



## The Formation of the Patient's Informed Consent of The AI-Powered Diagnosis and Treatment and the Civil Liability Arising from Their Biases and Errors in Both the Iraqi and Egyptian Laws.

Younis S. Ali  

Faculty of Law and International and Diplomatic Relations\ Cihan University-Erbil

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#### Correspondence:

Asst. Prof. Younis Salahuddin Ali

[younis888\\_sss@yahoo.com](mailto:younis888_sss@yahoo.com)

### Abstract

This research is concerned with studying the patient's informed consent of the AI-powered diagnosis and treatment, and the civil liability arising from their biases and errors. Three basic requirements should be satisfied for the formation of the patient's informed consent of these diagnostic and curative MAI-systems: first the physician's sufficient knowledge of how these systems of AI-powered diagnostic and curative algorithms work. Second the patient's informed knowledge of the probability or likelihood of the occurrence of diagnostic and curative biases and errors, which the AI-algorithms can acquire during the stage of machine-learning. There are many parties who can commit these biases and errors, like AI-designer, AI-developer, AI-processor, AI-trainer, AI-tester, or even AI-provider. The third component of the patient's informed consent is the necessity of his enjoying of the option to accept or reject the AI-powered diagnostic and curative procedures. Then the research studies the civil liability arising from dangerous AI-powered diagnostic and therapeutic algorithmic biases and errors. It is to be noted that the researcher studied three types of non-contractual (extra-contractual) civil liability, as well as the contractual liability in both the Iraqi civil code No.40 of 1951 and Egyptian civil code No. 131 of 1948. The problem of the research lies in the necessity of the legal regulation of the patient's informed consent of the AI-powered algorithmic diagnostic and curative procedures. As well as determining the most suitable system of the civil liability for compensating the damage the patient may suffer, as a result of these biases and errors in both the Iraqi and Egyptian laws. This study adopted the analytical comparative legal research methodology. The main finding of this study is the necessity of applying the system of strict-liability as the most suitable system of civil liability to encounter and compensate the damage caused by the multi-party algorithmic biases and errors. The researcher suggests some relevant recommendations to both the Iraqi and Egyptian legislators.

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## تكوين الرضاء المستنير للمريض بالتشخيص والعلاج المدعوم بالذكاء الاصطناعي والمسؤولية المدنية عن الأخطاء والإنحرافات الناجمة عنها في القانونين المدنيين العراقي والمصري

يونس صلاح الدين علي  

كلية القانون والعلاقات الدولية والدبلوماسية/ جامعة جيهان-اربيل

### المستخلص:

يُعنى هذا البحث بدراسة وتقصي مسألة تكوين الرضاء المستنير للمريض بالتشخيص والعلاج المدعوم بالذكاء الاصطناعي والمسؤولية المدنية عن الأخطاء والإنحرافات الناجمة عنها. ويشترط لتكوين الرضاء المستنير للمريض الخاضع للتشخيص والعلاج بهذه النظم التقنية الحديثة توفر ثلاثة متطلبات رئيسة تعرف بمكونات الرضاء المستنير للمريض بالإجراءات التشخيصية والعلاجية المدعومة بالذكاء الاصطناعي وهي: أولاً المعرفة الكافية والراسخة للطبيب المعالج بكيفية عمل نظم خوارزميات الذكاء الاصطناعي التشخيصية والعلاجية. ثانياً معرفة المريض المستنيرة بإحتمالية حدوث الأخطاء والإنحرافات التشخيصية أو العلاجية التي يمكن لخوارزميات الذكاء الاصطناعي البالغة التعقيد إكتسابها خلال مرحلة التعلم الآلي الواسعة النطاق والشاملة. وهناك العديد من الجهات التي يمكن أن ترتكب مثل هذه الأخطاء كمصمم الخوارزمية أو مطورها أو معالجها أو مدربها أو فاحصها أو حتى مزود الخدمة. أما المكون الثالث من مكونات الرضاء المستنير للمريض فهو ضرورة تمتع المريض بخيار قبول أو رفض الخضوع للإجراءات التشخيصية والعلاجية المدعومة بالذكاء الاصطناعي. ثم يتناول البحث بالدراسة المسؤولية المدنية الناجمة عن الأخطاء والإنحرافات الخوارزمية التشخيصية والعلاجية الخطيرة المدعومة بالذكاء الاصطناعي. وقد تناول الباحث ثلاثة أنواع من المسؤولية المدنية غير العقابية في القانونين المدنيين العراقي رقم (40) لسنة 1951 والمصري رقم (131) لسنة 1948. وتكمن مشكلة البحث في ضرورة وجود تنظيم قانوني في القانونين العراقي والمصري للرضاء المستنير للمريض بالإجراءات التشخيصية والعلاجية المدعومة بخوارزميات الذكاء الاصطناعي، فضلاً عن تحديد نظام المسؤولية المدنية الأكثر ملاءمة لجبر الأضرار التي قد يتعرض لها المريض نتيجة تلك الأخطاء والإنحرافات. وقد تبنت هذه الدراسة منهج البحث العلمي القانوني المقارن. أما النتيجة الرئيسية التي توصلت إليها الدراسة فهي ضرورة تطبيق نظام المسؤولية الموضوعية كأفضل نظام لمواجهة الأضرار الناجمة عن الأخطاء والإنحرافات الخوارزمية المتعددة الجهات. كما إقترح الباحث بعض التوصيات ذات الصلة للمشرعين العراقي والمصري. الكلمات المفتاحية: الرضاء المستنير, التشخيص والعلاج المدعوم بالذكاء الاصطناعي, الخطأ أو الإنحراف الخوارزمي, المسؤولية المدنية, المسؤولية الموضوعية.



## Introduction

The introduction of the study contains the ensuing items:

**First: The Foreword of the Study:** this research has studied the patient's informed consent of the AI-assisted diagnostic and curative procedures, which can be analyzed into three major components: the physician's sufficient knowledge of how AI-algorithmic systems operate. The patient's sufficient information of the AI-powered diagnostic and curative (therapeutic) biases and errors. And when these two components gather together, the third component will be realized, that is, the patient's option to accept or reject the AI-powered diagnosis and treatment. Both the Iraqi and Egyptian medical laws have taken into account these components, but neither of them regulated the AI-powered diagnostic and curative (therapeutic) biases and errors, caused by erroneous and biased AI-algorithm software. The study also evaluated the optimal or the most suitable civil liability system, in both the Iraqi civil code No.40 of 1951 and Egyptian civil code No. 131 of 1948, to compensate the victims of harms and injuries caused by the AI-powered diagnostic and curative biases and errors of various AI-actors.

