



IL TALENTO DELLE DONNE IN SANITA'
Medicina di genere
Ricerca Innovativa - Intelligenza Artificiale



L'intelligenza artificiale in medicina interna

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sulla Medicina di Genere
University Center for Studies
on Gender Medicine



Università
degli Studi
di Ferrara

Dipartimento
di Medicina Traslationale
e per la Romagna



SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliero - Universitaria di Ferrara
Medicina Interna Universitaria



25 NOVEMBRE GIORNATA INTERNAZIONALE PER L'ELIMINAZIONE DELLA VIOLENZA CONTRO LE DONNE

UN MINUTO



DI RUMORE



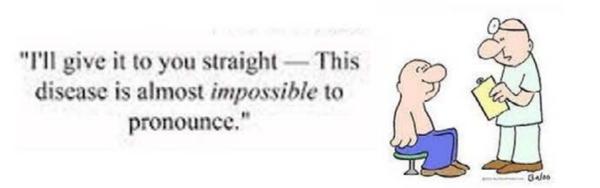


Agenda



- Le *sfide dell'internista* del 2023 – **comunicazione** ed processi interattivi nella gestione della complessità
- Opportunità e limiti** dell'intelligenza artificiale (IA) in ambiti di pertinenza internistica: ne parlano *Dr Tonic* e *Dr Raparelli*
- Applicazioni** dell'IA predittiva e generativa (Yin Yang) in ambito di **pertinenza internistica**: focus su cardiopatia ischemica e COVID-19





Original Investigation | Public Health
Accuracy in Patient Understanding of Common Medical Phrases

Rachael Gotlieb, MD; Corinne Praska, MD; Marissa A. Hendrickson, MD; Jordan Marmet, MD; Victoria Charpentier, MD; Emily Hause, MD; Katherine A. Allen, MD; Scott Lunos, MS; Michael B. Pitt, MD

Table 4. Statistically Significant Demographic Associations With Correct Understanding of Jargon Phrases on Multivariable Logistic Regression*

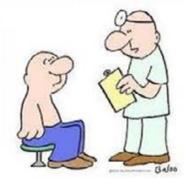
Phrase	Demographic association with correct understanding	Adjusted odds ratio (95% CI)	P value ^b
Your blood culture was negative	Older age (each year) associated with increased understanding	1.03 (1.00-1.06)	.03
The findings on the x-ray were quite impressive	Younger age (each year) associated with increased understanding	0.96 (0.94-0.99)	.002
You are to have nothing by mouth after 4 pm	Older age (each year) associated with increased understanding	1.03 (1.01-1.06)	.002
Your chest x-ray was unremarkable	Graduate degree associated with increased understanding compared with associate's degree or lower	3.33 (1.39-7.99)	.007
	Bachelor's degree associated with increased understanding compared with associate's degree or lower	2.23 (1.00-4.95)	.049
You will need to be NPO at 8 AM	Female gender associated with increased understanding	5.65 (1.59-20.13)	.008
Have you been febrile?	Female gender associated with increased understanding	5.90 (1.31-26.71)	.02

JAMA Network Open. 2022;5(11):e2242972.

INTERNIST IN 2023: KEEP YOUR BALANCE!



"I'll give it to you straight — This disease is almost impossible to pronounce."



Original Investigation | Public Health
Accuracy in Patient Understanding of Common Medical Phrases

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Original Investigation
April 28, 2023

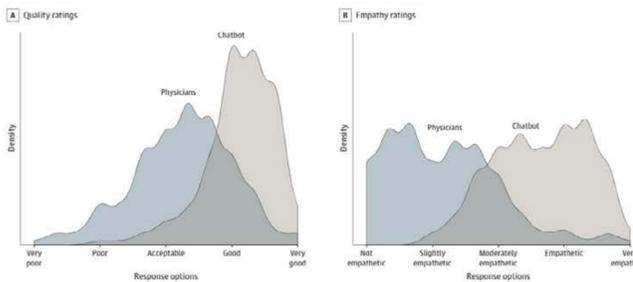
Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum

John W. Ayers, PhD, MA^{1,2}; Adam Pollak, PhD²; Mark Dredze, PhD²; et al

» Author Affiliations
JAMA Intern Med. Published online April 28, 2023. doi:10.1001/jamainternmed.2023.1838



Figure. Distribution of Average Quality and Empathy Ratings for Chatbot and Physician Responses to Patient Questions



Kernel density plots are shown for the average across 3 independent licensed health care professional evaluators using principles of crowd evaluation. A, The overall quality metric is shown. B, The overall empathy metric is shown.

INTERNIST IN 2023: KEEP YOUR BALANCE!

**La medicina interna...medicina basata
sul PAZIENTE... in UNO OMNIA...
la complessità**



*“Una realtà non ci fu data e non c'è,
ma **dobbiamo farcela noi**, se
vogliamo **ESSERE**: e non sarà mai una
per tutti, una per sempre, ma di
continuo e infinitamente mutabile”*



Pirandello L. Uno, nessuno e centomila



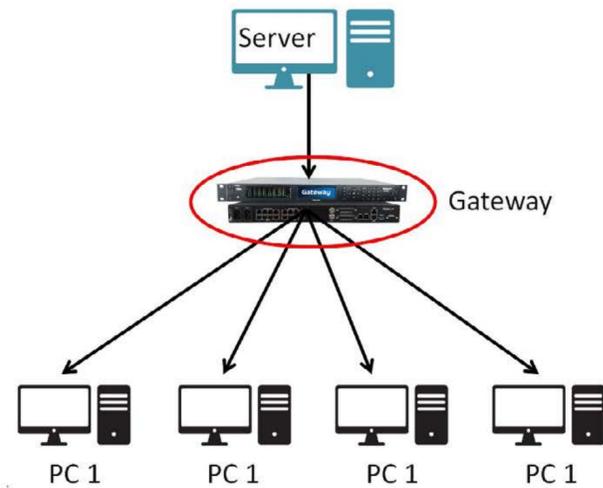
GENDER	SEX
<p>Socially-constructed roles, behaviours, expressions and identities of girls, women, boys, men and gender-diverse people.</p>	<p>Biological attributes of humans and animals, including physical features, chromosomes, gene expression, hormones and anatomy.</p>
	

EVERY CELL IS SEXED AND EVERY PERSON IS GENDERED
<https://cihr-irsc.gc.ca/e/48642.html>





Sex and Gender as the Gateway to Precision Medicine and Sustainability

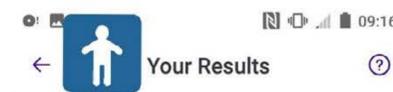




...are clinical manifestations of diseases **equally** recognized by medical chatbot?



