, 2023	Team Leader Telemedicine Model Planning 2 (RSUH Component Leader)	MoH、BPJS、MoECRT、AHS、RSUH、RS Wahidin
5	11th – 23rd Mar, 2024	Team Leader Telemedicine Model Planning 2 (RSUH Component Leader) Digital Health & Data utilization 2	MoH、BPJS、MoECRT、AHS、RSUH、RSUD Bumi Panua、DHO、PKM Lemito、PKM Paguat、RSUD KH Hayyung、PKM Benteng、PKM Bontosunggu、PKM Bontomatene

Source: JICA Expert Team

2. Private Partners

2-1. RSUI

Vitaars has conducted a total of eight tele-conferences for doctors and eight tele-conferences for nurses during the pilot activity, and 19 tele-conferences for doctors and 20 tele-conferences for nurses during the full-scale activity. The structure of the tele-conference is as follows: the first through the sixth sessions are allocated 0.5 hours each as a period of adaptation to the operation of preliminary consultation and feedback, and the seventh and later sessions are allocated 0.25 hours each.

- Preliminary consultation on RSUI's teaching policy: the first to sixth session 0.5 hours (0.25 hours after the 7th session)
- Conference call support to partner hospitals conducted by RSUI (conference call): 1.0 hour
- Immediate feedback to RSUI after conference call: the first to sixth session 0.5 hours (0.25 hours after the 7th session)
- Activity report preparation by instructor: 0.5 hours

During the tele-conference, Vitaars provided technical advice and suggestions to RSUI, RSUD Kota Depok and RSUD Cibinong regarding the operation of the tele-conferences.

In addition, Vitaars visited the Counterpart Hospital and the Partner Hospitals on the following three trips to conduct interviews regarding the ICU manual, provide instruction for settlement, and conduct follow-up seminars.

Table 68 Results of Vitaars Field Trips

	Period	Visitor	Destination
1	5th -11th Mar 2023	Doctor: 1, Nurse: 1	RSUI, RSUD Kota Depok, RSUD Cibinong etc.
2	10th – 16th Sep 2023	Doctor: 2, Nurse: 2	RSUI, RSUD Kota Depok, RSUD Cibinong etc.
3	10th – 15th Dec 2023	Doctor: 1, Nurse: 1	RSUI, RSUD Kota Depok, RSUD Cibinong etc.

Source: JICA Expert Team

2-2. RSUH(OPH)

MITAS Medical devices were delivered to the Partner Hospitals for initial setup and user training. Bi-weekly meetings and Weekly Reports provided progress reports.

Table 69 List of Equipment Provided by MITAS Medical

Equipment	Recipient	Quantity
MS1	RSUD Bumi Panua	1
	RSUD KH Hayyung	1
	PKM Lemito	1
	PKM Paguat	1
	PKM Benteng	1
	PKM Bontomatene	1
Smart phone	RSUD Bumi Panua	1
	RSUD KH Hayyung	1
	PKM Lemito	1
	PKM Paguat	1
	PKM Benteng	1
	PKM Bontomatene	1
Application	RSUH	1
	RSUD Bumi Panua	1
	RSUD KH Hayyung	1
	PKM Lemito	1
	PKM Paguat	1
	PKM Benteng	1
	PKM Bontomatene	1

Source: JICA Expert Team

2-3. RSUH(OB)

Sehati devices were delivered to the Partner Hospitals and initial setup and user training was conducted. Bi-weekly meetings and Weekly Reports provided progress reports.

Table 70 List of Equipment Provided by Sehati

Equipment	Recipient	Quantity
TeleCTG	RSUD KH Hayyung	1
	PKM Benteng	1
	PKM Bontomatene	1
	PKM Bontosunngu	1
Tablet	RSUD KH Hayyung	1
	PKM Benteng	1
	PKM Bontomatene	1
	PKM Bontosunngu	1
Application	RSUH	1
	RSUD KH Hayyung	1
	PKM Benteng	1
	PKM Bontomatene	1
	PKM Bontosunngu	1

Source: JICA Expert Team

IV. Input by the Government of Indonesia

IV. Input by the Government of Indonesia

1. RSUI

- Legal agreement (JICA-RSUI) signed
- Legal agreement (JICA-RSUD Kota Depok) signed.
- Legal agreement (JICA-RSUD Cibinong) signed.
- Memorandum of Understanding (RSUI-RSUD Kota Depok) concluded.
- Manpower for tele-conference implementation

2. RSUH

- Legal agreement (JICA-RSUH) signed
- Legal agreement (JICA-RSUD KH Hayyung) signed
- Legal agreement (JICA-RSUD Bumi Panua) signed.
- Memorandum of Understanding (The JICA Expert Team, Faculty of Medicine UH and RSUH) signed.
- Residents and other necessary staff for the implementation of the pilot and the scaling-up activity
- Participation in bi-weekly meetings and submission of weekly reports
- Assigned the residents and other necessary staff to implement the pilot activity activities.
- Assigned new the Partner Hospitals (two PKM in Kab. Pohuwato and two PKM in Kab. Selayar)
- Made comments to bi-weekly report drafted by the Private Partners.
- A cloud server has been implemented to facilitate the sharing of patient data for referrals from RSUD KH Hayyung to RSUH.
- Participation in discussions for data integration.
- Specialists and senior residents have been engaged in the implementation of tele-consultation.

V. Achievement of Project Purpose

V. Achievement of Project Purpose

The project purpose and evaluation indicators in this project are as follows.

Table 71 Project Purpose and Evaluation Indicators

Project Purpose	
To strengthen the role of the Counterpart Hospitals in terms of improving quality and coverage of regional health care including remote areas through the university hospital-centered D2D telemedicine mechanism with the Partner Hospitals.	
Evaluation Indicators for Project Purpose	
All	・ Number of the Partner Hospitals that operationalize the "university hospital-centered D2D telemedicine mechanism" ・ Satisfaction rate on D2D telemedicine by both the Counterpart Hospitals and the Partner Hospitals (Output2)
RSUI	・ Individual professional learning indicators (empowerment, confidence, perception) ・ ICU manual compliance rate
RSUH (OPH)	・ Meaningful/sustainable knowledge transfer between residents by seamless deployment to RSUD ・ Number of patients treated with D2D telemedicine using device for three months ・ Number of unnecessary referred patient decrease in scaling-up activity (early detection makes) (This indicator is only for the scaling-up activity)
RSUH (OB)	・ Meaningful/sustainable knowledge transfer between residents by seamless deployment to RSUD ・ Number of early detection by improvement of examination quality ・ Number of infant death cases at each Partner Hospital

Source: JICA Expert Team

1. RSUI

The project goals are deemed highly achieved. Regarding the satisfaction level of D2D telemedicine at both the Counterpart Hospital and the Partner Hospitals as an evaluation indicator for the project goals, as detailed in Output 2, the follow-up survey results confirmed a high level of satisfaction among the participants in RSUI tele-conferences.

In individual interviews with doctors and nurses from RSUI, many of them commented that they were highly satisfied with the effectiveness of the telemedicine implementation method and the usefulness of the advice provided by the Japanese ICU specialists. As for the professional learning indicators of healthcare professionals, the results of the Professional Learning Survey and Performance Interview indicate that the tele-conference improved the confidence and motivation of doctors and nurses, and improved their awareness and understanding of their colleagues, other teams, and other hospitals, as well as their relationships with each other.

For one of the project target indicators, the utilization rate of the manual was measured by the amount of use of the manual through ICU members' understanding of the ICU's duties as described in the manual. The base line survey (late Dec 2023 to early Jan 2024) and endline survey (mid-Mar 2024) each contained 10 to 17 questions, and changes between these surveys were analyzed. The rating scale for each question was from 1 to 4, with 1 indicating "no understanding at all" and 4 indicating "good understanding." The results of the pre-post comparison for doctors and nurses are as follows.

First, for doctors, the results of the measurement of the ventilatory management manual and the PICS manual confirmed that RSUD Cibinong had a better understanding through the use of the manual in all

questions. On the other hand, endline results for RSUI and RSUD Kota Depok were difficult to compare before and after due to time constraints and the inability to collect GP responses. Although this makes it impossible to describe the overall results of doctors' use of the manuals, interviews with doctors at RSUI, RSUD Kota Depok, and RSUD Cibinong indicate that among the manuals developed this time, the ventilatory management manual in particular was being actively used in clinical settings, such as in conjunction or integration with the current SOPs, It is therefore assumed that the manuals would continue to be used after the completion of the project.

