



# AI model to determine whether dialysis vascular access requires intervention

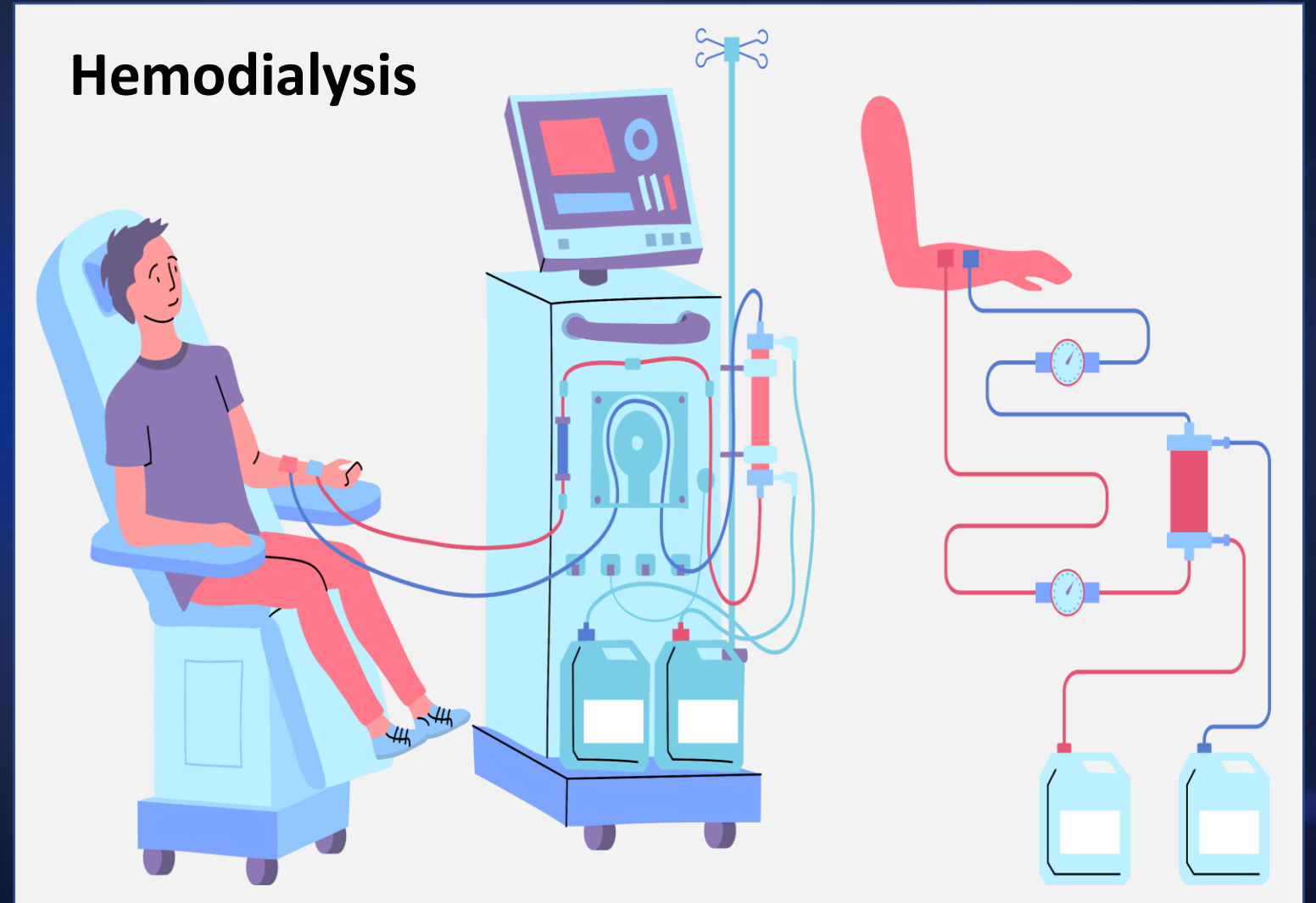
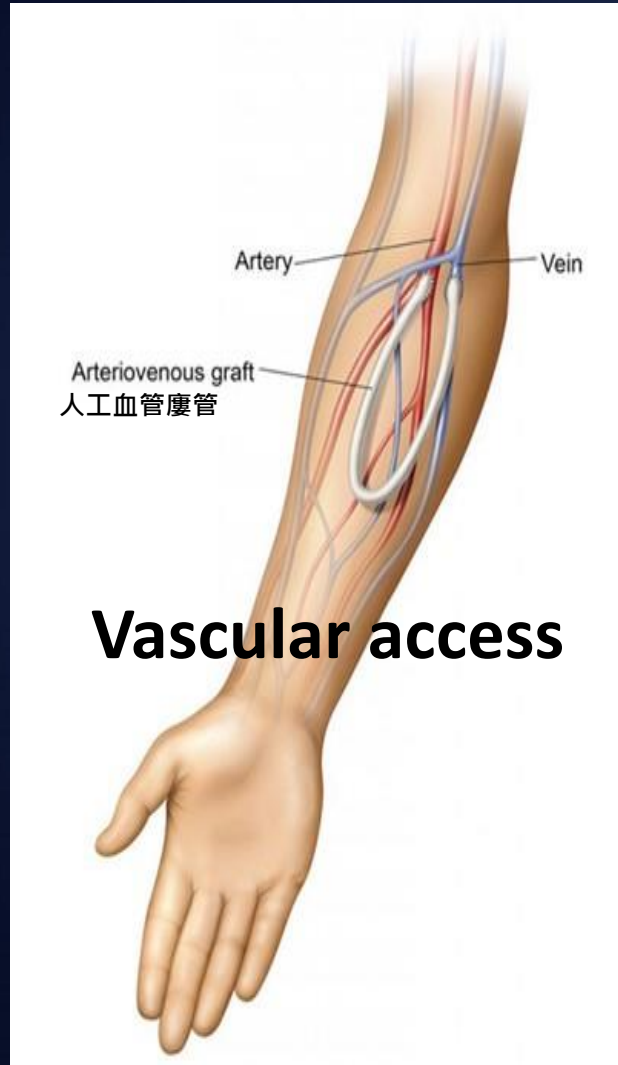
Changhua Christian Hospital, TAIWAN

