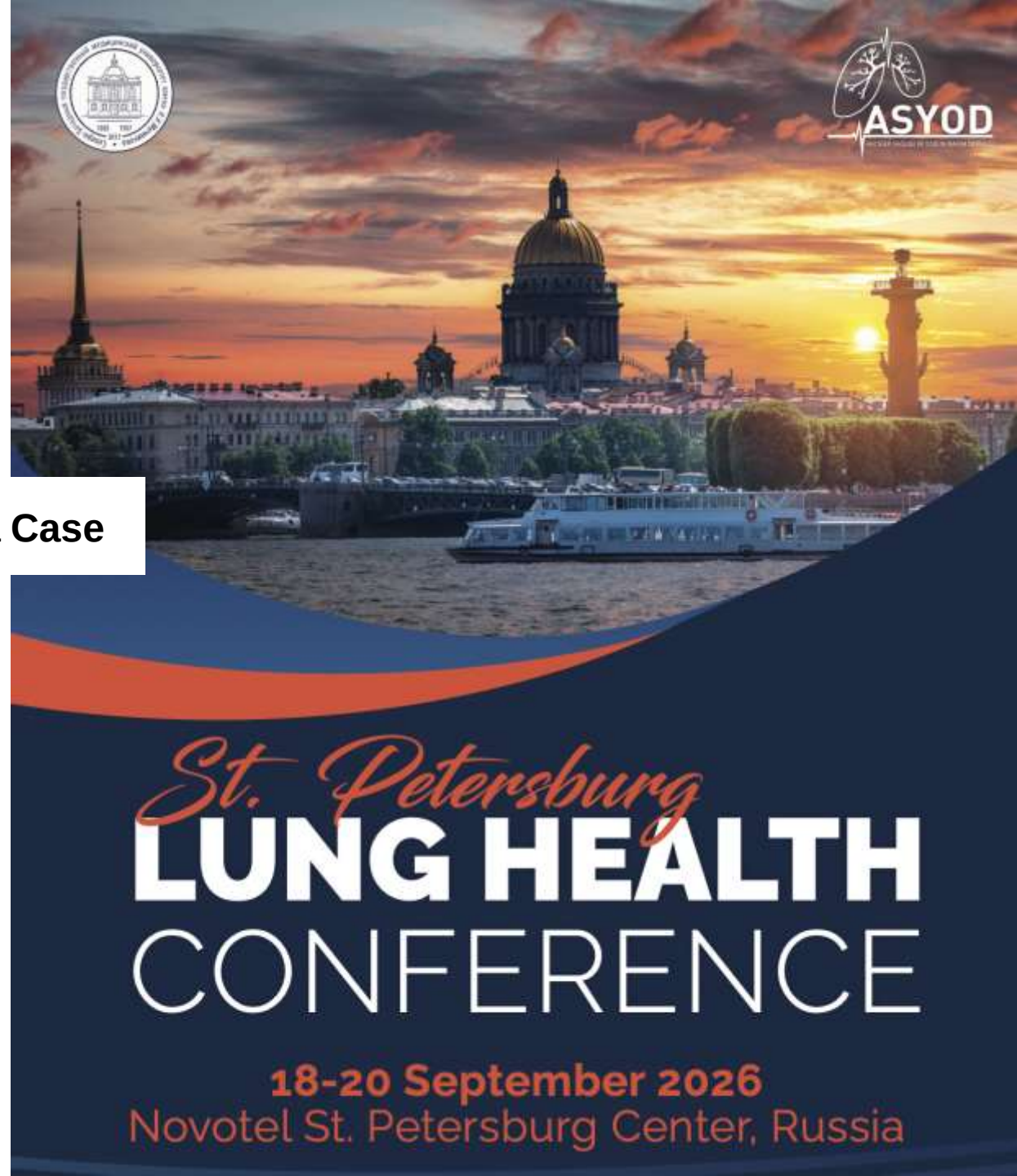




Case Discussion

A Robotic and AI-Assisted Approach to a Pneumonia Case

Neslihan ÖZÇELİK
RTEÜ Tıp Fakültesi, Göğüs Hastalıkları
ABD





Core question: In today's hospital, where can a "robot doctor" accelerate care for a patient with pneumonia, and where is a physician still required?