YOU ARE....56 yrs, smoker, left arm pain associated with sweating lasting more than 1 hour...



Some of the symptoms you reported might need emergency treatment. If things feel serious, your safest option is to call an ambulance.

Based on the information you gave, some possible causes are listed below.

1 **Pericarditis**
 An inflammation of the thin membranes surrounding the heart.
 This is usually treated at the emergency department.

2 **Unstable angina**
 A lack of blood supply to the heart muscle, causing unpredictable chest pain.
 This is usually treated at the emergency department.



3 **Gastritis**
 An inflammation in the lining of the stomach.
 This usually requires seeing a GP urgently.

4 **Panic attack**
 A sudden period of intense fear and anxiety.
 This can usually be treated at home.

5 **Heart attack**
 A sudden blockage of blood flow to the heart muscle.
 This is usually treated at the emergency department.



...are clinical manifestations of diseases **equally** recognized by medical chatbot?



YOU ARE....
56 yrs, smoker, left arm pain
associated with sweating
lasting more than 1 hour...



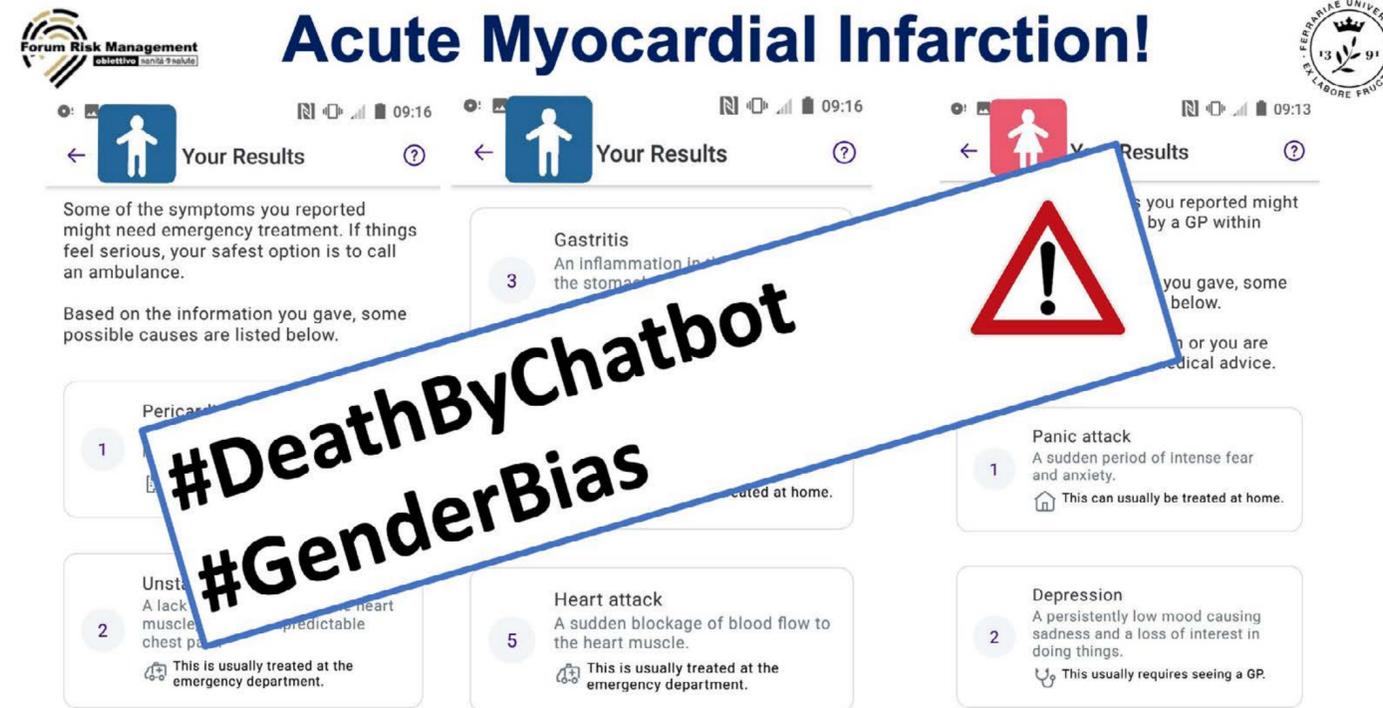
Some of the symptoms you reported might need to be checked out by a GP within the next 6 hours.

Based on the information you gave, some possible causes are listed below.

If symptoms persist, worsen or you are concerned, seek further medical advice.

1 **Panic attack**
 A sudden period of intense fear and anxiety.
 🏠 This can usually be treated at home.

2 **Depression**
 A persistently low mood causing sadness and a loss of interest in doing things.
 🏥 This usually requires seeing a GP.



Acute Myocardial Infarction!

Some of the symptoms you reported might need emergency treatment. If things feel serious, your safest option is to call an ambulance.

Based on the information you gave, some possible causes are listed below.

- 1 Pericarditis
- 2 Unstable angina
- 3 Gastritis
- 4 Heart attack
- 5 Depression

#DeathByChatbot
#GenderBias



Agenda

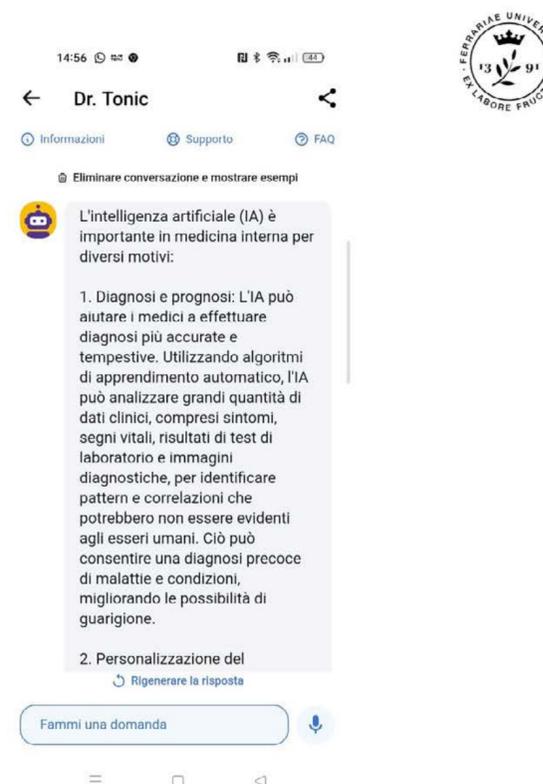


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- Opportunità e limiti dell'intelligenza artificiale (IA) in ambiti di pertinenza internistica: ne parlano *Dr Tonic e Dr Raparelli***
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**Dr Raparelli –
Perché l'intelligenza artificiale
è importante in medicina
interna?**





Dr TONIC... opportunità



DIAGNOSI E PROGNOSI:
L'IA PUÒ AIUTARE I MEDICI A EFFETTUARE **DIAGNOSI PIÙ ACCURATE E TEMPESTIVE**. UTILIZZANDO ALGORITMI DI APPRENDIMENTO AUTOMATICO, L'IA PUÒ ANALIZZARE GRANDI QUANTITÀ DI DATI CLINICI, COMPRESI SINTOMI, SEGNI VITALI, RISULTATI DI TEST DI LABORATORIO E IMMAGINI DIAGNOSTICHE, PER IDENTIFICARE PATTERN E CORRELAZIONI CHE POTREBBERO NON ESSERE EVIDENTI AGLI ESSERI UMANI. CIÒ PUÒ CONSENTIRE UNA **DIAGNOSI PRECOCE** DI MALATTIE E CONDIZIONI, **MIGLIORANDO LE POSSIBILITÀ DI GUARIGIONE**.



