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Integration of AI and Wearable Devices for Continuous Cardiac Health Monitoring

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ABSTRACT

The all-new integrative and wearable technology and AI universal steady cardiac health checkup will redefine the entire concept of cardiovascular treatment where checkup-detection-diagnosis of diseases will be done at early stage, followed by targeted therapy in real time. In as much as pertains the improvement of cardiac health results, this paper presents the prospects and threats associated with the integration of wearable devices such as heart rate monitor, ECG and other similar devices with AI algorithms. It also means that benchmarks that result from processing data from wearable's can be established for AI systems in order to predict outcomes and consequently develop better care plans for ordinary patients. However, as of now, there are definite some certain ethically legally, and policy relevant concern with these technologies. Most is do with data ownership and privacy as well as understanding and obtaining the patients consent, dealing with the bias issue in regards to artificial intelligence basic decision making and ensuring explicit accountability and transparency throughout the process. Still to encourage innovation, and more mixing of smart wearable's and artificial intelligence, it means that the requirements have to be adaptive to guarantee safety without necessarily denting the set effectiveness. Another shift that has to occur in reimbursement structures is that the various new technologies have to be made available for use and, therefore, appropriate reimbursement structures for them has to be promoted. In addition, the assessment equally applauds that for AI to complement rather than supplant human discretion, the balance of maintaining, on the one hand, the doctor-patient relationship and, on the other hand, the technical should be achieved. After comparing the major concepts of both the wearable technology and the artificial intelligence, the two would revolutionaries the monitoring of cardiac health. However, success in the outgoing needs such important aspects as access, ethical and legal question to monitor the position that the achieved success does not deepen health inequality.

INTRODUCTION

Along with artificial intelligence wearable technology is among one of such massive leaps that humanity has made in health care overall, distributed and continuous cardiac health monitoring. CVDs lower the quality of life of millions of patients and are among the leading causes of diseases and death in the global population. Cardiac diseases include conditions like abnormally fast or slow heartbeats or any irregularity in the heart rhythms, high blood pressure and heart diseases that should be diagnosed and treated often. ECG was once used in clinical practice only and during repeated monitoring patients may have brief symptoms or occurring events away from therapy which are not observed by the monitor [1]. It has, for instance, enabled a differentiation of a patient's cardiac health over time without having to call for invasive methods; and then once the mark of change has been noticed, a perfect fixation is conducted; and thus, healthcare can become so unique.

All of the basic electric heart activity should be detectable with wearable technology which could be as simple as smart wrist bands and wrist worn fitness trackers, and ECG patch and biosensors. These gadgets enable a person to manage their wellbeing and offer doctors data about the condition of a patient in the course of time. However, attempting to assess the quantity and the degree of subdivision offered by wearable's remains somewhat challenging even if specificity has been attempted without the aid of data science proficiency which offers an opening for the use of artificial intelligence [2]. The real-time throughput of extensive data sets may be powered by elements of machine learning together with deep learning models as well as every other display of artificial intelligence. This makes it possible to be able to identify some characteristics, and be able to make anticipations as regards the probability of a paroxysm afore it is evident or lethal.

Smart fashion AI applications of the said cardiac monitoring are intended to provide the benefit of wearable data analysis

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to support a broad range of treatments. It includes diagnosis of fluctuating blood pressure, arrhythmia, and other signs as an indication of steady decline of the cardiovascular pathology. As a result, life threatening cardiac episodes can be identified provided the machine learning models are taught to analyze the arrhythmic patterns and inform the user or a doctor of possible dangers [3]. For example, current deep learning algorithms have achieved high success rates of diagnosing cases of arrhythmia and in some cases have exceeded the results of certified cardiologists. Moreover, positive control measurements can also include that AI conceptualization ranges from understanding Cardiac to comprehensive perspective thus reducing chances of false statistics and recommendation view.

The possibility of applying the wearable devices with cardiac monitoring and artificial intelligence is limitless as for the potential for improving the health of population. Over time, it can help to lower the risk of hospitalization for cardiovascular events and at the same time also increase the numbers of diagnostic signals for preventive medicine [4]. Continuous surveillance can enhance adherence to the recommended prescribed medicine dosing and daily routines and enhance therapy strategies for patients with chronic diseases, such as AF, hypertension, or CHF. Wearable technology enables at risk persons to communicate or inform physicians or caregivers when certain observations have been made concerning cardiovascular diseases, modify behaviors or look for help. Taking advantage of the above benefits, the following challenge has to prevail to allow room for integrating wearable technology along with artificial intelligence in monitoring cardiac health. Still though, health data is unique because the information you deal with may be rather personal at times and thus, protection and privacy are still key considerations here. Much stress have to be placed on the fact that it is imperative that data collected from wearable's has to fulfill its intended use and has to be accurate always and this can only be done if the wearable's themselves are accurate. Wearable technology has to be durable and perform its functions with considerable precision and without causing users discomfort; AI algorithms must be prepped and fine-tuned with the use of various datasets to guarantee its success in population subcategories [5].

