

Introduction

This is a the second round questionnaire to establish a Delphi consensus among experts on an Ethical use of Medical-AI.

Questions are based on a Likert scale. State if you agree or disagree with each statement. Use the Statement space provided for any additional feedback.

Thank you for your time!

The questionnaire is divided into 6 blocks:

- Bioethical problems of using medical-AI.
- Ethical values.
- New bioethical principles.
- Guidelines for a bioethical use of medical-AI.
- Checklist for clinicians.
- Social responsibility markers.

Before starting the survey, here are a few points and definitions we would like to make clear:

When answering the survey think about AI in the healthcare setting, not AI in general.

What we mean by Artificial Intelligence: there is no consensus on what is AI. Russell and Norvig, in their AIMA texts (1995, 2002, 2009), identify AI in relation to its goals. They identify 4 categories to define AI as a system that:

1. Thinks like humans.
2. Acts like humans.
3. Thinks rationally.
4. Acts rationally.

More recently, Stanford's AI100 defined AI as "getting a machine to carry out behaviors that we think of as requiring intelligence"

We hope this clarifies some ideas about AI. When answering the survey please take into account current healthcare AI technologies, as well as foreseeable, likely, future developments and uses of AI in Healthcare.

By autonomous AI we mean a system that is capable of carrying out its tasks without requiring direct human instruction or real-time supervision.

Lastly, Control is the set of techniques, constraints, and oversight systems used to guide, limit, or regulate an AI system's behavior so that it acts within desired boundaries and achieves intended outcomes without causing unintended or harmful consequences.

General Background Information

Gender

- Male
- Female
- Prefer not to say

Geographical location

- Africa
- Asia
- Europe
- North America
- Oceania
- South America

In what of the following fields is your main background

- Healthcare
- Business
- Policy maker
- Researcher / Academic
- Law specialist
- IT / AI specialist
- Pharmaceutical company representative
- Patient representative / Advocate

Other

Other:

SOCIAL RESPONSIBILITY MARKERS

Block: Social Responsibility Markers

We also aim at establishing social responsibility markers that could help guide, analyze and report the ethical use of Medical-AI. These Markers will be reported by healthcare institutions, corporations or business (such as hospitals for example), and made publicly available. These social responsibility reports should be done regularly to update the public on any new issues, establish trust in the use of Medical-AI and mitigate some of the bioethical issues of using Medical-AI. Please state if you agree or disagree with each marker. If you would like to comment or add amendments to these markers, feel free to do so in the Statements box provided below.

Note: by discrepancies we mean differences in proposed paths

of action.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strong agree
Have there been any complains or notifications regarding unclear accountability and responsibility related to medical systems that use AI and Healthcare Professionals? If yes, how many? What measures have been taken to address future issues like this one? Explain these measures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Has there been any breaches in informed consent where an AI system was involved? If yes, how many? What measures have been taken to address future issues like this one? Explain these measures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How much money has been spent on topics related to Medical-AI (such as acquisition and maintenance costs)? Explain why spending money on this technology is better option than other (also necessary) non-AI resources, and if any money has been saved due to this.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What benefits have been achieved using Medical-AI compared to not using it?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are the Healthcare Professionals in charge of using medical devices that incorporate AI trained and knowledgeable on how to interpret the output provided by these AI devices? Explain what steps were taken to assure this. If not, explain why.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have there been any complains or notifications regarding possible biases of medical systems that use AI? If yes, how many? What measures have been taken to address future issues like this one? Explain these measures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Did the medical devices that use AI address ethical issues during the development process? If yes, explain how and what possible issues could have been left out. If not, explain why this technology has been used regardless of not addressing ethical issues during development.

Have there been any complains or notifications regarding lack of trust on medical systems that use AI? If yes, how many? What measures have been taken to address future issues like this one? Explain these measures.

Is there a way of knowing when a medical device that uses AI is behaving in an unexpected or dangerous way? If yes, explain which one. If not, explain why it is been used regardless.

