Interpretation of the *Guidelines for AI Application Scenarios in the Health Care Sector*

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I. Introduction

The rapid advancement of artificial intelligence (AI) technology has transitioned its integration into health care from experimental labs to practical clinical settings. In November 2024, the National Health Commission, in collaboration with the National Administration of Traditional Chinese Medicine and the National Administration of Disease Prevention and Control, released the *Guidelines for AI Application Scenarios in the Health Care Sector* (referred to as the “Guidelines”). The aim is to establish a standardized path for the fusion of “AI + Medical”. This initiative not only aligns with the State Council’s “AI+” strategy but also addresses pressing challenges such as uneven medical resource distribution, the necessity for enhanced diagnostic efficiency and the complexities in treating rare diseases.

Central to the Guidelines are the principles of “end-to-end coverage” and “scenario-based implementation”, outlining 84 application scenarios across prevention, diagnosis, treatment and rehabilitation. This article delves into how AI is reshaping health care processes, examining the opportunities and hurdles within the health care sector and investigating the profound impacts of the Guidelines on industry evolution.

II. How AI is reshaping medical processes – A full-chain transformation from screening to rehabilitation

The integration of AI in medical procedures has evolved from enhancing individual aspects to reconfiguring entire processes, encompassing the complete cycle of “screening-diagnosis-treatment-rehabilitation”. The subsequent analysis looks into specific scenarios:

1. Screening stage

At the core of this phase lies the identification of at-risk populations for diseases, enabling early detection and intervention. Traditional screening methods, reliant on manual procedures, suffer from inefficiencies, high missed diagnosis rates and unequal resource allocation. AI streamlines each step through automation and intelligent technologies.

- Data collection: AI integrates electronic health records, genetic data, lifestyle habits and other information, employing AI models to analyze data, spot potential risk factors, early symptoms and onset probabilities. This intelligent screening enhances early detection rates, reducing misdiagnosis risks.
- Preliminary analysis: AI swiftly identifies lesions in images, aiding in screening for conditions like cancers and eye diseases. For instance, AI models analyze CT images for lung cancer screenings, significantly reducing missed diagnosis rates and lessening the workload on pathologists.
- Risk assessment: By combining individual characteristics, AI predicts disease probabilities and identifies high-risk populations. For instance, in esophageal cancer screenings, AI tools predict high-risk groups, thereby enhancing accuracy.
- Result review and triage: AI streamlines screening processes, reducing manual intervention and enhancing efficiency. Hospitals can employ AI to triage patients who do not need immediate medical attention, thereby reducing the workload on health care professionals.

2. AI + Primary public health services

(VI) AI + Health management services

- Intelligent health management
- Intelligent traditional Chinese medicine health management
- Intelligent chronic disease management
- Intelligent self-service mental health
- Intelligent psychological grading assessment and care
- Intelligent student mental health management service
- Intelligent genetic disease screening and prediction
- Chronic non-communicable diseases screening and prediction

