

Experiences Using the MobileDaRt Evolution Equipped with Two Wireless FPDs



Mr. Hiromaro Furuki

Department of Radiology, Oki Hospital
Hiromaro Furuki, Chief Technologist

1. Introduction

Proud of its magnificent natural environment, the Oki Islands of eastern Shimane Prefecture encompass four islands of varied size located in the Sea of Japan about 70 km north of mainland Japan. The Oki Islands form part of the Daisen-Oki National Park, and support a population of around 20,000 people on a land area of 350 km². The Oki Islands have a traditional culture passed down over many generations and are known as the land of *giri* (sense of duty) and *ninjo* (human feelings). Oki Hospital is positioned on the largest island of the group and is the core hospital of this isolated island group.

The hospital continues its aim to become an essential part of the area, trusted by all island residents and operates under the fundamental principal of "safe and secure island health care." Reconstruction of the hospital saw the introduction and upgrade of medical devices and facilities to provide improved diagnostic functions and therapeutic effectiveness, and raise the medical case completion rate of the isolated islands. For emergency patients who require advanced medical care beyond the abilities of the hospital, remote image diagnostic systems improve the efficiency of systems used for transporting patients to the mainland and reduce time spent in transport, and help in sending information to mainland Shimane Prefectural Central Hospital and Matsue Red Cross Hospital, for image diagnosis and patient referral. A helipad has also been installed on the roof of the hospital to improve the operational effectiveness of the air ambulance.



Fig. 1 View of Oki Hospital

Overview

Category	Description
Facility	Five-floor reinforced concrete building, with building area of 9,497 m ²
Departments	14 departments in total including internal medicine, surgery, pediatrics, orthopedics, gynecology, psychiatry, nephrology, and dental surgery
Beds	Total: 115 beds. General use beds: 91, mental health beds: 22, infectious disease beds: 2

2. Details of Introduction

As the only hospital on the isolated Oki Islands, we must be active in all areas of primary care not limited to the medical services provided by each department, emergency medical services, and general medical care. Because the hospital is small and can only staff a limited number of doctors, nurses and medical care workers, cooperation is an important aspect in the everyday running of the hospital. In 2007, faced with aging buildings and facilities, the decision was made to replace the old buildings with a newly constructed hospital opening in May of 2012. During the interim and the various talks held between the general populace, hospital personnel and building design and construction engineers, plans were made by the Department of Radiology to digitize all paper medical records and move to a paperless and filmless system. Many parties assisted us in choosing how to update our mobile X-ray system, including manufacturers and other hospitals.

Selection Criteria

1. Programming is capable of storing radiography settings in memory.
2. Radiography can be performed without an FPD.
3. Able to show the calculated radiation dose and the actual measured exposure dose.
4. Ease of use of X-ray tube support.
5. Motorized function (safety and quietness of the motor).
6. Includes two detector panels: a large panel and a small panel, for use with newborn infants.
7. The computer used for digital processing is incorporated into the main unit.

8. Digital image processing to perform clipping area adjustments, automatic density adjustments, and add annotations.
9. The image processing system can store at least 3,500 images.
10. Able to connect to the hospital's designated PACS server and MWM server by wireless LAN, and images can be transferred and patient information obtained via DICOM.

Requirements for portable radiography at Oki Hospital

- Care must be taken when entering rooms as many different types of peripheral devices are placed at the bedside and there is little space. Snagging wires and colliding with other equipment are particular concerns. The unit should be highly operable and safe.
- For positioning, the unit should be efficient to operate and reduce the burden on the patient as much as possible.
- Radiography results should be available to view with minimal delay as patient status often changes rapidly and transferring patients can become problematic.

Shimadzu's MobileDaRt Evolution with two wireless FPDs (Fig. 2) was found to meet all the above requirements and was accordingly introduced at the hospital.



Fig. 2 MobileDaRt Evolution

3. Examples of Use

Use of the system at this hospital is broadly separated into the three applications below.