May 8~9, 2025

@Tokyo International Forum (TIF) Glass Building Lobby Gallery



# Purpose



# Determination of vascular access function

## Physical examination

The patient is routinely checked for tremor or rustling during vascular assessment **before** dialysis.

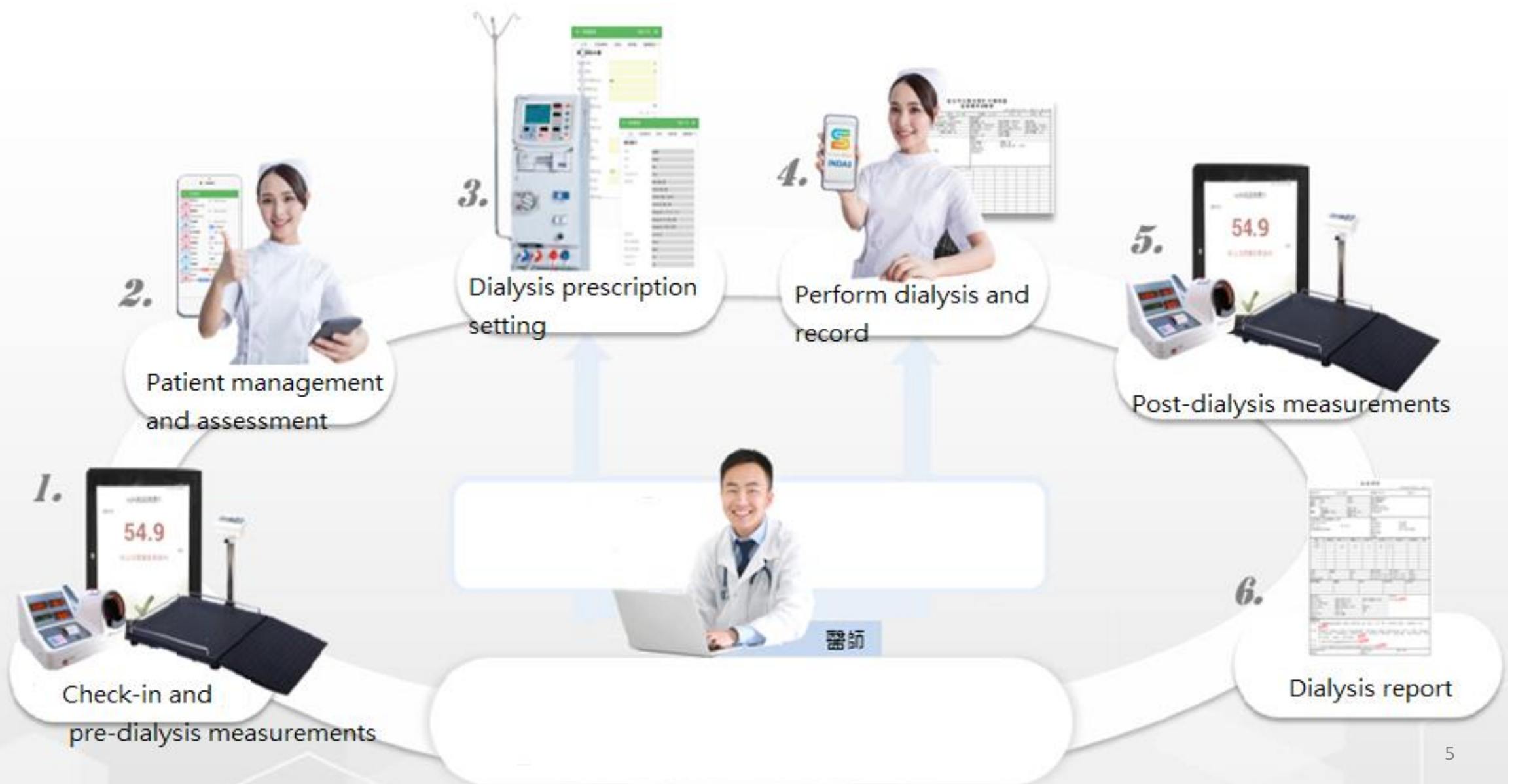
## Surveillance

Nurses observe blood flow rate setting and venous pressure changes **during** dialysis.

# Current Challenges

Traditional methods involve using hardware devices to measure sound, flow rate, or images, which are costly, time-consuming, and require additional manpower.