Table 72 Mechanical Ventilator Manual (Dr)

No	Questions	Hospital	Baseline	Endline
1	Choose the optimal target SpO2 value according to the disease	RSUI	3,46	-
		RSUD KD	3,15	-
		RSUD CB	2,50	↑ 3,17
2	Determine the appropriate settings for HFNC and evaluate its effectiveness	RSUI	3,15	-
		RSUD KD	3,08	-
		RSUD CB	2,33	↑ 3,17
3	Initiate NPPV and adjust it appropriately based on the patient's response	RSUI	3,08	-
		RSUD KD	2,69	-
		RSUD CB	1,83	↑ 2,67
4	Choose the appropriate mode of mechanical ventilation and adjust the settings according	RSUI	3,46	-
		RSUD KD	2,92	-
		RSUD CB	2,33	↑ 2,83
5	Apply and manage the principles of lung-protective ventilation, high PEEP strategy, and permissive hypercapnia for patients with ARDS	RSUI	3,00	-
		RSUD KD	2,38	-
		RSUD CB	2,17	↑ 2,67
6	Appropriately adjust and manage the ventilator settings for patients with COPD	RSUI	3,00	-
		RSUD KD	2,62	-
		RSUD CB	2,17	↑ 2,83
7	Be familiar with the typical graphical changes and recognize them when you glance at the ventilator screen	RSUI	3,00	-
		RSUD KD	2,31	-
		RSUD CB	1,67	↑ 2,17
8	Effectively troubleshoot problems with the ventilator using the DOPES mnemonic	RSUI	3,23	-
		RSUD KD	2,08	-
		RSUD CB	1,17	↑ 2,33
9	Calculate and interpret the RSBI and accurately assess the patient's readiness for ventilator withdrawal	RSUI	2,54	-
		RSUD KD	2,15	-
		RSUD CB	1,17	↑ 2,17
10	Perform a cuff leak test and assess the risk of laryngeal edema	RSUI	3,00	-
		RSUD KD	2,23	-
		RSUD CB	1,33	↑ 2,33

*KD : Kota Depok, CB : Cibinong

Source: JICA Expert Team

Table 73 PICS Manual (Dr)

No	Questions	Hospital	Baseline	Endline
1	Accurately collect and record a patient's basic information at admission, such as age, gender, height, weight, etc.	RSUI	3,42	-
		RSUD KD	3,57	-
		RSUD CB	2,40	↑ 3,50
2	Implement evidence-based ICU care, such as pain management, daily Spontaneous Awakening Trials (SAT) and Spontaneous Breathing Trials (SBT), sedation management, delirium management, and early mobilization	RSUI	3,25	-
		RSUD KD	2,93	-
		RSUD CB	2,20	↑ 2,50
3	Effectively monitor PICS risk factors during the ICU stay, such as changes in the Sequential Organ Failure Assessment (SOFA) score, device usage, and medication administration	RSUI	3,08	-
		RSUD KD	3,00	-
		RSUD CB	2,40	↑ 3,00
4	Appropriately manage and monitor devices (mechanical ventilation, ECMO, CRRT, etc.) and medications (neuromuscular blockers, steroids, sedatives, etc.) used during the ICU stay	RSUI	2,25	-
		RSUD KD	2,36	-
		RSUD CB	2,00	↑ 2,17
5	Effectively document daily patient status and care details in the ICU diary for efficient information sharing	RSUI	3,67	-
		RSUD KD	3,21	-
		RSUD CB	2,20	↑ 2,83
6	Ensure patient safety while avoiding unnecessary physical restraints	RSUI	3,33	-
		RSUD KD	3,43	-
		RSUD CB	2,40	↑ 2,83
7	Control lights and noises at night to improve patient sleep and comfort	RSUI	3,58	-
		RSUD KD	3,29	-
		RSUD CB	2,00	↑ 2,33
8	Accurately assess the severity of a patient's condition during the ICU stay and predict the risk of PICS	RSUI	2,92	-
		RSUD KD	3,21	-
		RSUDCB	2,20	↑ 2,67
9	Monitor complications such as hypoxemia, hypercapnia, hypoglycemia, hyperglycemia, delirium, and metabolic acidosis	RSUI	3,33	-
		RSUDKD	3,29	-
		RSUDCB	2,60	↑ 2,83
10	Appropriately summarize a patient's background, disease severity, treatment, and complications at the time of ICU discharge for effective handover to the next care phase	RSUI	3,00	-
		RSUDKD	3,21	-
		RSUDCB	2,60	↑ 3,00

Source: JICA Expert Team

For the nurses, almost overall, endline results improved compared to the baseline, confirming a high level of knowledge acquisition through the manual. On the nurses' side, an informational session on the PICS and Pressure Ulcer Prevention Manual was conducted for ICU nurses. In addition, some hospitals printed and

laminated the ABCDEFG bundle checklists that accompany the PICS manual for use in their daily activities. Each hospital practices on-site dissemination of the manual by distributing copies to nurses or placing them at patients' bedsides, which indicates that the manual is highly utilized.

Table 74 Pressure Ulcer Manual (Nurse)

No	Questions	Hospital	Baseline	Endline
1	Can you explain the mechanism of development/occurrence of decubitus ulcers/pressure ulcers?	RSUI	3,17	↑ 3,27
		RSUD KD	2,86	↑ 3,29
		RSUD CB	2,56	↑ 2,72
2	Can you perform a pressure sore risk assessment using the Norton Pressure Pain Risk Assessment Scale or the Braden Scale?	RSUI	3,30	↑ 3,64
		RSUD KD	2,95	↑ 3,43
		RSUD CB	2,61	↓ 2,50
3	Can you use the OH scale to choose a suitable mattress?	RSUI	2,09	↑ 2,64
		RSUD KD	2,62	↑ 3,05
		RSUD CB	2,56	→2,56
4	Can you explain all the common locations for pressure ulcers in patients lying down, sitting up in bed, and in wheelchairs?	RSUI	3,48	↑ 3,73
		RSUD KD	2,95	↑ 3,33
		RSUD CB	2,89	↑ 2,94
5	Can you use the NPUAP classification to classify pressure ulcers?	RSUI	2,39	↑ 2,91
		RSUD KD	2,48	↑ 2,90
		RSUD CB	2,33	↑ 2,39
6	Can you use DESIGN-R to assess wounds?	RSUI	1,91	↑ 2,64
		RSUD KD	2,62	↑ 2,90
		RSUD CB	2,17	↑ 2,44
7	Can you explain what a skin tear is?	RSUI	2,57	↑ 3,09
		RSUD KD	2,52	↑ 2,95
		RSUD CB	2,17	↑ 2,56
8	Have you used the STAR classification to classify skin tears?	RSUI	1,87	↑ 2,82
		RSUD KD	2,52	↑ 2,81
		RSUD CB	2,17	↑ 2,50
9	Can you move the patient on the bed without dragging the patient?	RSUI	2,96	↑ 3,27
		RSUD KD	2,86	↑ 3,24
		RSUD CB	2,56	↑ 2,89
10	When positioning the patient on their side to the left or right, the patient's large joints are grasped and the body is moved, and the patient can change position without strain.	RSUI	3,39	↑ 3,27
		RSUD KD	3,00	↑ 3,38
		RSUD CB	2,72	→2,72
11	Have used a pressure spreader or other device with a large buffer area to avoid continuous pressure on areas that are prone to pressure ulcers	RSUI	3,13	↑ 3,27
		RSUD KD	2,76	↑ 3,29
		RSUD CB	2,50	↑ 2,72
12	Have performed decompression by inserting hands into the point of contact between the patient's body and the bed	RSUI	2,96	↑ 3,27
		RSUD KD	2,71	↑ 3,33
		RSUD CB	2,33	↑ 2,83
13	Have applied moisturizer 1-2 times a day as a skin tear prevention treatment	RSUI	3,57	↑ 3,64
		RSUD KD	3,19	↑ 3,62
		RSUD CB	2,89	↑ 2,94
14	When cleansing the skin, I can lather the patient with plenty of foam, cleanse	RSUI	3,52	↑ 3,55
		RSUD KD	3,19	↑ 3,52

No	Questions	Hospital	Baseline	Endline
	without scrubbing vigorously, and use the foam as a cushion, and rinse thoroughly without leaving detergent residue.	RSUD CB	2,50	↑ 2,72
15	I can calculate the amount of energy required using the Harris Benedict method.	RSUI	2,57	↑ 3,09
		RSUD KD	2,48	↑ 2,95
		RSUD CB	2,44	→2,44
16	I can determine a comfortable, stable and activity-friendly patient position according to the individual patient.	RSUI	3,48	↑ 3,36
		RSUD KD	2,90	↑ 3,33
		RSUD CB	2,61	↑ 2,83
17	I can perform range of motion exercises on patients to prevent joint contractures	RSUI	3,61	↑ 3,64
		RSUD KD	3,05	↑ 3,57
		RSUD CB	2,67	↑ 2,89

Source: JICA Expert Team

Table 75 PICS Manual (Nurse)

