Lecture 17 - Contents

An overview of the main sections in this lecture.

This outline is for guidance. Navigate the slides with the left/right arrow keys.

Lecture 17:

Real-World Case Studies

Medical AI in Practice: Real-World Success Stories

Case Study Collage, Hospital Logos

Case Studies Overview

Case Categories

- Emergency Medicine
- Radiology Applications
- Clinical Trials & Drug Development
- Population Health Management

Success Factors

- ✓ Clear definition of clinical problems
- ✓ Data quality and accessibility
- ✓ Close collaboration with healthcare professionals
- ✓ Gradual implementation and validation
- ✓ Continuous monitoring and improvement

Part 1/3:

Emergency Medicine Applications

1. Emergency Department Triage System
2. Early Sepsis Prediction
3. Stroke Detection
4. Chest Pain Evaluation
5. Resource Allocation Optimization
6. Performance Metrics & Implementation Challenges

Emergency Department Triage System

ESI (Emergency Severity Index) Automation

Triage Flow

1	2	3	4	5
Immediate	Emergent	Urgent	Less Urgent	Non-Urgent

AI System Performance

- Accuracy: **92%**
- Processing Time: **30 sec reduction**
- Nurse Burden: **40% decrease**
- Mis-triage Rate: **5% improvement**

Key Features

- Real-time vital sign analysis
- Symptom-based priority determination
- Past medical record integration
- Healthcare staff final approval system

Early Sepsis Prediction

Prediction Model Input Features

- Temperature
- Heart Rate
- Blood Pressure
- Respiratory Rate
- White Blood Cell Count (WBC)
- Oxygen Saturation (SpO2)
- Lactate Level
- Urine Output
- Consciousness Level (GCS)

ROC Curve Performance

AUC-ROC	**0.89**
Sensitivity	**85%**
Specificity	**87%**
Positive Predictive Value (PPV)	**82%**

Clinical Impact

Early Detection	**4-6 hours**
Mortality Reduction	**15%**
ICU Stay Reduction	**2.3 days**
Time to Antibiotics	**1 hr faster**

Alert System

🔔 Real-time risk score calculation
🔔 Automatic high-risk patient alerts
🔔 Mobile push notifications for healthcare staff

Stroke Detection

Automated CT Scan Analysis

Imaging Analysis Features

- Hemorrhagic stroke detection
- Ischemic stroke identification
- Aneurysm detection
- Lesion size measurement
- ASPECTS score auto-calculation
- Vessel occlusion location identification

AI Model Performance

- Accuracy: 94%
- Sensitivity: 96%
- Specificity: 93%
- Processing Time: <5 min
- False Positive Rate: 3%
- Comparable to neurologist

🕐 Time to Treatment Reduction

Diagnosis Time	Thrombectomy Prep	Total Treatment Start
15min	**30**min	**45**min

"Time is Brain" - 1.9 million neurons lost per minute of delay

Chest Pain Evaluation

Risk Stratification Algorithm

High Risk

Immediate cath lab prep
Emergency coronary angiography

Medium Risk

Intensive monitoring
Cardiac biomarker tracking

Low Risk

Outpatient follow-up
Early discharge possible

AI Assessment Results

Acute MI Detection Rate	**98%**
False Negative Rate	**0.5%**
Unnecessary Admission Reduction	**30%**
Assessment Time	**10 min**

Clinical Improvement

Early Diagnosis	**2 hr faster**
Unnecessary Tests	**25% reduction**
ED Length of Stay	**1.5 hr reduction**
Patient Satisfaction	**15% increase**

Resource Allocation Optimization

Allocation System Features

Bed Management

Real-time bed status tracking

Staff Allocation

Demand-based deployment

Ambulances

Optimal routing

Medication Inventory

Automatic demand forecasting

Lab Scheduling

Priority-based booking

OR Management

Time optimization

Efficiency Improvements

Bed Turnover Rate	**+22%**
Wait Time Reduction	**35 min**
Resource Utilization	**85% → 95%**