Wearable technology and artificial intelligence are revolutionizing the area of cardiac heath care. Both preventive as well as, when necessary, reactive care might undergo advancements in the form of an actual time monitor of risks associated with the heart as well as an effective implementation of recommendations regarding enhancement of the quality of ratings of patients and their overall quality of life. Yet, sustaining these returns requires continuous inspiration for wearables, AI, and the tools for data gathering and processing [6]. An extended and individualized model of healthcare is likely to involve Wearable's & AI of heart health, as research progresses.

WEARABLE CARDIAC MONITORING: IT'S CURRENT STATE

As additional no pharmacological continuous ambulatory monitoring devices in addition to conventional clinical applications, wearable devices are popular tools for evaluating cardiovascular activity. What was once simple pedometers have become biosensors capable of capturing most critical Cardiac parameters ranging from pressure, rate, rate variability and even ECG [7]. Some of these aspects that make Wearable Technology relevant include, the fact it is practical, mobile and available; with its ability to avail people to up to date health information besides enabling health care providers to monitor a patient's condition from a distance.

Wearable Heart Monitoring Devices: Different Kinds

A range of technologies are included in wearable cardiac monitoring systems, each specifically designed to meet particular health tracking requirements:

Smart watches: The Oxometric sensors which assess the heart rate and the HRV at the same time are incorporated into most of the present modish smart watches launched in the market by Apple, Samsung, and Fitbit and so on. In addition to providing conventional ECG outcomes, some of those products can also identify variations in the proper rhythms of the heart that might suggest diseases such as AFib. Smart watches are handy, and so can be adopted by many patients who would prefer unobtrusive, continuous monitoring [8].

ECG patches: The adhesive patches that are worn on the chest and provide much better steady long-term ECG information acquisition are from iRhythm and Zio [9]. Because these devices may continuously record ECG data for days or weeks and, therefore, provide an overall impression of the electrical activity of the heart, they are increasingly employed in clinical practice of patients who require a comprehensive evaluation of their cardiovascular system.

Chest Straps: While the chest straps like the Polar or Garmin, is relatively common during training and exercising, is has electrodes that will assist the device capture electricity from the heart that assists in accurate determination of the heart rates. Conventional PPG sensors are useful for any physical activity lovers and everyone who need precise monitoring of the HR from medical POV because of its high accuracy [10].

Blood Pressure Monitors: One of the methods used in wrist-wearable devices, including the Omron HeartGuide smart watch, is oscillometric. In contrast to other instruments that read blood pressure once only, these instruments by identifying blood pressure variations with time alert their users to their condition all round cardiovascular health, systolic and diastolic pressure inclusive.

Biosensor-Embedded Clothes: Thus, people are also able to effectively and inconspicuously utilize wearable external heart monitor that can easily be incorporated into clothes like a bra or a shirt, due to new technologies [11]. These devices in most cases, incorporate more biometric in one measurement for instance ECG, PPG and the rest. There are new opportunities of invisible constant health surveillance because of integration of sensors into garments.

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PATTERNS THAT CAN BE EMPLOYED TO MONITOR HEART CONDITION

A number of fundamental measures are tracked by wearable cardiac devices as markers of cardiovascular health:

Heart Rate and Heart Rate Variability (HRV): HRV provide information on stress trends and ration between sympathetic and parasympathetic of the ANS and heart rate is a simple index of heart function. Atrial fibrillation and other diseases of the heart depends on the variability in the rate [12]. Electrocardiogram is a test, which may reveal presence of any abnormality of the heart rate, including atrial or ventricular fibrillation, which is also a sign of certain forms of heart disease.

Blood Pressure: Changes in the blood pressure advocated for hypertension, which is a potential precursor of heart diseases and stroke. Blood pressure is one of the cardinal areas of cardiology health. Such monitoring usually enables consumers and almost everyone within the medical fraternity to keep track of updates in or to manage hypertension [13].

Popular Devices and Market Trends: As a result, it owes its growth to the technological advancement that took place as well as the increasing awareness of cardiovascular health, and a growing focus on preventive healthcare products. Consequently, the market of wearable health gadgets based on the results of the industry survey will also remain a growth with focused on cardiac monitoring function that can act as a key stimulant for consumers' interest [14]. Apart from the healthcare oriented companies like iRhythm and AliveCor that created the clinical grade products targeting to fit in between what COTS and MEs are, there are many more companies like Apple, Fitbit, Samsung and Garmin that set the standards for wearables for consumers. For example, Apple innovation in Wearable technology allows ECG and detection of abnormal rhythms in portable electronics. Wearable cardiac monitoring is also relatively well defined by far mostly attributable to Apple Watch that has been given clearance by the US-FA government for the ECG feature. Likewise, the specific medical use devices encompass the Zio Patch designated for the comprehensive ambulatory cardio analysis pertinent for testing required by healthcare centers more often due to these factors, including the enhanced recording time [15].