Have there been any complains or notifications regarding discrepancies between medical systems that use AI and Healthcare Professionals? If yes, how many? What measures have been taken to address future issues like this one? Explain these measures.

Has there been any violation of human rights where an AI system was involved? If yes, how many? Have any measures been taken to address these issues in the future? Explain these measures.

Have there been any complains or notifications regarding lack of control over medical systems that use AI? If yes, how many? What measures have been taken to address future issues like this one? Explain these measures.

Were the medical devices that use AI sufficiently validated to be used safely? If yes, explain how and what validation standards were followed. If not, explain why this technology is being used regardless of validation and what protocols are being implemented to ensure the technology is safe and accurate for use

Are the Healthcare Professionals in charge of using medical devices that incorporate AI informed and knowledgeable of the risks of using these AI devices? Explain what steps were taken to assure this. If not, explain why.

When were the medical devices that incorporate AI last maintained, supervised and updated? How regularly is this process done?

Statement:

CHECKLISTS FOR CLINICIANS

Block: Checklist for Clinicians

Based on a previous review of the literature regarding the bioethical issues and solution proposals for a bioethical use of Medical-AI, we developed a checklist clinicians could use in their medical practice. This checklist aims to aid clinicians during

moral deliberations regarding the use of Medical-AI, as well as help them identify bioethical problems they must avoid. Please state if you agree or disagree with this checklist. If you would like to add new points, remove some points or give any additional feedback, feel free to do so in the Statements box provided below.

	Dislike a great deal	Dislike somewhat	Neither like nor dislike	Like somewhat	Like a great deal
Do I know the risks of using this AI?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What would by clinical judgement be, if I did not use this AI?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Can I trust this AI?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you been informed of the possible biases this AI has?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am I using the healthcare resources at my disposal appropriately by using AI?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is there a way to know when the AI is behaving in an unexpected or dangerous way?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What benefit do I expect from using AI?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am I properly trained to use this AI?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do I have sufficient control over this technology?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do I Know if ethical issues were addressed during the development process?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is there anyone I can contact in case I need help regarding the use of this AI?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do I know and understand what am I accountable for, when using AI?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Can I properly interpret AI results?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do I agree with the AI decision?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Has the patient been informed and consented the use of AI on his/her health?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Does this decision taken with AI impact Human Rights?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do I know who to contact to report a complaint or adverse event with the AI tool?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Has the technology been sufficiently validated to be used safely?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is the AI maintained, supervised and updated regularly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Statement:

GUIDELINES FOR A BIOETHICAL USE OF MEDICAL-AI

Block: Guidelines For a Bioethical Use of Medical-AI

Here you will find a list of proposals to deal with the bioethical issues of Medical-AI. These proposals intend to guarantee an ethical use of Medical-AI. Please state if you agree or disagree

with the following proposals to guarantee a Bioethical Medical-AI. If you would like to propose any other solutions, amendments to these proposals or any other further reasoning, feel free to do so in the Statements boxes provided below.

Solutions should be specific

Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree

Other than the general solutions proposed, solutions for use of AI in medicine should be assessed on a case-by-case basis as there are many variables to consider. But always taking into consideration this guidelines.

Guidelines - Responsibility

Responsibility

Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree

Humans are always responsible for AI actions.

Healthcare workers, specifically, are to be held accountable for the actions involving AI in healthcare.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developers of AI must be accountable for the performance of their models.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There must be shared responsibility between AI developers and healthcare workers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responsibility should also be shared with regulatory bodies that approve medical AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responsibility should also be shared with patients themselves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responsibility should also be shared with the Health Institution or corporation that bought the AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There must be shared responsibility between all stakeholders mentioned	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Statement:

Guidelines - Sustainability

Sustainability

Neither agree
nor disagree

Strongly disagree Somewhat disagree Somewhat agree

Ethical reflections and deliberations on the use of Medical-AI must include the environmental impact this technology will have. These can help mitigate the negative effects Medical-AI has on the environment and foster a sustainable development and use of Medical-AI.



Statement:

Empty text input box for the statement.