No	Questions	Hospital	Baseline	Endline
1	Can you explain the concept of Post-Intensive Care Syndrome (PICS) and Post-intensive Care Syndrome-Family (PICS-F)?	RSUI	2,33	↑ 2,87
		RSUD KD	2,68	↑ 3,17
		RSUD CB	2,20	↑ 2,62
2	Can you rate pain using the Numerical Rating Scale (NRS)?	RSUI	3,67	↑ 3,80
		RSUD KD	2,84	↑ 3,22
		RSUD CB	2,93	↑ 3,00
3	Can you assess pain using the Behavioral Pain Scale (BPS)?	RSUI	3,67	↑ 3,80
		RSUD KD	2,74	↑ 3,17
		RSUD CB	2,80	↑ 2,92
4	Can you assess pain using the Behavioral Pain Scale-Non Intubated (BPS-NI)?	RSUI	3,67	↑ 3,80
		RSUD KD	2,58	↑ 3,22
		RSUD CB	2,80	↑ 2,92
5	Can you assess pain using the Critical Care Pain Observation Tool (CPOT)?	RSUI	2,81	↑ 3,13
		RSUD KD	2,74	↑ 3,33
		RSUD CB	3,00	↑ 3,08
6	Can you perform Spontaneous Awakening Trails (SAT) every day according to the protocol?	RSUI	2,95	↑ 3,40
		RSUD KD	2,63	↑ 3,22
		RSUD CB	2,60	↑ 2,77
7	Can you do Spontaneous Breathing Trials (SBT) every day according to protocol?	RSUI	3,43	↑ 3,67
		RSUD KD	2,63	↑ 3,28
		RSUD CB	2,80	↑ 3,00
8	Are you able to assess and respond to assessment results when you fail the SAT/SBT?	RSUI	3,10	↑ 3,47
		RSUD KD	2,63	↑ 3,11
		RSUD CB	2,67	↑ 2,85
9	Can you assess delirium using the Confusion Assessment Method for the ICU (CAM-ICU)?	RSUI	2,38	↑ 2,60
		RSUD KD	2,63	↑ 3,06
		RSUD CB	2,47	↑ 2,69
10	Can you assess delirium using the Intensive Care Delirium Screening Checklist (ICDSC)?	RSUI	2,14	↑ 2,47
		RSUD KD	2,58	↑ 3,11
		RSUD CB	2,47	↑ 2,62

No	Questions	Hospital	Baseline	Endline
11	Can you explain when you would do a delirium assessment?	RSUI	2,90	↓ 2,87
		RSUD KD	2,63	↑ 3,22
		RSUD CB	2,53	↑ 2,77
12	Can you describe specific interventions for delirium preventative care?	RSUI	2,90	↓ 2,80
		RSUD KD	2,63	↑ 3,28
		RSUD CB	2,40	↑ 2,69
13	Can you assess a patient's sleep using the Richards-Campbell Sleep Questionnaire (RCSQ)?	RSUI	1,86	↑ 2,20
		RSUD KD	2,53	↑ 3,00
		RSUD CB	2,33	↑ 2,62
14	Can you discuss whether rehabilitation can be done daily according to the rehabilitation protocol or not?	RSUI	2,86	↑ 3,00
		RSUD KD	2,74	↑ 3,06
		RSUD CB	2,47	↑ 2,69
15	Can you explain PICS to the patient's family and ask for their cooperation?	RSUI	2,71	↑ 3,07
		RSUD KD	2,74	↑ 3,33
		RSUD CB	2,60	↑ 2,77
16	Can you continue PICS preventative care among medical staff?	RSUI	2,71	↑ 3,13
		RSUD KD	2,74	↑ 3,28
		RSUD CB	2,60	↑ 2,85
17	Can you use an ICU diary to share information with a patient's family?	RSUI	3,29	↓ 3,27
		RSUD KD	2,68	↑ 3,22
		RSUD CB	2,60	↑ 3,00

Source: JICA Expert Team

Based on the above, the indicators and evaluation results of RSUI's project goals are summarized in the table below.

Table 76 Challenges, innovations, and lessons learned from the project (RSUI)

Evaluation Indicators for Project Purpose	Assessment Results
① Satisfaction rate on D2D telemedicine by both the Counterpart Hospitals and the Partner Hospitals (Output2)	Achieved. Follow-up surveys confirmed the high level of satisfaction with the RSUI's tele-conferences.
② Individual professional learning indicators (empowerment, confidence, perception)	Achieved. Interim results from the Professional Learning Survey, and Performance Interview confirm that tele-conferences have increased the confidence and motivation of doctors and nurses, improved their awareness and understanding of their colleagues, other teams, and other hospitals, and improved their relationships.
③ ICU manual utilization rate	Mostly achieved. On the doctors' side, some improvement in understanding was observed using the manuals. On the nurses' side, there was an overall improvement in understanding of the manuals. All hospitals reported active use of the manuals, including actual implementation of the manuals in their daily clinical practice.

Source: JICA Expert Team

Based on the above, in the 6th TWG, it was agreed among the hospitals that tele-conferences will continue to be held after Apr 2024 following the completion of this project. In response to this, hospital officials are

discussing the renewal of the MoU among the hospitals signed under this project. Furthermore, the RSUI doctors are planning to collaborate with the research program by continuing the tele-conference, and the RSUI nurses are considering integrating the tele-conference into the comprehensive intensive nursing training (basic nursing training) program the hospital is implementing with the Nursing Association of Indonesia. Specifically, the hospital plans to conduct a tele-conference with RSUI nurses for program participants as a follow-up after they complete the training (expected trial after the 11th round of training scheduled for Apr to Jun 2024 at the earliest).

Table 77 ICU teleconference implementation plan after completion of the Project

Description	Doctor	Nurse
Starting Date	3rd week of Apr 2024	4th week of May 2024
Schedule	Every week with the possibility of 2 times a week	Every month, conducted in the 3rd week of the month
Presenter	RSUD Kota Depok and RSUD Cibinong alternate every 2 weeks, one patient at a time	RSUD Kota Depok and RSUD Cibinong alternate every 2 months, one patient at a time
Time	Thursday, 14.30-15.30 JKT Time	Friday, 15.00-16.00 JKT Time
Preparation	Do not need to prepare a patient sheet; the patient's case will be verbally explained by the consultee.	Do not need to prepare a patient sheet; the patient's case will be verbally explained by the consultee.
Platform	Zoom+KOMEN	Zoom+KOMEN
PIC	RSUI: Dr. Hafidz RSUD Kota Depok: Dr. Amel RSUD Cibinong: Dr. Arief & dr. Stessy	RSUI: Ns. Fitriah RSUD Kota Depok: Ns. Iwan RSUD Cibinong: Ns. Fina

Source: JICA Expert Team

2. RSUH (OPH)

The project goals in the field of OPH have been deemed achieved (detailed description in II.2.2-1). The number of partner hospitals operating D2D telemedicine expanded to six by the end of the project. In terms of satisfaction with D2D telemedicine by MS1, stakeholders were highly satisfied with D2D telemedicine using MS1, as outlined in Output 2. Furthermore, regarding the sustainable knowledge transfer by handover of the MS1, it is verified that the handover process has been taken place at RSUH by predecessors. The number of clinical cases with the use of the MS1 showed an increasing trend. About the reduction of unnecessary referrals from PKM, the monitoring result suggested that the use of the MS1 for patients at PKM has resulted in a decreasing trend in the total number of referrals from PKM to RSUD, indicating a possible impact on the reduction of unnecessary referrals. Furthermore, the use of the MS1 has led to a downward trend in unnecessary referrals from RSUD to RSUH.

Table 78 Indicators and Evaluation of Project Purpose (RSUH OPH)

Evaluation Indicators for Project Purpose	Assessment Results
① Number of partner hospitals operating D2D telemedicine, primarily university hospitals	Starting with two partner hospitals, a total of six partner hospitals were operating D2D telemedicine in scaling-up activities.
② Satisfaction with D2D telemedicine at both the Counterpart Hospitals and the Partner Hospitals (related to Output 2)	Many stakeholders expressed high satisfaction with D2D telemedicine. (See Output 2)
③ Meaningful and sustainable knowledge transfer among residents through seamless deployment to RSUD	Although the device handover had not taken place at RSUD, the knowledge sharing for MS1 operation had taken place at RSUH before deployment to RSUD. (See Output 2)
④ Number of patients using D2D telemedicine devices for 3 months	A total of 430 cases were recorded during the project period.
⑤ Decrease in the number of patients not requiring referral 5-1 Unnecessary referrals from PKM 5-2 Unnecessary referrals from RSUD to upper-level hospitals	The use of MS1 was shown to reduce the overall number of referrals and thus potentially reduce the number of potential unnecessary referrals. (Detailed in Output 2) The results confirm that the use of MS1 reduces unnecessary referrals. (Detailed in Output 2)

Source: JICA Expert Team

3. RSUH (OB)

The goals of the project in the field of OB are considered achieved (detailed description in II.2.2-2). As for the number of Partner Hospitals operating D2D telemedicine, the number has expanded to four facilities at the conclusion of the project from two at the start of the project. In terms of satisfaction with D2D telemedicine using TeleCTG, positive feedback was indicated. Regarding meaningful and sustainable knowledge transfer, residents showed high satisfaction due to the seamless assignment of residents and consistent training provided by Sehati. The number of neonatal deaths in each Partner Hospital showed a downward trend throughout the project period.