Issues and Things to Think About in the Present Environment: Wearable Cardiac Monitoring the Gross Potential Several challenges still remain even as the world is coming up with new inventions. With particular emphasis on consumer-level systems, the issue of accuracy and reliability of wearable sensors is one of the most frequently reported problems. For both 'AFib' and irregular heartbeat, the smart watches can identify and alert the user although their precision is not as high as clinical thermometers. Therefore, rather than assuming identities of expert systems in the performance of CAD examinations, they are marketed as support systems. Data security is another problem and privacy as well [16]. Although the schemes used in consumer devices are a long way off from the data encryption seen in medical grade equipment, arguably the most compelling issue that wearable's raise is data security, given the tsunami of health data that these devices generate. Nonetheless, the presented consumer grading wearables were fully adequate for personal and home use, though not completely compliant with some of the defined data formats and the strictly regulated paradigms of data interchange in health care providers' settings. Modern optimal devices like smart watches have emerged as perfect tools to monitoring heart status in real time constantly. They offer the citizens and health related active people with opportunities to regularly control the key markers of cardiac gens, besides blood pressure, pulse, ECG. These tools shall in themselves enhance the understanding of diseases as well as the possible routes for their treatment, and as a result shall in the long run increase efficiency in cardiovascular disease prevention. However, concerns that have been emerging from data security/ accuracy and health care need integration must be met for these tools to achieve their best utilization [17].

MANAGING CARDIOVASCULAR DISEASE WITH THE HELP OF AI

Since data integration, pattern recognition and forecast are feasible with the Overall AI system, the option for cardiac health monitor and wearable systems has gone up with the help of AI. Conventional CV assessments utilize a heterogeneous, non-standardized, physician-led approach to data gathering that may fail to capture profound new signs or threats. But an ordinary person, a patient, can use wearable technology any time, whether it is a smart watch, ECG patch, or clothes with biosensors to record ECG patterns, HRV and other vital health indicators continuously [18]. Such large data volumes become easily actionable through the use of such advanced technologies like artificial intelligence (AI) that helps to process such data and comes up with information needed to diagnose cardiovascular diseases, future probable health complications, and present simple health information based on an individual's health records.

Artificial Intelligence Methods for Heart Monitoring: Data collected from wearables is processed using several artificial intelligence approaches that include; deep learning model and classical machine learning [19]. These methods analyze continuous, high-dimensional data streams from multiple sensors to find anomalies and produce useful insights:

Machine Learning Algorithms: For outlines like risk profiling, heartbeat pattern identification, and so on, conventional machine learning algorithms like logistic regression, decision trees, support vector machines are applied. In the case of classification of new data originating from wearable's and in differentiating normal and pathological rhythms these models can be trained using episodes of cardiac data which are labeled [20].

Deep Learning Models: in tasks such as ECG waveform identification, both CNNs and RNNs models provided the

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highest accuracy to complex tasks. CNNs are useful when used in processing of ECG readings because they compute the least change that could herald an arrhythmia or any other heart complications [21]. As mentioned earlier the data collected by wearable's is in the form of time-series data and is therefore well suited to analysis using RNNs. This also improves surveillance and also patterns of cardiac health over some period of time in individuals.

Natural Language Processing (NLP): Many components of NLP are used in cardiac monitoring in data analysis and in communication between the patient and the provider. For a richer understanding of medical conditions, for example, in situation with patient generated data (symptoms) NLP could be utilized and combine it with sensor information [22].

AI Applications for Monitoring Cardiac Health: AI applications for wearable heart health monitoring comprise a number of notable areas of research to develop diagnostics and preventative healthcare interface:

Arrhythmia Detection: In particular, the algorithms are very efficient for recognizing the cases of the arrhythmia, including the AFib. It is these models that can distinguish patterns or even irregularities of the ECG and heart rhythm which, were it not for constant monitoring, would remain undiagnosed [23]. For instance, deep learning models are useful in AFib, which is relatively difficult to diagnose in clinical care because it is paroxysmal.

Analysis of Heart Rate Variability: Hear rate variability or HRV is one of the useful indices of the stress levels of cardiac autonomic functions". Consequently, to uncover stress response as well as potential vulnerabilities for developing hypertension, heart failure, or sudden cardiac arrest, AI models assess HRV. It is also valid in the long-term criterion, presumably the constant AI HRV tracking may also shed light on the effectiveness of stress-reducing processes alongside with the changes in life patterns [24].

Cardiovascular Event Predictive Modeling: To estimate the probability of a cardiovascular incident, retrospective and synchronal data are used, which the algorithms examine. For instance, small fluctuations, either within hours or days, in the patient's blood pressure, HRV or ECG have the potential of indicating the probability of the development of new complex chronic diseases such as heart failure or myocardial attack. In proactive healthcare where earliest possible interventions can lower the risk of severe cardiovascular events to a controlled level, such forecasts are real insightful [25]. Suggestions concerning health are retrieved based on the history of health profiles and activity and base-line values of each user statistically analyzed. There recommendations may include changing one's life style, changing ones exercise regime or recommending a certain individual to go and see a doctor. As it has been noted earlier, cardiac health is somewhat unique and it is related the actual behavior the environment and genetics Therefore such customization works well.