Guidelines - Compensation for Errors and Harm

Compensation for Errors and Harm

Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree

We must go beyond establishing who is responsible and accountable, and establish proper systems and institutions to make sure patients are compensated for any harm caused by Medical-AI.



Statement:

Guidelines - Explicability

Explicability

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Individuals are currently not able to properly challenge the results provided by algorithms, so individuals must have the right to an explanation of how and why AI took a decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is more important fir healthcare professionals working with AI to be prudent than to require absolute explicability, as explicability might not be possible in many cases or hinder AI performance, trump other ethical practices and even cause other ethical issues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explicability should not be absolute, as this might come at the cost of performance of AI, causing harm; or cause further ethical issues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Statement:

Guidelines – Informed Consent

Informed Consent (IC)

Here we want to establish when would Informed Consent be required in cases were a Medical-AI is involved.

There are many cases of new medical technologies were IC is not generally required. For example, electronic medical records, were IC is not required . With previous medical technology IC is generally not required, but based on specific circumstances it might be required.

Here we want to know if AI should follow the trend of previous medical technologies, were IC not required generally but it is required in some specific circumstances, or if, on the other hand, IC should generally always be required, and not required in some specific circumstances.

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Agree	Strongly Disagree
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IC should generally NOT be required, even though there might be specific situations or circumstances were an IC IS required regarding the use of Medical AI.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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IC should generally BE required, even though there might be specific situations or circumstances were an IC is NOT required regarding the use of Medical AI.

IC should ALWAYS be required.

Statement

Guidelines - Embedded Ethics

Embedding Ethics into AI Design

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
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All stakeholders should be involved in the development and use process of Medical-AI. This includes patients, healthcare workers, designers, ethics and law experts, and any other stakeholder.

Medical-AI must be Human-Centered. This means humans must be placed at the center of Medical-AI design and only serve human interests.

Social responsibility strategies must be included in the design and implementation of Medical-AI. These will help guarantee clear accountability and liability for any harm caused by AI.

Ethical alignment must be implemented. Ethical alignment is a principles-driven approach to guarantee Medical-AI behaves in an ethically acceptable way. This means ethically aligned approaches emphasize specific, high-level principles such as transparency, responsibility, fairness, human rights, or human well-being as relevant elements to their applied ethical account.

For an AI to perform "ethically", we cannot expect to "implement ethics in the system" (we cannot use embedded ethics), rather, we must design the AI to be functional in context, including contexts of oversight and review.

A value sensitive design could mitigate some ethical concerns regarding AI. This is, to introduce values directly into the AI during development.

Medical-AI must benefit global health, not only developers or patients alone.

Medical-AI must be developed with a "people firsts governance".

There must be individual, multidisciplinary ethical deliberation about AI during the development and implementation of each Medical-AI technology.

Medical-AI must be patient centered. This means patients specifically must be placed at the center of the design, development and use strategies of any Medical-AI.

As AI should be accessible to all, there must be a public ethical deliberation of AI systems.

Ethics must be integrated into the AI (Embedded ethics), to make the AI an ethical agent.

Social stigma must be considered during Medical-AI development and use. These will help avoid AI discrimination and decreasing harm.

Embedded ethics is not enough, by it self, to guarantee an ethical AI, therefore other measures, such as human oversight should be used.

Patients must have the opportunity be involved in the development process of Medical-AI.

Governments and institutions should be involved in the development of Medical-AI.

Healthcare workers must be involved in the development of Medical-AI.

Statement:

Guidelines - Responsibility Level

Degree of Responsibility

State what level or degree of responsibility should each of the following stakeholders have in regards with an unethical AI action (eg: AI actions that cause harm to patients).

