

Use of Artificial Intelligence to Improve Radiology Service Efficiency

Yung-Cheng Wang

Department of Radiology, Cathay General Hospital, Taipei City of Taiwan

Purpose

Embraced human factors engineering principles
Incorporating intelligent technology

Automatic Registration and Distribution System(ARDS)

- Low risk AI in the work office
- Promoting for ESG
- Improve medical quality
- Human factors engineering
- Reduce patient waiting times
- Patient-centric service

Method

➤ Build system automatic interface

ARDS is based on automation system and applied to X-ray photography, CT and MRI processes. It integrates softwares of check-in machines, scheduling machines and paging machines, and captures basic patient data, examination parts and PACS examination images in HIS and RIS through ARDS, and it can automatically transmit, identify, sign and distribute information with terminal instruments.

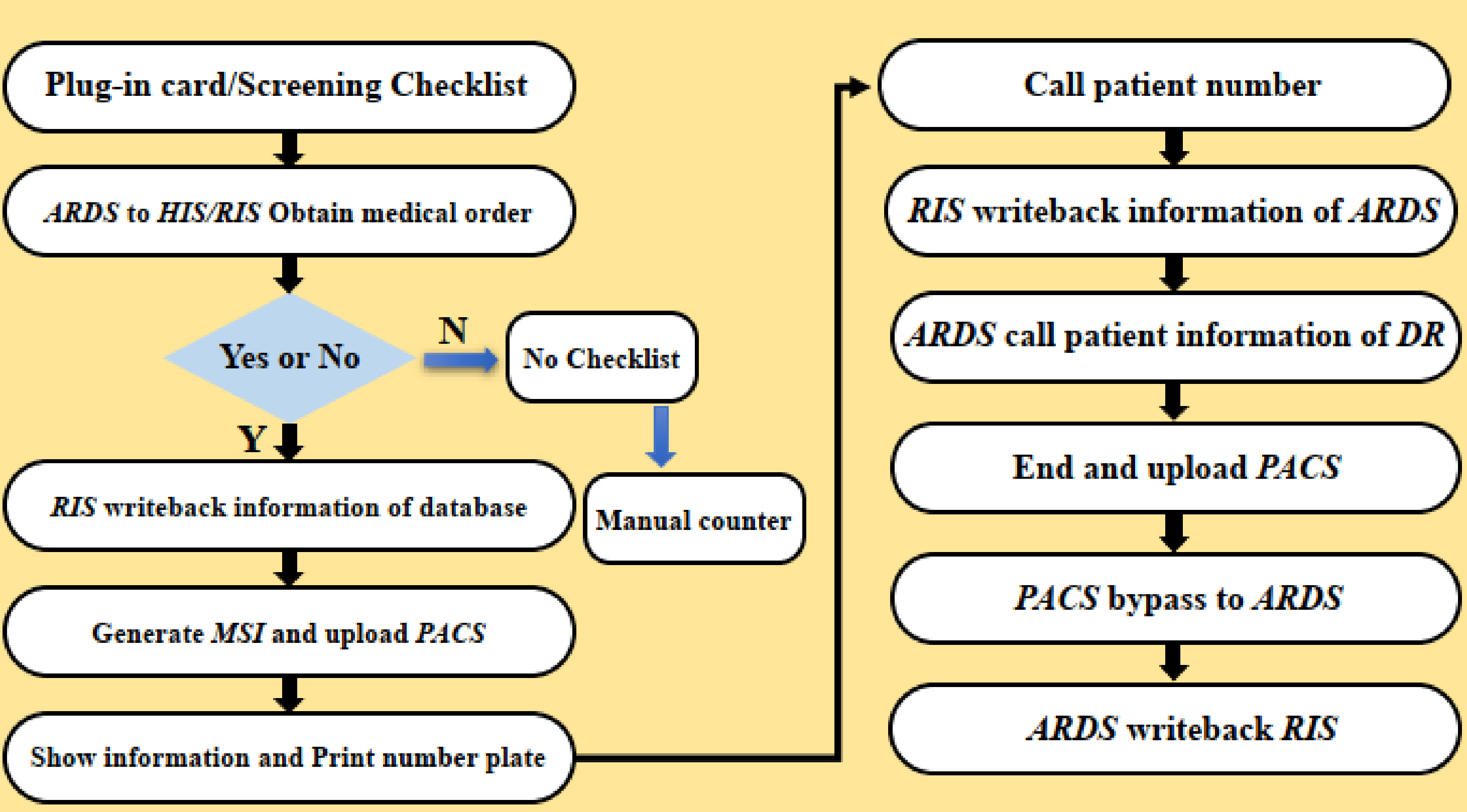


Figure 1. ARDS connects various information systems in series

➤ Introducing Patient-Centered Ergonomics

Special Priority Mechanism for Specific Patient Groups

- ❑ Establishes a prioritization mechanism.
- ❑ Provides clear test numbers.