PERSONALIZZAZIONE DEL TRATTAMENTO:
L'IA PUÒ AIUTARE A **PERSONALIZZARE** IL TRATTAMENTO PER I PAZIENTI. ANALIZZANDO I DATI INDIVIDUALI DEI PAZIENTI, COME LA STORIA MEDICA, I FATTORI DI RISCHIO E LE RISPOSTE AI TRATTAMENTI PRECEDENTI, L'IA PUÒ SUGGERIRE OPZIONI DI TRATTAMENTO **OTTIMIZZATE PER MASSIMIZZARE** L'EFFICACIA E RIDURRE GLI EFFETTI COLLATERALI.



MONITORAGGIO DEI PAZIENTI:
L'IA PUÒ MONITORARE COSTANTEMENTE I PAZIENTI, ANALIZZANDO I DATI DEI DISPOSITIVI INDOSSABILI, COME I MONITOR CARDIACI O GLI OROLOGI INTELLIGENTI, PER **RILEVARE PRECOCEMENTE** SEGNI DI DETERIORAMENTO DELLA SALUTE O COMPLICANZE. CIÒ PUÒ CONSENTIRE INTERVENTI **TEMPESTIVI E MIGLIORARE** LA GESTIONE DELLE CONDIZIONI CRONICHE.



RICERCA MEDICA:
L'IA PUÒ **ACCELERARE** LA RICERCA MEDICA ANALIZZANDO GRANDI QUANTITÀ DI DATI SCIENTIFICI E IDENTIFICANDO NUOVI PATTERN, CORRELAZIONI O SCOPERTE. CIÒ PUÒ AIUTARE I RICERCATORI A IDENTIFICARE NUOVI BERSAGLI TERAPEUTICI, **SVILUPPARE NUOVI FARMACI O MIGLIORARE** LE TERAPIE ESISTENTI.



RIDUZIONE DEGLI ERRORI MEDICI:
L'IA PUÒ AIUTARE A RIDURRE GLI ERRORI MEDICI, CHE RAPPRESENTANO UNA DELLE PRINCIPALI CAUSE DI MORBILITÀ E MORTALITÀ. L'IA PUÒ FORNIRE SUPPORTO DECISIONALE AI MEDICI, SUGGERENDO DIAGNOSI E TRATTAMENTI BASATI SU EVIDENZE SCIENTIFICHE E LINEE GUIDA, **RIDUCENDO COSÌ LA PROBABILITÀ DI ERRORI UMANI**.



Dr Raparelli –
***Quali sono i potenziali rischi
dell'intelligenza artificiale in
medicina interna?***



Dr. Tonic



L'intelligenza artificiale (IA) offre molte opportunità nel campo della medicina interna, ma presenta anche alcuni potenziali rischi. Alcuni di questi rischi includono:

1. Errori diagnostici: L'IA potrebbe commettere errori nella diagnosi delle malattie, se addestrata con dati non rappresentativi o se non viene costantemente monitorata e aggiornata.

Rigenerare la risposta

Fammi una domanda



Updates



Dr. Tonic



Messaggi



Comunità



Dr Tonic... rischi



ERRORI DIAGNOSTICI:
L'IA POTREBBE
COMMETTERE ERRORI
NELLA DIAGNOSI DELLE
MALATTIE, SE
ADDESTRATA **CON DATI
NON RAPPRESENTATIVI**
O SE **NON** VIENE
COSTANTEMENTE
**MONITORATA E
AGGIORNATA.**



**MANCANZA DI
RESPONSABILITÀ:**
SE UN ERRORE
DIAGNOSTICO O
TERAPEUTICO VIENE
COMMESSO DALL'IA,
POTREBBE ESSERE
DIFFICILE ATTRIBUIRE
LA **RESPONSABILITÀ** E
STABILIRE CHI SIA
RESPONSABILE DELLE
CONSEGUENZE.



PROTEZIONE DEI DATI:
L'IA RICHIEDE
UN'ENORME QUANTITÀ
DI DATI PER ESSERE
ADDESTRATA E
MIGLIORATA. CIÒ
SOLLEVA
PREOCCUPAZIONI
SULLA **PRIVACY DEI
PAZIENTI E SULLA
SICUREZZA DEI DATI**
MEDICI, SPECIALMENTE
SE VENGONO
UTILIZZATI **DATI
SENSIBILI SENZA IL
CONSENSO
INFORMATO** DEI
PAZIENTI.



BIAS DI DATI:
SE I DATI UTILIZZATI PER
ADDESTRARE L'IA SONO
INCOMPLETI O
PRESENTANO BIAS, L'IA
POTREBBE PRENDERE
**DECISIONI SBAGLIATE O
DISCRIMINARE** CERTI
GRUPPI DI PAZIENTI.



**MANCANZA DI
COMPrensIONE:**
L'IA POTREBBE
PRENDERE DECISIONI
COMPLESSE BASATE SU
ALGORITMI E MODELLI
CHE SONO DIFFICILI DA
COMPNDERE PER I
MEDICI E I PAZIENTI.
CIÒ POTREBBE
PORTARE A UNA
MANCANZA DI FIDUCIA
NELL'IA E A UNA
**MINORE
ACCETTAZIONE** DELLE
SUE
RACCOMANDAZIONI.