(VII) AI + Public health services

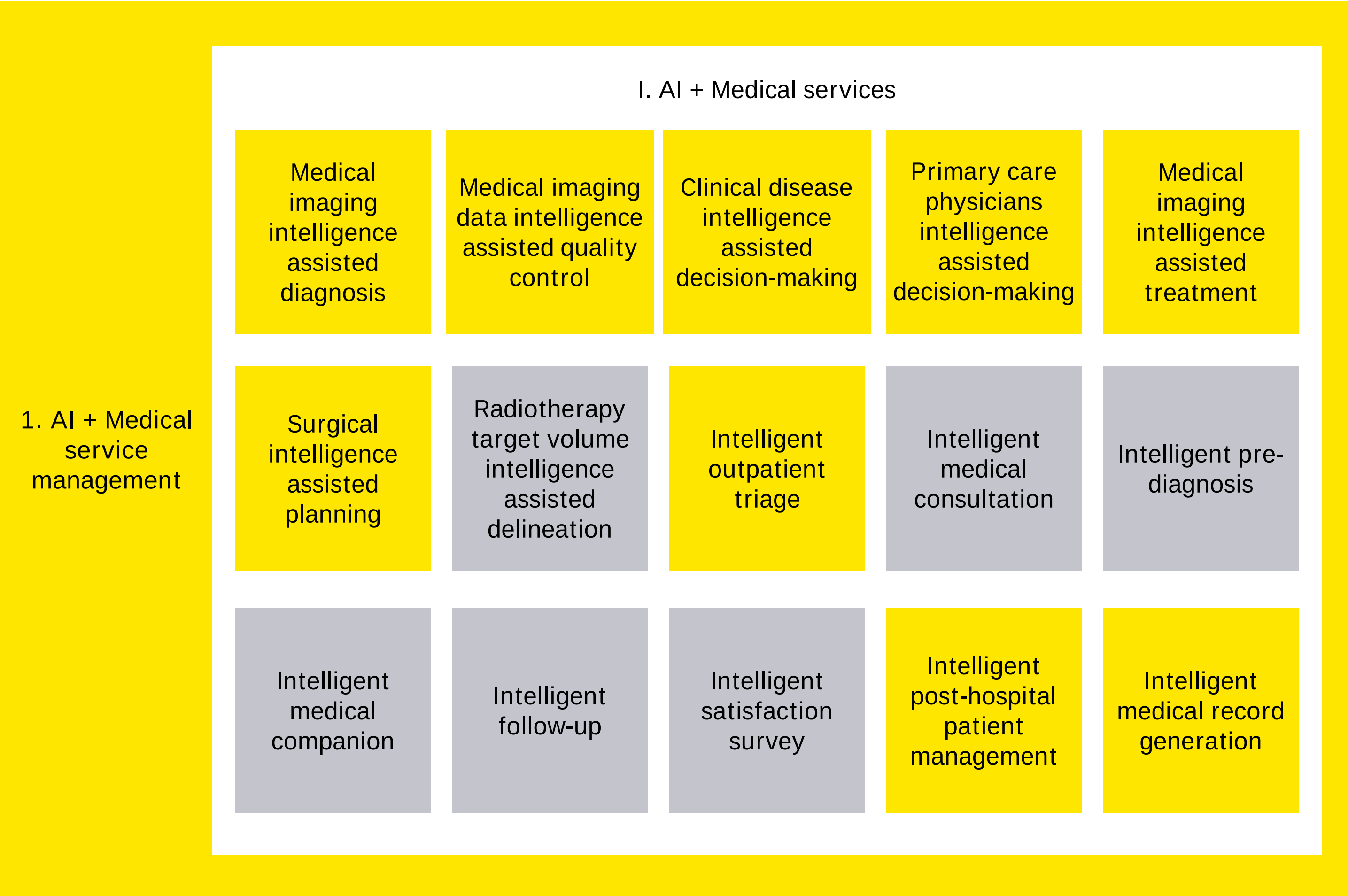
- Intelligent monitoring of infectious diseases
- Intelligent health emergency management
- Intelligent public health population data analysis
- Intelligent vaccine detection and re-inoculation
- Intelligent infant jaundice monitoring and intervention
- Intelligent analysis on child growth and development
- Intelligent radioactive chromosome aberration dose estimation
- Intelligent occupational health risk assessment

[See Guidelines sections: (VI) “AI+” health management services, (VII) “AI+” public health services]

2. Diagnosis stage

This phase is pivotal, where health care professionals determine disease type, stage and cause based on patient symptoms, examination data and medical history. Traditional diagnoses rely on experience and manual analysis, prone to subjectivity and complexity, whereas AI boosts diagnostic efficiency and accuracy through automated reasoning and knowledge support.

- Data integration: AI combines imaging, genetic and laboratory data to formulate comprehensive diagnostic suggestions.
- Preliminary differential diagnosis: AI aids in quickly identifying lesion characteristics, enhancing diagnostic accuracy for complex diseases. For example, in tumor typing and staging, AI-driven CT image analysis identifies cancer types, reducing reliance on immunohistochemistry. In dynamic monitoring, AI technology can compare pre- and post-treatment images to quantify tumor volume changes and assist in efficacy evaluation.
- Diagnostic report generation: AI systems automatically generate pathological reports, including lesion details and recommendations based on imaging reports and biopsy results, reducing the documentation burden on health care professionals.