Clinical objective of the presentation

Reframing conventional pneumonia management through an AI and robotic clinical workflow

Pneumonia diagnosis: synthesis of clinical findings, imaging, and laboratory data

Risk stratification: hypoxemia, sepsis, CURB-65/PSI, and need for intensive care

Artificial intelligence: early warning, radiologic pre-assessment, guideline adherence, and continuous monitoring

Main discussion: decision support from the robot, final responsibility with the physician

CASE + DISCUSSION + FUTURE



Reality check

Today there is no “autonomous physician robot”; instead, we have robotic transport, digital sensors, radiology AI, and clinical decision-support components.

Hospital robots such as Moxi: logistics, specimen, medication, and supply flow

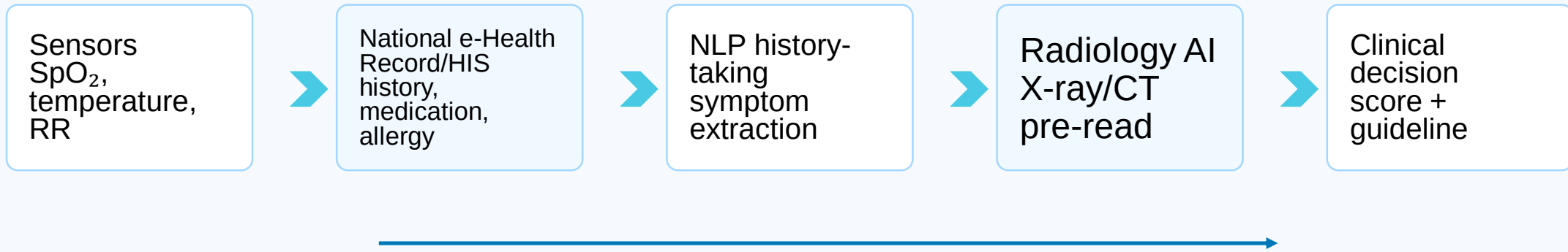
Telepresence robots: remote rounds and bedside access

Numerous AI-enabled radiology devices are listed by the FDA

Message: this presentation is not “near future” fiction, but a clinical integration of currently available technologies.

Dr. ROB architecture

Robotic body + AI layers + physician approval



Final decision: pulmonology / emergency / intensive care physician

Case

Suspected hypoxemic pneumonia presenting to the emergency department

68-year-old man
COPD + hypertension
Fever, productive cough, and dyspnea for 3 days
SpO₂ 88% on room air

Vital signs
BP 105/65 mmHg
Heart rate 112/min
Respiratory rate 28/min
Temperature 38.6°C

First robot question: is the patient stable?



Stage 1 — Robotic triage

Initial risk label within seconds

NEWS2-like early warning
low SpO₂ + tachypnea +
tachycardia

Sepsis screening
hypotensive tendency,
lactate, mental status, fever

Isolation/viral testing
influenza/COVID and
exposure history according
to symptom pattern

Robot's initial output

“Hypoxemic lower respiratory tract infection; admission and close monitoring are required.”