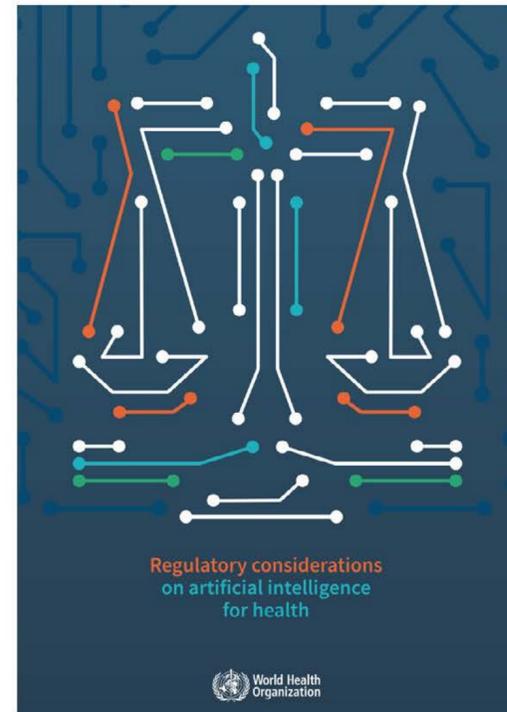


**DIPENDENZA E
RIDUZIONE
DELL'AUTONOMIA
MEDICA:**
L'UTILIZZO ECCESSIVO
DELL'IA POTREBBE
PORTARE A UNA
**RIDUZIONE
DELL'AUTONOMIA
MEDICA** E ALLA
DIPENDENZA DA
ALGORITMI,
RIDUCENDO LA
CAPACITÀ DEI MEDICI DI
PRENDERE **DECISIONI
AUTONOME E BASATE
SULL'ESPERIENZA
CLINICA.**



**SOSTITUZIONE DEI
PROFESSIONISTI
SANITARI:**
SE L'IA DIVENTA
ESTREMAMENTE
AVANZATA, POTREBBE
SOSTITUIRE ALCUNE
FUNZIONI DEI
PROFESSIONISTI
SANITARI, PORTANDO A
UNA **RIDUZIONE
DELL'OCCUPAZIONE**
NEL SETTORE
SANITARIO.

È importante affrontare questi rischi e sviluppare regolamenti e linee guida per garantire un utilizzo etico e sicuro dell'IA in medicina interna.



WHO 2023 - <https://iris.who.int/handle/10665/373421>



FIGURE 1. A general spectrum of AI research and development in health-care delivery and therapeutic development

TABLE 1. Six key topic areas of regulatory considerations

Topic Area No.	Topic Area Name
Topic Area 1	Documentation and transparency
Topic Area 2	Risk management and AI systems development lifecycle approaches
Topic Area 3	Intended use and analytical and clinical validation
Topic Area 4	Data quality
Topic Area 5	Privacy and data protection
Topic Area 6	Engagement and collaboration



Agenda



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Applicazione Intelligenza Artificiale In Ambito Medico: Yin Yang!

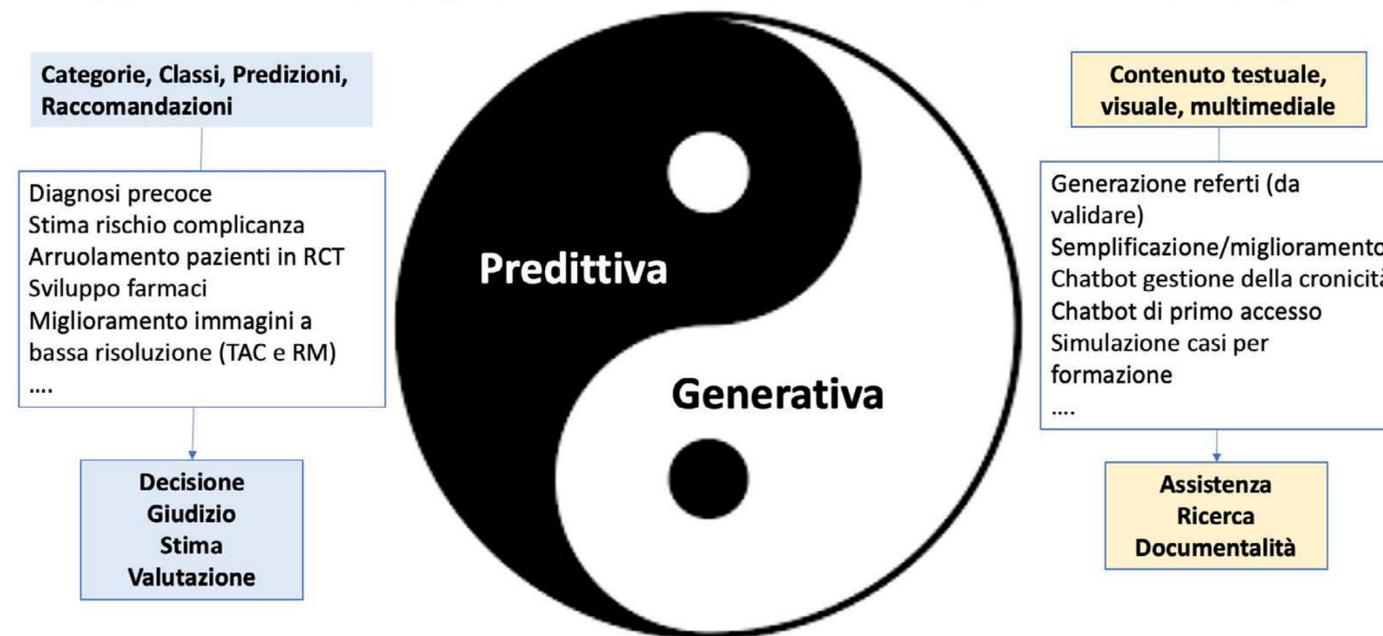
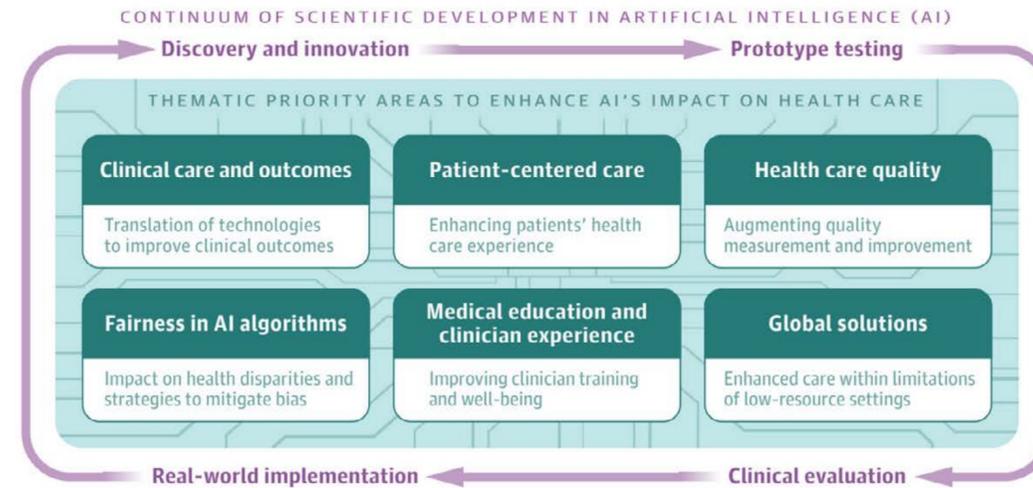