3.1. General Wards and Emergency Rooms

The new system can be operated from the right and left, front and back, and from the X-ray tube side. This has streamlined setting up and positioning the unit compared to the pantograph-type system in use previously, particularly in areas with restricted movement where there are a large number of peripheral devices (Fig. 3, 4).

Efficiency is improved when working on the wards as images can be checked at the bedside once radiography has been performed (Fig. 5), and then transferred to the PACS sever by DICOM via wireless LAN.

Extracting and positioning a large FPD can be difficult in small rooms. Having two FPDs, a small and a large panel, has made it easier to adjust positioning and orientation during radiography work and increased efficiency.



Fig. 3



Fig. 4

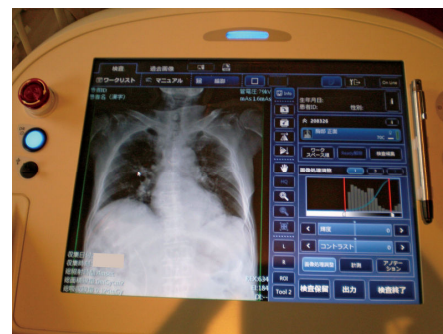


Fig. 5

3.2. Operating Room

Performing radiography in an operating room demands even greater awareness of unit operability, as there is limited available movement around the peripheral devices in use and around the clean area. When contrast examination is performed during surgery, the FPD is positioned on the operating table in advance. Using two FPDs simultaneously has resulted in substantially improved efficiency and reduced times. The wireless FPDs are also safe to manipulate around peripheral devices. The ability to view images after radiography without needing

to remove/insert the FPD also makes it possible to perform consecutive radiographic examinations. Being able to adjust image density at the bedside as desired has also made it easier to change parameters between different radiographic applications, such as between normal radiography and radiography for checking remnants. Work progresses more smoothly compared to previous film radiography, with clear improvements in operability, implementation of radiographic techniques, and the checking of images (Fig. 6, 7).



Fig. 6

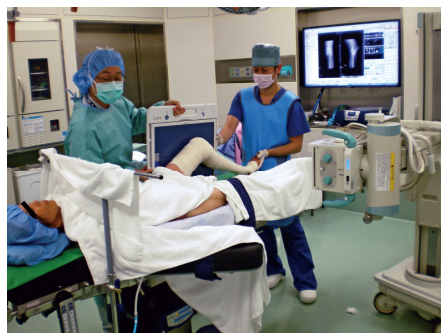


Fig. 7

3.3. Neonate Room

Previously, with the limited space available inside neonatal intensive care units, radiography required newborn babies to be moved temporarily outside the unit, positioning the FPD and then performing radiography while the unit was left open. Using the new small-sized FPD allows radiography to be performed safely without moving the newborn baby from the neonatal intensive care unit, while a diagnosis can be confirmed immediately by sending the images to PACS via wireless LAN (Fig. 8, 9).



Fig. 8



Fig. 9

4. Discussion

After introducing MobileDaRt Evolution to our hospital we have recognized a substantial reduction in workflow demands during portable radiography, and combined with the reduction in times needed to send and process the images after radiography, mobile work undertaken using the new system progresses much quicker and smoother than before. These features were not available in previous portable machines, and introducing MobileDaRt Evolution at Oki Hospital has allowed us to improve our working efficiency.

There are still some aspects of the system that, in the course of use, have come to attention as deserving of improvement. It takes several minutes for the unit to start up, which can delay an initial response in emergency situations. And, though instructions tend to be delayed during an emergency, there are occasions where though we are ready to perform radiography, we must wait for the unit to become ready to perform. It can also be inconvenient when poor planning results in a low battery on the unit as radiography cannot be performed while the unit is recharging.

Nevertheless, the fact that fully charging the unit from a private emergency power supply provides enough power for 2.5 hours of operation and 150 chest radiographies, and that the unit can store 3,500 images is noteworthy and means the unit can be used in crisis situations when there are long periods of power outage during a disaster such as a typhoon or after flood damage.

We intend to continue to efficiently operate the MobileDaRt Evolution using its benefit of having two wireless FPDs.