Table 79 Indicators and Evaluation of Project Purpose (RSUH OB)

Evaluation Indicators for Project Purpose	Assessment Results
① Number of partner hospitals operating D2D telemedicine, primarily university hospitals	Starting with two partner hospitals, a total of four partner hospitals operated D2D telemedicine in scaling-up activities.
② Satisfaction with D2D telemedicine at both the Counterpart Hospitals and the Partner Hospitals (related to Output 2)	Many stakeholders expressed high satisfaction with D2D telemedicine. (See Output 2)
③ Meaningful and sustainable knowledge transfer among residents through seamless deployment to RSUD	Meaningful and sustainable knowledge transfer took place throughout the project. However, TeleCTG was not used at RSUD Hayyung since a specialist was assigned in Nov 2023 (See Output 2)
④ Number of fetal and neonatal deaths at each Partner Hospital	A decreasing trend was observed throughout the project period.

Source: JICA Expert Team

VI. List of Project Outputs

VI. List of Project Outputs

The expected results of the project, evaluation indicators for the results, and the results of the activities are described in detail in Chapters II.1-4.

<table>
<tr><th colspan="6">Output 1</th></tr>
<tr><td colspan="6">D2D telemedicine (tele-consultation and tele-education) between the Counterpart Hospitals and the Partner Hospitals are planned and introduced, for enhancing inter-hospital collaboration in diagnosis and clinical case management support and knowledge sharing.</td></tr>
<tr><th colspan="2" rowspan="2">Evaluation Indicators of RSUI</th><th colspan="2">The pilot activity</th><th colspan="2">The full-scale activity</th></tr>
<tr><th>Doctor</th><th>Nurse</th><th>Doctor</th><th>Doctor</th></tr>
<tr><td>①</td><td>Number of tele-conferences held</td><td>8</td><td>8</td><td>19</td><td>20</td></tr>
<tr><td>②</td><td>Number of medical professional involved in the D2D telemedicine
RSUI
RSUD Kota Depok
RSUD Cibinong</td><td>
27
36
7</td><td>
137
58
15</td><td>
57
54
87</td><td>
180
113
67</td></tr>
<tr><td>③</td><td>Number of clinical cases diagnosed on D2D tele-consultation</td><td>7</td><td>8</td><td>19</td><td>20</td></tr>
<tr><td>④</td><td>Number of clinical cases discussed in tele-conference</td><td>7</td><td>8</td><td>19</td><td>20</td></tr>
<tr><th colspan="2">Evaluation Indicators of RSUH (OPH)</th><th colspan="4">Result</th></tr>
<tr><td colspan="2">① Number of cases diagnosed by D2D telemedicine at the Partner Hospitals</td><td colspan="4"><u>Pilot Activity</u>
・ Apr-Jul: 30 cases
<u>Scaling-up Activity</u>
・ Aug-Oct: 143 cases (RSUD: 60, PKM: 83)
・ Nov-Jan: 208 cases (RSUD: 64, PKM: 144)
・ Feb-Mar: 49 cases (RSUD: 15, PKM: 34)
*Six cases from RSUD in Oct were not be judged due to poor video quality .</td></tr>
<tr><td>①-1</td><td>Number of emergency surgery cases at RSUD (Emergency)</td><td colspan="4"><u>Pilot Activity</u>
・ Apr-Jul: 2 cases
<u>Scaling-up Activity</u>
・ Aug-Oct: 0 cases
・ Nov-Jan: 7 cases (RSUD: 6, PKM: 1)
・ Feb-Mar: 0 cases</td></tr>
<tr><td>①-2</td><td>Number of patients to be referred to top hospitals (not just RSUH)</td><td colspan="4"><u>Pilot Activity</u>
・ Apr-Jul: 6 cases
<u>Scaling-up Activity</u>
・ Aug-Oct: 7 cases (RSUD: 7)
・ Nov-Jan: 12 cases (RSUD: 9, PKM: 3)
・ Feb-Mar: 10 cases (RSUD:6, PKM: 4)</td></tr>
<tr><td>①-3</td><td>Number of patients requiring remote consultation (Follow and Consultation)</td><td colspan="4"><u>Pilot Activity</u>
・ Apr-Jul: 7 cases
<u>Scaling-up Activity</u>
・ Aug-Oct: 35 cases (RSUD: 12, PKM: 23)
・ Nov-Jan: 28 cases (RSUD: 10, PKM 18)
・ Feb-Mar: 10 cases (PKM: 10)</td></tr>
<tr><td>①-4</td><td>Number of patients receiving follow-up at RSUD and PKM (remote consultation is unnecessary)</td><td colspan="4"><u>Pilot Activity</u>
・ Apr-Jul: 14 cases
<u>Scalin-g up Activity</u>
・ Aug-Oct: 69 cases (RSUD: 31, PKM: 38)</td></tr>
</table>

	(Follow)	・ Nov-Jan: 60 cases (RSUD: 31, PKM: 29) ・ Feb-Mar: 12 cases (RSUD:9, PKM: 3)
①-5	Number of patients not requiring follow-up (End)	**Pilot Activity** ・ Apr-Jul: 1 case **Scaling up Activity** ・ Aug-Oct: 26 cases (RSUD: 4, PKM: 22) ・ Nov-Jan: 101 cases (RSUD: 8, PKM: 93) ・ Feb-Mar: 17 cases (PKM:17)
②	Number of tele-conferences held between RSUH and the Partner Hospitals	1 (A teleconference was organized in Feb 2024)
③	Number of medical and para-medical staff (residents, GPs, nurses, etc.) at the Partner Hospitals using MS1	**Pilot Activity** ・ Apr-Jul: 5 residents **Scaling-up Activity** ・ Aug-Oct: 16 (RSUD: 4 residents PKM:12 medical staff) ・ Nov-Jan: 16 (RSUD: 4 residents, PKM: 12 medical staff) ・ Feb-Mar: 15 (RSUD: 3 residents, PKM: 12 medical staff)
Evaluation Indicators of RSUH (OB)		**Result**
①	Number of tele-conferences between RSUH and the Partner Hospitals	1 (A teleconference was organized in Feb 2024)
②	Number of cases diagnosed by D2D telemedicine at the Partner Hospitals	**Pilot Activity** ・ Apr-Jul: 81 (RSUD:31, PKM:50) **Scaling-up Activity:** ・ Aug-Oct: 69 (RSUD:7, PKM: 62) ・ Nov-Jan: 66 (RSUD: 0, PKM: 66) ・ Feb-Mar: 26 cases (RSUD: 0, PKM 26)
③	Number of medical staff using TeleCTG (residents, GPs, midwives)	Pilot activity: 59 individuals were registered and installed Scaling-up activity: 99 individuals were registered and installed

Output 2			
Monitoring & Evaluation (M&E) plan and structure are developed and utilized to assess effectiveness of D2D telemedicine at both the Counterpart Hospitals and the Partner Hospitals			
Evaluation Indicators of RSUI	**RSUI**	**RSUD Kota Depok**	**RSUD Cibinong**
① Existing ICU M&E reports are reviewed, and M&E plans are revised with indicators for assessing tele-ICU outcomes	Achieved	Achieved	Achieved
② Personnel for the revised M&E are assigned and trained.	Achieved	Achieved	Achieved
Evaluation Indicators of RSUH (OPH)	**Result**		
・ Establishment of monitoring mechanisms to monitor the project every three months. ・ For measuring the usage status and satisfaction by users every three months, a questionnaire will be developed and carried out.	An M&E tool, comprising of various indicators and questionnaires, was established prior to the pilot activity. The first M&E activity was conducted in early Jul to observe project progression during the period from Apr to Jun 2023, with subsequent M&E activities taking place every three months. This series of M&E activities throughout the project not only reflected the project's progress but also yielded insightful results, as demonstrated earlier. However, it is noteworthy that the results of such M&E activities were based on short-term assessments within the		

	context of a one-year project. Thus, it is crucial to track them over the long term to obtain further implications that could contribute to the future prosperity of OPH care with D2D telemedicine.
Evaluation Indicators of RSUH (OB)	**Result**
・ Establishment of monitoring mechanisms to monitor the project every three months. ・ For measuring the usage status and satisfaction by users every three months, a questionnaire will be developed and be carried out.	With the commencement of the pilot activity, an M&E tool comprising various indicators and questionnaires was established. The initial M&E activity occurred in early Jul and was subsequently conducted every three months throughout the project duration. This sequence of M&E activities not only portrayed the project's advancement but also yielded insightful results, as previously indicated.