**Second: The significance of the study:** The importance of this research is represented by the study of the complications of how the patient's informed consent for the AI-powered diagnosis and treatment be formed. As well as studying the optimal civil liability system, which emerging from MAI-powered diagnostic and curative biases and errors (Medical Artificial Intelligence-powered diagnostic and curative biases and errors).

**Third: The objective of the study:** The aim of this research is the attempt to identify the most suitable civil liability system for compensating the victims of harms and injuries caused by the AI-powered diagnostic and curative biases and errors of various AI-actors.

**Fourth: The problem of the study:** The problem of this research lies in the difficulty to apply the MAI-service provider's civil liability from personal acts, embodies by AI-powered diagnostic and curative biases and errors. because it is too difficult to prove the causal link between the AI-biases and errors and the damage. which might easily be broken by a lot of AI-actors. The problem of this research focuses also on the following two questions: first: Is the strict-liability principle most

suitable for compensating the victims of harms and injuries caused by the AI-powered diagnostic and curative biases and errors of various AI-actors. Who indoctrinate the erroneous and biased AI-algorithm software, underlying the MAI-powered diagnosis and treatment?. Second: Can the vicarious liability of the employer be applied from the AI-Powered algorithmic biases and errors, arising from the erroneous or biased AI-algorithm software, leading to erroneous or biased AI-diagnosis and treatment. Particularly the biases and errors made by AI-actor employees?.

**Fifth: The Scope of the Study:** The researcher studies the formation of the patient's informed consent of the AI-powered diagnosis and treatment and the civil liability emerging from their biases and errors in both The Iraqi And Egyptian laws. And the scope of the study is restricted to four Iraqi and Egyptian laws. That is, the "Iraqi civil code" No.40 of 1951, the "Egyptian civil code" No. 131 of 1948. the Iraqi law of human organ transplantation operations and preventing their trafficking No.11 of 2016, and the Egyptian Law No. 13 of 2025 on the Regulation of Medical Liability and Patient Safety.

**Sixth: Research Methodology:** This study has followed the analytical comparative research method, by studying and analyzing the situation of both the Iraqi and Egyptian laws, concerning the patient's informed consent for the AI-powered diagnosis and treatment. As well as the civil liability arising from the AI-powered diagnostic and curative (therapeutic) biases and errors.

**Seventh: The plan of the research:** This research has been divided into two chapters. The first chapter discusses the components of the patient's informed consent for the AI-powered diagnosis and treatment. Whereas the second chapter is profoundly involved in studying the civil liability arising from the AI-powered diagnostic and curative (therapeutic) biases and errors as follows:

1. The Components of the Patient's Informed Consent For the AI-Powered Diagnosis And Treatment.
  - 1.1. Physician's Sufficient Knowledge of How AI-Algorithmic systems operate.
  - 1.2. Patient's Well-informed Knowledge of the AI-Powered Diagnostic And curative (therapeutic) Biases And Errors.
  - 1.3. Patient's Option To Accept Or Reject the AI-Powered Diagnosis And Treatment.



2. The Civil Liability Arising From the AI-Powered Diagnostic And curative (therapeutic) Biases And Errors.
  - 2.1. The Service Provider's Contractual Liability Arising From the AI-Powered Diagnostic And Curative (Therapeutic) Biases And Errors
  - 2.2. The Personal Civil Liability Arising From the AI-Powered Diagnostic And Curative (therapeutic) Biases And Errors.
  - 2.3. The Vicarious Liability Arising From the AI-Powered Diagnostic And Curative (therapeutic) Biases And Errors.
  - 2.4. The Strict-Liability Arising From the AI-Powered Diagnostic And Curative (therapeutic) Biases And Errors.

## 1. The Components of the Patient's Informed Consent for the AI-Powered Diagnosis and Treatment

This chapter will be devoted to study and investigate the concept of the patient's informed consent for the AI-powered diagnosis and treatment. The researcher shall analyze in the following three topics the three major components of the patient's informed consent of the AI-assisted diagnostic and curative procedures, namely the physician's sufficient knowledge of how AI-algorithmic systems operate. The Patient's sufficient information of the AI-powered diagnostic and curative (therapeutic) biases and errors. And the patient's option to accept or reject the AI-powered diagnosis and treatment:

### 1.1. Physician's Sufficient Knowledge of How AI-Algorithmic Systems Operate and The Obligation of Disclosure

One of the most fundamental obligations of the physician or clinician, is the obligation of the disclosure of information to the service recipient or the patient concerning MAI-algorithmic biases and errors<sup>(1)</sup>, so that the patient can form legally and validly his or her informed consent about AI-powered diagnosis and treatment. But this obligation can not originate, unless the physician or clinician obtain sufficient knowledge of how MAI-systems operate and their main features. As far as the Egyptian law is concerned, the fifth article of the Egyptian Law No. 13 of 2025 on the Regulation of Medical Liability and Patient Safety regulated the Obligations of the Service Provider,

including the physician's obligation of the disclosure of information in its fifth paragraph, which stated that "The service recipient shall be informed of the nature of their illness, its severity, and any potential medical complications arising from the proposed treatment, and consent must be obtained prior to its administration. If obtaining consent is not feasible, a medical report from the treating physician, and another physician of the same specialty, and the facility director or their deputy shall suffice. The treating physician must also prescribe the treatment, specify its dosage and method of use in writing clearly, and sign it with their full name and the date of the prescription". The same is true for the article (15) of the Iraqi law of human organ transplantation operations and preventing their trafficking No.11 of 2016, which stated that " The doctor shall make the recipient aware of the risks and possible medical consequences of the transplant". It can be said here that the physician's obligation of the disclosure of information comes easily into line with the medical AI-ethics, based upon transparency, fairness and honesty. Which obligate the physician and other AI-actors to be honest and respect human values, in securing safe AI-assisted diagnosis and treatment, and avoiding erroneous and biased AI-algorithmic software.

