

Sehreen Far Bokhari^{*} Muhammad Jawwad^{**} Aqsa Abdulghafar^{***}

CYBER CRIMES, ONLINE HEALTH CARE SYSTEMS AND MORALITY

Abstract

Modern scientific inventions have shown their effects in every field of human life. The developments in cyber technology in the form of various software for chatting, mailing and record keeping have made personal and official correspondence easier. As far as medical matters are concerned, due to computer-generated technologies, patient's records are now saved with the help of especially developed software instead of saving data in paper-based filing system. The advantage is that all the patient's records are categorized and compiled which makes it easier to keep them safe and access them when needed. In addition, the patient's ailment history is constantly listed and updated, which helps with his/her future treatments easier. The another benefit of relying on online records is that medical experts do not have to rely on patients to provide data nor it requires heavy paperwork for the maintenance of patient's record both by the patient and by the health providers. This feature of technological development looks very attractive in the world of healthcare but it has its own disadvantages. The recent study analyses the benefits and draw backs of the adaptation of this advanced method of record keeping as it involves the hazards of data alteration, hacking and identity theft. These problems are discussed in reference with ethical notions of personal integrity and individuality.

Key Words: Cyber technology, paperwork, record keeping, integrity, individuality.

Modern technological development has converted numerous impossibilities into possibilities. From the invention of printing press to complicated printing devices, and from agricultural to industrial societies human beings have found new ways to maintain their socio-economic and geo-political relations. The technological development has opened new horizons for human mind to reshape the traditional patterns of living. The dimensions of scientific expansion point clearly towards information technology as a major player in the contemporary hi-tech world. Internet is a remarkable invention that has redesigned the social structure of human societies in the form of modified economic, financial, psychological and moral values. In April 2022 five billion active internet users are recorded which is almost 63 percent of the overall global population. Moreover, it is also mentioned that 4.65 of the total population are the social media users. Most of the users belonged to China, India and the United States.¹

Information technology in the twenty first century is working as a facilitator in the replacement of old ways of communication on workplaces. Ongoing technological modernization of countries has increased the number of internet users in public and private sectors. This technological advancement not only associates people with their loved ones across significant distances through internet-based apps but also enables professionals to share and communicate their ideas regarding official or professional matters with the help of online resources.² It may look impressive that people are getting more and more familiar with modern technologies and bringing comforts in their life styles but humans, due to some destructive inclinations, are facing a number of problems in the utilization of modern resources for

^{*} Sehreen Far Bokhari, Assistant Professor, Department of Philosophy, University of the Punjab, Lahore

^{**} Dr. Muhammad Jawwad, Assistant Professor, Department of Philosophy, University of the Punjab, Lahore

^{***} Aqsa Abdulghafar, Research Scholar, Department of Philosophy, University of the Punjab, Lahore

communication. The gap between traditional and contemporary perceptions of ethical values in recent era is a major problem to be faced in current socio-technological atmosphere. In other words, new challenges are visible due to the effect of this major invention in the perspective of applied ethics. Moral values are redesigned with the passage of time and have given new dimensions to the mankind. One may disagree with the view of proponents of Psychological Egoism that human beings are not selfish naturally, but it will be hard to deny that human beings seek their own interests by fulfilling their desires of being authoritative, powerful and loved by others. To obtain the desired targets or remaining failed to achieve them, an individual may become tyrant, revengeful, aggressive and pugnacious. The effects of these emotional reactions can be seen not only on individual but also on communal level.

The reflection of the negative human traits can be found in the cyber world in the form of *hacking* or *data/identity-theft*. *Hacking* is defined as an unauthorized access to any data in a system or computer³ whereas *Data* or *identity theft* is stealing computerized information from an uninformed person with the purpose of compromising privacy or gaining private/ confidential information to make it publically visible or to use it for some other malicious purposes.⁴ As the advent of computers and online access to the data have made it easier for the authorized users to remain in touch with their desired information, organizations of various fields of life keep online records of their policies, strategies, clients, consumers and transactions. Although manual means of preserving records are also in practices but electronic facility is considered more convenient in organizing, accessing, gathering, securing and sharing data. Organizations use special soft wares for the security and confidentiality of their records⁵ but sharp minded hackers often break security measures and get unauthorized access to the confidential materials.