COLLECTING AND ACCOUNTING INFORMATION ON MEDICAL WEARABLE DEVICES

The foundation for creating wearable cardiac monitor is data gathering and analysis processes which enable effective and simultaneous measures of multiple cardiovascular parameters. In this case, there are various parameters in form of sensors such as blood pressure, blood oxygen, ECG, pulse rate, and pulse rate variability, which wearable technology employs Ive capture data in real-time [26]. Still, the usefulness of this data lies in how data is gathered, managed and analysed to furnish health gains. Because cardiovascular status is closely monitored, concerns related to data confidentiality, data accuracy and data sensitivity prevalence are critical and allow high level data processing in addition to strict data filtering.

Sensory and data acquisition features of wearable heart devices

A number of crucial sensors used in wearable cardiac devices record a range of information necessary for keeping an eye on cardiovascular health:

Photoplethysmography (PPG) Sensors: Primarily they are integrated to fitness trackers and smart watches for the recording of the HVR and the heart rate. They measure the variation in absorption of light due to blood flow, equivalent to heart beats, by placing a light on the skin [27]. PPG sensors are especially preferred since they don't come into contact with the patient's body; however, this kind of data acquisition is sensitive to skin color, motion, and light and is prone to further recalibration.

Electrocardiogram (ECG) Sensors: One key body function that requires electrical recording is in electrocardiogram, or ECG, in wearable applications that the sensors are found in patches, chest strap and in some smart watches. These sensors can identify such pathologies as arrhythmia or so called irregular palpitation, or provide relevant information regarding the type of heart rhythm [28]. So even though ECG sensors are considered to be better for cardiac monitoring when compared with PPG the size sensors may limit the portability and ease of the we believe is a big factor in wearables.

Blood Pressure Sensors: However, for simple BP measurement, an inflatable cuff is used; new wearable's introduced tiny sensors; use tried and tested techniques like PTT and PPG to measure blood pressure. Current advanced wearable blood pressure devices are still displaying an increase in reliability but they can offer semantics for non-stop monitoring without the requirement for massive and cumbersome apparatus [29].

Oxygen Saturation (SpO2) Sensors: It is also commonly used with PPG sensors to track the blood oxygen level of a patient it is used. Because low blood oxygen levels are sometimes related to cardiovascular issues, this measurement could be very important in identification of respiratory and or cardiac disorders [30].

Methods of Data Preprocessing: Wearable technology creates data which is basic in nature so may need primary processing including data cleansing with a view of ridding the data of unwanted attributes or noise in order to possess clean data that would be used in analysis. Important preprocessing actions include of:

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Signal Filtering and Noise Reduction: Wearable's cardiac data are prone to a high level of motion artifacts, variations of the light conditions, etc [31]. In addition to improve more accurate the heart rate and heart rhythm, there are some filtering including the band pass and low pass filters where it is use to minimize these undesirable signals mostly in PPG and ECG signals [32].
Data Normalization and Scaling: And when working with many devices or different time periods the data normalization is crucial because it brings obtained data to the required scale to make sure all the data are similar. Scaling helps to keep trends of the data, which is processed by AI systems, more comprehensible in terms of variability rather than be influenced by the different hummer irregularities [33].
Artifact Removal: Wearable technology: Such technology would be interfered by the user's movements such as walking or exercising. In order to eliminate the artifacts that are expected to contribute to the noise, the following techniques are applied: adaptive filtering, independent component analysis (ICA) and machine learning noise estimation [34].
Transmission and Storage of Data: Since the information gathered by wearable devices has to be transmitted and stored safely, it is innovative that data is transmitted wirelessly to cloud servers and be stored at the device as well. These most gadgets send output data through Bluetooth in real time to smartphone or other devices connected with the gadgets [35]. The said devices then relay the information to other secure servers in the cloud for which the caregivers can access and store the information. The transmission and storage of wearable health data depends on a number of crucial factors:
Real-Time Data Transmission: A wearable and the connected devices mostly rely on Bluetooth and Wi-Fi protocol for synchronous data transfer. However, while the streaming technique is continually used, the devices employ the periodic or batch transfer strategies to avoid energy consumption. These strategies include transmission of data at fixed time intervals or where the connection is feasible [36].
Cloud Storage and Data Security: Traditionally, the data collected is sent to what is known as cloud servers for storage and processing, and analysis. For this reason, patient data must not disclose, hence basic concepts like HIPAA, GDPR need to use, and encryption protocols are crucial because health information is valuable.
Edge Computing: Some wearable's working based on edge computing in which the computing takes place locally hence the number of request made to the cloud is minimized and hence the load that is placed on the cloud is minimized [37]. Therefore, edge computing allows the data to be analysed and alerts to be provided to the wearer as soon as possible instead the data to be transferred to the cloud to be processed by the wearable device.

ANALYZING AND PROCESSING DATA

Following preprocessing and secure transmission procedures the data is processed for effective information retrieval. The processed data is analyzed by AI-driven algorithms to find trends, spot anomalies, and generate predictions:
Pattern Recognition: For non-homo dynamic structures, relations between and within hjr, hjv, ECG and other measures can be given by the AI models. For example, time series data can be worked through with the help of recurrent neural networks (RNNs), which in turn will find the time and measure the threats such as, for example, fatigue, or burnout [38].
Abnormality Detection: Normal and abnormal will be the dispositions that signal will be able to possess by the AI systems that are created based on the labeled Cardiac data. For example, in using the waveform characteristics, the Convolutional neural networks, CNNs, is appropriate for identifying the arrhythmias of the ECG signal. The identification of deviations enables describing to patients or any person some context regarding heart conditions, such as tachycardia or atrial fibrillation [39].
Predictive Modeling: Another area of wearables exists because it explained that through a process called machine learning, the wearables present in this technology may be able to infer how likely the individual would experience another heart attack based on past information. To assist identify the population at enhanced risk of cardiac diseases and to provide early ambulatory care, models used include; blood pressure, heart, and heartbeat variability.