This means that in order for the clinician's obligation of the disclosure of information to originate, he or she should have sufficient knowledge of how AI-algorithmic Systems and software Operate. This essential knowledge is realized by conceiving the two important characteristics or features of the artificial intelligence in general, and (MAI) systems in particular, that is to say the self-learning and autonomy:

First: The feature of self-learning: this feature is regarded as the most important feature of the (AI), as a simulation of human intelligence, in such a way that it can be simulated by a machine<sup>(2)</sup>. This feature comes into existence by two steps: the first step is the machine learning (ML), which is defined<sup>(3)</sup> as a branch of artificial intelligence (AI) and computer science that concentrates on utilizing data and algorithms to empower (AI) to imitate the way that humans learn, and gradually improving its accuracy. The machine learning (ML) is a subset of (AI) that concentrates on the ability of machines to learn from data, without being explicitly



programmed. This means that the (AI) system can learn tasks and optimize them over the time. Both the data mining and machine learning make use of algorithms. But in machine learning these algorithms can improve automatically with experience.

Therefore, machine learning algorithms are used for the machine to learn<sup>(4)</sup>. And this process must be done by humans<sup>(5)</sup>. Whereas data mining technologies concentrate on clustering and knowledge discovery in huge database, and also make use of algorithms to find patterns in large datasets. But these algorithms do not evolve or improve automatically. Although the algorithms can be designed in such a way that they autonomously improve themselves through learning process. It is to be noted that the algorithm is a highly-complicated or highly-sophisticated sequence of computations or instructions<sup>(6)</sup>. It can be applied to data for performing calculations, data processing or automated reasoning. It is also a mathematical set of instructions aimed at solving problems and performing calculations. But the algorithms in itself, is neither smart nor self-learning. Algorithms are also designed to assist in, or substitute for human decision-makers. This will lead to the second step, embodied by automated decision-making, or algorithmic-based decisions, which is characterized by ever-increasing accuracy, precision and efficiency, because the automation is tasked with increasing efficiency and effectiveness<sup>(7)</sup>. Furthermore the decision-making process would be certainly faster, more economical, better informed, free of human error or negligence, arbitrariness or prejudice<sup>(8)</sup>. If these two steps are realized, the third and more significant step of the self-learning will be achieved. The self-learning is the process by which a system takes the initiative without the assistance of human intervention to identify patterns, discover new information, and predict future events with similar data.

Secondly: Autonomy: this feature is closely connected with the self-learning. The autonomy means that AI-systems can make decisions by themselves, and these decisions are not pre-programmed. An important remark here is that the problem-solving depends upon AI-system's decision in a particular situation<sup>(9)</sup>. But it can decide autonomously on the best strategy to make a decision, and solve the problem. The main outcome

of the autonomy is that the optimum strategy can be different in each specific situation. The (AI) system may have learned a better strategy after some time, which means that the next time it is confronted with the same situation. It may choose a different strategy. In brief, the artificial intelligence may easily exceed human intelligence, particularly when processing or memorizing large amounts of data. Some of these systems can beat human intelligence. The introduction of highly sophisticated autonomous technologies will lead to automating society<sup>(10)</sup>. It might yield some disadvantages and undesirable side-effects. Therefore, we shall focus on one of the worst disadvantages and side-effects of the features of both the self-learning and autonomy in the field of healthcare. Which is embodied by the MAI-powered algorithmic biases, and the MAI-driven algorithmic errors. In brief, it can be said that both the eighth and ninth paragraph of the first article of the Egyptian Law No. 13 of 2025 on the Regulation of Medical Liability and Patient Safety regulated also the service provider's obligation of the disclosure of the information to the service recipient (including the patient) of all the aspects of the medical service.

## 1.2. Patient's Sufficient information of the AI-Powered Diagnostic and Curative Biases and Errors

The patient's sufficient information of the AI-powered diagnostic and curative biases and errors is realized or materialized by the physician's obligation of the disclosure of the fundamental or essential pieces of information to patient, concerning the AI-assisted diagnosis and treatment in general, and the AI-powered (AI-driven) medical biases and errors in particular. In order to help the patient, form his or informed (enlightened) consent as clearly as possible. Therefore, the service provider, including the physician (clinician) is obligated to inform the service recipient, including the patient two main problems concerning the medical artificial intelligence (MAI), namely the AI-biases and the AI-errors:

First: The patient's sufficient information of the AI-biases: although the main source of the bias is human and not (MAI) system, but the bias may still occur in (MAI) system<sup>(11)</sup>. The (MAI) systems are usually used to diminish if not eliminate human bias, because the (MAI) systems out-perform any



human. This means that the data is not neutral or objective, but may be biased, since it is a product of social practices. Put another way, the machine learning processes and algorithmic procession of data might not be inherently neutral, objective, or fair<sup>(12)</sup>. It is to be noted here that three categories of bias in (MAI) system might lead to discriminatory data, which may be translated into biased decisions and outcomes. These three categories are: 1-biased data input (data bias). 2-biased data processing (algorithmic bias). 3-biased output (outcome bias). Data bias signifies that the data used for analyzing or training algorithms encompasses bias<sup>(13)</sup>. The data bias is classified into societal bias and statistical bias. The societal bias occurs when data yields unfair discrimination of individuals or groups. Whereas the statistical bias, known also as sample bias, suggests or refers to measurement errors in sampling. When these errors come into machine learning, they might have considerable effects on training an algorithm. Sample bias occurs when the selection of the data sample focuses on a limited number of variables that is insufficient to adequately represent the environment as a whole. It contains four sub-types: gender bias, ethnic bias, and socio-demographic bias<sup>(14)</sup>. Both the sample and societal biases might yields diagnostic biases, which lead to health disparities for different social groups, based on sex, ethnicity and gender differences. Algorithmic bias happens when the output of an algorithm affects different individuals or groups discriminately in an unfair way<sup>(15)</sup>. Although the algorithmic procession of data is characterized by its accuracy and objectivity, but it could hide the risk of algorithmic bias. This process is in itself open to bias. Another type of bias, known as contextual bias, is closely related to algorithmic bias. It refers to the social or economic context in which (MAI) systems and technologies are designed and developed<sup>(16)</sup>. For example, (MAI) algorithmic technologies are mostly produced in high-resource well-equipped settings, it may be difficult to apply these state-of-the-art algorithmic technologies to other low-resource settings, such as low and middle-income countries, since these algorithms are then specific to the context in which they were designed and developed. The outcome bias happens when the outcome of data processing by a (MAI) system application results in an unfair or unjust discrimination of individuals or groups.