Output 3	
A model of the university hospital-centered D2D telemedicine mechanism is verified and considered for further roll-out by the Counterpart Hospitals as well as for horizontal scaling-up in other university hospitals.	
Indicator	**Result**
① Number of seminars / dialogues held with external stakeholders to explain and disseminate the university hospital-centered D2D telemedicine mechanism	Telemedicine promotion seminar (1) AHS (4) FORKOMTIKNAS (1) AHI (1) ATENSI (1)
② Number of other university hospitals and regional hospitals participated at seminars/dialogues	AHS Hospital:5 (USU, UNAIR, UGM, UI, UNHAS) Regional Hospital:4 (RSUI, RSUD Kota Depok, RSUH, RSUD KH Hayyung, RSUD Bumi Panua, PKM Benteng, RS Brawijaya University, RS Universitas Sebelas Maret, RS Airlangga University)
③ Number of other university hospitals and regional hospitals interested to join in the D2D telemedicine mechanism (leveraging the AHS initiative)	AHS Hospital:5 (See above for details) Regional Hospital:4 (See above for details)

Output 4	
Identified challenges and opportunities in mainstreaming the D2D telemedicine are widely shared for relevant policy framework development and data connectivity management by the authorities.	
Indicators	**Result**
① Amount of accumulated medical dataset to be connected with IHS Platform	OPH: 6 cases OB: 0 cases
② Number of seminars / dialogues held with external stakeholders to share lessons learnt from the project regarding the policy framework and data connectivity in D2D telemedicine	MoECRT/AHS(4) MoH(4) BPJS(3) FORKOMTIKNAS (1) AHI (1) ATENSI (1)
③ Submission of policy recommendation paper for D2D telemedicine mainstreaming is shared to related stakeholders	Completed

Source: JICA Expert Team

VII. Issues, Measurement and Lessons Learned in Project Implementation and Operation

VII. Issues, Measurement, and Lessons Learned in Project Implementation and Operation

1. RSUI

The following is a summary of the challenges, innovations, and lessons learned in the implementation and operation of the pilot activities. In the pilot activities, many operational issues were observed, mainly to implement and establish the new telemedicine model. These issues ranged from organizing the recognition and roles of the hospitals and Japanese parties involved, to setting up and coordinating the details of the case conference operations. From the full-scale activities onward, the challenges, innovations, and lessons learned from these pilot activities will be utilized to promote the established model.

Table 80 Challenges, efforts, and lessons learned from this project (RSUI)

Challenges	Efforts	Lessons
[Ownership Fostering] Since RSUI was in the position of receiving advice from Japanese ICU experts in the previous project, a passive attitude was also observed in some parts of the communication with the Japan side in this project.	・ For this project, focus was placed on the role of RSUI as a higher education institution and to encourage a greater sense of ownership. The Japan side provided side support by operating the tele-conference and offering advice.	・ From the tele-conference, ownership of the project had been fostered, with RSUI actively leading the meeting and carefully listening to the opinions of the RSUD Kota Depok side. In this way, it is important for the Japanese side to intervene to improve the confidence of the local side, especially in specialized technical areas. This may contribute to fostering local ownership and sustainability of the project after its completion. ・ While trying to foster ownership, Vitaars operated to provide supplementary guidance on medically incorrect content as side support. However, it is assumed that there are a certain number of people who do not like the idea of having their mistakes corrected in front of lower-level hospital staff from the position of upper-level hospital staff member, so the timing of instruction should be considered.
[Instructional Methods of RSUI] At the beginning of the tele-conference, there were some situations in which the content of instruction from RSUI to partner hospitals was limited to general discussions at the level of textbooks in response to questions from partner hospitals.	・ Operational policy for specific and practical discussions was considered. ・ Example: Vitaars instructed RSUI to discuss not only single answers to questions from partner hospitals, but also to understand the background and circumstances that led to the questions, to understand the differences in situations and responses among different	・ The discussion, including detailed background information, was interesting, especially for the relatively inexperienced doctors and nurses. Since the tele-conference was conducted remotely, it was very difficult to assess patients and tended to remain in general terms, but it is important to provide guidance for more practical discussions. It is also desirable to include information on risk assessment to avoid adverse events in patients.

	facilities, and to discuss what responses would have been appropriate. and guiding them to offer practical advice and suggestions based on their field experience.	
[Linguistic barriers] Few staff at local hospitals could understand English, and if the tele-conference could not be held in Indonesian, there was a possibility that it would not be able to attract enough participants.	・ The tele-conference was originally intended to be conducted in English, but an Indonesian interpreter was found and consecutive interpretation was used. The case conference was also improved by allocating time for Japanese translation and setting time for sufficient understanding by all parties involved.	・ Although the tele-conference takes longer due to the time taken for interpretation, effective communication is possible for participants to understand the content. It is important to consider the language issue as a top priority when considering telemedicine (especially in remote areas) within Japan and Indonesia in the future, although the presence of interpreters for highly specialized medical terminology and an adequate budget are major prerequisites.
[Improvement of Quality of Discussion] During the 1-hour tele-conference, there were scattered times when patient information from partner hospitals was not shared, and central issues were not sufficiently organized and discussed in depth.	・ After discussions with Vitaars, criteria was established for selecting case studies, sample answers to questions were created, and the specifications of the Excel sheet for sharing patient information were changed.	・ These improvements led to more efficient and higher quality discussions. In order to have meaningful discussions with busy doctors and nurses in a limited amount of time, it is important to have a precise method of sharing patient information that does not become too burdensome between RSUI and partner hospitals and an awareness of the need to appropriately capture central issues.
[Medical information sharing] In Indonesia, it is necessary to sign a legal agreement to share medical information between hospitals. Considerable time was required to exchange the agreement document with RSUD Cibinong, which is participating in this project.	・ The JICA Expert Team introduced and tested the tele-conference on a trial basis to see if medical information could be easily shared among hospitals in the future through KOMEN by MoH developed as a D2D platform.	・ Although KOMEN is not yet fully functional as D2D platform, it was possible to conduct the tele-conference. Until now, legal agreement documents have been a bottleneck, preventing active collaboration among hospitals, but more active use of KOMEN will enable more hospitals to practice essential telemedicine with real and timely medical information.
[KOMEN's function] Although KOMEN was introduced on a trial basis at the tele-conference, its limited functions made it impossible to implement the telemedicine model of this project using only KOMEN, and it was decided to use Zoom in collaboration with KOMEN.	・ Although projecting patient images is prohibited on Zoom, it is possible to do so on KOMEN. For improving convenience, the JICA Expert Team added a function to attach images to KOMEN (demo account only) on a trial basis, and then examined its usefulness.	・ In the case review meetings, even without video materials, it was possible to review text-based data alone as long as the necessary information for consultation was available. Although KOMEN's functions are currently limited, the JICA Expert Team expects to improve KOMEN by adding more practical and high-priority functions through repeated use in tele-conferences.
[Creation of manuals]	・ In this project, a manual that	・ It was confirmed that the manuals

Although each hospital already has manuals and SOPs, they are comprehensive and difficult to understand and use for healthcare professionals who do not have ICU expertise.	is easy to understand for GPs and nurses without ICU expertise was created, reflecting the opinions of the hospitals. The JICA Expert Team worked on the manual to make up for the lack of local knowledge of the diseases that are often covered in tele-conferences and topics that were not included in the existing SOPs.	created in this project have penetrated into the clinical practice. Newly created manuals (especially those created by outside parties) tend to be over generalized and lack substance, but in this project, the JICA Expert Team made a concerted effort to reflect the voices of the practitioners as much as possible and kept the manuals simple and focused on essential content. This approach resulted in manuals that align with existing processes and guidelines in practical settings. In addition, by clarifying the method of storage and management of the manual,its proactive use was encouraged.
[Collaboration with the AHS] The vision, strategy, daily activities, etc. of the AHS were unclear, and it took a long period of time before the meeting was approved and held, despite making contact with the MoECRT managing the AHS.	・ Prior to the meeting with the AHS, a meeting with the MoECRT and approval by the MoECRT was required. Therefore, at the meeting with the MoECRT, the JICA Expert Team presented milestones for holding meetings with the AHS and proposed agendas for each meeting, in an effort to reducerepeating the same discussions and the time required to set up meetings.	・ Despite efforts, it took more than several months to implement the meeting with the AHS. Approaching and gathering information from key organizations, etc., that have been identified from the beginning of the project should be started earlier as it will have a significant impact on the progress of the project.
[Collaboration with the Counterpart] The Counterpart for this project was the MoECRT, whose technical field is education. On the other hand, RSUI's activities were mainly in the clinical field, resulting in a mismatch between the project and the MoECRT's technical field.	・ In collaboration with local consultants, close communication was maintained with the MoECRT.	・ At the project development stage, sufficient consideration should be given to ensure that there is no mismatch between the project's field of activity and the Counterpart's field of expertise.
[Protocol and guideline sharing among hospitals] In order for upper-level hospitals to provide appropriate advice to lower- level hospitals, the JICA Expert Team tried to exchange protocols and guidelines for ICU operations between hospitals. However, it was difficult to exchange files without high-level approval from organizations.	・ In collaboration with Vitaars, while respecting the operation at each hospital, instruction was provided on a case-by-case basis through tele-conferences and field trips for medically inappropriate issues .	・ To promote D2D telemedicine in the future, a situation in which hospitals can understand each other's operations and advise each other more appropriately is expected. ・ At least among public medical facilities, a simple approval process for sharing protocols and manuals is recommended.

