Medical Practice and Artificial Intelligence
~How Should We Prepare?~

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Future Direction of AI Use

- Genomic medicine
  - Cancer Institute Hospital starts collection of cancer genome information in the core center for genome analysis to develop better diagnosis and therapy.
- Drug discovery
  - AI related research is done for targeting, compound, pharmacodynamics, and toxicity test.
- Surgical operation support
  - Integration of images, navigation system, and robots with previous data and logs.

AI Use for Visual Information

- Pathological diagnosis
  - Tissues of stomach, colon, and gynecology
- Radiographical diagnosis
  - X-ray, CT scan, MRI…
- Endoscopic images
  - Upper GI, Capsule endoscopy…
- Other images
  - Retina, Pharynx…

→ AI's Accuracy is as good as human Dr.

AI Support for Medical Interview

- Preliminary interview
  - Ask questions to a patient for reflecting her/his symptoms with medical meaning.
  - Relating questions to ask more questions.
  - Such dialogues are converted to text for electronic medical chart.
  - Information on the medication note and referral letter is converted to text by OCR (optical character reader)
- Transcribing dialogues
  - Patient-physician (nurse) dialogues are converted to text file with summary.

AI Support for Differential Diagnoses

- After signs/symptoms are entered differential diagnoses are listed by the order of plausibility.
- Issues
  - Several approaches are used – Gestalt, exhaustive enquiry, multiple branching, hypotheticodeductive…
  - Information source – (1) Dr's interpreted information might be biased, (2) Pt's entry may include Pt's misunderstanding, (3) Other data sources: Images, Continuous monitoring of patients' vital signs etc.
  - Goals – Diagnosis, Symptom improvement…
  - Improvement decision – Pt's subjective information or Dr's objective measurement…

Does ChatGPT Work as Decision Support System?

- Healthcare DSS assist Drs in improving Dx accuracy, treatment efficacy, patient safety, etc.

- Example case: If a senior person has fever, shoulder pain, low back pain and fatigue for more than a month what would be differential diagnoses?
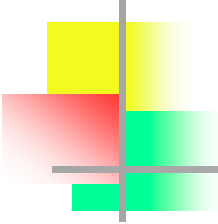
→ Go to ChatGPT!

Six Principles to Ensure AI Works for the Public Interest

- Protecting human autonomy

- Promoting human well-being and safety and the public interest.

- Ensuring transparency, explainability and intelligibility.

- Fostering responsibility and accountability.

- Ensuring inclusiveness and equity.

- Promoting AI that is responsive and sustainable.

WHO (2021), Global report on Artificial Intelligence

Concerns for Large Language Models (LLMs)

- Bias in AI training data, which can lead to misleading or inaccurate information that poses risks to health, equity, and inclusiveness.

- LLMs generating responses that may seem authoritative and plausible but can be completely incorrect or contain serious errors, particularly in health-related contexts.

- LLMs being trained on data without prior consent and not adequately protecting sensitive data, including health data, provided by users.

- Misuse of LLMs to create and spread highly convincing disinformation, such as text, audio, or video content that is difficult to distinguish from reliable health information.

- The World Health Organization (WHO) supports the use of new technologies, including AI and digital health, for improving human health but recommends that policy-makers prioritize patient safety and protection while technology companies work to commercialize LLMs.

WHO (16 May 2023) WHO calls for safe and ethical AI for health
https://www.who.int/news/item/16-05-2023-who-calls-for-safe-and-ethical-ai-for-health

General Concerns for AI

- Copyright of the answer/ Right of AI's portrait publicity

- Accuracy of information (input/output)

- Personal information/ Privacy protection

- Invasion of privacy

A physician considered introducing AI to simplify his medical practice. He collected information from several companies, but none of them indicated that they would not use patient information to improve their future AI programs.

Competencies for the Use of Artificial Intelligence in Primary Care

1. Foundational knowledge – what is this tool?
2. Critical appraisal – should I use this tool?
3. Medical decision making – when should I use this tool?
4. Technical use – how do I use this tool?
5. Patient communication – how should I communicate with patients regarding the use of this tool?
6. Awareness of unintended consequences –what are the "side effects" of this tool?

Wrap Up

- Please make good use of AI. Not used by AI creators!

- Learn strengths, weaknesses, possible concerns first. Make AI your smart servant!

- Don't be too scared!! If you are a professional, don't rely on it too much!