Second: The patient's sufficient information of the AI-biases and errors: During the process of the machine learning, when humans train the machine, biases and errors will inevitably be made<sup>(17)</sup>. Put another way, when machines are trained with trillions of data representing trillions of real-world cases, algorithms can design other algorithms. This means that the algorithms which make the autonomous biases and erroneous decision (algorithm-based decision) are responsible for the erroneous decision-making<sup>(18)</sup>. An AI-error is any incorrect output, prediction, or decision produced by a machine learning system. The important question here is how an erroneous or biased algorithms is Formed? The answer of this question is embodied by the fact that an erroneous or biased algorithm is a fundamentally flawed algorithmic model, either because of errors or biases initially present in its design, or incorporated during the training of the algorithm in machine learning<sup>(19)</sup>. Many AI-actors might be responsible for introducing erroneous or biased algorithmic software: the AI-designer, AI-developer, AI-trainer or AI-processor. For example the AI-designer might build the algorithmic model incorrectly, the AI-trainer trains the model erroneously or incorrectly<sup>(20)</sup>.

### 1.3. Patient's Option to Accept or Reject the AI-Powered Diagnosis and Treatment

To begin with, the eighth paragraph of the first article of the Egyptian Law No. 13 of 2025 on the Regulation of Medical Liability and Patient Safety has determined the service provider's consent, as well as empowering or awarding him or her the option to accept explicitly (expressly) or refuse the medical service, including the AI-powered diagnosis and treatment. As far as the consent in the medical contract is concerned, The ninth paragraph of the first article of the Iraqi law of human organ transplantation operations and preventing their trafficking No.11 of 2016 defined the patient's informed (enlightened) consent in the scope of the human organ transplantation as " the clear expression of a person's will to give up his/her organs or tissues, provided that the conditions stipulated by law are met, and on condition that it is not tainted by any of the defects of the will". But no Iraqi law defined the patient's informed (enlightened) consent of the AI-powered diagnosis and treatment. The same is true for the Egyptian law, since the eighth paragraph of the first article of



the Egyptian Law No. 13 of 2025 on the Regulation of Medical Liability and Patient Safety defined the "informed consent" as "the written expression based upon free autonomy of will and complete voluntariness, issued by the service recipient if fully competent, or by his or her guardian, custodian, or caretaker if he or she is wholly or partially incompetent. If none of these are available, then by one of his relatives up to the second degree. It must include explicit or express consent to receive the medical service or to refuse it after being informed and made aware of all its aspects, particularly the possible effects and risks that may influence his decision in this regard, in accordance with the form prepared by the ministry responsible for health affairs." Whereas the ninth paragraph of the first article of the same law defined the "consent" in general as the "expression based upon the free autonomy of will and full voluntariness, issued by the service recipient if fully competent, or by his guardian, custodian, or caretaker if he is wholly or partially incompetent; and if none are available, then by one of his relatives up to the second degree. It includes consent to receive the medical service after being informed and made aware of all its aspects".

As a consequence of exercising the option, the service recipient or the patient can either accept or reject the AI-powered diagnosis and treatment. If he or she refuses, the medical contract will not be concluded. But if he or she accepts, the medical contract will be concluded. Because the informed consent is available, and the acceptance meets the offer<sup>(21)</sup>. According to the first paragraph of the article (77) of the Iraqi civil code which provided that " Offer and acceptance are every two expressions (words) used customarily for the creation of a contract; whichever expression is made first is an offer and the second is the acceptance". And the article (89) of the Egyptian civil code which provided that "A contract is created, subject to any special formalities that may be required by law for its conclusion, from the moment that two persons have exchanged two concordant intention". It has been clearly indicated from these two legal texts that the consent in both the Egyptian and Iraqi civil codes is analyzed into two components: the offer and acceptance<sup>(22)</sup>. Therefore, the consent of the parties is made up of two components, But these two legal texts impliedly or implicitly refer to the consent of each

party, which embodied by offer and acceptance themselves<sup>(23)</sup>.

## 2. The Civil Liability Arising From the AI-Powered Diagnostic And Curative (Therapeutic) Errors

The system of civil liability is considered as one of the main cornerstones of AI-ethics, besides fairness, honesty and transparency, which help the health sector realize safe AI-assisted healthcare, as well as achieving AI-governance. The system of the civil liability engages in providing a remedial function to protect victims in general, and service recipients and patients in particular, and compensate them from the damage exposed and the costs incurred by erroneous and biased AI-powered algorithmic diagnosis and treatment. Therefore, We shall discuss and evaluate in this chapter the most appropriate and suitable system of civil liability to compensate the service recipients and patients suffering from harms or injuries, caused by AI-powered algorithmic diagnosis and treatment, as a consequence of erroneous and biased AI-algorithmic software. And weigh the optimal system of civil liability to award damages and remedies to these aggrieved service recipients and patients. To achieve this aim we shall divide the civil liability arising from the AI-powered diagnostic and curative errors into contractual and non-contractual (extra-contractual) civil liability, because many actors may take part or participate in the biased or erroneous AI-powered diagnosis and treatment, or incorporate biases and errors into medical AI-algorithmic software, without being tied with a patient by a medical contract, like AI-designer, AI-developer, AI-trainer, AI-tester, AI-processor. As opposite to the end-user, represented by the AI-service provider, including the physician or clinician, who are concluding the medical contract with the patient, to supervise the diagnosis and treatment as follows:

### 2.1. The Service Provider's Contractual Liability Arising From the AI-Powered Diagnostic And Curative (Therapeutic) Biases And Errors