Low level security measures, huge data and direct connections with *e-commerce* sites make e-commerce industry the most prone to hacker's attacks.⁶ On electronic-commerce sites, consumer's protection issues are common because there is an absence of certainty which causes an obstacle to full-scale electronic business. Barely any day abandons significant new things on security and protection issues⁷. In 2014, a cyber-attack on e-commerce can be witnessed when an online business giant *eBay* asked its 145 million customers to change their passwords. The authorities of *eBay* notified their consumers that unknown hackers tried to encrypt passwords, steel email/ mailing addresses, birth dates, and other important data in an attack carried out between late February and early March 2014.

Therefore, the users must be replacing their old passwords with the new ones. Later on, it was also reported that the stolen files did not contain financial information of consumers.⁸

The online stores are hit by the cyber criminals not because of the products, but because of all online data of consumer or clients. The hackers sell stolen user lists online or use it to commit identity theft and fraud. *Business Insider* reported that at least sixteen retailers encountered separate security breaches during 2017⁹. A cyber security firm *Shape Security* stated that almost 90% of the login attempts made on online retailers' websites are the results of using stolen data by hackers.¹⁰ Some other big names in business industry like *Forever 21*¹¹, *Adidas*, *Sears*, *Arby's*, *Gamestop*, *Delta* and *BestBuy* also asked their customers to remain cautious regarding the malicious software used by cyber criminals to steal card credit card numbers, expiration dates, verification codes and sometimes names of the cardholders.¹² Likewise, many others renowned companies including Microsoft, Facebook, JBS (the third largest meat processor) became victims of cybercriminal activities during 2021.¹³

The technological benefits are not only utilized by e-commerce but also by the health sector in the maintenance of patient's records to make health care procedures more convenient. The record of patient affects the efficacy of health organizations and medical insurance companies. Before the advent of electronic record keeping, the identities of patients, facts regarding diseases, laboratory reports and third party payments were secured in paper based medical records. Although this traditional method of record keeping is not completely replaced by electronic record keeping systems, but most of the technologically advanced countries use special software of *e.record* keeping in the maintenance of their health care services. The *Electronic Medical Record* (EMR) is the digital equivalent of paper based records in the hospitals or clinics whereas the *Electronic Health Records* (EHRs) pay attention on the overall health conditions of the patient with a broader view on a patient's care. Usually both terms are used interchangeably but there are slight differences between them.¹⁴ The EMRs contain the details of patient's identity and demographic physiognomies, medications, reactions, allergies, consultation note by a particular healthcare provider. The EHRs are designed to share facts and history of the patient with other health care providers, such as laboratories and specialists, so they may have access to the information from all the clinicians involved in mater of the patient's care and cure. In other words, computerized records of the patients can be considered as *cognitive artifacts* which provide assistance in managing and organizing electronic data of patients.¹⁵ Another benefit of EMR and EHR is computerized physician order entry systems (CPOE) which help in the elimination or reduction of medication errors. CPOE systems enable licensed healthcare professionals to transmit electronic prescriptions, orders regarding radiology or labs and administer online medication record or review the ongoing treatment of the patient.¹⁶ CPOE has been shown to decrease adverse drug effects (ADE) up to 80 percent. It means that the patients will not staying in the hospital for long period of time and it will also reduce financial burdens of hospital expenditures. With the help of CPOE, the paramedical staff and pharmacists will be able to reduce their work load and save time because they will not have to understand handwritten orders. The physicians will be showing more efficiency and potential because they will not be interrupted again and again for the interpretation of their orders while nurses will be more available to provide assistance to the patients.¹⁷ *Carecloud, Epic, Athenahealth, Allscripts, NextGen, eClinicalWorks* are the some of the top venders in providing EHR's software to the health organizations.¹⁸

Health organizations, like e-commerce business, face similar data breaching activities and threats. The hackers sell the stolen records of the patients for profit on the black market and the buyers might use the information to create fake IDs to purchase medical equipment, paraphernalia or drugs, or to file a fabricated and deceitful insurance claim.¹⁹