Cost Savings

Operating Costs	**-12%**
Overtime	**-28%**
Inventory Waste	**-15%**

Staff Allocation Optimization	**+18%**
Annual Savings	**$2.5M**

Performance Metrics

Key Points

- Feature 1
- Feature 2
- Feature 3

Results

- Result 1
- Result 2
- Result 3

Implementation Challenges

Key Points

- Feature 1
- Feature 2
- Feature 3

Results

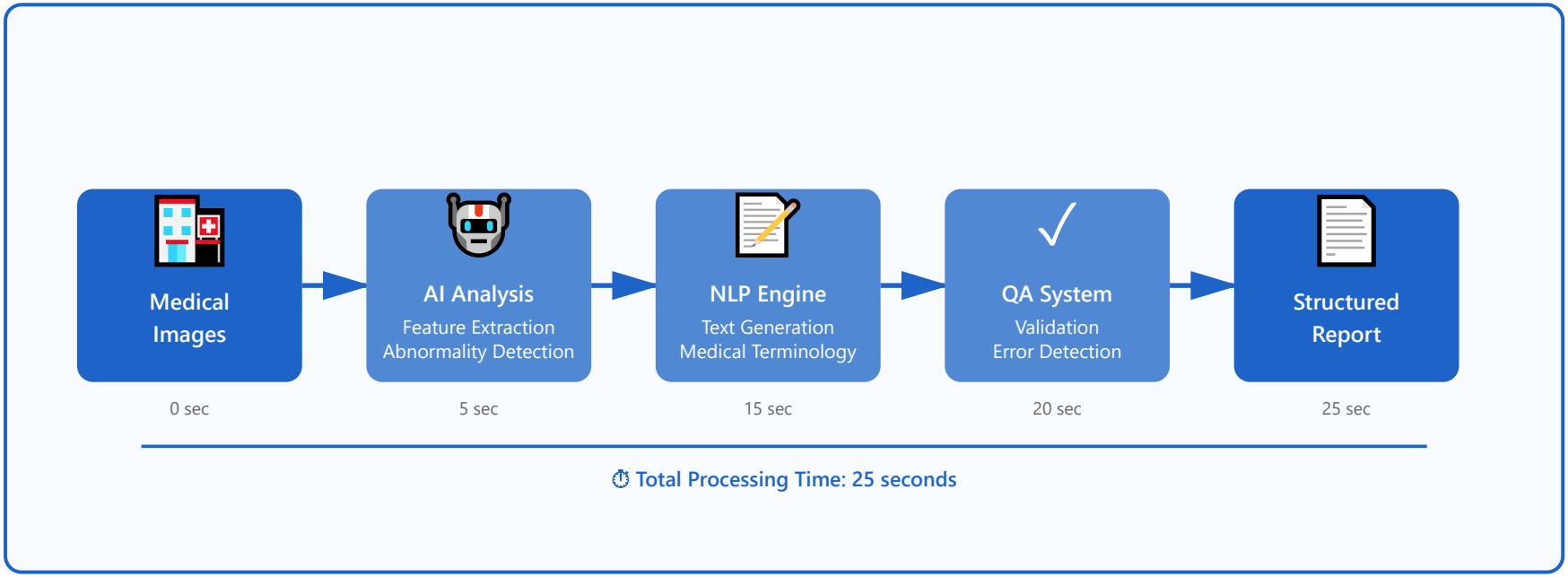
- Result 1
- Result 2
- Result 3

Part 2/3:

Radiology AI Deployments

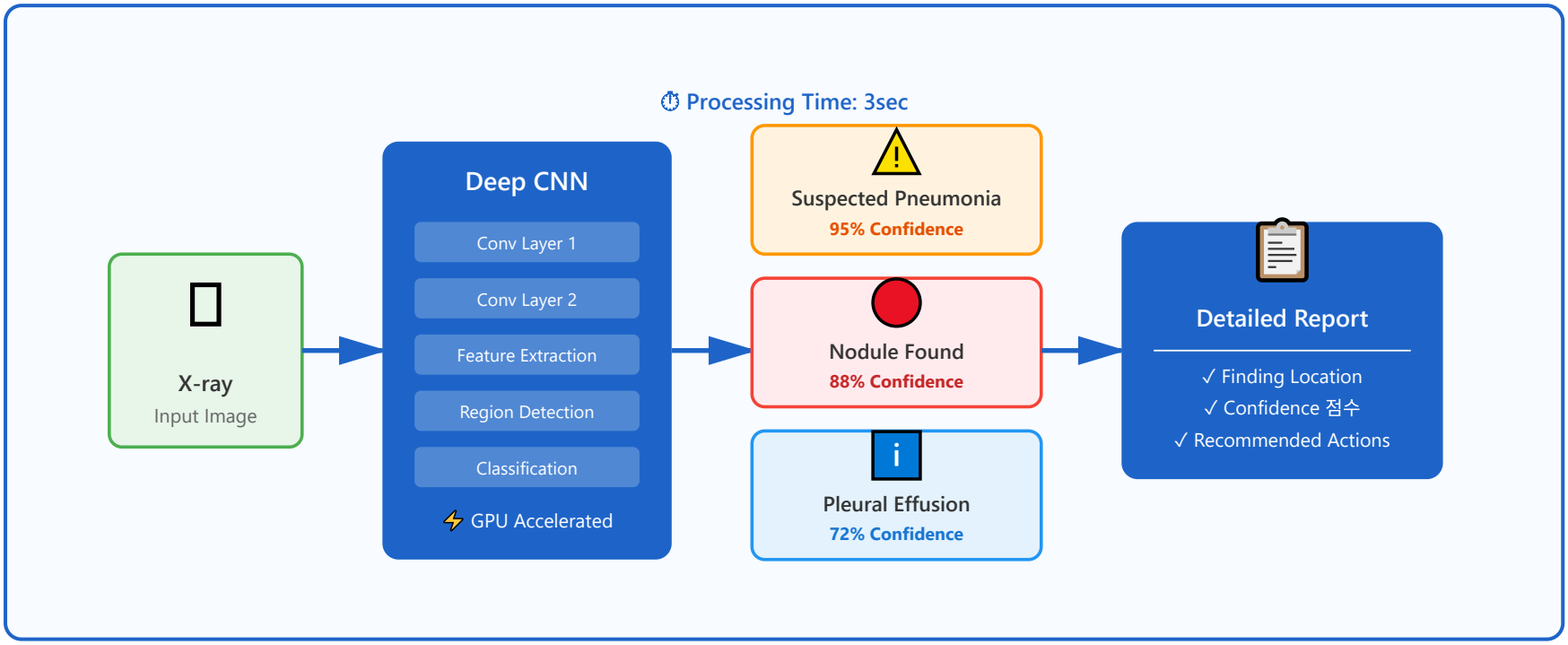
1. Automated Report Generation Pipeline
2. Finding Detection
3. Priority Queuing System
4. Quality Assurance
5. Radiologist Workflow Integration
6. PACS Integration