The combination of health care systems and Wearable Data using Artificial Intelligence

Organic use of AI in generating real data of wearable for cardiovascular patient attention and care, early diagnosis, timely health checkup, or personalization in prescription can be integrated into health care system only [40]. By incorporating biosensors, smartwatches, and ECG patches in practice, there is a chance of capturing ongoing general health information that paints picture of the patient's cardiac state. However, these solved a number of technical, legal, and integration questions that would enable the data's incorporation into the extant healthcare systems where it could then be highly reliable, secure and clinically useful.

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EXAMPLES OF AI WEARABLE DEVICES

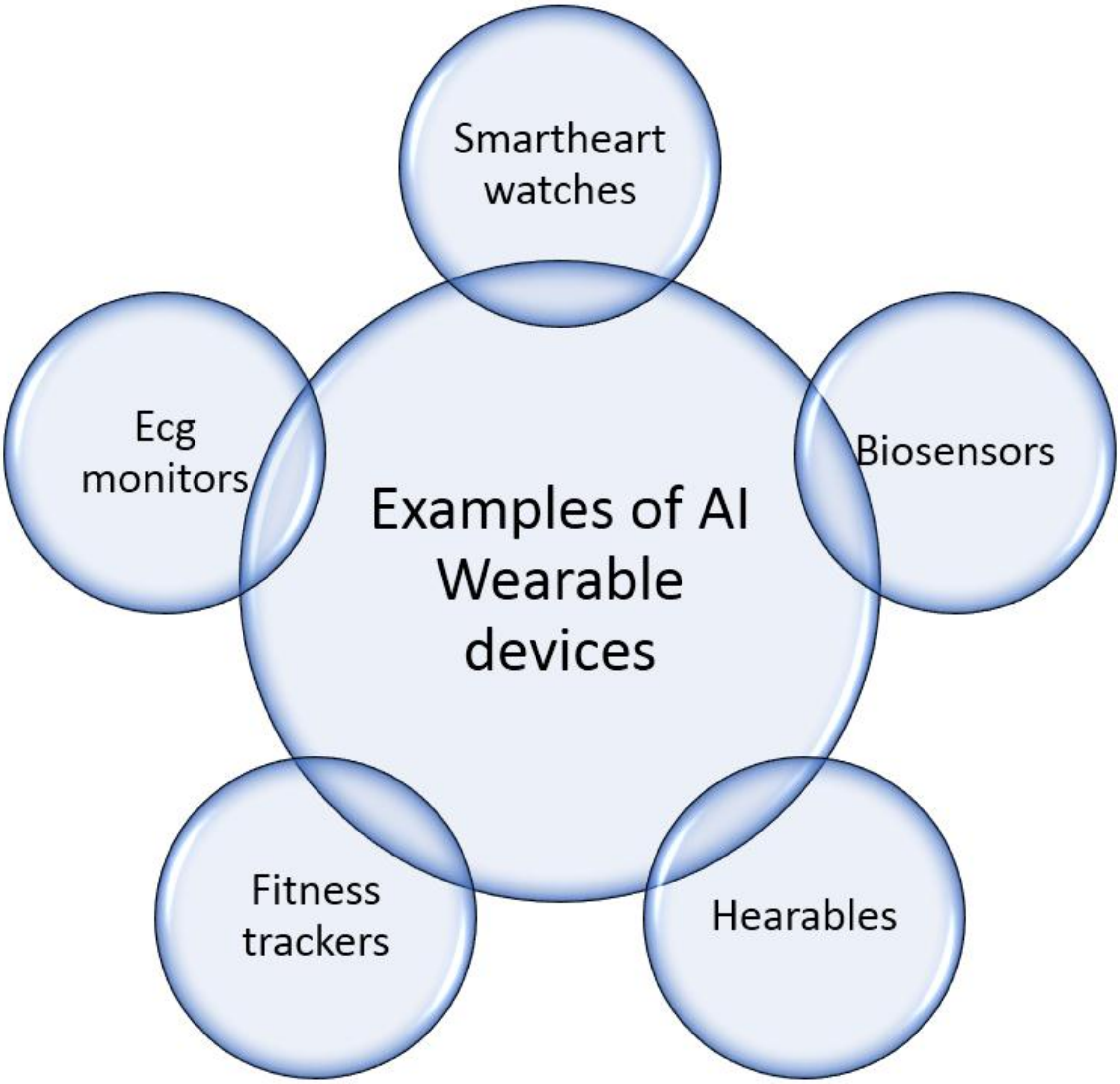

Figure: 1 showing examples of AI Wearable devices

SYNERGY BENEFITS OF INTEGRATION FOR HEALTH CARE ORGANIZATIONS.