To start with, the civil liability in general is described<sup>(24)</sup> as the penalty imposed or inflicted on the breach or violation of the engagement, undertaking, commitment or obligation arising from the contract, or from a harmful, wrongful, illegal or unlawful act which may cause an injury



or harm to the third party. The contractual liability is being described as the penalty or sanction imposed for breaching or violating of a contractual undertaking (obligation). It is relevant here that the civil liability of the medical service provider, including the physician or clinician would be, for the most part, contractual. Because of the presence of the medical contract concluded between the medical service provider and the patient. Once concluded validly, the medical contract becomes binding and generates a lot of contractual obligations to both parties of a contract<sup>(25)</sup>. The most significant of which is the service provider's obligation of the disclosure of information to the service recipient or the patient, particularly respecting MAI-algorithmic biases and errors, known as AI-powered diagnostic and curative (therapeutic) biases and errors. Which may cause harm and damage to the patient. Besides the patient's obligation to undergo AI-powered diagnosis and treatment, if he or she exercises the option, and expresses the acceptance of these procedures. The service provider, including the physician or clinician, bears also the obligation of transparency, honesty in administering the AI-powered diagnostic and curative procedures, as well as respecting human values, and adhering to medical ethics. If the service provider breaches one of these obligations, particularly by bringing about MAI-biases and errors, his or her contractual liability will emerge, as the penalty of breaching the contractual obligation. And he or she would be obligated to compensate the patient from the damage and hurt caused by these biases and errors. The Iraqi and Egyptian civil codes regulated the contractual liability within articles (168) and (215) which provided that (if specific performance by the debtor is impossible, he will be adjudged to pay damages for non-performance of his obligation, unless he establishes that the impossibility of the performance was due to a cause beyond his control; the adjudication will be the same if the debtor is late in the performance of his obligation). The contractual liability can only arise, if three fundamental requirements are present<sup>(26)</sup>, namely, the fault perpetrated by one of the parties to a contract, the harm "damage" placed on the other party and the "causation or causal link" between them<sup>(27)</sup>. The most significant remark to be mentioned here is about the type of the "obligation" the violation of which produces the fault in the sphere of the "contractual liability"<sup>(28)</sup>. In fact both

the Iraqi<sup>(29)</sup> and Egyptian<sup>(30)</sup> jurisprudence distinguished between the "legal and contractual obligations", within the sphere of "civil liability". In that the "contractual obligation", the violation of which will produce the "contractual liability", can either be an "obligation of result" or an "obligation of conduct"<sup>(31)</sup>. Whereas the "legal obligation", the violation of which will produce the "tort non-contractual liability" is always an "obligation of conduct"<sup>(32)</sup>. And whether the "obligation of conduct" (Obligation to take care) is contractual or legal, the debtor should take the reasonable care in fulfilling his or her obligation. This reasonable care is measured with the care of the "ordinary person", known as the "reasonable person". Even though the intended object of the obligation has not been realized or materialized<sup>(33)</sup>. In conformity with the first paragraph of both the article (251) of the Iraqi civil code, and (211) of the Egyptian civil code, which provided that: "Subject always to any provision of the law or agreement to the contrary in the case of an obligation to do something, a debtor who is required to preserve a thing, to manage it or to act with prudence in the performance of his obligation, he would have performed the obligation if he had exercised the care of an ordinary person even where the intended object has not been achieved". This means that both the Iraqi and Egyptian civil codes regulated an objective norm to evaluate the behavior of the illegal act perpetrator or the harmful wrongdoer, which is represented by the norm of the reasonable person<sup>(34)</sup>, deprived from his or her internal personal circumstances, and surrounded or beset by the same external contingencies of the harmful wrongdoer according to the first paragraph of the above-mentioned articles<sup>(35)</sup>. But it is worth-mentioning here that the service provider, including the physician or clinician can be exonerated or excused from his or her contractual obligation, if he or she establishes that the causal link has been cut off, broken or disrupted by the extraneous cause<sup>(36)</sup>, in conformity with both the articles (168) and (215) of the Iraqi and Egyptian civil codes. And proved that the damage has been brought about by MAI-powered diagnostic and curative biases and errors. That is to say the biases and errors made by AI-actors, like the AI-designer, AI-developer, AI-trainer, AI-tester, AI-processor, who can influence or affect the MAI-powered algorithmic software.



## 2.2. The Personal Civil Liability Arising From the AI-Powered Diagnostic And Curative (Therapeutic) Biases And Errors

Although the Iraqi civil code dedicated or devoted thirty two articles (186-217) to deal with the civil liability from personal acts<sup>(37)</sup>, but the articles which can be practically applied to establish the legal basis of the civil liability from personal acts arising from the AI-powered diagnostic and curative (therapeutic) biases And errors, to compensate victims of these biases and errors are the texts (186, 202 and 204) of the Iraqi civil code<sup>(38)</sup>. This same is true for the first paragraph of the article (163) of the Egyptian civil code. The non-contractual tort liability (Extra-contractual liability) from unlawful act is defined<sup>(39)</sup> as the penalty or sanction imposed for the breach of one unchangeable legal obligation of not harming anyone, arising from the harmful (wrongful) act, or a breach of a general duty of care of not causing harm. And the illegal or wrongful act is defined<sup>(40)</sup> as a harmful or unlawful act emanating from the debtor to impoverish the creditor. It should be noted here that this type of the non-contractual tort liability is most suitable for the wrongful acts, biases and errors committed by such AI-actors, like the AI-designer, AI-developer, AI-trainer, AI-tester, AI-processor, who are not connected directly with the patient by the medical contract. The emergence of this liability entails that three basic elements or fundamental requirements should be satisfied:

First: The fundamental requirement (basic element) of trespass, transgression or encroachment: The "Iraqi civil code" No. (40) of 1951 is affected by the Islamic jurisprudence, particularly, the "Journal of juristic rules of 1869" (Mejallat-Al-Ahkam), which is regarded as a European-style Ottoman codification of Islamic law of the hanafite school<sup>(41)</sup>, from which it borrows most of its rules. As well as being affected by the "Egyptian civil code" No.131 of 1948. Therefore it adopts the trespass or transgression as the basic element of the " civil liability" arising from the unlawful acts<sup>(42)</sup>, as well as the damage and the causal link between them. It does not adopt superficially or apparently the basic element of the fault<sup>(43)</sup>, unlike the Egyptian civil code No. (131) of 1948, which adopted expressly the basic element of the fault . This is inferred or deduced from the formulation of the article (204) which provides that "Every