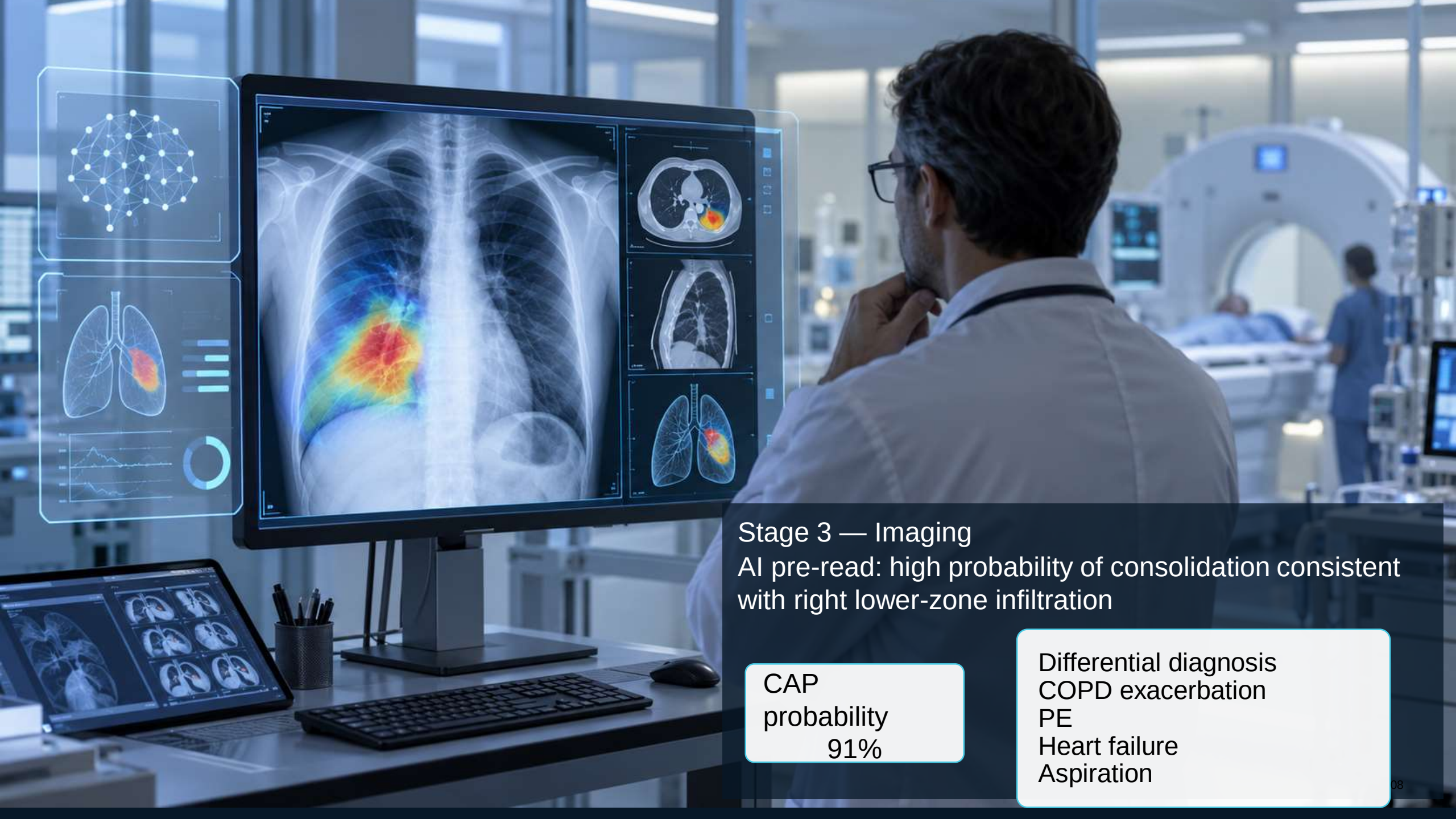
Stage 2 — Robotic history-taking

Structured question set, but clinical intuition remains with the physician

Symptom duration, fever pattern, sputum,
hemoptysis, pleuritic pain
COPD history, recent antibiotic use/hospitalization,
aspiration risk
Immunosuppression, travel/exposure history, viral
outbreak context
Allergy, renal function, QT risk, and drug interactions

Weak point: interpreting ambiguities in the patient narrative, social context, and “clinical gestalt.”