# The process of dialysis service



# Proposed Solution

An artificial intelligence (AI) model is trained to read data from the dialyzer and physiological parameters to assist in determining the need for intervention.



# Data Analysis

Training Data: Collected from 121 patients, totaling 2,852 records.

AI Model Variables:

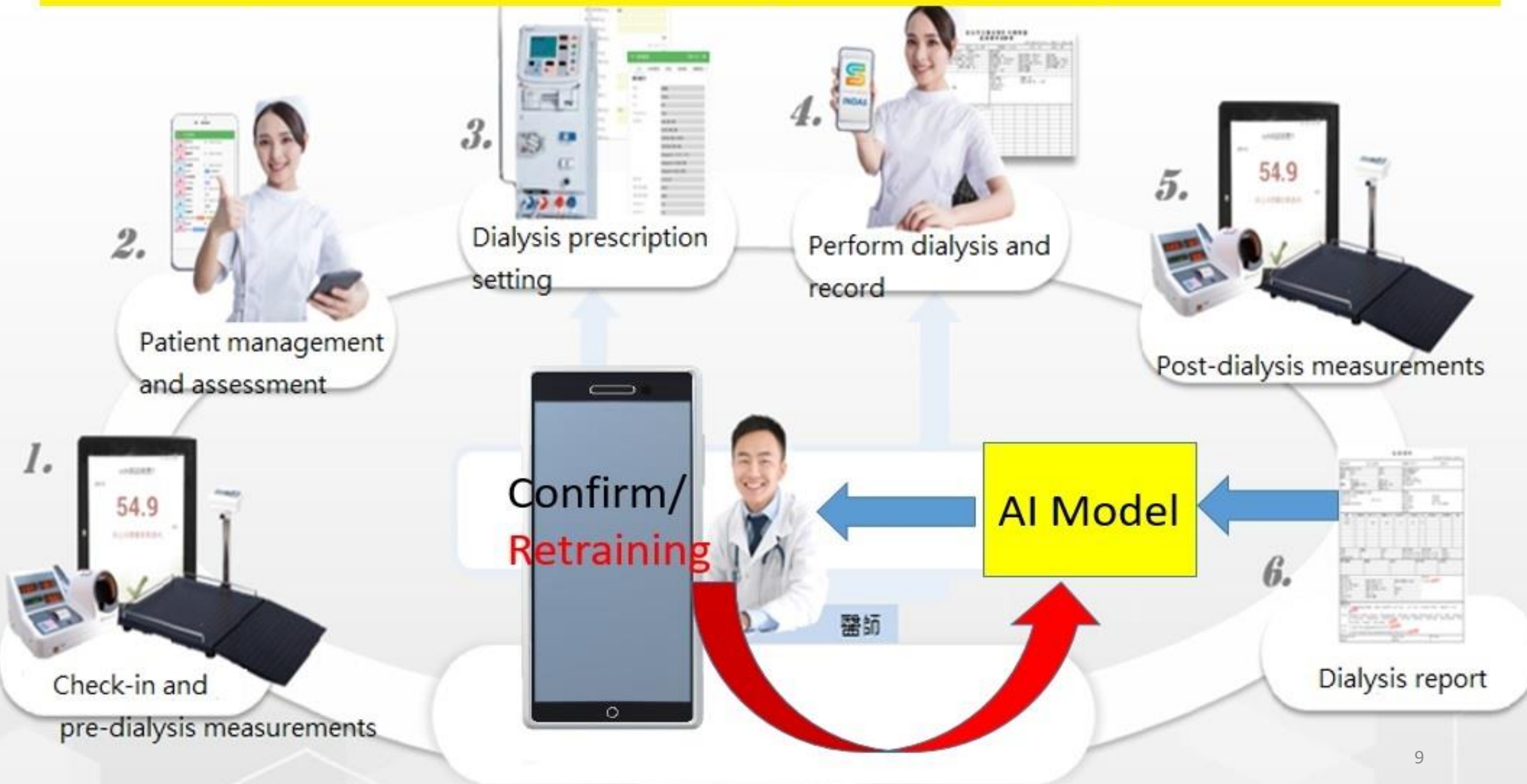
systolic blood pressure, diastolic blood pressure,  
heart rate, respiration rate,  
blood flow rate and venous pressure.