trespass or transgression which causes other than the injuries mentioned in the preceding Articles entails payment of compensation". Whereas the article (163) of the Egyptian civil code provided that (Every fault which causes injury to another, imposes an obligation to make reparation upon the person by whom it is committed). the third article of the Egyptian Law No. 13 of 2025 on the Regulation of Medical Liability and Patient Safety also established the medical liability on the basis of fault (error), and provided that (Medical liability arises for every medical error resulting from the provision of medical service that causes harm to the service recipient). Some authors and jurists<sup>(44)</sup> of the Iraqi civil code defined the encroachment (trespass) as the detour from the behavior of the reasonable person surrounded and encircled by the same external circumstances of the perpetrator or wrongdoer. They have clearly distinguished or drawn a distinctive line between the fault and the trespass, which is considered as merely the material element of the fault, which is composed of two elements: the material element, that is to say, the encroachment (trespass), and the moral element, the prudence and discernment<sup>(45)</sup>. Besides the article (202) of the "Iraqi civil code" is suitable for establishing the basis of the civil liability from personal harmful acts, arising from the AI-powered diagnostic and curative (therapeutic) biases and errors of above-mentioned AI-actors other than the MAI-service provider, including the physician or clinician. It can also be used to compensate the victims (patients) of these biases and errors. It provided that "Every act which is injurious to persons such as murder, wounding, assault, or any other kind of inflicting injury entails payment of damages by the perpetrator". It is also worth-mentioning that the first paragraph of the article (186) of Iraqi civil code for compensating the MAI-service provider from the material damage of MAI-powered algorithmic software caused by one of the above-mentioned AI-actors, embodied by computational and mathematical biases and errors inserted or incorporated into the sequence of the MAI-algorithmic software. It provided that (A person, who willfully or by trespassing, as a perpetrator or abettor, has directly or indirectly caused damage to or decreased the value of the property of another person, shall be liable). When we analyze the first paragraph of the article (186), we can reach a conclusion that it requires that the intentional willfulness or purposefulness be



available, as well as the trespass or transgression for the extra-contractual or negligent liability from personal acts to arise, and the transgressor or trespasser will be obliged to compensate. In brief we can infer that the article (186) refers to the fault rather than to the mere transgression or trespass itself, because it requires that two basic elements be satisfied. And the combination of both the willfulness and trespass or encroachment means the perpetration of the basic element of fault<sup>(46)</sup>. And these two elements should be combined together or available in the liability (guaranteeing) of both the perpetrator of the wrongful act and the abettor.

Second: The fundamental element of the damage: it is considered as the second fundamental element of the of the extra-contractual "civil liability from personal acts". The damage is the hurt or injury from which the aggrieved or injured (damaged) party suffers. Therefore, no liability will emerge without damage<sup>(47)</sup>. Furthermore, It is sub-categorized into material and moral damage. The material damage is the hurt or injury which happens the plaintiff's body, property, right or a legal interest. Whereas the moral (mental) damage is the injury which happens the plaintiff's feelings, emotions, honor, reputation, social standing, financial position (credibility), or other affairs of moral importance, in keeping with the first paragraph of the articles (205) and (222) of both the Iraqi and Egyptian civil codes respectively. As we have mentioned earlier, the service recipient, including the patient can suffer from both the material and moral damage, brought about by AI-powered diagnostic and curative (therapeutic) biases and errors. The service provider can also suffer from the material damage of MAI-powered algorithmic software caused by one of the above-mentioned AI-actors.

Third: The fundamental (basic) element of the causal link or the causation: it refers to the close connection between the wrongful act and the damage. Therefore nobody will be liable for any act perpetrated by a third party, because this is neither acceptable legally nor logically <sup>(48)</sup>. The general rule in both the Iraqi and Egyptian civil codes is that the causal link is usually broken, cut-off or disrupted by the extraneous cause. Therefore, it can be noted here that the causal link can easily be broken by a lot of AI-actors, such as AI-designer, AI-developer, AI-processor, AI-trainer, AI-tester<sup>(49)</sup>, who can incorporate biases and errors

to change the sequence of MAI-powered algorithmic software, and can be considered as an extraneous cause. If anyone of these AI-actors can prove that another AI-actor committed the AI-powered diagnostic and curative (therapeutic) biases and errors, he or she can exonerate or excuse him-or-herself from the extra-contractual civil liability. In conformity with the articles (211) of the "Iraqi civil code", which provided that "A person who has established that the injury had arisen from an extraneous cause beyond his control, such as by an act of God, sudden accident, a force majeure, by the act of a third party or the fault of the injured himself, shall not be liable on damages unless there is a provision (in the law) or an agreement otherwise". And the articles (165) of the Egyptian civil codes, which provided that "In the absence of a provision of the law or an agreement to the contrary, a person is not liable to make reparation, if he proves that the injury resulted from an extraneous cause beyond his control, such as unforeseen circumstances, force majeure, the fault of the victim or of a third party". Finally three remarks should be made: first the causal link or the causation within the concept of the extra-contractual civil liability means that the damage is the direct consequence of the breach or the violation of the legal obligation of not harming anyone<sup>(50)</sup>. Second it is too difficult to prove the source of the AI-powered biases and errors<sup>(51)</sup>. third the greater are the AI-learning capabilities, the greater will be the potentials of the AI-machine-learning algorithms, and AI-autonomy to have a disruptive effect on the causal link between the AI-powered biases and errors and the damage<sup>(52)</sup>. Therefore the AI-machine-learning capability can disrupt or break the causal link between the AI-powered biases and errors caused by any of the above-mentioned AI-actors or the parties involved and the damage, in order to prove the AI-biases and errors of another actor.

### **2.3. The Vicarious Liability Arising from the AI-Powered Diagnostic and Curative (Therapeutic) Biases and Errors**

The vicarious liability is defined as the accountability or responsibility of the employer from his or her employee's harmful act. Trying to apply the legal general rules of this type of extra-contractual liability in both the Iraqi and Egyptian civil codes, we would be encountered by many difficulties. Therefore, many remarks and



observations should be made about these difficulties: first it is difficult to consider the (AI) in general, and (MAI) in particular as employees, in order for the employer to become vicariously liable for the AI-powered diagnostic and curative (therapeutic) biases and errors.