Implementation of Human Factors Design in the Interface

- ❑ Patient-centered-design.
- ❑ Ensuring a clear understanding of scheduling · any contraindications and preparation instructions.
- ❑ More comfortable experience for patients.

The scheduling interface is patient-centered-designed, and the design mode is centered on the needs and experiences of patient, so as to improve the usability of patients. Its evaluation angles include:

Evaluation project	content
Color Psychology	Yellow provides users with a warm and optimistic feeling, while green provides a relaxed and healthy feeling.
Background and text	among the seven principles of website design aimed at the elderly put forward by foreign scholars, the text suggests black or dark black and the background suggests white.
Script	Domestic expert research suggests "Microsoft bold font".
Script size	after referring to domestic and foreign literature, it is presented in fonts 24 and 28.
User education level	presented in a simple and easy to understand manner, and discussed and reached a consensus with three representatives of the public, presenting all issues in a right and wrong menu.
Patient autonomy	Patients can choose their own date and time and bring their consent form back for review and signing. The patient's selection of the examination date is clear at a glance, fully demonstrating its openness and fairness.

➤ Improve inspection safety and efficiency

The patient undergoes a double check to confirm their identity and location (Figure 2). The system automatically displays the ICON and photography conditions based on the medical order code (Figure 3). The diagnostic radiographers only needs to make minor adjustments for special circumstances to perform the examination.