According to the *Black Book Research*, 93% healthcare organizations of the United States of America reported various attempts of data breach within last five years. The research also mentions that over the similar timeframe, more than 50% of healthcare organizations have suffered at least five incidents.²⁰

In May 2017, a ransomware²¹ *WannaCry* severely affected functionalities of the National Health Services in England. The ransomware encrypted records on 230000 computers in 150 countries by blocking key systems and preventing health workers from getting patient's data. Although *WannaCry* attack also impaired other major organizations like FedEx, Nissan, the Bank of China and Russian Railways but NHS was mostly affected by the attack.²² The

government of United Kingdom and the United States of America accused North Korea for damaging the financial and health organization through the *WannaCry* malware attack.²³

All scientific researches follow utilitarian approach in opening new prospects for humans to attain more psychological, physiological and financial benefits. The main purpose of ethics is to pursue and promote good life by making conscious decisions; therefore it demands from inhabitants of the society to remain careful and cautious regarding their responsibilities towards their fellow beings.

Bioethics, being a branch of applied ethics, addresses *the respect for personal autonomy* on substantial level. Autonomy allows an individual to make his own right to choose among alternatives and helps him to maintain his own identity within his human society; moreover it also warns an individual to refrain from intervention in the matter of other persons. Immanuel Kant states that autonomy is based on the human capabilities to direct an individual's life in accordance with the rational principles. He states,

Everything in nature works in accordance with laws. Only a rational being has the capacity to act in accordance with the representation of laws, that is, in accordance with principles, or has a will. Since reason is required for the derivation of actions from laws, the will is nothing other than practical reason.²⁴

According to Kant only rational people are autonomous and respected because they are considered as ends in themselves due to their ability to determine their own destiny. Another nineteenth century philosopher John Stuart Mill says that a person shows autonomy by free thinking, deciding and acting without any restriction imposed by any external authority or person. Although Mill warns all free individuals to remain careful about damaging other persons because individual liberty may have limitations imposed by the state or society if and only if it shows harmfulness for fellow human beings.²⁵

In the maintenance of patient's electronic health and medical records, the principle of personal autonomy²⁶ must be considered as an essential ethical requirement. John Stuart Mill, as a proponent of individual liberty, would be considering it immoral to use any patient's data without prior permission from the patient or his guardians. It can be derived by Mill's contemplations that if someone is unaware of the outcomes of his actions, he must be prevented by the society or state. The autonomy of the patient can be witnessed in the maintenance of *Personal Health Record* (PHR) which is managed and maintained by the patient him/herself. Patients not only upload their medical details to get medical assistance from health care experts but can share appropriate parts of their treatment history with their loved ones. The PHR also helps people in the administration of their health and wellness.²⁷ Although against PHR, it is also recommended that this kind of high level of autonomy of patients may have direct conflicts with the medical and legal efficacy of a health record, therefore, patients ought to be restricted from amending or erasing any of the data entered by health care professionals; "however, it should be acceptable for autonomous patients to view, annotate, or challenge the record with relative ease".²⁸

In these days, general public regularly shares personal or public details to the Internet, and the fast social networking websites enable people to control their online presence. The electronic health care or record maintenance systems though facilitate patients in respecting their

autonomy but it can equally cause damage on practical levels. It can be explained by offering an example, as an individual does not usually bother to know the mechanism involved behind the functioning of his/her household appliances because he never feels any insecurity regarding his identity theft or defamation in the usage of these machines, but in the case of internet, there can be a number of possibilities of data breach, hacking or loss of identities. As most of the internet users remain unaware of the fact that their personal chats, details or records can be observed or monitored by some other persons who might use these details to damage the reputation, belongings and trustworthiness of the innocent users. Same can happen with patients who are used to monitor their health records electronically and these malicious activities directly hit the respect of autonomy of patients in the form of stolen details without their consents. Moreover, the question of data ownership needs attention because it can create conflicts among autonomous patients, clinicians and software designer companies.²⁹

Justice or equity, another principle of bioethics, is characterized as *fairness* regarding medicinal services and refers to society's obligation to give its individuals access to a sufficient degree of human services that satisfies fundamental needs. *Inequity* is the presence of avoidable differences among people on demographic, financial or geographical grounds. Health inequities comprise “more than inequality with respect to health determinants, access to the resources needed to improve and maintain health or health outcomes. They also entail a failure to avoid or overcome inequalities that infringe on fairness and human rights norms”.³⁰ The relations between physician and patient are different and not equal.