[Development of inter-hospital collaboration/telemedicine mode] There is no national-level structure or system to implement D2D telemedicine. In this project's telemedicine model, ICU doctors and nurses were selected as telemedicine partners through their personal connections.	・ Discussed with relevant ministries, the Counterpart Hospitals, the Partner Hospitals, etc. to explore the possibility of policy recommendations using existing networks .	・ The sustainability of D2D telemedicine could be ensured by establishing a formal network among medical facilities and a system to continue the system of D2D telemedicine even after the transfer or departure of doctors or nurses. ・ Despite the difficulty of the national government to address this issue, if a certain framework for hospital collaboration is established on a trial basis, other issues related to mainstreaming D2D (medical information sharing, sharing guidelines, and incentives) may be addressed within this framework.
[Telemedicine Continuation Incentives] Incentives to continue the tele-conference after project completion were unclear for both RSUI and the Partner Hospitals.	・ Discussions were held on the possibility of collaboration with research grants that the MoECRT and the MoH have in order to provide financial incentives.	・ Doctors and nurses participate in tele-conferences using their regular work hours. ・ Although RSUI, as a university hospital, is willing to a certain extent to teach other hospitals and the Partner hospitals to advise and learn from telemedicine itself, it also requires time to prepare for tele-conferences, etc., and a more appropriate incentive design is needed.
[Digitalization of the ICU Department] In both RSUI, RSUD Kota Depok, and RSUD Cibinong, ICU department patient monitoring data was not linked to EMR. (Paper-based records)	・ Data exchange for tele-conferences was done through cloud services such as Google Spread Sheets and Zoom.	・ The primary reason for the delay in digitization of the ICU department was the challenge of securing maintenance costs. To address this, it is necessary to promote cooperation with startups, etc., pursuing cost-effective initiatives , such as implimenting a minimum, simple system, rather than a full-specification system.

Source: JICA Expert Team

2. RSUH

The challenges identified in the pilot activities and the scaling-up activities of the RSUH OPH component and the measures taken to address them are as follows.

Table 81 Challenges, efforts, and lessons learned from this project (RSUH OPH)

Challenges	Efforts	Lessons
[Medical Device Registration] The MS1 provided by MITAS Medical had been registered as a medical device in Japan but had not yet been registered as a medical device in Indonesia.	・ Since the device cannot be used on actual patients without completing medical device registration, the device was used for residents training during the application period. ・ The trial was only applied	・ For remote devices, equipment that has already been registered should be selected, or a preparation period of at least three months should be allowed in addition to the lead time for conducting the pilot. Although it is stated in the special specifications that support will be provided so that equipment registration can be completed by the end of the pilot activity, it is a challenge to manage the pilot

After selecting the Private Partner, the JICA Expert Team prepared the necessary documents and started the procedures during the preparation period of the pilot activity, and the approval was granted on Jun 8, 2023.	to patients who gave their informed consent in advance.	activity with equipment that has not been registered. In this case, the equipment registration was not sufficiently smooth . Therefore, local procurement will facilitate not only equipment registration but also follow-up, including language issues.
[It takes an extended amount of time to download the photos taken.] Due to the very high resolution of the photos and videos taken with the MS1, some ophthalmologists at RSUH commented that downloading the data was time consuming and difficult, especially in suburban areas where there was no signal coverage.	・ Asynchronous uploading of medical examination images and enhancement of the network using satellite communications can be considered.	・ Applications must be developed that allow busy specialists to review the accumulated images at any time.
[Linguistic impairment]. There were many opportunities to conduct meetings in Indonesian, including with counterpart RSUH staff. Especially in Selayar and Pohwat, communication in English proved difficult.	・ Meetings were held mainly with team members who could understand Indonesian. In addition, team members who understood Indonesian explained in Indonesian what had been explained in English. ・ For the scaling-up activity, two MITAS Medical local coordinators have been appointed to facilitate communication.	・ In implementing projects in rural areas within Indonesia, it is necessary to have Indonesian speakers in both the consultant team and the partner companies, as communication in Indonesian is essential.
[Patient Conditions] Some patients do not want to be examined and just want to be referred to a hospital.	・ Explained the significance of the diagnosis to the patient at each PKM and seek understanding.	・ This is a request from patients due to low confidence in PKM's ophthalmic diagnosis, and it is hoped that the use of MS1 will improve diagnostic skills. Explanation of remote diagnostic assistance to patients is needed, and consideration will be given to including outreach to residents (community empowerment) in the project design. It is important to facilitate the use of local resources for this purpose. ・ It is necessary to bridge the gap between patient expectations and the actual function of PKM.
Feedback from senior residents takes time; GPs give referral letters to patients before receiving	・ Emphasized that it is necessary for senior resident to give feedback in real time.	・ D2D telemedicine works more efficiently with real-time remote diagnosis. Where this is difficult, it is important to promote understanding on the part of the patient, e.g.

judgement from senior residents.		through community education.

Source: JICA Expert Team

The issues identified in the pilot and scaling-up activities of the RSUH obstetric component are as follows.

Table 82 Challenges, efforts, and lessons learned from this project (RSUH OB)

Challenges	Efforts	Lessons
[Restrictions on the BPJS Coverage] The existing the BPJS pregnancy screening procedure only applies CTG to high-risk pregnant women who are at least 30 weeks pregnant. If the patient is not at high risk, it is difficult to use CTG for all patients because they are not eligible for CTG examinations using the BPJS. For D2P, the BPJS can receive reimbursement, but in the case of remote D2D with RSUH or RSUD, the higher-level hospital cannot receive reimbursement.	・ Emphasized that the target of TeleCTG examination is high-risk pregnant women who are at or beyond 30 weeks' gestation. ・ The BPJS is running a pilot project, and D2D telemedicine reimbursement for top hospitals will be applied from next year.	・ Future progress of the BPJS pilot project and policy decisions by the MoH need to be followed up. ・ The BPJS coverage of D2D telemedicine may be a potential target for future cooperation, as it is linked to the expansion of KOMEN coverage.
[Clarification of CTG inspection procedures] During the pilot activities, it was identified that some patients did not undergo CTG testing even though they were eligible for CTG.	・ Interviews with residents and midwives revealed that some patients were not being tested because health care providers were not familiar with the equipment.	・ The definition of high-risk patients must be clarified. ・ Improve SOPs in terms of knowledge transfer, taking into account the rotation of residents, expansion of coverage to other PKM, and sustainability of the project. As a result, in PKM, testing using TeleCTG was performed on more than 95% of eligible pregnant women.
[Time to use TeleCTG] Since TeleCTG measurements currently take 40 minutes per patient and 20 minutes for recording, some patients refuse to undergo TeleCTG testing because they are "busy," "in a hurry," or "it takes too much time." In addition, because some patients are not cooperative in recording TeleCTG, the results may be inaccurate and the recording process may have to be repeated .	・ Additional training by Sehati reduced the measurement and recording time to 20 minutes. ・ Once TeleCTG has connected with Satusehat, the amount of data filling will be reduced.	・ Within the Partner Hospitals (RSUD and PKM), a system should be established to separate the flow lines for CTG and non-CTG pregnant women, and to examine and checkup only those pregnant women who are eligible for CTG. In addition, the project should include activities such as running a campaign to promote understanding of pregnant mothers undergoing CTG examinations.

[Network problems]. The network is unstable and the device may not be usable after charging. In addition, notifications should be sent via WhatsApp, as e-mail may cause a time lag.	・ Promoted supplementary use of WhatsApp. Consider uploading information asynchronously. ・ The Private Partner, Sehati, developed an offline feature that was not affected by network conditions.	・ Since the network contract had expired at PKM, it is necessary to consider the use of satellite communications in the future, especially on remote islands.
[Patient Conditions] Uncooperative pregnant mothers in using TeleCTG. Residents' awareness of ANC consultation and risk avoidance is not high.	・ Proposed implementation of a health promotion campaign. Increased frequency of use and clarification of the in-hospital flow of targeted pregnant mothers.	・ An outreach to the resident side (community empowerment) should be considered in the project design. The use of local resources for this purpose should be promoted.
The TeleCTG has not been utilized in RSUD KH Hayyung, since a specialist was assigned.	・ The obstetrician newly assigned to RSUD provided diagnostic assistance and referral instructions (remote consultation) based on TeleCTG results from PKM, following SOP option 1. Additionally, the educational effect of having an obstetrician/gynecologist nearby was also improved for the resident assigned to the RSUD. Therefore, an obstetrics and gynecology specialist from RSUD KH Hayyung proposed to reassign the TeleCTG to another PKM.	・ The event occurred eight months after the start of the project POC, but it was only just before the end of the project that it was organized through coordination with the same specialist, RSUD and RSUH. ・ This made it difficult to co-ordinate the reallocation of equipment and other arrangements during the activity period. In order to handle these unforeseen events, consistent coordination with partner hospitals and a longer project period are required.