There are many advantages to the smooth integration of wearable data with healthcare systems, particularly for individuals who are at risk for cardiovascular illnesses and other chronic conditions:

Continuous Monitoring and Early Detection: Clinicians can view signs like arrhythmias, hypertension, and irregular pattern of the heart rate, through data from wearable's which would take could far much longer to notice through simple check and examination. That stream of data is essential in proactive healthcare since symptoms that are not necessarily severe but do not need a call for aggravating medical procedures, can be diagnosed before forming part of a more complicated ailment [41].

Personalized Treatment Plans: Applied to wearable data, these operations make it much easier for the medical personnel to obtain vastly more detailed vision of each individual's particular lifestyle and his or her particular health tendencies. This information replaces general guideline such that the program can be developed to fit each client with their own particular health statistics [42]. For example, data regarding the rate of the heart and the level of the patient's activity with particular biomarkers of stress could be helpful in correct dosage of some medications as well as changes in the behavior

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or activity of the patient.

Remote Patient Management: Wearable technology therefore has utility to the medical practitioners since it enables them monitor the patients from afar. It is especially important for patients who require more frequent monitoring, for example, after cardiac surgery, with chronic heart disorders, for the patient with restricted mobility, or for those who might have limited ability to go to medical centers. A reduction in hospitalizations and readmissions, minimization of emergency-related admissions, and reduced costs of care are made possible by remote monitoring [43].

Data-Driven Clinical Decision Support: As for the wearable data, the work of AI algorithms is to analyze data that a doctor would never have time to consider, granular data. With these ideas in mind, clinical decision support systems (CDSS) can inform the potentials for cardiac risks to healthcare professionals this way, healthcare professionals can make better decisions much faster [44]. These lead to advocacy for efficient practices; accrued results; and a reduction on the diagnostic errors.

INTEGRATION DIFFICULTIES

Despite the substantial advantages, there are a number of important obstacles to overcome when incorporating wearable data into healthcare systems:

Data Standardization and Interoperability: There are millions of manufacturers today who already produce wearable technology and all develop unique data formats and connection procedures. Most importantly for effective implementation and as to enable data sharing these devices must be integrated with the hospital EHR system [45]. This problem is expected to be solved under some standards like the Fast Healthcare Interoperability Resources (FHIR) that outline the blueprint for the exchange of health data. But, the diffusion of this technology across the global platforms is not an easy thing to do.

Data Reliability and Quality: This means that the current wearable data can be of a low quality because of movement from users and the equipment, the positioning accuracy, and the sensors used. For patients, active health care systems require methods to validate and sanitize wearable data because clinical settings require decisions from sound-byte data. Preprocessing needs further refinement since methods that can eliminate noise and artifacts are essential to estimate data accuracy; moreover, repeated calibration of the device in different settings is inevitable [46].

Data Security and Privacy: Wearable technology is relevant in the current healthcare system because the type of information it transacts, shares, and stores is sensitive/health information; the information is accessed, managed, shared by multiple actors but with what level of privacy/security. The patients 'rights to privacy have occasioned the need to adhere to data protection laws including the General Data Protection Regulation (GDPR) of the European Union, and Health Insurance Portability and Accountability Act (HIPAA) of the United States [47]. It is compulsory for user consent management and encryption as well as safe storage to support secure integration architecture for the new online research platform.

Clinical Workflow Integration: The information collected henceforth as wearable data therefore has to be incorporated into the work of physicians in some way in which it makes things easier not more complicated if it is to serve any purpose in patient care. Nevertheless, if more data is introduced to it, there could be an 'alert fatigue' because heath care providers are always overloaded with information. For integration purposes intelligent data filtering and user friendly interfaces are necessary in order to prevent an overload of information for the healthcare provider and so that the physician only receives the information and the alarms that are useful from a medical point of view only [48].

Cost and Resource Restrictions: Wearable data integration to EHRs will need significant capital investment in structures and technologies for both the software and update. The problems which are associated with difficulties in accessing or at least availability to many HC organizations especially small clinics, rural-based etc Hence taking into a overall picture of blending wearables in clinics would require some time and adequate or relevant training of medical staff in the right usage of wearables data [49].

CURRENT INTEGRATION INITIATIVES AND EXAMPLES: THE INCREASE OF ATTEMPTS TO INTEGRATE WEARABLES WITH HEALTHCARE IS BEST ILLUSTRATED BY A FEW PROJECTS AND CASES

Programs for Remote Monitoring in Telehealth: Almost all the healthcare organizations have done innovations in the telehealth that incorporate wearable data to monitor patients from a distance due to the outbreak of COVID-19 epidemic. For instance, wearable technology can be applied by the individuals with cardiovascular diseases to measure his or her blood pressure, pulse [50]. It is then forwarded to their healthcare professional for evaluation for the benefits of the patient. Such measures have rather proved their value with regard to enhancing the engagement of the patients, as well as reducing the number of their readmission to hospitals.