EHR frameworks are most gainful when they are easy to use, completely incorporated, effectively accessible, worked with very much planned equipment and software to provide maximum healthcare facilities to every patient regardless of demographic or geographic features. In spite of all positive characteristics of EHRs, it cannot be concluded that every single patient cannot have benefits from these records. The residents of rural areas do not have proper access to digital records therefore; unlike urban areas the implementation of EHR is difficult among providers in rural areas. It may be on lower side among providers who serve the patients from poor families, minorities and the uninsured persons.³¹ EHRs in this way prevent patients of lower financial status or distant geographical regions from picking up the full advantages of an available EHR framework.³²

Traditionally, the beneficent acts and intentions have a fundamental status in morality. Programs regarding social welfare, providence of scholarships to deserving students, and supporting communal health-related research are a few examples of beneficent acts. The term *beneficence* denotes acts or rules with the motives to facilitate others. The importance of rule of *beneficence* is that healthcare providers have an obligation to be of an advantage to the patient, just as to find a way to predict and to expel injury or harm from the patient. These obligations may be seen as balanced and obvious, and are generally acknowledged as the best possible objectives of medication. This standard is at the very heart of medicinal services suggesting that an enduring petitioner (the patient) can go into a relationship with one whom society has authorized as capable to give clinical consideration, believing that the doctor's central goal is to help. The objective of giving advantage can be applied both to singular patients and to the benefit of society as a whole.³³ John Stuart Mill says that the single principle of beneficence can resolve a number of moral conflicts by coherently unifying incompatible theories of ethics offered by different moral philosophers. He claims that the rule of beneficence assists objectively

in differentiating between right and wrong acts.³⁴ Kant does not support utilitarianism but highlights that it is an essential duty of every individual to remain helpful for others without having any prior self-interest.³⁵ EHRs are primarily designed to help the patients as well as the health care team members. The patient gets benefits because of the availability of the details regarding his history, allergies and treatments. He does not have to recall or remember all the details of his old diseases and treatment nor carry bundle of papers given by different medicinal experts, labs or insurance companies.

Another fundamental principle of bioethics *non-maleficence* states that an individual, either a healthcare professional or any person involved in some process of healthcare assistance, should not purposefully damage, injure or harm any patient.³⁶ In the maintenance of medical or health records, a medical practitioner or any authority from Software Company may alter the particulars of a patient. Technical incapability to operate the software, reluctance in sharing patient's details with other medical expert and lack of time in mentioning the details can be the other major possible factors which can harm physiological and psychological states of a person under treatment. John Stuart Mill defends individual's liberty by asserting that no one has any right to control an individual's acts but if a person's liberty restricts some other person's liberty or causes harm for others, he must be stopped by the society from doing that act.³⁷ Any society of physically healthy and mentally stable individuals affirms the realization of the importance of non-maleficence or not to harm principle. While offering his list of prima facie duties, W. D. Ross states that duty of non-maleficence is more binding than the duty of beneficence.³⁸ Whereas Beauchamp and Childress claim that the principle of beneficence is potentially more demanding than non-maleficence because the moral agent not only avoids harming others but also tries to give benefits to the fellow beings. The rules of non-maleficence and beneficence are not only rooted in the desire of achieving best possible consequences but these rules also work on deontological basis for not treating individuals as means to achieve other ends.³⁹ The physician is considered as an authority because he holds the position to decide the destiny of the person under his treatment. Morality demands from physicians to use their authority judicially, wisely and cautiously. There are sensible physicians who are used to rationally exercise the power granted to them, but there exist some medical practitioners who do not always act with utmost caution or place timely decisions. At this point, a wise physician protects his patient from harm by making intelligent decision in accordance with the rule of beneficence.