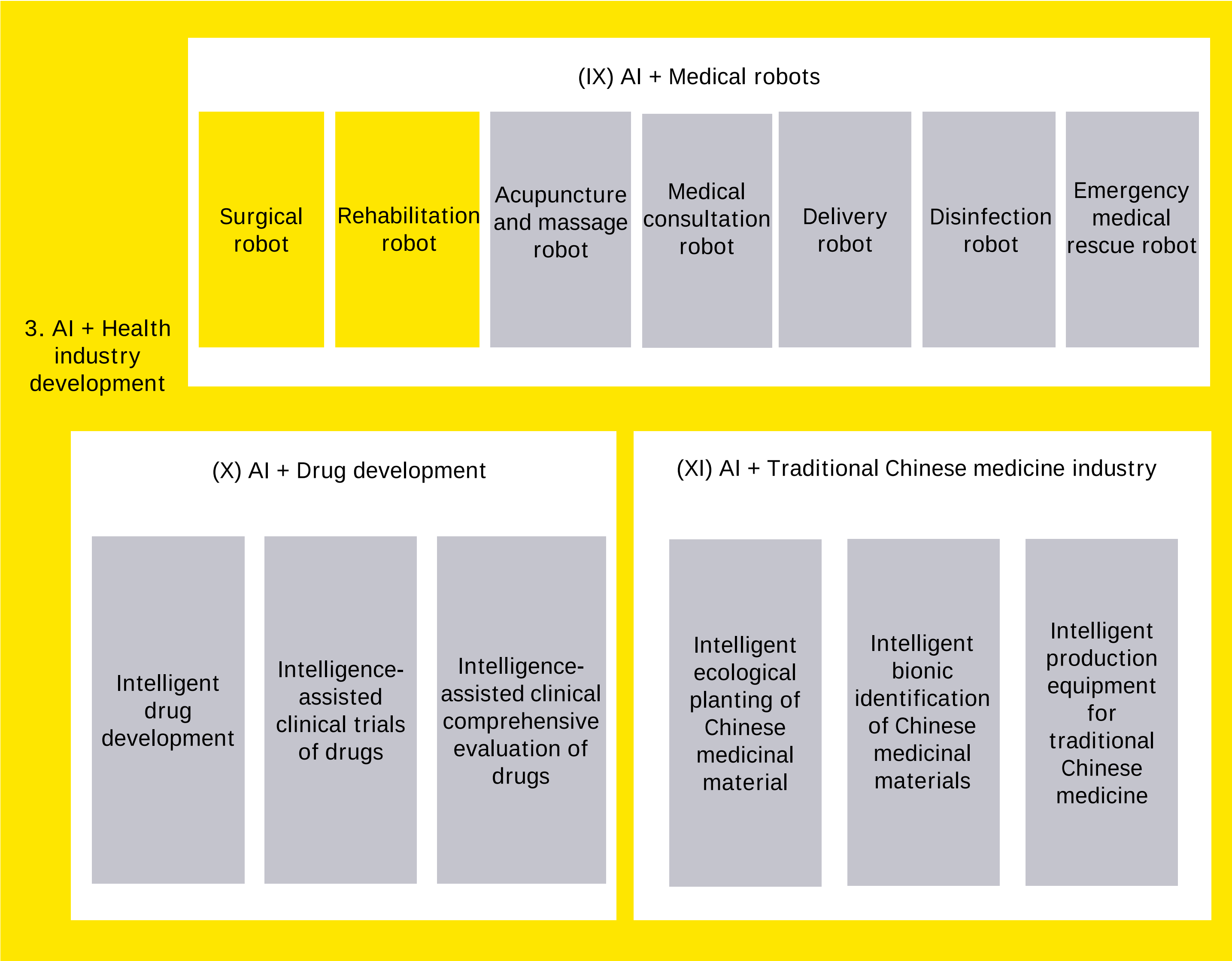


[See Guidelines section: (I) "AI+" medical services]

3. Treatment stage

This core step involves formulating and implementing interventions based on diagnostic findings. Traditional treatments rely on static data and experience, lacking standardized protocols and prompt responses, while AI optimizes the treatment process through data-driven analysis.