Automated Report Generation Pipeline



Processing Speed	Accuracy	Time Saved	Daily Throughput
25sec	**96%**	**80%**	**500+**

Finding Detection (Finding Detection)



검출 Accuracy

94%

Sensitivity

96%

Specificity

92%

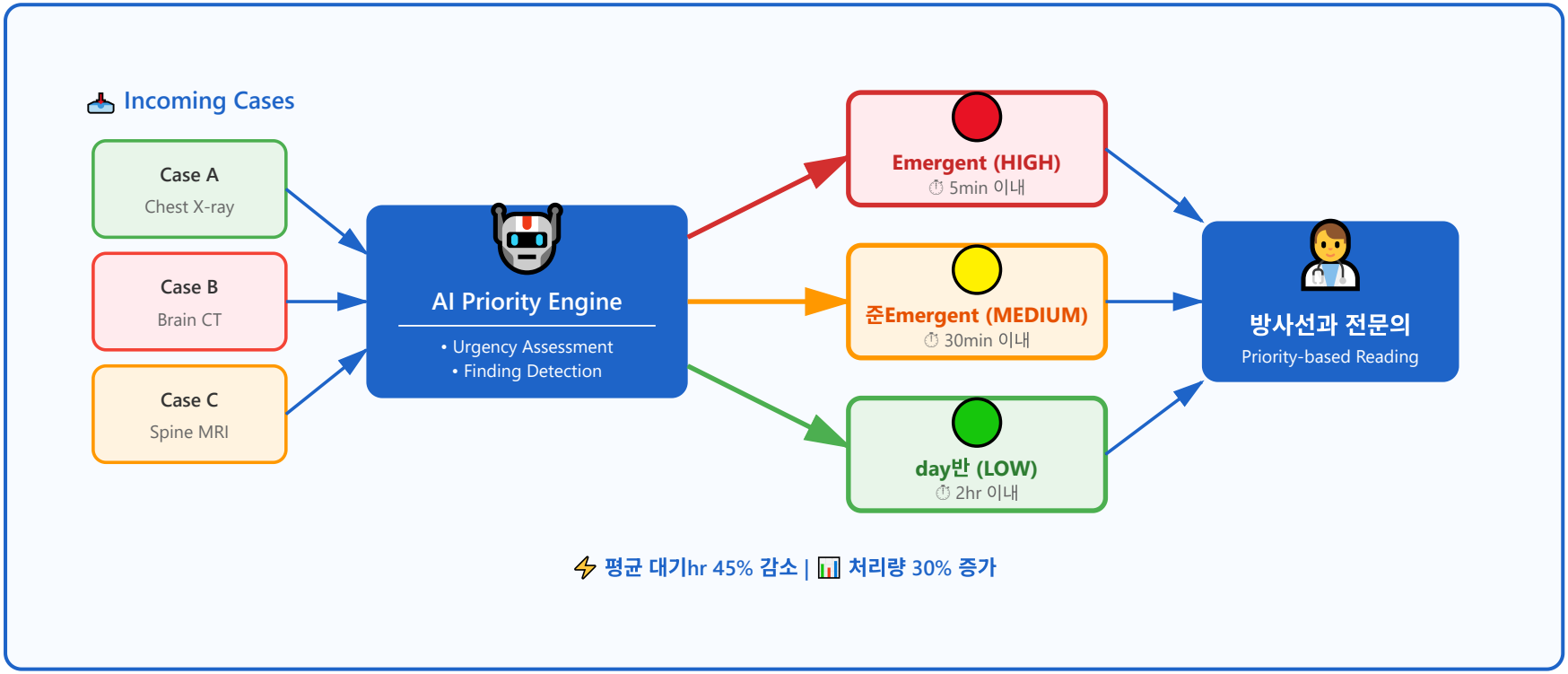
Processing Speed

Daily Analysis

Detection Categories

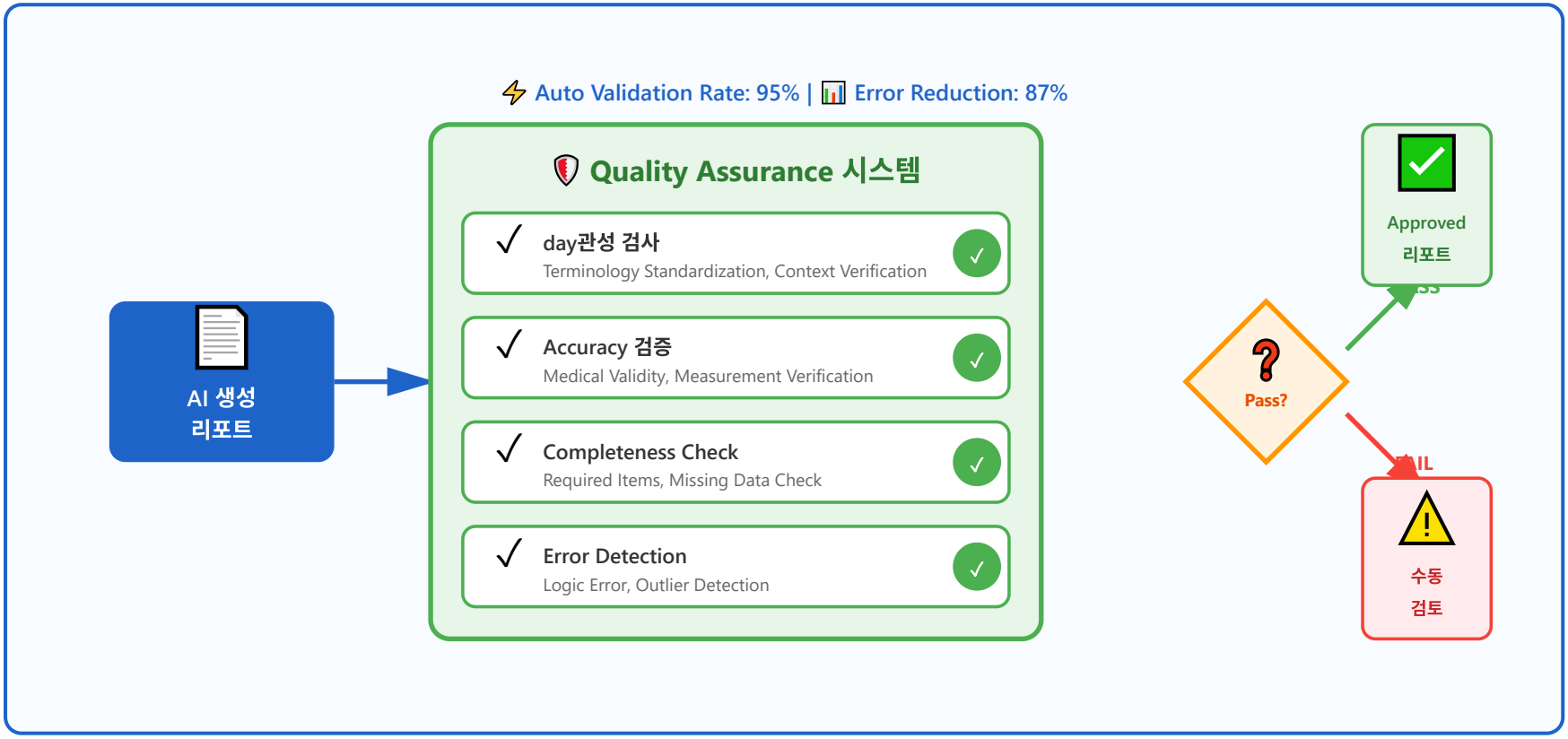
3sec	1000+	15+

Priority Queuing (Priority Queuing)



Wait Time Reduction	Throughput Increase	Urgent Case Processing	시스템 Accuracy
45%	**30%**	**98%**	**91%**