Integration with EHR Systems: Secondly, to optimize the utilization of fast-growing wearable technology companies, some EHR providers including epic and Cerner are possibly merging. For example, Epic's MyChart app lets specialist's trade health measurements ptotfile data from Apple Health right to their clients who have iPhones and Apple Watches. This makes the organization of work convenient and easier since doctors can locate wearables data within the same setting they encounter other patients' data [51].

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Employer-Sponsored Wellness Programs and Insurance: When it comes to wellness programs, some of the companies and the insurance providers offering rebates regarding the wearable for health tracking. Since there are legal requirements for state secularity agreements to protect the data of participants, the wearable data gathered from such programs may be young with healthcare practitioners regarding an advised therapy plan [52].

NEW TECHNOLOGIES LIKE WEARABLE TECHNOLOGY AND ARTIFICIAL INTELLIGENCE IN A SYSTEMATIC MANNER: ACCELERATORS WITH DISADVANTAGES OF HEART HEALTH MONITOR

Based on the arguments above, one can assume that wearable technology and artificial intelligence to enhance heart health outcomes share the capacity for collecting continuation data, as well as typifying cardiovascular diseases and providing customized outputs for the optimum population's health. However, there are several issues and constrains which accompanies the implementation of these technologies in real life settings [53]. Some of these challenges include; screening issues, reliability of data, interoperability, privacy, compliance, equitable patient treatment using the technological application. In order to use the AI-enhanced wearable for cardiac monitoring, it is necessary to overcome the said problems.

Issues with Data Accuracy and Quality: Thus, if the technology is to be useful in cardiac monitoring, then wearable technology should be capable of performing the data capture in a high quality and with very precise measurements [54]. However, with wearable technology, there is always data inaccuracy as result of sensor restraint, movement, and environment and loss of a device. For instance, if the device is not placed properly or if the user is physically active then although the PPG sensors which are commonly used to count pulse rates give wrong results and result in data outliers. Major disadvantage of ECG sensors as compared to other sensors is that they are more accurate, but the electrical noise is its main concern and they also depend on the position of the instrument. All of these disparities are rather questionable, particularly when using wearable's to attain dependable medical-grade tracking [55]. Any mistake could show reports that are misleading and cause the user unnecessary anxiety that he or she has a particular health ailment, or on the other hand, give the user a clean bill of health when in actual sense he or she does have a particular ailment. Since AI algorithms rely heavily on the quality of the input data, they therefore eliminate noise and also recognize anomalies despite being programmed to do so. However, as with most wearable data, there are some challenges with regarding to its randomness with regards to clinical utilization, wearable data needs preprocessing to enhance the data quality through normalization and noise removal.

Limited Device and System Interoperability: Another area of concern with regards to implementing wearable data into the health care systems is connectivity. At present, many companies make wearable technology and they have a so called closed data exchange and a closed application protocol. This absence of standardization therefore mean that, it becomes even more difficult to populate wearable data into the EHRs, or for devices to exchange data to and from various systems in the healthcare domain. For example, a patient may wear four devices like blood pressure monitor, pulse oximetry, and heart monitor while a hospital may interface many such users; but collecting data from different devices about a particular patient may be difficult if there is no similar standards [56]. However, the cultural aspect of data sharing is still under development, while others like the FHIR standards are already trying to develop general methods of exchanging data. I anticipate clinicians to have a challenge in Retrieving well-coordinated data of wearable data until interoperability is established; thus, its use won't be that helpful in clinical decisions and the sequence of treatment [57].

Concerns about Security and Privacy: Due to the proliferation of passive devices, health information is compiled in 'Wearable's' in a manner that is not privacy and security compliant. In a nutshell, some of the categories of personal health information which are vulnerable to misuse in case of a breach include, heart rate, ECG, and other biometrics used especially in cardiac care. Consistently, wearables push data to cloud servers and cellphone and open numerous doors for adversaries. An attack on a security feature may result in identification of patients, or possible misuse of the data obtained. While personalizing wearables, the safety of patient information and security of data flows within wearable platforms are critical objectives [58]. These dangers can, as a result, be prevented by employing end-to-end encryption, safeguard measures of data, and permission systems of the users; however, adopting legalities on security of health data as HIPAA and GDPR could be a bit dintsw. Companies designing wearable technology and the health care industry needs to spend more on protected structures as these rules lay out archetypes for any interchange, storage, and retrieval of health information. To understand the matter, these issues need to be discussed, which contributes to raising users' confidence and extending the number of the latter [59].

Obstacles in Regulatory and Compliance: The legal structure in wearable technology with the choices for measuring health is rather broad. For purpose of safety, effectiveness and reliability of the equipment used in making the medical gadgets, for cardiac monitoring they are regarded as regulations. Supervising bodies in charge of such flows as, for example, bodies governing the American ones. EMA and FDA have provided regulations for Medical products or particularly devices that are used to treat or diagnose an illness. The start-ups in wearable technology products are faced with the long, and expensive process of getting approved to use this technology. Consumer wearable's are most of the time not tested and researched as medical wearable devices, which might lead to the provision of less accurate data suitable for clinical applications [60]. Many times the companies are stuck in the consumer centered segment of the value chain while many applications are not even clinically relevant or on the other extreme they are trying to take the long

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road to become a medical device company which makes sure that the data collected is clinically rich. One of the main issues, which is tightly related to the wearables' business, is how to find the right proportions between these legal constraints and the need for innovation and timely application.