Figure 2. diagnostic radiographers and patients double check

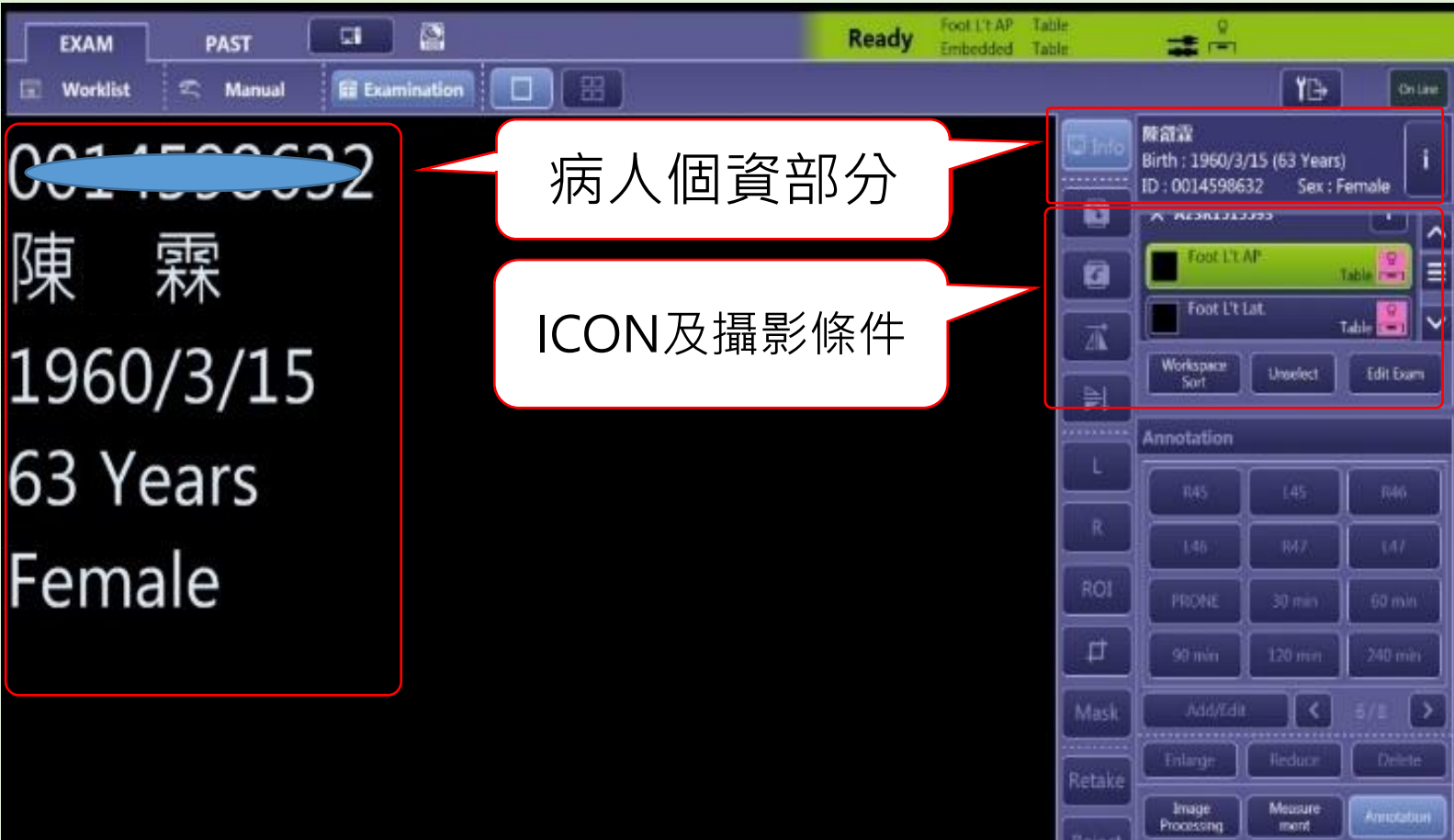


Figure 3. The system automatically brings out information according to the medical order code

The examination room screen will present the contents of electronic medical orders (Figure 4), which can bring out relevant information through the system, so that the diagnostic radiographers can pay attention to the patient's condition when performing radiation business.

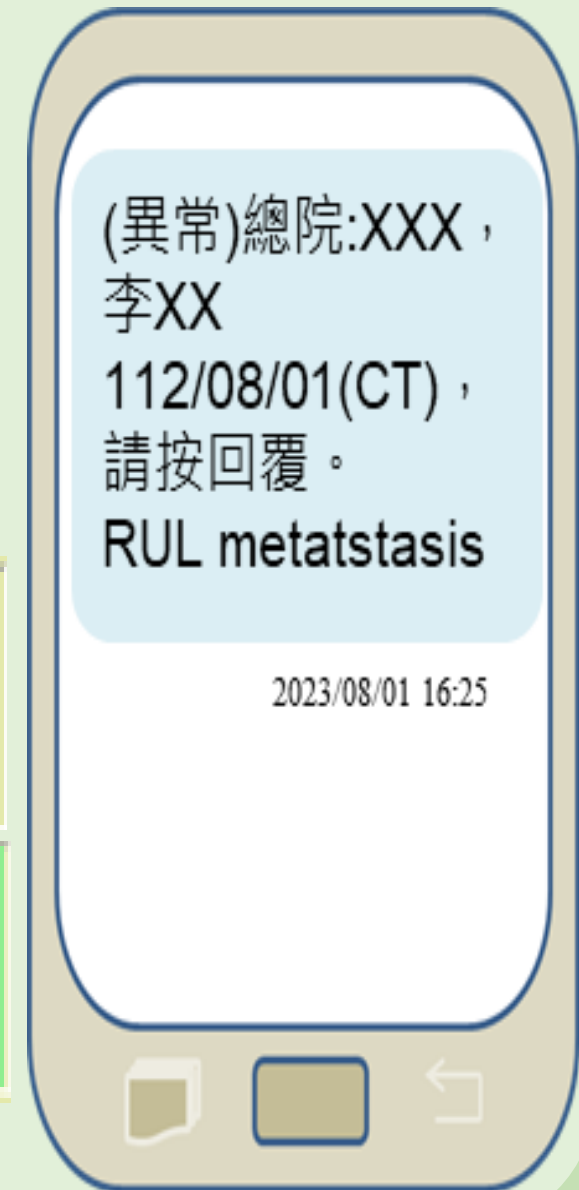


Figure 4. The examination room screen presents electronic medical order content

In case of critical value or abnormal value, the radiologist will send short message through HIS to inform clinical physician (Figure 5).

醫師代碼	簡訊內容	發送時間
陳如 (13499)	(異常)總院:0024159725, 李安, 112/08/01(CT), 請按回覆	2023-08-01 16:25:52.9

Figure 5. HIS of critical/abnormal value and the content of short message



Result

1. The patient's waiting time for examination has been reduced by about 15 minutes compared to before the system was introduced.
2. The patient's waiting time for the report has been reduced by about 37 hours compared to before the system was imported.
3. Satisfaction rate of X-ray photography is 92%, and 94% of CT and MRI.
4. Saved paper, ink, and labor costs amount to NT\$640,000/year, reducing carbon emissions by at least 6,322 kgCO²/year .

Conclusion

Our institution pioneered the ARDS, it can help infection control by reducing close contact among personnel, and shortening waiting time, the system establishes a prioritization mechanism for vulnerable and special cases, effectively reducing the mental workload on diagnostic radiographers , optimizing operational performance, and enhancing the resilience.

Through ARDS optimizing the selection criteria for examination items, improving clinical execution convenience and reducing manual intervention, it also simultaneously reduces manual interventions to decrease the occurrence of patient safety incidents or medical dispute events, significantly shortens report times, and enhances perceptible healthcare quality. With the establishment of ARDS system modules, aiming to improve patient examination safety and efficiency, future expansion to other examination items and other medical centers is envisioned.