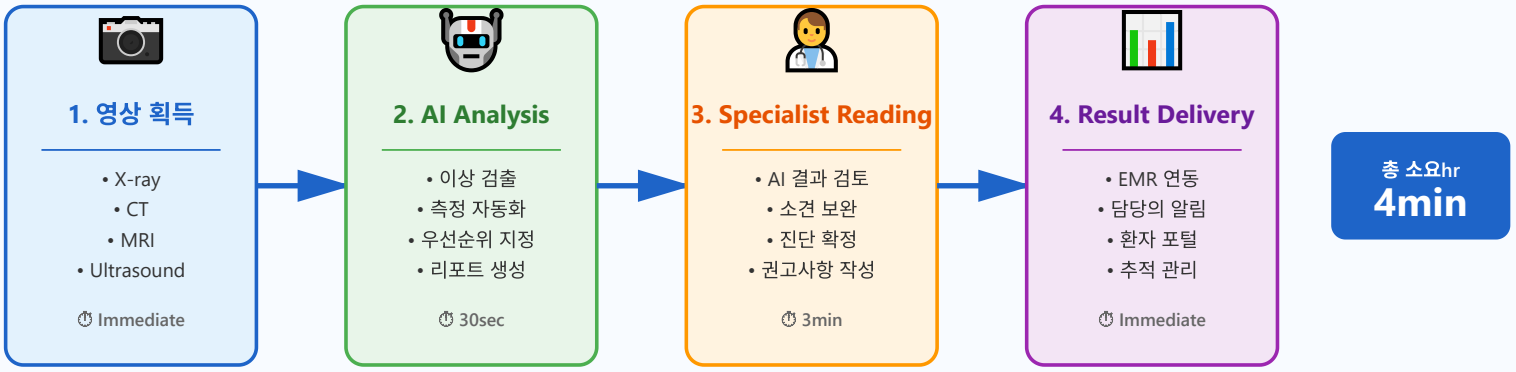
Quality Assurance (Quality Assurance)



Auto Validation Rate	Error Reduction	Processing Time	Manual Review Rate
95%	87%	2sec	5%