Figure. The Continuum of Scientific Development in Artificial Intelligence and Thematic Priority Areas



JAMA September 5, 2023 Volume 330, Number 9

Comparison of History of Present Illness Summaries Generated by a Chatbot and Senior Internal Medicine Residents

- To evaluate the ability of a chatbot to generate a **history of present illness (HPI)** compared with *senior internal medicine residents*.
- The HPIs were generated by a chatbot (ChatGPT; OpenAI [January 9, 2023, version]) and written by 4 residents based on 3 patient interview scripts portraying different types of **chest pain**
- The chat-bot HPIs were generated using an **iterative process known as prompt engineering**

Figure. Prompt Engineering With the Chatbot

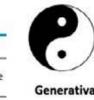
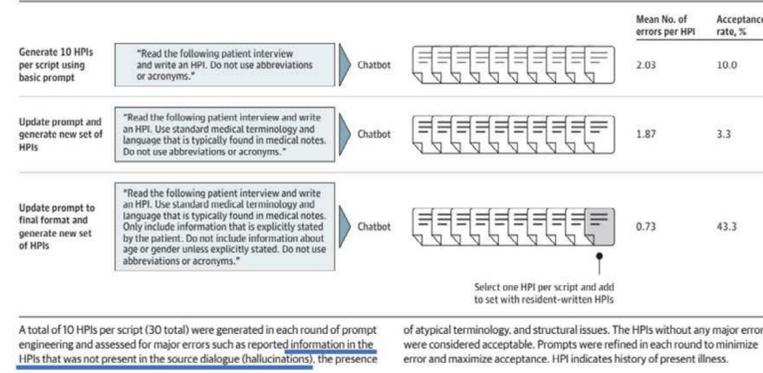


Table. Composite and Domain-Specific HPI Grades^a

Grade type	Mean (SD) resident HPI grade (n = 120)	Mean (SD) chatbot HPI grade (n = 30)	Wilcoxon rank sum P value
Composite	12.18 (2.40)	11.23 (2.84)	.09
Detail-oriented	4.13 (0.86)	3.57 (1.04)	.006 ^b
Succinctness	3.93 (1.09)	3.70 (1.15)	.29
Organization	4.12 (0.91)	3.97 (0.96)	.43

Abbreviation: HPI, history of present illness.

^a HPIs were graded across 3 domains addressing level of detail, succinctness, and organization using a 5-point Likert scale with 5 representing the best

grade on the domain. The composite grade was calculated as the total grade across the 3 domains.

^b Denotes statistical significance, defined as 2-sided $P < .05$.

JAMA Internal Medicine September 2023 Volume 183, Number 9

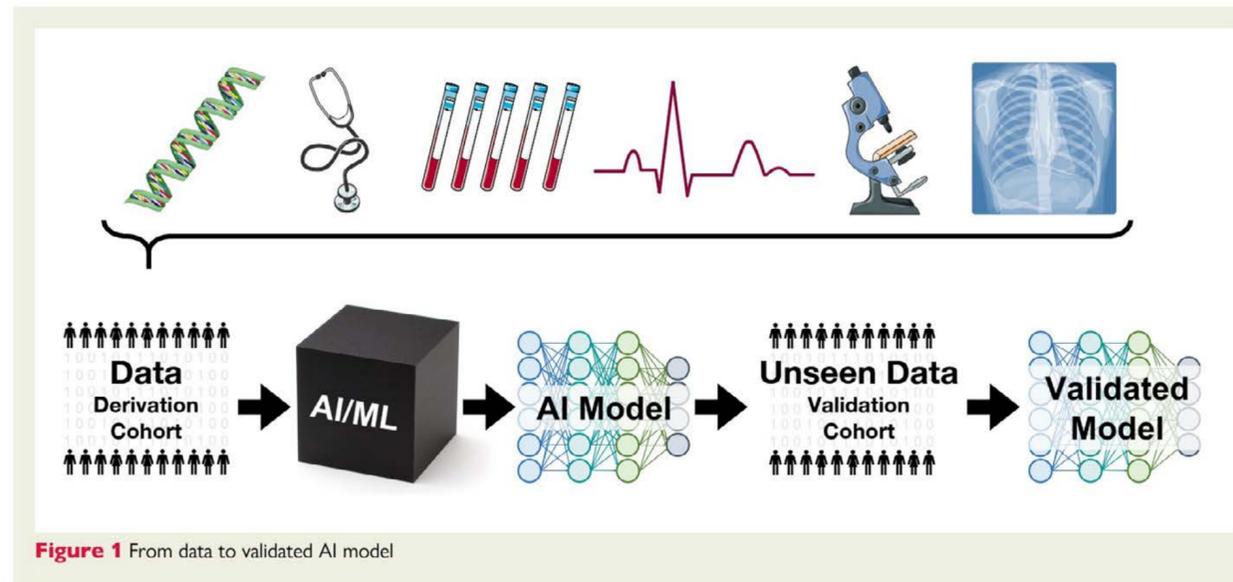


Figure 1 From data to validated AI model

European Heart Journal (2023) **44**, 4403–4405

**Towards personalized cardiovascular care:
 Global Registry of Acute Coronary Events
 3.0 score heralds artificial intelligence era**

21/11/2023



Florian A. Wenzl ^{1*}, Keith A.A. Fox ², and Thomas F. Lüscher ^{1,3,4,5}

¹Center for Molecular Cardiology, University of Zurich, Zurich, Switzerland; ²Centre for Cardiovascular Science, University of Edinburgh, Edinburgh, UK; ³Royal Brompton and Harefield Hospitals, London, UK; ⁴National Heart and Lung Institute, Imperial College, London, UK; and ⁵School of Cardiovascular Medicine and Sciences, Kings College London, London, UK