Source: JICA Expert Team

In common with OPH and OB, the issues identified in the RSUH component are as follows.

Table 83 Challenges, efforts, and lessons learned from this project (common to RSUH OPH and OB)

Challenges	Efforts	Lessons
[Staffing at the Counterpart Hospital] Slow feedback from RSUH	・ Ensured rapid information sharing via WhatsApp. Several WhatsApp groups were set up with the launch of the project, and external resources such as the consultant team took the lead in the initial stages to ensure smooth communication and coordination. RSUH specialists and senior residents facilitated the response and encouraged counterparts to take ownership of the communication themselves from the mid-project stage onwards.	・ The establishment of communication for D2D consultations between different hospitals is essential to realize diagnostic assistance by telemedicine devices. It is desirable to establish communication methods as thoroughly as possible from the start of the activity and to modify them through monitoring. Using KOMEN practically is desirable in the future.

[SOP] Inspection standards and SOPs are unclear]	・ The SOP prepared at the start of the pilot activity was revised before the scaling-up activity and made known to the public.	・ Pilot activities should be positioned as a lead-time period or sufficient lead-time should be ensured before pilot activities.
[Resident education] The main residency is in the Faculty of Medicine within the university, and in the case of Hasanuddin University, the University Hospital and the Faculty of Medicine are parallel organizations under the supervision of the university president. Residents were almost always notified of their new assignments several days in advance, which did not allow time for equipment training or familiarization with SOPs. In addition, there was often a gap of a few days between the two RSUDs, making it difficult to take over locally. In the case of this project, where the central issue is to improve the quality of healthcare services, difficulties were encountered in ensuring continuity with a residency that rotates every two months.	・ Immediately after this project was initiated, after explaining this project to the medical schools, the educational staff of each medical school was involved in this project. This allowed for a few days of handover time at RSUD whenever possible. In addition, the Private Partners provided thorough pre-project training and post-project follow-up. ・ In addition, in the second half of the project, briefings for pre-deployment residents were conducted by residents who had already completed their training in the target RSUD	・ In the future, for projects based on a residency-based model, not only university hospitals but also medical schools need to be involved in the project as counterparts.
[Referral System] RSUH is a class B hospital affiliated with the university, and patients referred from RSUD were rarely referred to RSUH.	・ The indicator was set to reduce the number of unnecessary referrals of patients from PKM to RSUD.	・ The function of the university hospital is teaching and research, and the medical system does not accept referral patients. ・ As the RSWS is responsible for the quality of health services in the region, it is vital to use the RSWS as a counterpart when the aim is to improve the quality of health services and the efficiency of the referral system. ・ The quality of local health services is ensured by MoH and local government (county government) hospitals. When using the quality of health services as a project (including outcomes) indicator, it is advisable to organize the relationship with these hospitals before starting the project. If residency training is the primary focus, university hospitals are highly significant, but if the quality of

		medical services is this project (including outputs) indicator, there will be a diconnect between the remote diagnosis and the recipient.
[Data Linkage] Registration of diagnostic information by remote devices to SatuSehat	・ Possible data linkages were coordinated with RSUH, RSUD KH Hayyung, and the Private Partners to create a model for future linkage to SatuSehat for OBand OPH, using a new data cloud for linkage between RSUH and RSUD KH Hayyung. The decision was made to use a new cloud to link data between RSUH and RSUD KH Hayyung for OPH.	・ Data integration through RSUH is difficult because Indonesian government legislation requires each hospital to register and connect to SatuSehat. ・ In addition, MITAS Medical device does not collect the information SatuSehat seeks (especially personal information) and the server is not located in Indonesia, making data integration difficult.

Source: JICA Expert Team

VIII. Recommendations for Achieving the Overall Goal (including JICA's next project proposal)

VIII. Recommendations for Achieving the Overall Goal (including JICA's next project proposal)

Issues and Lessons learned in VII that are closely related to the achievement of the overall goal are listed in the table below.

Table 84 Issues and lessons learned from this project

No.	Issue	Lesson learned
Ⅰ. Medical personnel/Patient		
1	Lack of Human resources (upper-level hospital) for D2D telemedicine	Efficient D2D telemedicine system needs to be developed
2	Some pregnant women are not cooperative with the use of TeleCTG.	It is a necessity to consider including outreach activities to empower the community in the project design.
3	SOPs weren't efficient at the beginning of the project.	It is a necessity to create and establish clear and efficient SOPs at the beginning of D2D telemedicine POC.
4	Medical staff are not used to using D2D telemedicine devices, so relatively slow use of D2D telemedicine devices.	Establishment of clear and efficient SOPs is needed Continuous training to health workforce and timely resident assignment is needed.
Ⅱ. Service/Application		
5	Undeveloped ICU data system	It is a necessity to introducte the ICU system and collaboration with startups.
6	Limited KOMEN's function	It is a necessity to improve functions.
7	MITAS Medical's MS-1 does not meet the data items required by Satusehat.	It is necessary to select a device that meets national regulations.
8	WhatsApp is used as a communication tool among healthcare professionals, but it does not protect personal information, track information on healthcare provision, and link to BPJS.	Since the Indonesian government has already developed a number of apps, it is necessary to examine issues of existing apps that have not spread, and to integrate and renew them.
Ⅲ. Data Integration Platform		
9	EMR is not yet prepared in PKM.	EMR and infrastructure in PKM needs to be developed for connection to SatuSehat and use of D2D telemedicine system.
Ⅳ. Device/Infrastracuture		
10	Weak telecommunication network	It is a necessity to strengthen telecommunication networks in remote areas
11	Takes time to download photos taken	Innovation is needed for the device It is a necessity to strengthen telecommunication networks in remote areas
Ⅴ. Regulation		
12	Incentives for conducting D2Dtelemedicine are unclear.	Continuous incentive design is needed
13	Public insurance (BPJS) coverage limitations	Continued consideration of insurance coverage for medical treatment using telemedicine devices is needed
14	D2D telemedicine is not regulated.	Regulation to implement D2D telemedicine is needed
Ⅵ. Data governance		
15	There is no agreement that is shared patient medical information between hospitals.	Revise/update system design for patient information sharing
16	It is difficult to share detailed data on daily changes in patients' physical condition.	There is necessity for establishing a system for smooth medical information linkage approved as a country

Source: JICA Expert Team

Based on above issues and lessons learned, the JICA Expert Team proposed ideas to overcome the issues for D2D telemedicine. The idea below is mainly policy level such as the establishment and implementation of data governance policy and mechanisms for health-based data and information. The Indonesia government has already developed KOMEN as D2D telemedicine platform, however teleconsultation by KOMEN is not covered by BPJS. In order to expand and promote D2D telemedicine, incentive mechanisms are essential in D2D telemedicine, and the Indonesian government needs to collaborate further with the BPJS to expand national health insurance coverage for D2D telemedicine. Not only incentive mechanisms, but also the limited function of KOMEN is one of the issues that inhibit the expansion of D2D telemedicine (e.g. limited patient data sharing, etc.). The pilot project for D2D telemedicine between BPJS and MoH is still ongoing, and the JICA Expert Team hopes that the experiences and lessons learned from the pilot project will contribute to improving existing issues of D2D telemedicine and functions of KOMEN. Also, for implementation of D2D telemedicine, the foundation of a network infrastructure and introduction of EMR etc. is required for hospitals and PKM to use the D2D telemedicine platform and system. While upper-level hospitals are relatively well equipped with EMRs and network environments, lower-level hospitals and PKM are not well developed and require government support.