The above discussion presents an analysis of modern information technology in healthcare sector. Scientific achievements have given new directions to human mind but these reshaped patterns of life needs attention to resolve the matters which were not existent within the old and traditional practices. The conflict among the basic rules of medical ethics arises while adapting new record keeping methods. For example, the PHR software allows a patient to control each part of his/her data to respect the principle of autonomy, but if a person deliberately erases or hides some detail from the medical experts, it may work against the rules of beneficence and non-maleficence because he will not get the proper medical assistance in the absence of relevant data. And if the rules of beneficence and non-maleficence are to be followed strictly and patient cannot have any access to control his data, it will be against the rule of the respect of autonomy. Moreover, if a patient needs to hide some genuine issue from another physician but he is not given the right to control his own data, it will become a cause of anxiety and will be against the rule of autonomy. If a patient hides some previous treatment's details and medication from another physician, the medicine prescribed by the next doctor may have some dangerous

interaction with that previously given medicine. Therefore, the question of the legitimacy of giving granular control to the patient remains unanswered. Other than non-maleficence, benevolence and respect for autonomy, the rule of justice or equity also remains ambiguous because of demographic, geographic and regional differences.

Although Information technology sector in Pakistan is getting synchronized rapidly with domain of technology in rest of the world. Information technology is the most emerging field in health sector and playing its fundamental role not to compromise health issues of the individuals. Current scenario in Pakistan regarding the availability of centralized data of patients is not much impressive. The stakeholders involved in the project relating Pakistan Kidney and Liver Institute's (PKLI) Hepatitis Prevention and Treatment Centre (HPTC) realized the importance of EMRs for the welfare of patients therefore, the *Hospital Information Management System (HIMS)* was arranged to increase the facilities of medication. The system was inaugurated in March 2017 at PKLI-HPTC and has recorded 11,573 consultations with 4,620 patients under treatment.⁴⁰

The concept of EMRs is getting richer with the passage of time in different organizations and some leading health organizations are successfully utilizing EMRs, but the activity of fetching centralized data is limited within the different localities of same organization. *Indus Hospital, Karachi, Agha Khan University Hospital (Karachi), Shaukat Khanum Memorial Trust Hospital and Research Centre (Lahore)* and *Fauji Foundation* have adopted advanced means of health care providence by replacing paperwork with computerized data management systems. The *Shoukat Khanum Memorial Trust* has engaged some other hospitals within and outside Lahore to install its HIMS.⁴¹

Data mining is a concept in information technology where data is poled in centralized domain and everyone is free to grab the data according to its requirements. Gist of EHRs is still missing in domain of Pakistan. The private sector is trying to hold the basic requirement for data mining but still it does not exist in its true sense. The contribution on state level in this regard is negligible. Distant prescriptions and even surgeries are common phenomena in global scenario now a days, and it improving the quality of medical practice throughout the world. Although some organizations are providing basic infrastructure and canvas to practice medical activities from distance, but are rare and beyond the reach of common people due to technical and economic requirements. The true implementation of EHR is possible only when data is centralized and data mining is possible at any level either by individuals, organizations or authorities. In EHR's context, the major ethical concern related with data sharing is the privacy and security concern regarding the personal information of patients. Leakage of such kind of information can damage the person on physical, psychological and financial levels.

The journey of the progress of information technology is presenting advanced software to maintain huge records in electronic form. Like developed countries, the third world countries will have to get these electronic benefits to secure better future for upcoming generations. Pakistan, a third world country, is not having centralized EHRs in government hospitals. It can be derived by technological advancements in IT sector that Pakistan has to launch central electronic record keeping systems of patients. So, the threats faced by advanced countries should be examined keenly by the e-healthcare providers in Pakistan to develop more secure software. The government must involve expert authorities of information technology for the improvement of EHR to provide maximum assistance in diagnostics and medicinal treatment of patients. The

basic ethical principles must be followed in the implementation of newly developed computerized systems. Moreover, the legal framework must work effectively so that the efforts of data breaches and identity theft can be properly stopped. Although the *Prevention of Electronic Crimes Act, 2016* is active in Pakistan but still lot of measures and meaningful legislation is required on national level to avoid illegality in data security especially in healthcare procedures.

In the developed countries, where central EHRs are working effectively, and in the developing countries like Pakistan, where EMR (not HER) is functional in some private or semi government health organization, the problem of the proper implementation of the principles of bio-medical ethics will be having same value. The need is to design more secure software to secure data from hackers and the security precautions should be examined regularly. The stakeholders must be having proper knowledge of the utilization of the software so that they will comfortably make changes or add new details for the facilitation in the healthcare services.