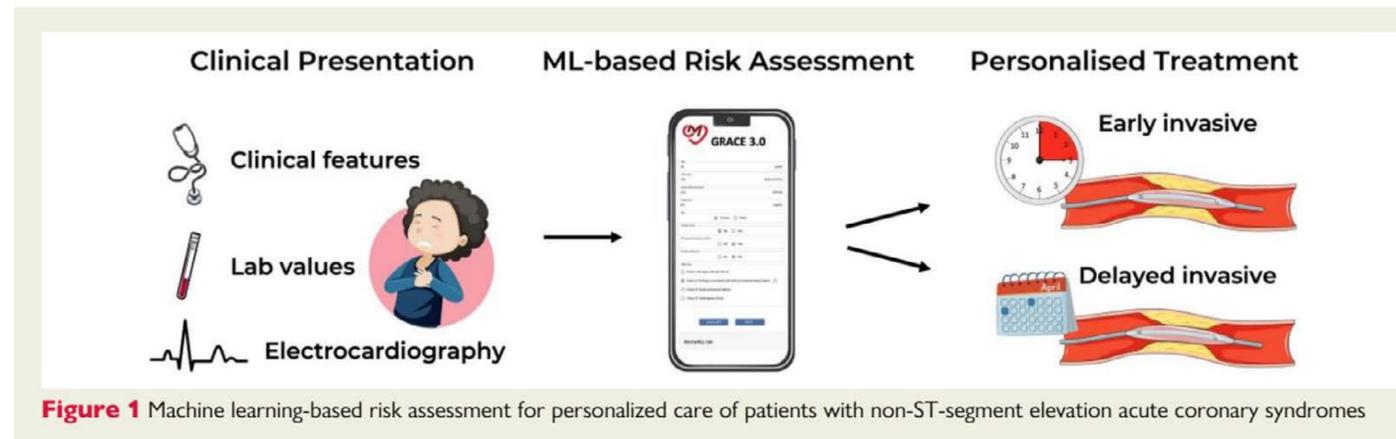


Figure 1 Machine learning-based risk assessment for personalized care of patients with non-ST-segment elevation acute coronary syndromes

European Heart Journal (2023) **44**, 4615–4616

Global Registry of Acute Coronary Events Score 3.0

Age _____ years

Heart rate _____ beats/minute

Systolic blood pressure _____ mm Hg

Creatinine _____ mg/dl

Sex Female Male

Cardiac arrest No Yes

ST-segment deviation on ECG No Yes

Troponin elevation No Yes

Killip class

Class I. No signs of heart failure

Class II. Findings consistent with mild to moderate heart failure. ⓘ

Class III. Overt pulmonary edema

Class IV. Cardiogenic shock

The GRACE 3.0 score has recently been developed and is suggested to reduce sex inequalities in risk stratification

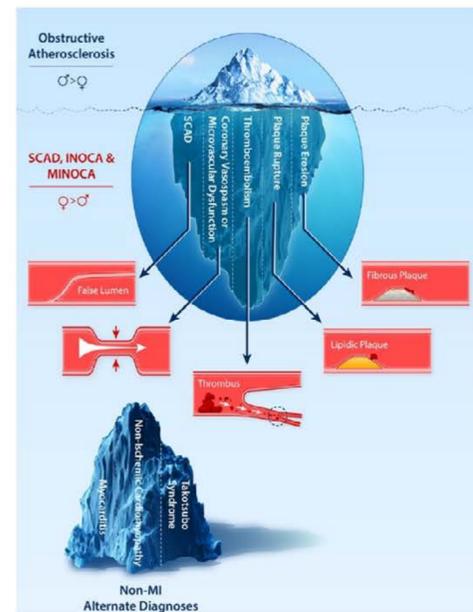
European Heart Journal (2023) 44, 3720–3826



Applicazioni in ambito di ricerca... Cardiopatia ischemica e COVID-19

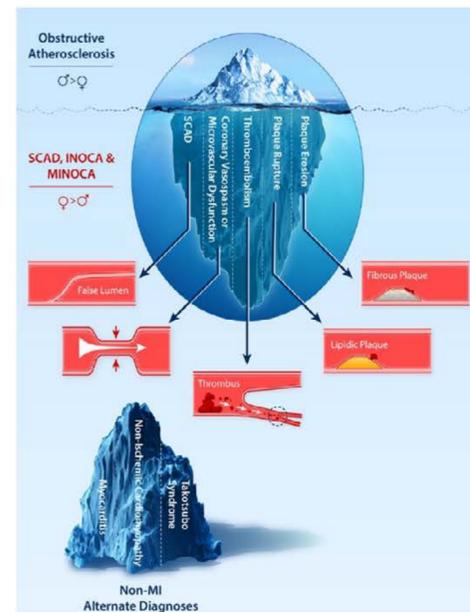


A Machine-learning Based Bio-psycho-social Model for the Prediction of Non-obstructive and Obstructive Coronary Artery Disease.