Radiologist Workflow Integration

⚡ Compared to Previous 65% Time Reduction | 📈 처리량 3x increase



⚡

Processing Time 단축

65%

📈

Throughput Increase

3배

✓

Accuracy 향상

12%

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🎯

💰

Physician Satisfaction

92%

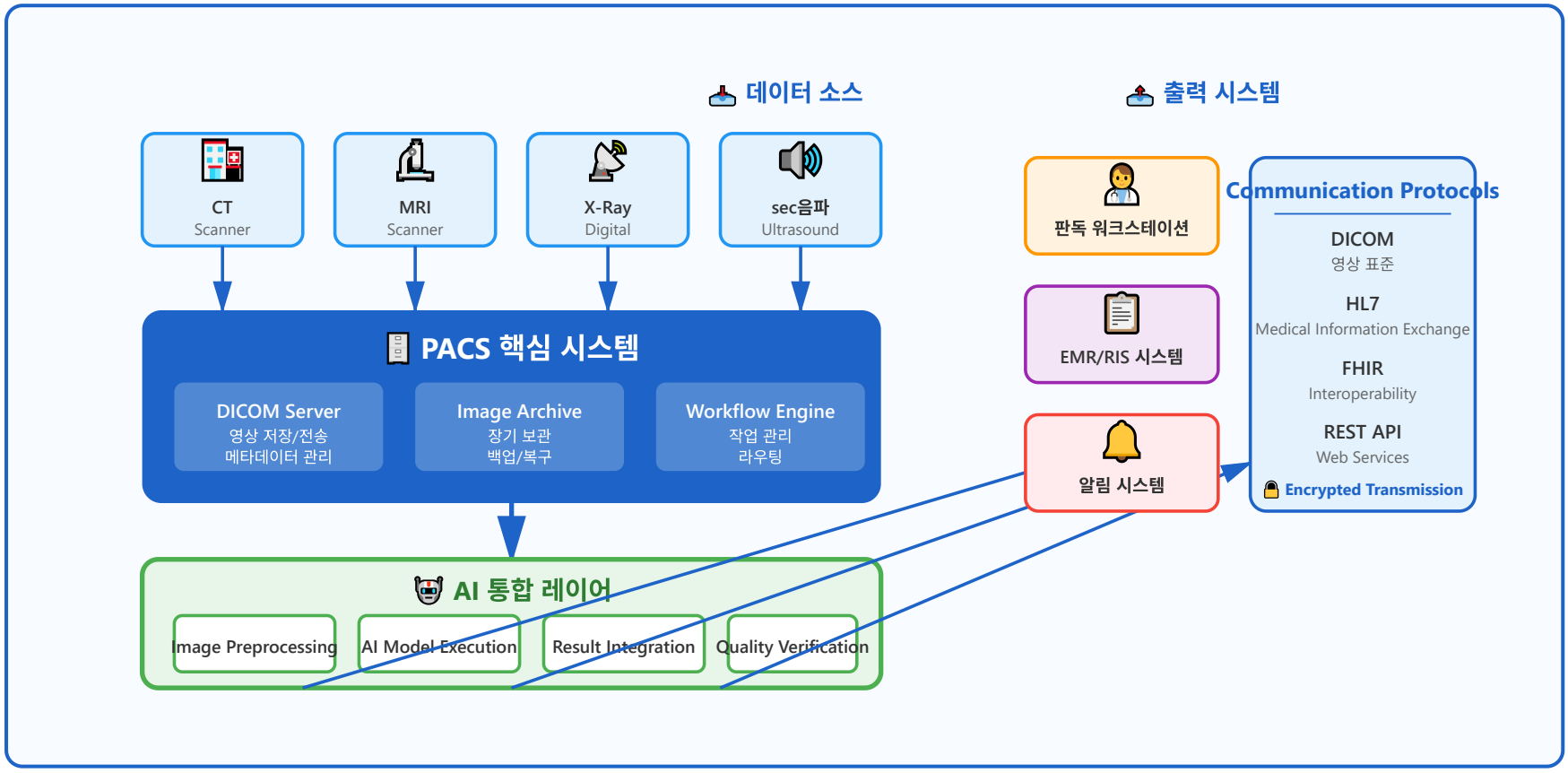