- Protocol formulation: AI integrates multidimensional data to tailor customized treatment strategies based on patient conditions, genetic features, complications and more.
- Treatment implementation: AI assists surgeons in enhancing surgical precision and safety. For instance, in orthopedic surgery, robots with 3D vision and robotic arm control perform minimally invasive surgeries, reducing postoperative complications.
- Efficacy monitoring: AI optimizes treatment progress through real-time data analysis, aiding in treatment plan adjustments. For instance, in tumor treatment evaluations, AI tracks treatment effects dynamically, facilitating treatment plan modifications. In the postoperative recovery monitoring phase, wearable devices can continuously track vital signs such as heart rate and oxygen saturation, leveraging AI algorithms to trigger early warnings for postoperative infection or thromboembolic risks.



[See Guidelines section: (IX) “AI+” medical robots]

4. Rehabilitation stage

This stage is a crucial part of the entire medical process, aimed at restoring patients' physical function and improving their quality of life through systematic interventions. Traditional rehabilitation models rely on manual observation and experience-based assessment, suffering from low efficiency and insufficient personalization, while AI enhances rehabilitation precision and efficiency through data-driven and intelligent analyses.

- Rehabilitation assessment: Comprehensive evaluations of patient rehabilitation needs and baseline status using physiological indicators, motor function tests, imaging data, etc.
- Protocol formulation: AI swiftly generates personalized rehabilitation plans through multidimensional data analysis. For example, in psychological state assessment, AI combines voice and facial expression analysis to identify patient depression or anxiety tendencies and recommend psychological interventions. In motor function assessment, rehabilitation training systems can analyze patient neural signals in real time to customize training plans, improving hand function recovery efficiency for stroke patients.
- Treatment implementation: AI utilizes robots, VR/AR and other technologies to enhance the interactivity and effectiveness of rehabilitation training. For example, robot-assisted training can use AI path planning to guide patients through precise joint movement training, reducing manual intervention.
- Dynamic monitoring: AI adjusts rehabilitation strategies dynamically based on patient characteristics, tracking progress in real time through wearable devices or remote platforms.

[See Guidelines sections: (I) “AI+” medical services, (IX) “AI+” medical robots]

III. Development opportunities for AI in the health care sector

1. Improving medical efficiency and quality

AI rapidly processes and analyzes vast medical data, aiding in disease diagnosis, treatment plan formulation and enhancing the efficiency and quality of medical services.

2. Promoting personalized medicine

By analyzing individual patient data, AI tailors personalized treatment plans, achieving precision medicine, improving treatment outcomes and minimizing unnecessary drug side effects.

3. Enhancing medical service accessibility

AI technologies, such as telemedicine and smart medical devices, allow more equitable distribution of medical resources, enabling remote and underserved areas to access high-quality health care services.

4. Driving health care industry transformation and innovation

The integration of AI encourages continuous exploration of new service models, management approaches and technological applications within the health care sector, fostering transformation and innovation and ushering in new opportunities and challenges for medical development.

IV. Challenges and solutions for AI in the health care sector

With the widespread adoption of AI in health care, legal, regulatory and ethical challenges have surfaced. Issues such as liability determination in cases of misdiagnosis in AI-assisted diagnosis, lack of transparency in AI algorithm decision-making and patients' rights protection require further research and development. Proposed solutions include:

- Clarifying liability attribution mechanisms: Specialized legislation defining access standards, liability boundaries and accountability mechanisms for AI medical products to prevent "accountability gaps".
- Promoting a "human-machine collaboration" medical model transition: Positioning AI as a "super assistant" for standardized tasks while complex decisions remain under the purview of health care professionals. Enhancing doctors' AI literacy to comprehend technology logic and constraints, avoiding blind reliance on technology.
- Establishing interdisciplinary ethics committees: Forming governance bodies comprising medical, legal, ethical and technical experts to regularly assess AI application risks and adjust policies. Creating a graded catalog of AI medical technologies to clarify approval processes and usage restrictions based on varying risk levels.

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