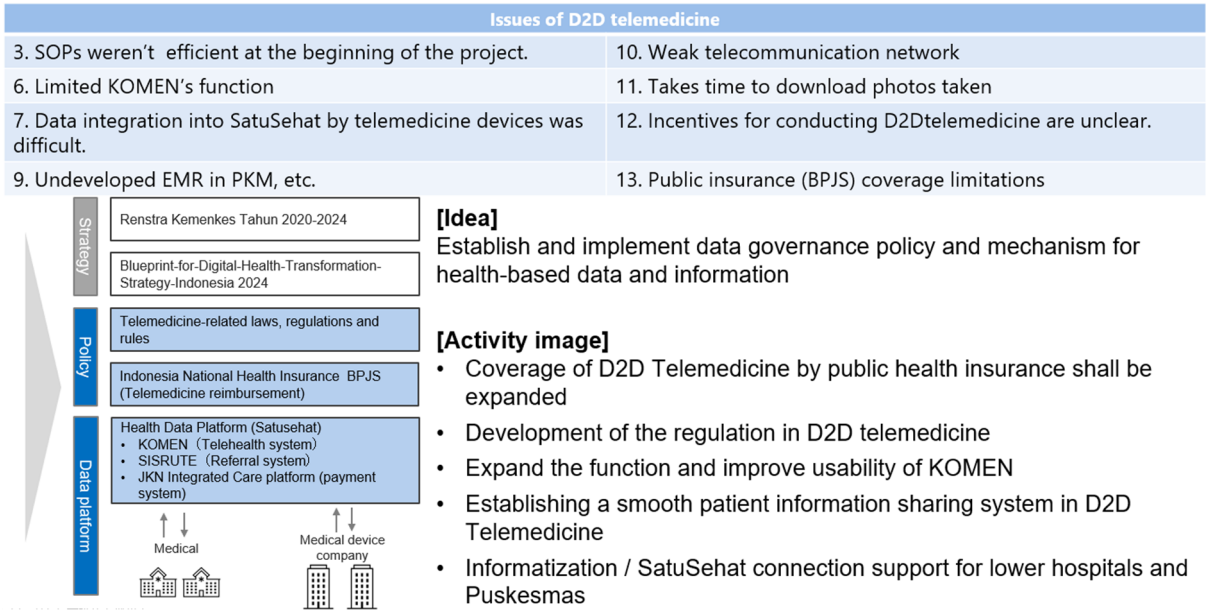


Figure 61 Idea to improve the issue for D2D telemedicine (Policy Level)

Source: JICA Expert Team

The consultant team proposed a new D2D telemedicine model based on the D2D telemedicine model implemented in this project, with sustainability considerations for D2D telemedicine (see Figure 62 below).

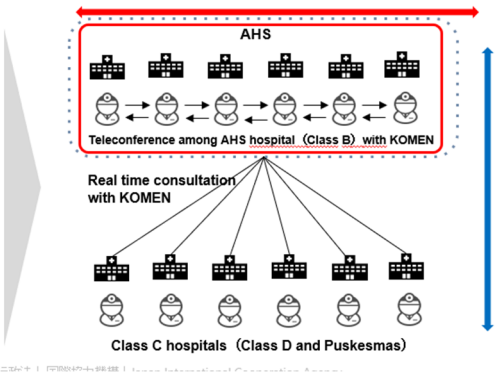
In this project, there is only one upper-level hospital each at RSUI and RSUH providing instruction to lower-level hospitals. In this model, a majority of the workload is concentrated in upper-level hospitals, so there are concerns about the continuation of the D2D telemedicine model itself.

In the figure below, by collaborating with a network formed by multiple upper-level hospitals such as AHS, the telemedicine workload of the upper-level hospitals can be distributed to multiple facilities, and by collaborating among multiple hospitals, the telemedicine operations and experiences can be shared across

the entire network, which is expected to improve the sustainability of telemedicine. Although this project has established a D2D telemedicine model that enables consultation with upper-level hospitals, the current operation does not allow upper-level hospitals to immediately respond to consultations from lower-level hospitals when an urgent situation suddenly occurs that requires advanced experience at lower-level hospitals. If the D2D telemedicine system can be established to support lower-level hospitals through collaboration among multiple hospitals, real-time consultation would be possible. This idea covers not only D2D telemedicine, but also Telehealth between AHS such as joint research and knowledge sharing.

Regarding the tool of Telemedicine in this idea, KOMEN is recommended as a Telemedicine tool for real-time consultation. Currently, there are no measures to improve the functionality of KOMEN in the MoH, but it is essential to improve the convenience of KOMEN for the spread of D2D telemedicine. Therefore, the government needs to make initiatives to improve KOMEN's functions. To further promote D2D telemedicine in the future, the government needs to identify the functional problems of KOMEN and bottlenecks in the spread of KOMEN and aim to establish a framework for KOMEN to take root in Indonesia as a D2D telemedicine tool.

Issues of D2D telemedicine	
1. Lack of human resource (upper hospital) for D2D telemedicine	14. D2D telemedicine is not regulated.
2. Some pregnant women aren't cooperative in using TeleCTG.	15. There is no agreement that is shared patient medical information between hospitals.
4. Medical staff are not used to using D2D telemedicine devices,...	16. It is difficult to share detailed data on daily changes in patients' physical condition.
6. Limited KOMEN's function	



[Idea]
Establishment of a D2D telemedicine model under the AHS (Class A/B) network

[Activity image]

Telehealth
Knowledge sharing among AHS University Hospitals (Research + Education)

D2D Telemedicine
Tele-consultation (Clinical and health service delivery + education)

Figure 62 Idea to improve the issue for D2D telemedicine (Telehealth and Telemedicine 1)

Source: JICA Expert Team

In addition, the below D2D telemedicine model is the same as the above model regarding Telehealth, but the content of Telemedicine differs between above and below models. In the Telemedicine inthe model above, the activity is mainly consultation such as providing advice and instruction for cases (no refer to upper-level hospitals). On the other hand, for some clinical departments such as OPH and OB, if the patient is in serious condition, the lower-level hospitals and PKMs need to refer the patient to upper-level hospital after tele-consultation. In this case, Telemedicine is assumed to be implemented in each referral area, with upper-level hospitals supporting lower-level hospitals and PKMs.

The government has expressed its intention to promote both Telemedicine and Telehealth in D2D

telemedicine. In order for the government to establish a D2D telemedicine model in the future, the government is required to establish the model that utilizes existing networks and tools, using above and below models as one set of examples.

Issues of D2D telemedicine	
1. Lack of human resource (upper hospital) for D2D telemedicine	11. There is no agreement that is shared patient medical information between hospitals.
2. Some pregnant women aren't cooperative in using TeleCTG.	10. D2D telemedicine is not regulated.
4. Medical staff are not used to using D2D telemedicine devices,...	16. It is difficult to share detailed data on daily changes in patients' physical condition.
6. Limited KOMEN's function	

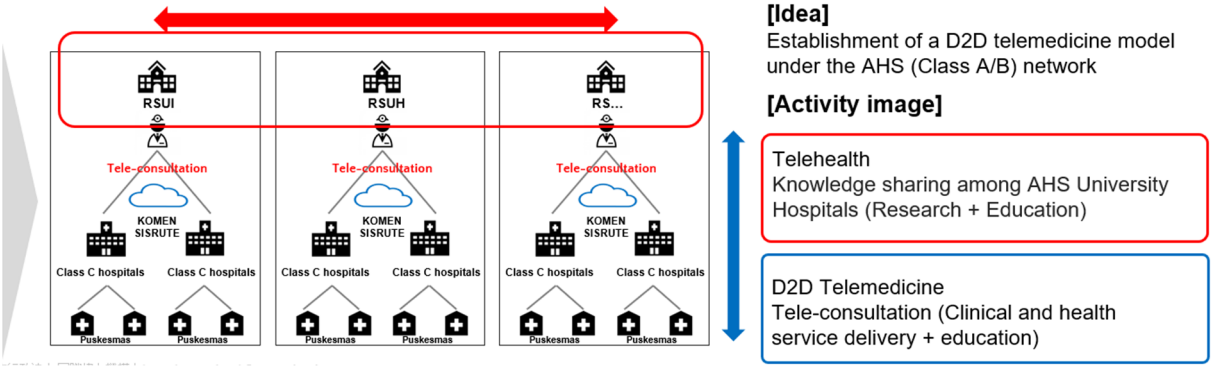
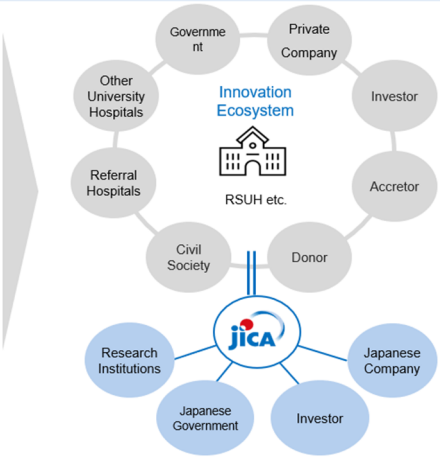


Figure 63 Idea to improve the issue for D2D telemedicine (Telehealth and Telemedicine 2)

Source: JICA Expert Team

Finally, it is essential for the expansion of D2D telemedicine to collaborate with startups offering new solutions and technologies, not only in Indonesia but also in foreign countries including Japan and other countries. The government needs to establish a flexible support system that not only utilizes Indonesian technologies but also those of foreign countries as needed, so that the effects of start-up support can be synergized.

Issues of D2D telemedicine	
5. Undeveloped ICU data system	8. WhatsApp is used as a communication tool among healthcare providers
6. Limited KOMEN's function	
7. Data integration into SatuSehat by telemedicine devices was difficult.	11. Takes time to download photos taken



[Idea]
Implementation of PoC for the development of ecosystems related to healthcare data collaboration

[Activity image]

- Startup support (Ninja, Tsubasa) (in collaboration with startups), meet to Indonesian regulation(s), device registration, funding and so force
- In collaboration with Indonesian Sandbox
- In collaboration with JICA DX Lab

Figure 64 Idea to improve the issue for D2D telemedicine (Support startups)

Source: JICA Expert Team