Misdiagnosis Reduction

28%

Cost Savings

35%

PACS Integration (PACS Integration)



실hr 처리

Auto Synchronization

Secure Communication

Integrated Dashboard

Auto Backup

Web Access

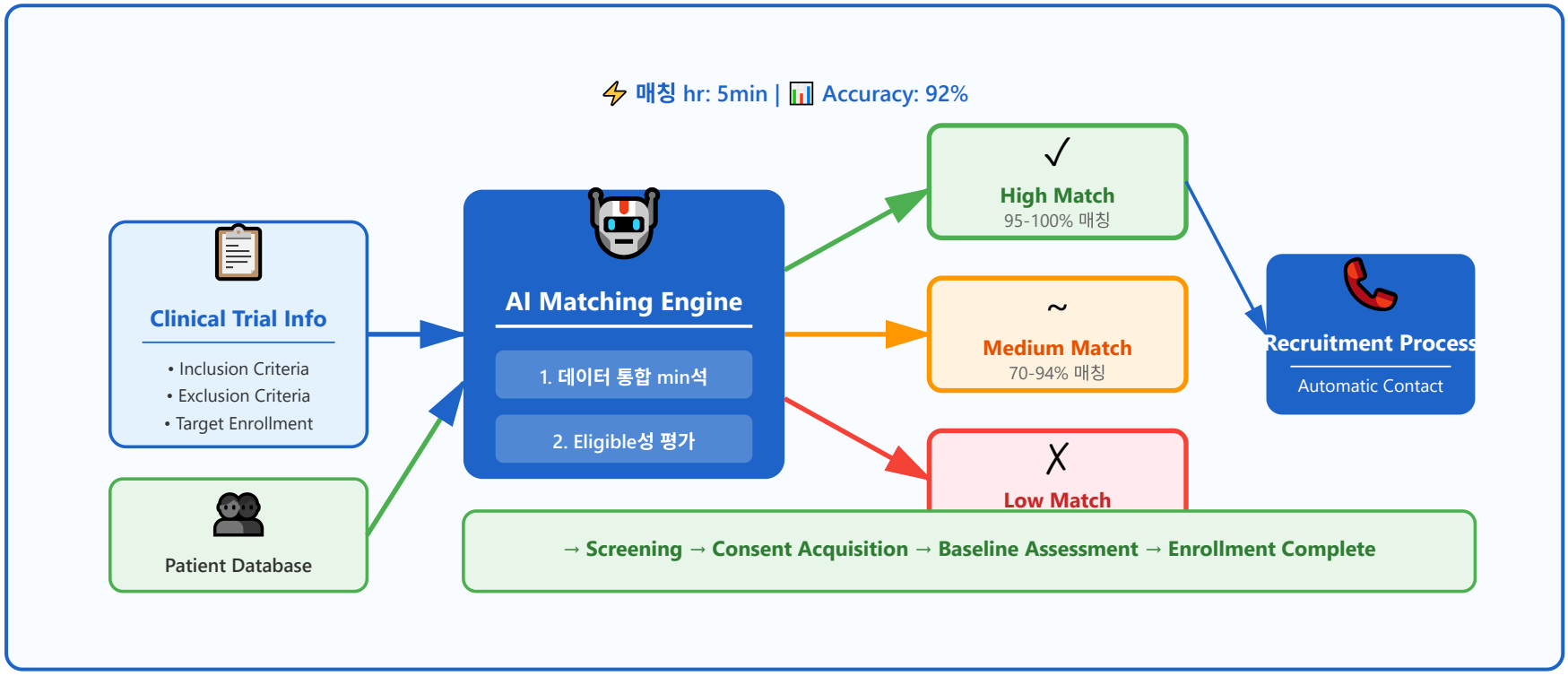
Standards Compliance

모바day 지원

Part 3/3:

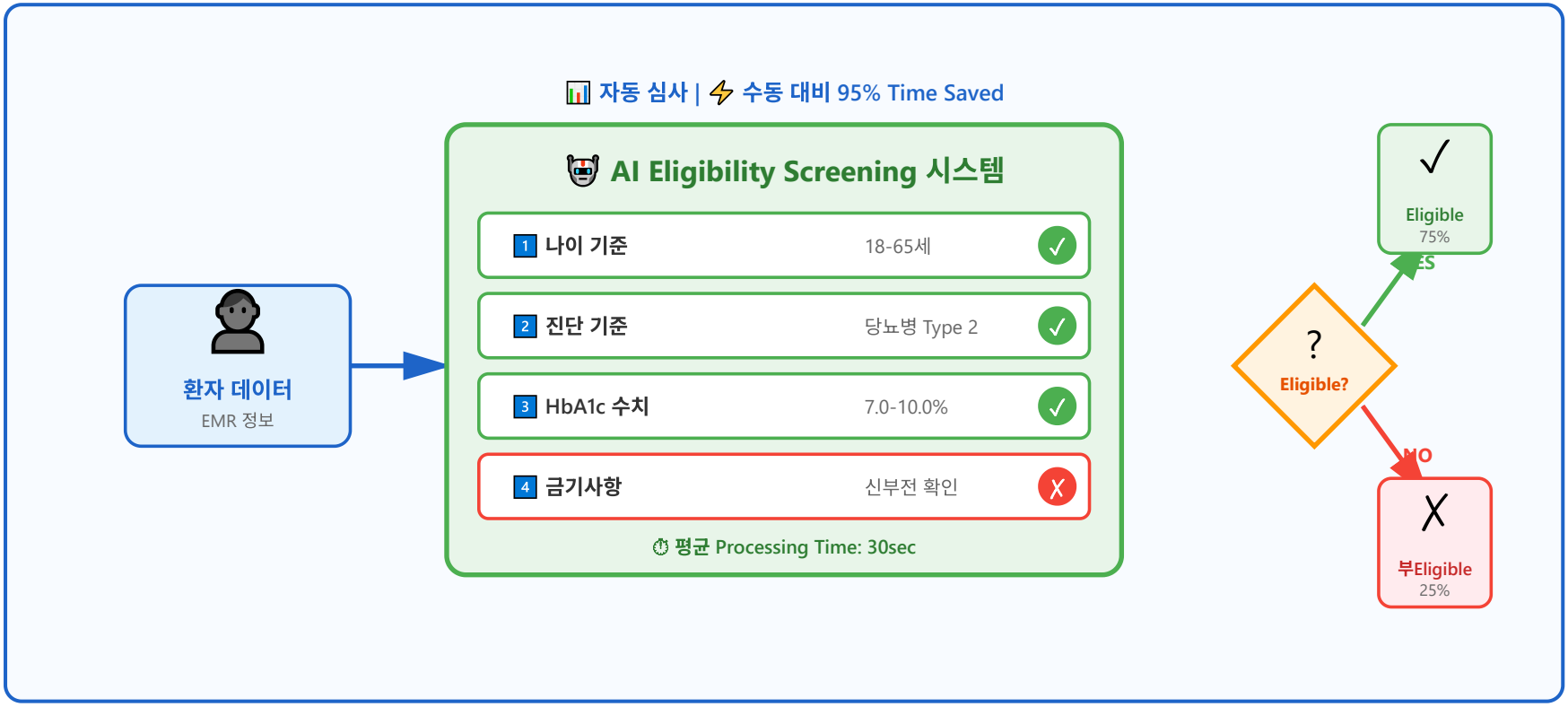
Clinical Trials and Drug Discovery

Patient Matching (Patient Matching)



매칭 Accuracy	Processing Time	Recruitment Speed Improvement	Cost Savings
92%	**5min**	**3배**	**45%**

Eligibility Screening (Eligibility Screening)