Endnotes

¹ Joseph Johnson. "Worldwide digital population as of April 2022." *Statista*. May 09, 2022. <https://www.statista.com/statistics/617136/digital-population-worldwide/#statisticContainer>

² Even during pandemic, internet facilitated people in the maintenance of their professional and domestic affairs.

³ Sunil Kumar, "Hacking Attacks, Methods, Techniques and Their Protection Measures," *International Journal of Advance Research in Computer Science and Management* (IJARCSMS Publisher), no. 4 (May 2018): 2253-2258.

⁴ Rita O. Koyame-Marsh, John Marsh, "Data Breaches and Identity Theft: Costs and Responses." *IOSR Journal of Economics and Finance (IOSR-JEF)* (iosrjournals.org) 5, no. 6 (November- December 2014): 36-45. <https://www.iosrjournals.org>

⁵ Julia Hawley, "Best Record-Keeping Software for Your Small Business." *Investopedia*, accessed May 22, 2020. <https://www.investopedia.com>

⁶ David Batut, "All About Hacking Attacks in Ecommerce," *Cyber Forces*, accessed June 12, 2018. <https://cyberforces.com/en/hacking-attacks-ecommerce-part-1>

⁷ Godwin J. Udo, Privacy and security concern as major barriers for e-commerce(2001),USA

⁸ Jim Finkle, Soham Chatterjee and Lehar Maan. "EBay Asks 145 Million Users to Change Passwords After Cyber Attack," *Technology News*, accessed May 26, <https://www.reuters.com/article/us-ebay-password/ebay-asks-145-million-users-to-change-passwords-after-cyber-attack-idUSBREA4K0B420140521>

⁹ Dennis Green and Mary Hanbury, "If you shopped at these 16 stores in the last year, your data might have been stolen," *Business Insider*, accessed May 26, 2020, <https://www.businessinsider.com/data-breaches-2018-4>

¹⁰ Shape Security, *2018 Credential Spill Report*. Annual Report (California: Shape Security, 2019), 6.

¹² Green and Hanbury, "If you shopped..."

¹³ Kelsey Kinzer. "Top 5 Security Breaches of 2021." *jumpcloud*. December 31, 2021, accessed May 25, 2022, <https://jumpcloud.com/blog/top-5-security-breaches-of-2021>

¹⁴ Peter Garrett and Joshua Seidman, "EMR vs. EHR – What is the Difference?" *Health IT Buzz*, accessed June 7, 2020, <https://www.healthit.gov/buzz-blog/electronic-health-and-medical-records/emr-vs-ehr-difference>

¹⁵ Vimla L. Patel, Andre W. Kushniruk, Seungmi Yang and Jean-Francois Yale, "Impact of a Computer-based Patient Record System on Data Collection, Knowledge Organization, and Reasoning." *Journal of American Medical Information Association* (Oxford University Press) 7, no. 6 (Nov-Dec 2000): 569-585.

¹⁶ Margret Rouse, "Computerized Physician Order Entry (CPOE)," *SearchHealthIT*, accessed June 01, 2020, <https://searchhealthit.techtarget.com/definition/computerized-physician-order-entry-CPOE>

¹⁷ Margret. "Computerized Physician..."

¹⁸ "Top EHR Software Vendors of 2020 Comparison." *CareCloud*. CareCloud Corporation. accessed June 11, 2020, <https://www.carecloud.com/top-ehr-vendors/>

¹⁹ Linda Carroll, "Healthcare Data Hacking Could Lead to Identity Thefts," *Reuters*, accessed May 26, 2020, <https://www.reuters.com/article/us-health-privacy-cyber/healthcare-data-hacking-could-lead-to-identity-thefts-idUSKBN1W82K3>

²⁰ Charlie Osborne, "The latest healthcare data breaches in 2019/2020," *The Daily Swig-Cybersecurity News and Views*, accessed May 26, 2020, <https://portswigger.net/daily-swig/the-latest-healthcare-data-breaches>

²¹ *Ransomware* is malicious software that infects computer and displays messages demanding a fee to be paid in order for your system to work again. This class of malware is a criminal moneymaking scheme that can be installed through deceptive links in an email message, instant message or website. It has the ability to lock a computer screen or encrypt important, predetermined files with a password.