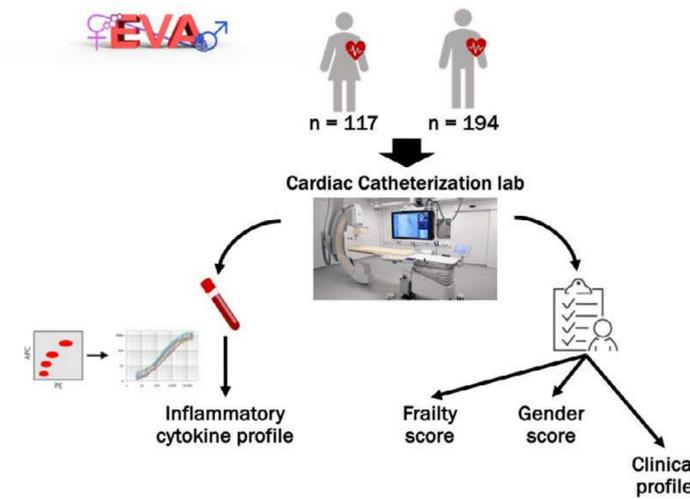


Reynolds HR et al. *Circulation Research*. 2022;130:529–551

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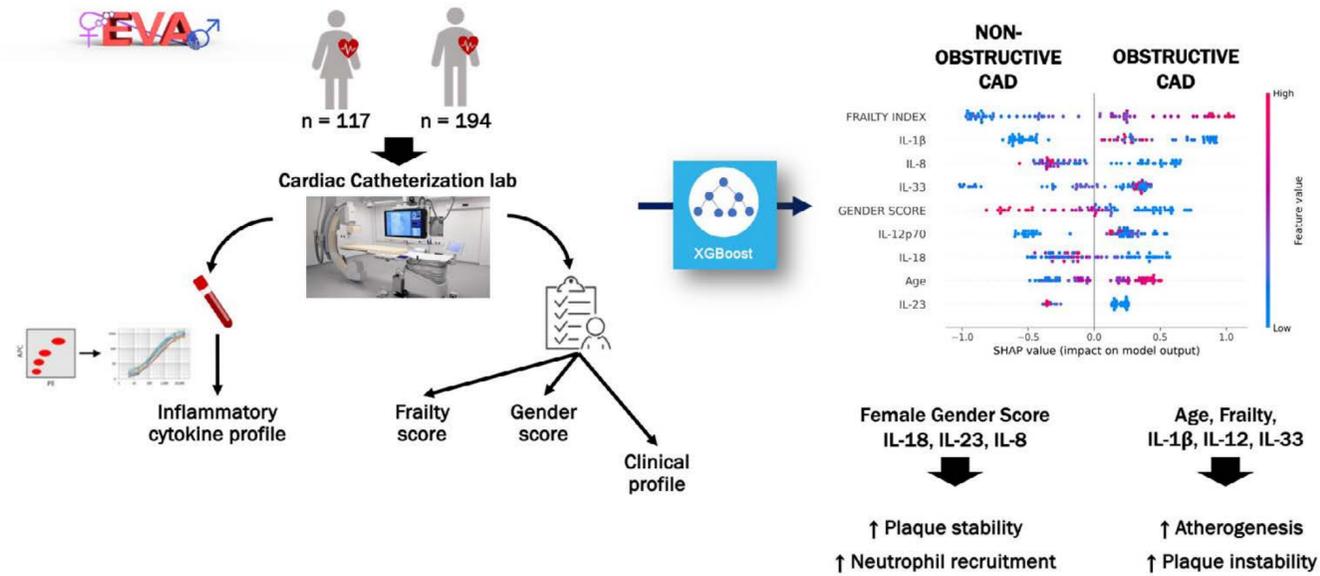


Reynolds HR et al. *Circulation Research*. 2022;130:529–551



Raparelli V. et al. *Clin Res Cardiol*. 2023 Sep;112(9):1263-1277.

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Open access

Original research

BMJ Open Importance of sex and gender factors for COVID-19 infection and hospitalisation: a sex-stratified analysis using machine learning in UK Biobank data

Zahra Azizi,¹ Yumika Shiba,² Pouria Alipour,^{1,3} Farhad Maleki,⁴ Valeria Raparelli,^{5,6} Colleen Norris,^{6,7} Reza Forghani,⁴ Louise Pilote,^{1,3,8} Khaled El Emam,^{9,10} The GOING-FWD investigators

ABSTRACT

Objective To examine sex and gender roles in COVID-19 test positivity and hospitalisation in sex-stratified predictive models using machine learning.

Design Cross-sectional study.

Setting UK Biobank prospective cohort.

Participants Participants tested between 16 March 2020 and 18 May 2020 were analysed.

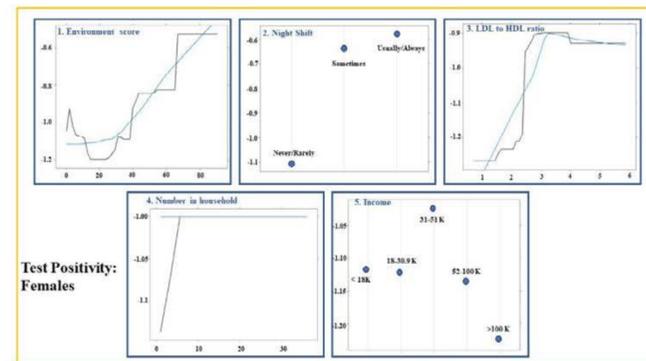
Main outcome measures The endpoints of the study were COVID-19 test positivity and hospitalisation. Forty-two individuals' demographics, psychosocial factors and comorbidities were used as likely determinants of outcomes. Gradient boosting machine was used for building prediction models.

BMJ Open 2022;**12**:e050450. doi:10.1136/bmjopen-2021-050450

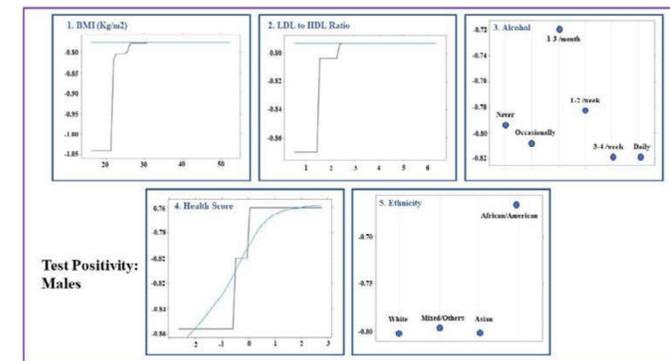
Machine learning-based prediction models for SARS-CoV-2 positive test



Of **4510** patients (51.2% females, and **68.5±8.88** years) who were tested in the UK-Biobank, **29.4% were positive**.
Females were less likely to be positive (males: 31.6% vs females: 27.3%, p=0.001).



Females who lived in **more deprived areas** (increased environment score), had increased LDL/ HDL, **worked night shifts** and had a **greater number of family members in their household**, those with **lower income** were more likely to test positive.



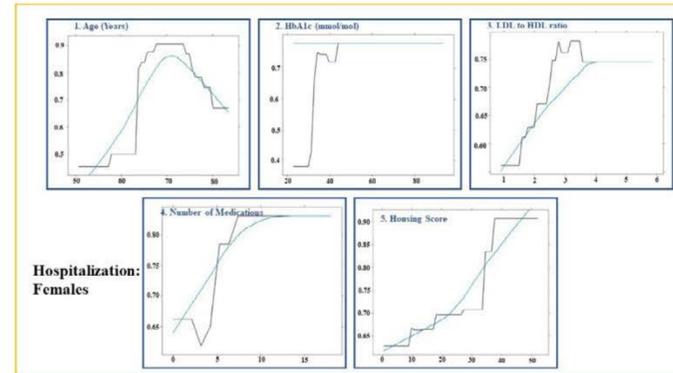
Males with **greater BMI and LDL to HDL ratio**, **more deprived area (greater score)** and **black British ethnicity** were more likely to test positive

BMJ Open 2022;**12**:e050450. doi:10.1136/bmjopen-2021-050450

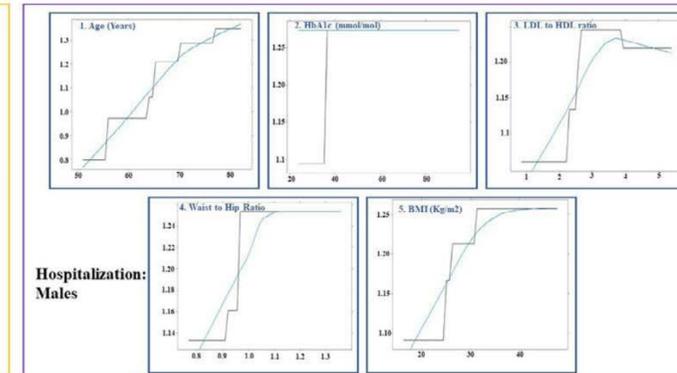
Machine learning-based prediction models for COVID-19 related hospitalisation



Among the **1326 test-positive** patients, **932 (70.3%)** were hospitalised (females: 44.3%).