It is a common ground that the AI-system does not acquire the legal personality, and consequently cannot be considered as an employee. Therefore the MAI-service provider cannot be vicariously liable as an employer for the AI-Powered algorithmic biases and errors made by the MAI-system. It is difficult to consider the (AI) itself as an employee, Because it does not enjoy or entertain the legal personality. Instead the employer (MAI-service provider) can only be vicariously liable for the AI-Powered algorithmic biases and errors, arising or emerging from the erroneous or biased AI-algorithm software, and leading to erroneous or biased AI-diagnosis and treatment. Particularly the biases and errors introduced by such AI-actors as AI-designer, AI-developer, AI-trainer, AI-tester or AI-processor, for learning the machine. If one of these actors or parties is supposedly to be an employee, and connected with the service provider by a relation of subordination. Therefore these types of AI-actors might be considered as employees, and the employer would be vicariously liable for the MAI-powered biases and errors, which the actors insert or incorporate into the structure of the MAI-driven algorithmic software. Second the situation of the Egyptian civil code is better than that of the Iraqi civil code, since it contained a general rule, in accordance with which every employer is vicariously liable for wrongful acts of his or her employees. According to the article (174), which provided that "A master "employer" is liable for the damage caused by an unlawful act of his servant "employee", when the act was performed by the servant in the course, or as a result, of his employment. The relationship between master and servant exists even when the master has not been free to choose his servant, provided he has actual powers of supervision and control over his servant". While the article (219) of the Iraqi civil code determined the employer as narrowly as possible, and identified certain organs as employers. Such as government, municipalities and other institutions which render a public service as well as every person who exploits an industrial or commercial enterprise. And provided that "1- Government, municipalities and other institutions

which perform a public service as well as every person who exploits an industrial or commercial enterprise are responsible for the damage (injury) caused by their employees if the injury resulted from an encroachment committed by them in the course of their service. 2-The employer will be able to relieve himself of the liability if he establishes that he had exercised the necessary care to prevent the injury or that the injury would have happened had he exercised the necessary care (caution)". Third notwithstanding this shortcoming or weakness in the situation of the "Iraqi civil code", the article (219) can be applied on the MAI-powered biases and errors, which the AI-actors insert or incorporate into the structure and sequence of the MAI-powered algorithmic software, and consider them as employees of the institutions which render a public service, such as hospitals, as employers that are vicariously liable for the AI-powered diagnostic and curative (therapeutic) biases and errors. Fourth the materialization of the vicarious liability entails three requirements to be satisfied<sup>(53)</sup>: 1- First: The existence of the relation of the subordination between the employer and employee<sup>(54)</sup>, on the basis of the authority imposed by the master on the servant<sup>(55)</sup>. The employer might be the company designing the AI-algorithm, providing the dataset to train the AI-algorithm or developing the AI-algorithm<sup>(56)</sup>. The employee would be the AI-designer, provider, trainer or developer<sup>(57)</sup>. 2- Second: The error or fault committed by the employee: The second requirement to be satisfied is represented by the bias, error or fault, which is committed by the employee, and embodied by unlawful or wrongful act<sup>(58)</sup>. Particularly the AI-biases and AI-errors. This fault may either be "rebuttable or irrebuttable". But it should always be rebuttable, in conformity with the second paragraph of the article (219) of the "Iraqi civil code". 3- In the course of employment: This means that the Iraqi law-maker restricts the emergence or emanation of the vicarious liability to the case in which the perpetration of the fault by the employee or the servant must happen in the course of his or her employment to the employer<sup>(59)</sup>. If the employee commits the error or fault as a personal unlawful act, because of the employment, but not in its course or during it, the employer's vicarious liability would not arise. According to the article (219) of the "Iraqi civil code", as opposite to the article (174) of the "Egyptian civil code" No 131 of



1948. Which considers the employee liable, even though the fault was committed due to the employment. We can conclude that the Egyptian text is more suitable for the AI-powered biases and errors, committed by some AI-actors, as explained earlier.

#### **2.4.The Strict-Liability Arising from the AI-Powered Diagnostic and Curative (Therapeutic) Biases and Errors**

Understandably, the strict-liability is established on the fundamental element of the damage (hurt), rather than the element of the error (fault), on which the civil liability from personal illegal acts is established. The victim or the aggrieved party is only required to prove three fundamental elements or requirements for the strict-liability to arise: the abnormally or exceptionally risky act leading to the damage, the damage itself, upon which the strict-liability is based, and the causal link or causation between the damage and the risk-driven act. Therefore one of the Iraqi civil code jurists or scholars defines<sup>(60)</sup> the strict-liability as a type of civil liability, which completely eliminates the concept of the fault (error), and is based only on the concept of the damage, without proving the element of fault, on which the fault-based liability is based.

Although the strict-liability principle is distinguished by its material or objective tendency, but it is applied as narrowly as possible in the Iraqi civil code, on the liability of the minor or any one in his or her status in the article (191). The modern attitudes of the comparative law encourage the extension of its applications, due to the latest developments in the field of technology, particularly the AI-based algorithmic technology. Therefore, logically speaking, the strict-liability principle is most suitable for AI-powered diagnostic and curative biases and errors, caused by various AI-actors. The suitability of this principle for compensating victims of AI-powered diagnostic and curative biases and errors emanates from the fact that it is based on the element of the damage rather than the fault (error), which is difficult to prove, due to the variety or multitude of such AI-actors as AI-designer, AI-developer, AI-processor, AI-trainer, AI-tester, or even AI-provider, who might break, disrupt or cut off the causal link between the AI-powered diagnostic and curative biases and errors and the damage from which the