- 0 is NO responsibility

- 10 is maximum responsibility

	0	1	2	3	4	5	6	7	8	9	10	
Physicians	<input type="radio"/>											<input type="text"/>
Other Healthcare Professionals	<input type="radio"/>											<input type="text"/>
Developers	<input type="radio"/>											<input type="text"/>
Regulatory bodies that approve Medical-AI	<input type="radio"/>											<input type="text"/>
Patients	<input type="radio"/>											<input type="text"/>
Health Institution or corporation that bought the AI	<input type="radio"/>											<input type="text"/>

Statement:

Guidelines - Constant Learning

Constant Learning

Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree

Medical-AI should be self-improved, constantly receiving new data to improve its performance an avoid unnecessary harm. (Note: improving performance can

Statement:

Guidelines - Constant Monitoring

Constant Monitoring

Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree

There must be a constant ongoing monitoring of Medical-AI to ensure the AI outputs remain acceptable as clinical practices and disease prevalence evolve. Checking AI systems to make sure they maintain safety and performance standards. Furthermore, performance evaluations of Medical-AI will help mitigate the bias and wrong outputs of Medical-AI.

Multidisciplinary group evaluations (with patients and clinicians) should be used to monitor the Medical-AI performance.

Periodic audits on the Medical-AI performance must be done.

Stewardship programs should be implemented to surveil AI and avoid wrongful outputs.

Statement:

Guidelines - Control

Control

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Medical-AI must always be controlled by healthcare workers. Autonomous AI must be avoided.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Even if autonomous Medical-AI is used, humans must always be able to overrun an AI decision. All AI actions must be able to be cancelled by humans.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical-AI must only be used for decision-support by clinicians (use AI only as a tool).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Medical-AI should only be used by physicians or under physician orders.

Statement:

Guidelines - Accesibility

Accesibility

Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree

Medical-AI must be accessible to all patients to diminish health disparities. All must be able to use AI. Benefits and prosperity derived from Medical-AI should be shared with all humanity.

Statement:

Guidelines - Information, Clinical Relationships and Autonomy

Information, Clinical Relationships and Autonomy

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Patients must be given the autonomous choice to decide if they want to be treated with AI or without it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Healthcare workers must encourage and respect patient decisions regarding the use of Medical-AI.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patients must always know if they are dealing with a human or with an AI.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the case of a clinical decision being taken by or with the help of AI, patients must have the right to a second opinion where AI is not used.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patients must always know when AI is being used on their health, the benefits and disadvantages of using it, and be given the choice to use it or not (shared decision-making process to use AI).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Statement:

Guidelines - Continuity of Care

Continuity of Care

Strongly Disagree Somewhat Disagree Neither Agree nor Disagree Somewhat Agree Strongly Agree

Patients must be granted appropriate, quality care and continuity of care, with alternative and adequate means or methods, in the case they voluntarily reject the use of Medical-AI on their health.

Statement

Guidelines - Data Management

Data Management

Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree

Patients must have the right to access their own personal data.

Patients should have the opportunity to be involved in data collection for AI development and give their informed consent for specific uses of their data.

Informed Consent should not always be necessary for the use of AI on patient health.

There should be dynamic informed consent models where participants can withdraw their personal data at any given time for any reason.

Dynamic informed consent models should be used. Dynamic consent models aim at embedding evolving data subject preferences into an open communication process between participants and researchers. When data is used and reused for different research projects, they are only used according to the indicated preferences of participants, who are notified of such use.

Data management and proper security mechanisms must be developed for data protection. These could include: data stewardship, cryptography techniques, homomorphic encryption, secure multiparty computation Garbled circuits, adding noise into data, federated learning, and blockchain among others.

Statement:

Guidelines - Validating AI

Validating AI

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Competing interests must be stated by Medical-AI developers for a transparent Medical-AI development.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data sets used to train AI must be accurate and scientifically proven (validated). This way AI can avoid bias and harm. Only the best clinical knowledge available must be used develop AI. Data used to develop Medical-AI must be robust.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical-AI must be developed to mitigate bias and cyber-attacks, creating a more robust AI.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical-AI should only be used in the general population after appropriate medical clinical trials are carried out.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical-AI must only be used after an appropriate risk and benefits analysis of the use of Medical-AI is carried out.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An impact assessment should be carried out prior to the implementation of each Medical-AI to make sure benefits outweigh the negative effects of using medical-AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical-AI must always be validated scientifically and proven to be safe before it is used on humans. Evidence-Based Medicine must be used for the development of algorithms, to avoid bias and harm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It should be openly stated what population what used to train a certain medical-AI.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Statement:

Guidelines - Training

Training

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Healthcare workers must be trained to understand how AI works and be able to take proper decisions using AI.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical Schools (universities) must include AI courses into their curriculum to help make an ethical use of Medical-AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not only healthcare workers, but also patients must be educated on AI. Understanding how AI works can empower patients to make autonomous decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accreditation must be needed to use Medical-AI, provided prior training, when using Medical-AI.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Statement:

Guidelines - Adapt AI to Social Context

Adapt Medical-AI to the Social Context and Place where it is Being Used

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
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Social and cultural factors that might facilitate or impede the acceptance of AI technology in healthcare must be considered during its design and use.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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To avoid bias and discrimination, Medical-AI must be adapted to the social, cultural and endemic context where it is being used. This means Medical-AI might have to be trained with different data sets for it to be validated for use in different populations or different predictive models might need to be used for different populations. These can mitigate injustice towards certain social, religious or ethnic groups.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Statement:

ETHICAL VALUES

Block: Ethical Values

To address the bioethical issues of Medical-AI, we must consider important ethical values. Please state which values we should consider when addressing an ethical use of Medical-AI.

Take into account we are talking about values, more generally, not specific principles.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Governance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Governability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rule of Law	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lawfulness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Democracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Human Rights	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teamwork and Cooperation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Solidarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inclusivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diversity/Pluralism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accessibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sharing of benefits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Human Dignity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Body and Mental Integrity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Application of Human Values	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Privacy and confidentiality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compassion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vulnerability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Awareness of Misuse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Validation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Caution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robustness and security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interpretability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trustworthiness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accountability and responsibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explicability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transparency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contestability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sustainability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Penalty for non-compliance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Respect for religious, ethnic, and cultural identity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Primacy of individual human life value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Statement:

NEW ETHICAL PRINCIPLES

Block: New Bioethical Principles

To address the bioethical issues of Medical-AI, several new ethical principles have been proposed. By “new bioethical principles” we mean principles other than the main four bioethical principles proposed by Beauchamp and Childress: Autonomy, Non-Maleficence, Beneficence and Justice.

Here we are talking about principles, not values. We can have many values, for example: human dignity or respect for human life, governance..., but few principles.

It is important to know that our goal is to establish which of the following principles has enough intrinsic value in it self, not instrumental value.

To clarify, this part of the survey is about new ethical PRINCIPLES other than autonomy, non-maleficence, beneficence and justice;

NOT about values or virtues necessary for a bioethical use of Medical-AI. Take into account the 4 main bioethical principles and think which of the following has enough intrinsic value, if any, to be considered independent ethical principles.

New Bioethics Principles

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
Accountability and responsibility has enough intrinsic value to be considered an independent new bioethical principle.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explicability, has enough intrinsic value to be considered an independent new bioethical principle.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transparency, has enough intrinsic value to be considered an independent new bioethical principle.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trustworthiness, has enough intrinsic value to be considered an independent new bioethical principle.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Statement

BIOETHICAL ISSUES OF THE USE OF MEDICAL-AI

BLOCK: Bioethical problems of using medical-AI.

On a previous review, we classified Bioethical issues derived from the use of medical-AI into the following categories.

State if you agree or disagree with each of these categories being a bioethical issue of relevance:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Biomedical Data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Justice and discrimination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responsibility and decision-making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effect on clinical relationships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Self-regulation (by this we mean business could develop their own internal standards of ethical use of AI with no external coercion to enforce them)

Autonomy

Technological imperialism

Maleficence

Security

Human rights

Beneficence

Drug development

Sustainability

Employment (such as AI increasing unemployment and taking over jobs).

Health Law

Statement:

Bioethical issues

Strongly Disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree

Bioethical issues should be analyzed specifically and depend on the particular factors of each situation.

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