# Four models trained using 5-fold cross-validation.

The predictive power of each model	XGBoost	Random Forest	adaboost	Voting
Sensitivity	0.832	0.888	0.843	0.863
Specificity	0.606	0.550	0.599	0.583
Accuracy	0.752	0.769	0.757	0.764
Area Under Curve	0.771	0.79	0.777	0.784



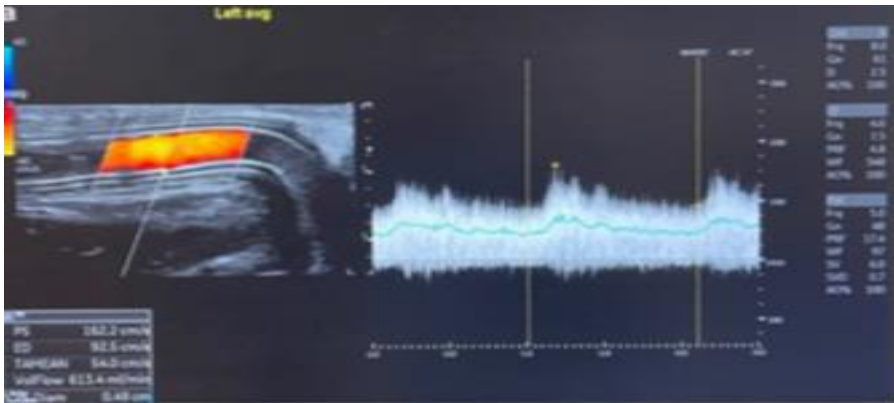
# "Predicting vascular access efficiency with every dialysis session's data!"



# Advantages of applying the AI model



Angiography



Sonography

Acquisition cost

Operating manpower

Space

Time



# The Gold Medal Award



**tie** Taiwan Innotech Expo  
2024台灣創新技術博覽會發明競賽

## 金牌獎

### 【參賽單位】

彰化基督教醫療財團法人彰化基督教醫院

### 【專利權人或專利申請人】

彰化基督教醫療財團法人彰化基督教醫院

### 【發明人、新型創作人或設計人】

楊明治、蕭玉鑫、林榆蓁、陳佳芬、張曉琪

### 【專利】

洗腎血管通路阻塞的輔助判定系統

特頒此狀・以茲表揚

發明競賽評審委員會主任委員

2024年10月19日於臺北市

## Gold Medal Award

This award is proudly presented to

### 【Patent】

Auxiliary determination system for kidney dialysis vascular obstruction

### 【Organization】

CHANGHUA CHRISTIAN MEDICAL FOUNDATION  
CHANGHUA CHRISTIAN HOSPITAL

### 【Patentee/Patent Applicant】

CHANGHUA CHRISTIAN MEDICAL FOUNDATION  
CHANGHUA CHRISTIAN HOSPITAL

### 【Inventor/Creator/Designer】

YANG, MING-CHIH、HSIAO, YU-HSIN、LIN, YU-JHEN、CHEN, CHIA-FEN、CHANG, HSIAO-CHI

2024 Taiwan Innotech Expo  
Invention Competition

Award Committee Chair  
October 19, 2024, Taipei City

The background is a dark blue gradient with faint, abstract geometric patterns. These include vertical lines of small squares, larger circles, and thin lines forming arrow-like shapes pointing downwards. The overall aesthetic is modern and technological.

# Thank you for listening