Stage 3 — Imaging

AI pre-read: high probability of consolidation consistent with right lower-zone infiltration

CAP
probability
91%

Differential diagnosis
COPD exacerbation
PE
Heart failure
Aspiration

Diagnostic synthesis

The robot's output alone is not a diagnosis; it must be confirmed by the physician

Clinical

Fever + sputum +
dyspnea

Physical examination

Right basal
crackles/rhonchi

Laboratory

CRP↑, leukocytosis,
lactate 2.4

Imaging

Right lower-
lobe
consolidation



Final diagnosis: community-acquired pneumonia + hypoxemic respiratory failure

“Automatic antibiotics” should not be initiated before alternative diagnoses are excluded.

Risk stratification

The admission decision is based not only on diagnosis, but also on **prognosis**

CURB-65

Confusion: 0

Urea: borderline

RR ≥ 30 : 0/1

Low BP: 0/1

Age ≥ 65 : 1

Score: 2

PSI

Age + comorbidity +
abnormal vital signs +
hypoxemia

Possible class IV

Robot recommendation

Admission

Oxygen

Early reassessment

Close monitoring for sepsis

Discussion question: ward admission or close ICU-level monitoring?

Stage 4 — Treatment recommendation

The robot applies the guideline; the physician approves the prescription

Oxygen: in COPD, target SpO₂ is generally monitored in the 88–92% range

Cultures: if severe disease/sepsis/ICU admission is considered, obtain blood cultures before antibiotics

Empiric antibiotics: based on local resistance, recent antibiotics, renal function, and allergy

Fluid/vasopressor decision: reassess according to hypotension and lactate dynamics

Robot output

“Beta-lactam + macrolide or respiratory fluoroquinolone options; QT, allergy, and renal dose checks are required.”

Red line

AI recommendation ≠ autonomous prescription

Hour 12 — the robot detects deterioration

Clinical value of continuous monitoring

Parameter	Hour 0	Hour 12
SpO ₂	%91	%87
Respiration	28/dk	34/dk
BP	105/65	92/58
Lactate	2.4	3.8

Robot alert: “Clinical deterioration + rising lactate:
intensive care assessment is recommended.”



Discussion: did the robot save the patient?

Answer: it provided an early warning; the clinical decision remains a team decision

Robot contribution

- Does not miss trends
- Calculates scores in real time
- Generates alerts
- Reminds the team of guidelines

Physician contribution

- Broadens the differential diagnosis
- Interprets patient values
- Weighs treatment risk
- Assumes responsibility

Team decision

Intensive care consultation
NIV/HFNC assessment
Revision of antibiotics and sepsis treatment

Main message: not a “robot doctor,” but an AI-assisted clinical team under physician supervision.

Human–AI task sharing

It must be clarified who performs which task better

Task	Robot/AI	Physician
Continuous vital monitoring	+++	+
Risk scoring and guideline adherence	+++	++
Image pre-assessment	+++	+++
Ambiguous clinical picture	++	+++
Empathy and communication	+	+++
Final clinical responsibility	–	+++

Risks and ethical boundaries

Data quality: inaccurate vital signs, incomplete history, and erroneous HIS records can mislead the algorithm