- ²² Saira Ghafur, Emilia Grass, Nick R Jennings and Ara Darzi, "The Challenges of Cybersecurity in Health care: the UK National Health Service as A Case Study," *The Lancet- Digital Health*, accessed May 25, 2020, [https://www.thelancet.com/journals/landig/issue/vol1no1/PIIS2589-7500\(19\)X0002-3](https://www.thelancet.com/journals/landig/issue/vol1no1/PIIS2589-7500(19)X0002-3)
- ²³ "Cyber-attack: US and UK blame North Korea for WannaCry," *BBC-News*, accessed May 26, 2020, <https://www.bbc.com/news/world-us-canada-42407488>
- ²⁴ Immanuel Kant, *Groundwork for the Metaphysics of Morals*, trans. Allen. W. Wood (New Haven and London: Yale University Press, 20020, 20.
- ²⁵ John Stuart Mill, *On Liberty -1859* (Kitchener, Ontario: Batoche Books Limited, 2001), 13.
- ²⁶ "What is a Personal Health Care Record?" *Evergreen Life*, accessed June 08, 2020, January 18, 2019. <https://www.evergreen-life.co.uk/health-and-wellbeing/what-is-a-personal-health-record>
- ²⁷ Paul C. Tang, Joan S. Ash, David W. Bates, J. Marc Overhage, and Daniel Z. Sands, "Personal Health Records: Definitions, Benefits, and Strategies for Overcoming Barriers to Adoption." *Journal of the American Medicine Informatics Association* (JAMIA) 13, no. 2 (March-April 2006): 121-126.
- ²⁸ John J. Mercuri, "The Ethics of Electronic Health Records," *Clinical Correlations*, accessed June 8, 2020, <https://www.clinicalcorrelations.org/2010/01/15/the-ethics-of-electronic-health-records/>
- ²⁹ Mercuri, "The Ethics of Electronic Health Records."
- ³⁰ "Equity- Health Systems," *World Health Organization (WHO)*, accessed June 10, 2020, <https://www.who.int/healthsystems/topics/equity/en/>
- ³¹ Christopher A Harle & Nir Menachemi, "Will Electronic Health Records Improve Healthcare quality? Challenges and Future Prospects," *Expert Review of Pharmacoeconomics & Outcomes Research* (Informa UK Limited) 12, no. 4 (2012): 1744-8379. <https://doi.org/10.1586/erp12.43>. (accessed June 10, 2020)
- ³² John J. Mercuri, "The Ethics of Electronic Health Records." accessed June 10, 2020, <https://www.clinicalcorrelations.org/2010/01/15/the-ethics-of-electronic-health-records/>
- ³³ Beauchamp T, Childress J. Principles of Biomedical Ethics,
- ³⁴ *Stanford Encyclopedia of Philosophy*, s.v. "The Principle of Beneficence in Applied Ethics." Accessed June 15, 2020, <https://plato.stanford.edu/entries/principle-beneficence/>
- ³⁵ *Stanford Encyclopedia*, "The Principle of..."
- ³⁶ Beauchamp T, Childress J. Principles of Biomedical Ethics,
- ³⁷ Mill, *On Liberty -1859*, 13.
- ³⁸ Luther J. Binkley, *Contemporary Ethical Theories* (New York: Philosophical Library, INC., 1961), 32.
- ³⁹ Tom L. Beauchamp & James S. Childress. *Principles of Biomedical Ethics* (New York: Oxford University Press, 2013), 101-292.
- ⁴⁰ The Punjab Information and Technology Board, Governmentt of the Punjab. *Electronic Medical Record & Hospital Information Management System*, accessed June 11, 2020, https://www.pitb.gov.pk/hims_automation
- ⁴¹ Dr. Hamid Mehmood , et al, "Electronic Health Record Systems; Perception And Evaluation Among Physicians In Pakistan," *The Professional Medical Journal* 24, no.1 (June 2020) : 182
DOI: 10.17957/TPMJ/17.3213