victims suffered. This also means that the proof of the causal link between the harmful algorithmic errors or biases and the damage will be very difficult. Therefore, the strict-liability principle would be the most appropriate to compensate the damage caused by MAI-systems. Particularly when the AI-algorithmic-software learns biases and error<sup>(61)</sup>. There are situations in which many AI-actors might contribute to teach or indoctrinate MAI-algorithmic-software the undesirable biases and errors. It is relevant in this context that three basic elements or fundamental requirements must be satisfied, in order for the strict-liability to emerge or emanate: 1- The abnormally or exceptionally risky act: the first requirement which should be satisfied, in order for the strict-liability to emerge is the risk-driven act. That is, it must be abnormally or exceptionally dangerous or risky, and implies the probability or likelihood of causing the damage. Therefore, the risk is defined<sup>(62)</sup> as the uncertainty concerning the occurrence of a loss, and the conditions under which the individual can estimate the probabilities or likelihood of certain outcomes. Because the "Iraqi civil code" is highly affected by the Islamic jurisprudence, the principle or doctrine of the (Cujus est commodum ejus debet esse incommodum) can be easily applied<sup>(63)</sup>, it can also be applied in the Egyptian law, so as to consider the AI-algorithm manufacturing companies and medical service providers strictly liable for the damage caused by AI-powered diagnostic and curative biases and errors. 2- The damage (harm) suffered by the service recipient: this requirement is considered the most important element, because the strict-liability is based upon the element of the damage<sup>(64)</sup>, rather than the element of the fault, upon which the civil liability from personal wrongful acts is based. 3- The causation or causal link between abnormally or exceptionally risky act and damage: The victim or service recipient must prove the causal link or causation between the damage and the abnormally or exceptionally risky acts, represented by AI-powered diagnostic and curative biases and errors. If the victim succeeds in proving this link, the defendant's strict liability will arise<sup>(65)</sup>. Because no one would be liable for the results of the acts perpetrated by the third party, which is neither acceptable legally nor logically<sup>(66)</sup>.



## 5. Conclusions

The conclusion is made up of both the findings and recommendations and as follows:

**First:** Findings: The study has reached the following findings:

1. The patient's informed consent of the AI-assisted diagnostic and curative procedures is analyzed into three major components: the physician's sufficient knowledge of how AI-algorithmic systems operate. The patient's sufficient information of the AI-powered diagnostic and curative (therapeutic) biases and errors. And the patient's option to accept or reject the AI-powered diagnosis and treatment.
2. Both the physician's sufficient knowledge of the AI-algorithmic systems, and the patient's sufficient information of the AI-powered diagnostic and curative (therapeutic) biases and errors, are considered as the cornerstone of one of the most fundamental obligations of the physician or clinician. namely the obligation of the disclosure of information to the service recipient or the patient concerning MAI-algorithmic biases and errors.
3. The MAI-driven biases are categorized into three types: Data biases, algorithmic biases and outcome biases.
4. The system of the civil liability engages in providing a remedial function to protect victims in general, and service recipients and patients in particular, and compensate them from the damage exposed and the costs incurred by erroneous and biased AI-powered algorithmic diagnosis and treatment.
5. It is difficult to apply the personal extra-contractual liability of the MAI-service provider, arising from AI-powered diagnostic and curative biases and errors. because it is too difficult to prove the source of the AI-powered biases and errors. And the causal link between the AI-biases and errors can easily be broken by a lot of AI-actors, such as AI-designer, AI-developer, AI-processor, AI-trainer, AI-tester, who might incorporate biases and errors in the MAI-powered algorithmic software, and can be considered as an extraneous cause.
6. The service provider's contractual liability from the AI-powered diagnostic and curative biases And errors, arises when the service provider breach one of the contractual obligations generated by the medical contract, which is concluded between the service provider and the service recipient (patient).

Especially the obligation of the disclosure of information to the service recipient or the patient concerning MAI-algorithmic biases and errors. Which might cause a great deal of harm to the patient.

7. As far as the application of the vicarious liability on the AI-system is concerned, it is difficult to consider the (AI) in general, and (MAI) in particular as employees, in order for the employer to become vicariously liable for the AI-powered diagnostic and curative biases and errors.
8. The employer (MAI-service provider) can only be vicariously liable for the AI-Powered algorithmic biases and errors, emerging from the erroneous or biased AI-algorithm software, and leading to erroneous or biased AI-diagnosis and treatment. If the biases and errors are introduced by such AI-actors as AI-designer, AI-developer, AI-trainer, AI-tester or AI-processor, for learning the machine.
9. The strict-liability principle is most suitable for AI-powered diagnostic and curative biases and errors, caused by various AI-actors. The logics of the suitability of this principle for compensating victims of AI-powered diagnostic and curative biases and errors, emanates from the fact that it is based on the element of the damage rather than the fault (error), which is difficult to prove, due to the variety or multitude of such AI-actors as AI-designer, AI-developer, AI-processor, AI-trainer, AI-tester, or even AI-provider, who might break, disrupt or cut off the causal link between the AI-powered diagnostic and curative biases and errors and the damage from which the victims suffered.

**Second:** Recommendations: After reflecting the outcomes of the study, the researcher suggests two significant recommendations:

- 1- The researcher recommends that both the Iraqi and Egyptian law-makers widen the scope of the application of the strict-liability principle, and establish the civil liability from the AI-powered diagnostic and curative biases and errors, caused by various AI-actors, on the strict-liability, particularly the strict-liability to compensate victims from MAI-powered diagnosis and treatment, based upon the erroneous and biased AI-algorithm software, caused by various AI-actors. The strict-liability is the most appropriate type of civil liability to situations like these, because of the difficulty of proving the causal link, given the multitude of the AI-actors affecting the AI-machine learning, for example, the AI-designer, AI-developer, AI-trainer,



AI-tester, AI-provider, AI-processor or even the end-user. Therefore the researcher suggests that both the Iraqi and Egyptian legislators adopt the following text: (The liability from the AI-powered diagnostic and curative biases and errors, arising from the erroneous and biased AI-algorithm software, caused by various AI-actors, should be established merely on the basic element of the damage, irrespective of proving the basic element of fault, embodied by the willfulness and transgression of the perpetrator of the wrongful act).

- 2- The researcher recommends that both the Iraqi and Egyptian law-makers adopt the vicarious liability of the employer from the AI-Powered algorithmic biases and errors, arising or emerging from the erroneous or biased AI-algorithm software, Which leads to erroneous or biased AI-diagnosis and treatment. Particularly the biases and errors committed by such AI-actors employees as AI-designer, AI-developer, AI-trainer, AI-tester or AI-processor. Therefore the researcher suggests that the Iraqi legislator adopt the following text: (The employer (MAI-service provider) might be vicariously liable for the AI-Powered algorithmic biases and errors, arising or emerging from the erroneous or biased AI-algorithm software, Which leads to erroneous or biased AI-diagnosis and treatment. Particularly the biases and errors committed by such employees (AI-actors) as AI-designer, AI-developer, AI-trainer, AI-tester or AI-processor, for learning the machine, in the course of the employment or due to it).

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### Notes:

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