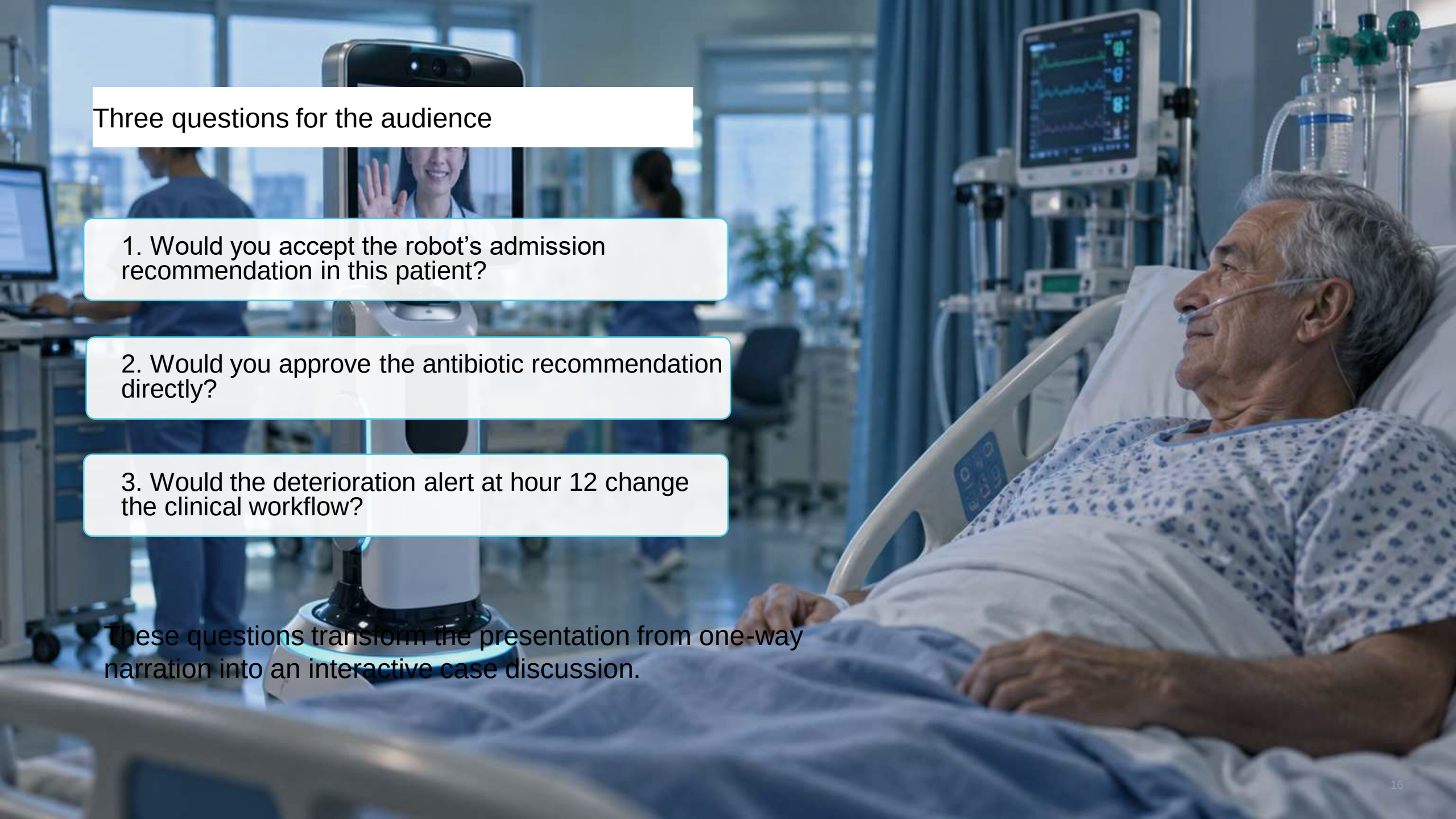
Bias: performance differences related to age, comorbidity, and data source

Explainability: the system should provide a clinical rationale for “why intensive care?”

Responsibility: decision suggestions come from software, but medical and legal responsibility remains with the physician

Cybersecurity and privacy: risk increases when the robot connects to the hospital network



The background image shows a hospital room. An elderly male patient is lying in a hospital bed, looking towards a robot. The robot is a white, cylindrical device with a screen at the top displaying a woman's face. Medical monitors and equipment are visible in the background.

Three questions for the audience

1. Would you accept the robot's admission recommendation in this patient?

2. Would you approve the antibiotic recommendation directly?

3. Would the deterioration alert at hour 12 change the clinical workflow?

These questions transform the presentation from one-way narration into an interactive case discussion.

Global examples: division of labor for robots inside hospitals

The following systems are illustrative examples in terms of active use, clinical implementation, or broad hospital integration.