Older age, a higher level of HbA1c, LDL to HDL ratio, a greater number of medications and higher housing score (showing more deprived areas) were most influential in females



Older age, an increased HbA1c level, WHR, LDL to HDL ratio and BMI were the most influential variables in males

BMJ Open 2022;**12**:e050450. doi:10.1136/bmjopen-2021-050450



What's new for clinical scientists?

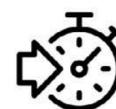


Table. Opportunities and Risks for Artificial Intelligence (AI) in Clinical Trials



	Opportunities	Risks
Engagement and recruitment	Multifaceted engagement with potential participants likely to contribute informative data	Bias in who is approached, coercion, and where a trial is deployed
Consent	Bidirectional, ongoing, informed consent process tailored to the participant in terms of delivery, language, cultural context, and understanding	Inadequate informed consent, coercion, misunderstanding of benefits vs risks
Participant management	Customized study procedures, ongoing engagement with complete follow-up	Bias in adherence to study procedures and loss to follow-up, failure to identify safety issues
Data capture and curation	Comprehensive data set describing all health domains of interest for every participant	Incomplete data, inaccurate data, inaccurate linkage among data sources, misappropriation or misuse of data
Outcomes and safety ascertainment	Completely captured clinical and patient-reported outcome trajectories	Missing outcomes, misattribution of outcomes
Data analysis and reporting	Automated reporting integrated with interpretation based on all information available globally	Inappropriate data manipulations, improper causal inference
Dissemination and implementation	Trial results reported to participants, communities, and clinical communities	Inequitable dissemination and lack of implementation

JAMA Published online November 11, 2023



New recommendations of the International Committee of Medical Journal Editors: use of artificial intelligence

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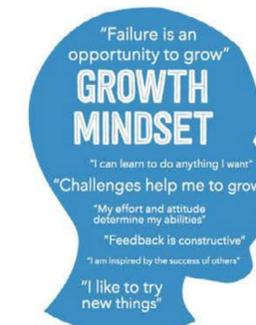
International Committee of Medical Journal Editors recommendations 2023 update

Most changes in the May 2023 update to the ICMJE recommendations addressed the use of AI in the scientific and editorial process.⁵ The section entitled 'Roles and Responsibilities of Authors, Contributors, Reviewers, Editors, Publishers, and Owners' has been modified to highlight issues related to AI.⁵ When defining the role of authors and contributors, a new section has been added to explicitly address the role of AI, entitled 'Artificial Intelligence (AI)-Assisted Technology'. In the new section the ICMJE states the following:

'At submission, the journal should require authors to disclose whether they used artificial intelligence (AI)-assisted technologies (such as Large Language Models [LLMs], chatbots, or image creators) in the production of submitted work. Authors who use such technology should describe, in both the cover letter and the submitted work, how they used it. Chatbots (such as ChatGPT) should not be listed as authors because they cannot be responsible for the accuracy, integrity, and originality of the work, and these responsibilities are required for authorship...⁵

Wake up Calls for Internists in 2024

- **Get familiar with Artificial Intelligence (AI)**
- Inequities in **accessibility technology**
- **Unequitable** algorithms: Sex and Gender Biases
- **Wise** use of technology – it's a tool
- **Innovation in Clinical Trials** – (Event Adjudication- Human vs Machine)
- **External validity**
-



«Medicine is a science of uncertainty and an art of probability»

Sir William Osler (1849 -1919)

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<https://www.mcgill.ca/going-fwd4gender/about>



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 sulla Medicina di Genere
 University Center for Studies
 on Gender Medicine



Università
 degli Studi
 di Ferrara

Dipartimento
 di Medicina Traslazionale
 e per la Romagna



Centre universitaire
 de santé McGill



Delitti in materia di violazione del diritto d'autore (Art. 25-novies, D.Lgs. n. 231/2001) [articolo aggiunto dalla L. n. 99/2009]

- Messa a disposizione del pubblico, in un sistema di reti telematiche, mediante connessioni di qualsiasi genere, di un'opera dell'ingegno protetta, o di parte di essa (art. 171, legge n.633/1941 comma 1 lett. a) bis)
- Reati di cui al punto precedente commessi su opere altrui non destinate alla pubblicazione qualora ne risulti offeso l'onore o la reputazione (art. 171, legge n.633/1941 comma 3)
- Abusiva duplicazione, per trarne profitto, di programmi per elaboratore; importazione, distribuzione, vendita o detenzione a scopo commerciale o imprenditoriale o concessione in locazione di programmi contenuti in supporti non contrassegnati dalla SIAE; predisposizione di mezzi per rimuovere o eludere i dispositivi di protezione di programmi per elaboratori (art. 171-bis legge n.633/1941 comma 1)
- Riproduzione, trasferimento su altro supporto, distribuzione, comunicazione, presentazione o dimostrazione in pubblico, del contenuto di una banca dati; estrazione o reimpiego della banca dati; distribuzione, vendita o concessione in locazione di banche di dati (art. 171-bis legge n.633/1941 comma 2)
- Abusiva duplicazione, riproduzione, trasmissione o diffusione in pubblico con qualsiasi procedimento, in tutto o in parte, di opere dell'ingegno destinate al circuito televisivo, cinematografico, della vendita o del noleggio di dischi, nastri o supporti analoghi o ogni altro supporto contenente fonogrammi o videogrammi di opere musicali, cinematografiche o audiovisive assimilate o sequenze di immagini in movimento; opere letterarie, drammatiche, scientifiche o didattiche, musicali o drammatico musicali, multimediali, anche se inserite in opere collettive o composite o banche dati; riproduzione, duplicazione, trasmissione o diffusione abusiva, vendita o commercio, cessione a qualsiasi titolo o importazione abusiva di oltre cinquanta copie o esemplari di opere tutelate dal diritto d'autore e da diritti connessi; immissione in un sistema di reti telematiche, mediante connessioni di qualsiasi genere, di un'opera dell'ingegno protetta dal diritto d'autore, o parte di essa (art. 171-ter legge n.633/1941)
- Mancata comunicazione alla SIAE dei dati di identificazione dei supporti non soggetti al contrassegno o falsa dichiarazione (art. 171-septies legge n.633/1941)
- Fraudolenta produzione, vendita, importazione, promozione, installazione, modifica, utilizzo per uso pubblico e privato di apparati o parti di apparati atti alla decodificazione di trasmissioni audiovisive ad accesso condizionato effettuate via etere, via satellite, via cavo, in forma sia analogica sia digitale (art. 171-octies legge n.633/1941).

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