Processing Time	Accuracy	Time Saved	dayday 처리 건수
30sec	**96%**	**95%**	**500+**

Protocol Optimization

Key Points

- Feature 1
- Feature 2
- Feature 3

Results

- Result 1
- Result 2
- Result 3

Adverse Event Monitoring

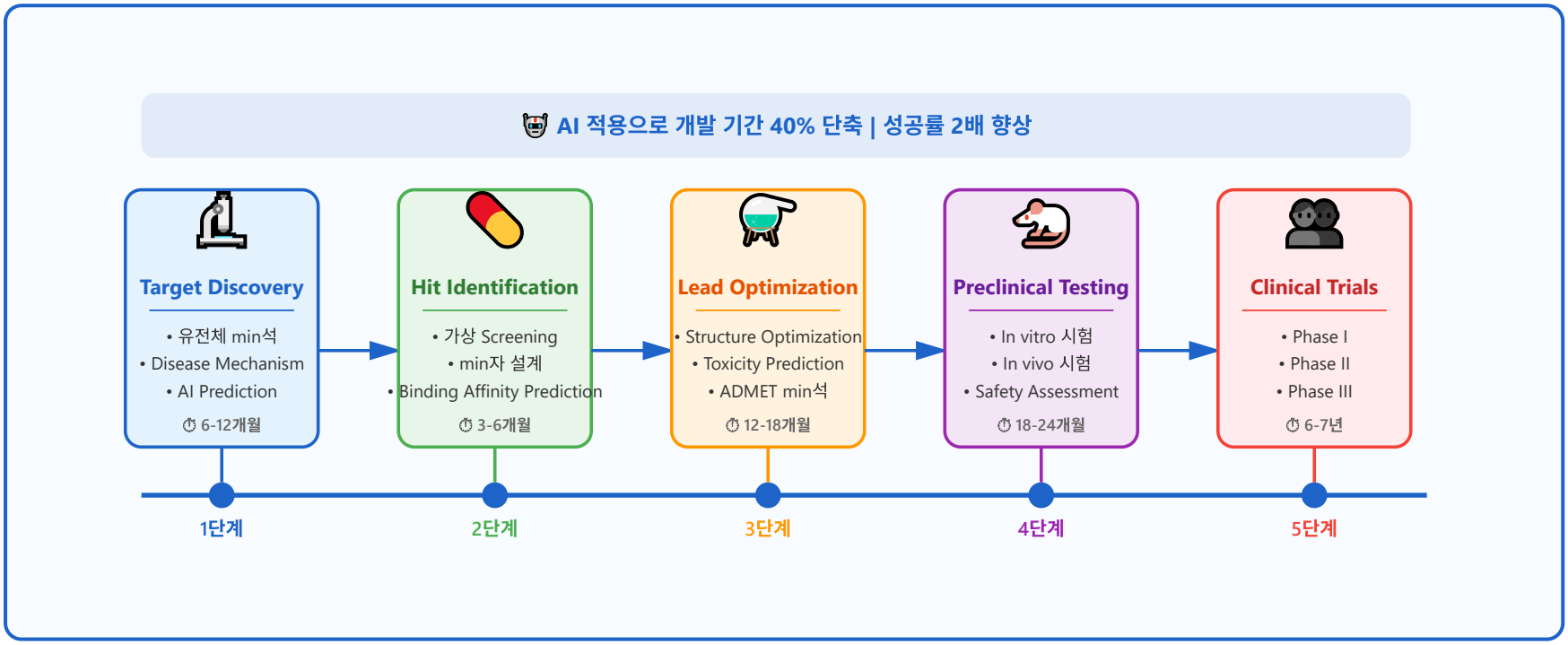
Key Points

- Feature 1
- Feature 2
- Feature 3

Results

- Result 1
- Result 2
- Result 3

Drug Discovery Pipeline



Development Time Reduction

40%

Success Rate Improvement

2배

Cost Savings

30%

후보물질 Accuracy

Screening 속도

Toxicity Prediction Accuracy

85%

100배

90%

Target Identification

Key Points

- Feature 1
- Feature 2
- Feature 3

Results

- Result 1
- Result 2
- Result 3

Population Health Management

Key Points

- Feature 1
- Feature 2
- Feature 3

Results

- Result 1
- Result 2
- Result 3

Risk Stratification

Key Points

Feature 1

Feature 2

Feature 3

Results

Result 1

Result 2

Result 3

Lessons Learned

Key Points

Feature 1

Feature 2

Feature 3

Results

Result 1

Result 2

Result 3

Success Factors

Key Points

Feature 1

Feature 2

Feature 3

Results

Result 1

Result 2

Result 3

Future Opportunities

Key Points

Feature 1

Feature 2

Feature 3

Results

Result 1

Result 2

Result 3

Thank You

Real-World Case Studies in Medical AI