Robot	Country/origin	Setting	Clinical context	Main task
Moxi	USA	ward/logistics	ward/operations	medication, specimens, supplies
TUG	USA	ward/logistics	ward/operations	medication, meals, laundry, waste
HOSPI	Japan/Singapore	porter/delivery	ward/operations	medication and specimen transport
VSee AI Robot	USA	telepresence	ward/ICU	remote rounds
Pepper	Belgium/Japan	reception	ward/operations	reception/navigation
PARO	Japan	therapeutic	ward/operations	dementia and anxiety support
da Vinci	USA/global	surgery	operating room	minimally invasive surgery
ROSA	France/USA	neuro-orthopedics	ward/operations	navigation-guided robotic surgery
CyberKnife	USA/global	radiosurgery	operating room	SRS/SBRT, tumor tracking
Xenex LightStrike	USA	infection control	ward/operations	UV room disinfection

Most relevant use areas for pulmonology

Robotic systems should be interpreted less as “replacing the doctor” and more through the lens of clinical workflow.

1 | Teleconsultation

Virtual bedside presence of a pulmonologist in the ICU, emergency department, and peripheral hospitals.

2 | Pulmonary interventions

Robotic bronchoscopy, navigation, peripheral nodule sampling, and procedure planning.

3 | Lung cancer treatment

Precise targeting of mobile lung tumors with CyberKnife/SBRT.

4 | Clinical early warning

Continuous vital-sign monitoring, deterioration detection, and triage integration.

5 | Infection control

Isolation-room/disinfection cycles and reduction of staff exposure.

6 | Workforce management

Delegating specimen, medication, and equipment transport to robots so clinicians can remain at the bedside.

Limited autonomy

Most systems do not make clinical decisions; they are either controlled by a surgeon/remote physician or perform logistics tasks.

Heterogeneous level of evidence

Logistics efficiency data and patient-outcome data are not equally strong; marketing claims should be separated from evidence.

Regulation and responsibility

Medical device approval, data security, patient privacy, and adverse-event responsibility should be addressed separately.

Integration cost

Integration with elevators, doors, EHR/HIS, PACS, pharmacy, and inventory systems is mandatory.

Acceptance problem

Acceptance by patients, physicians, and nurses; if workflow is disrupted, the technology may be rapidly abandoned.

Algorithmic trust

If an AI module is present, bias, explainability, validation, and local performance should be monitored.

Examples from Russia

Russia provides examples of both patient-facing clinical robots and logistics and robotic surgery solutions.

Note: some of the systems below are Russian-origin; others are international platforms used in Russian hospitals.

Clinical message: Russian examples show that the “robot doctor” concept is not a single device, but consists of different robotic layers in triage, logistics, remote monitoring, and surgery.

Robot / system	Origin	Use setting in Russia	Main task
Dr. Hudsson / Promobot Medical Assessor	Russia	Hadassah Medical Moscow, Moscow	Patient conversation, preliminary screening, basic parameter measurement (e.g., temperature, blood pressure, SpO ₂ /glucose), and navigation support.
Yandex delivery robots	Russia	Pirogov City Clinical Hospital No. 1 and GKB No. 15, Moscow	Transport of medications, consumables, and biomaterials; reducing staff logistics workload.
Remote monitoring “robot” assistant	Russia	Multiple hospitals in the Perm region	Automatically calls patients, collects symptom and measurement data, and alerts the team in case of deterioration.
da Vinci Surgical System	USA / global	Sechenov University and other Russian centers	Surgeon-controlled minimally invasive robotic surgery; urology, general surgery, thoracic surgery, and other fields.
Toumai / EDGE robotic surgery platforms	China	Sechenov University, Moscow	Next-generation robotic surgery; minimally invasive procedures, telementoring, and future telesurgery potential.





With International Participation

LUNG HEALTH CONGRESS



17-20 MARCH 2027
Susesi Luxury Resort, Belek, Antalya/Türkiye

Your Voice, Your Congress...