Disparities in Technology and Problems with Access: Because of the variation in technology some people can always get no use from wearable technology with artificial intelligence integrated in the monitor of hearth activity. To a certain extent some people are restricted as can be due to for instance being part of the low income earners or living in rural areas where for instance, internet, which is required in some of the wearables is normally slow or too expensive. It is probable that this digital divide will widen disparities in the health care of the different demographic classes meaning that people will not be privileged of advanced cardiac monitoring. Moreover, lack of technological interface awareness forms an issue as target population more especially the elderly tend to develop complications when attempting to wear wearable gadgets [61]. There are people who have some challenges when it comes to challenging operating systems, equipment or model initialization and other problem solving processes and as such restrict the uses and opportunities of such devices in risky societies.

Algorithmic Bias and Misinterpretation Risk: People explain wearable AI systems by previous data which, if the data set contains a particular type of people, then the AI system will also contain prejudice. For example, an algorithm will make fewer accurate predictions on lower performing categories within a population provided the source data used in creating a cardiac risk model is mainly composed of such a group. This will be due to poor interpretation of cardiac data by algorithms for some population types leading to that population being in a worse condition as compared to other population groups. In addition, as the analysis of a cardiac data set fits within the remit of AI, it is worth emphasising that consumers, or even physicians, might be confused by the information provided by an AI tool. Nonetheless, when the AI outputs are not well defined, the users may fail to put focus on the recommendations or may not even notice clinical variations that would lead to undesirable health decisions. Although, it is still an immense effort to come up with a perfect method for today's highly complex models, considerable vigor in make these particular artificial intelligence models more understandable is being invested in the field known as explainable AI or XAI [62].

Battery Life and the Life of the Device: Wearable technology has short battery life since it has to draw a lot of power to send data and be on the lookout for various human body metrics. This is normally the case due to short battery life and charging is frequently needed, this interferes with continuous cardiac monitoring and has low user compliance. Like every typical gadget, wearables are also prone to breaking issues and wear and more so has a shorter battery design than normal devices especially if used or worn all the time [63]. Longevity of devices can indeed be suitable in long-term health monitoring tasks, but this longevity may be again still bounded by some physical constructions of specific devices. Wearable technology, AI, and others can therefore revolutionize the sector and wearable technology added to the other realized innovations can fully revolutionize the sector in line with its vision to champion the success of the System, yet there are barriers and therefore there are limitations to the application of these technologies which has to be addressed for the system to succeed. Some of the concerns that have discouraged wider use of the tool include: Privacy/Policy concerns; Legal/ Legalization concerns; Access concern especially to the disabled students; and Material quality/compatibility arbitrations deposited insight. Compounding these pressures is algorithmic bias; hence, the AI technologies themselves have prejudiced outcomes, there are concerns of imperfect interpretation of AI technologies outcomes and battery power in the devices used. In order to unlock true potential of AI integrated wearable devices to improve cardiac health and to make sure that everyone around the world gets same quality cardiac health care then there are certain of these challenges which would need to be address through development of new technologies, formulation of good policies as well as integration of fair practices with regard to wearables [64].

GETTING A SNEAK PREVIEW OF THE WEARABLE AND ARTIFICIAL INTELLIGENCE FOR CARDIOLOGY TO KEEP AN EYE ON CARDIAC HEALTH

The field of cardiac health monitoring still has massive potential to grow due to the emergence of better wearing devices and integration of artificial intelligence able to help people achieve a swifter and more personal diagnosis of their health condition. This is due to the influential factors such as advancements in technology, the paradigm move towards preventive healthcare and an increasing interconnectivity of devices capable of documenting and interpreting various aspects of health in the citizen [65]. Sophisticated sensor system, future and complex artificial intelligence model, use of multiple health modalities, predictive and preventive healthcare, and improved patient-centric care are some of the future directions of this subject. Besides, they are likely to need to escape current limitations should they hope to fully harness these technologies.

Improved Data Collection and Sensor Technologies: Subsequent generations of WCM devices will include better, more dependable, and functional sensors [66]. Biochemical, heart rate, heart rate variability, electrocardiogram, the modern bracelets, such as smart watches, can register today, and in the future models will attempt to use more detailed and non-intrusive methods to evaluate other cardiac and physical characteristics. Among the developments are:

Nanotechnology and Micro-Electromechanical Systems (MEMS): These little devices also can record data in the real time format with higher accuracy and sensitivity in most cases. For instance, MEMS-based sensors might allow the rapid and continual monitoring of cardiac data, blood pressure, glucose etc, which brings in more or a different type, model or

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brand of total health information through a single device [67].

Flexible and Wearable Bioelectronics: New materials are coming to the surface attempting to improve the fit and flexibility of the wearable's on each segment of the body. Extended measurements could indeed be served by these bioelectronic devices, for example, wearable cardiac monitoring that are patches fixed on the skin or incorporated into clothing fabrics can be stiff and inflexible [68].

Multimodal Sensors: The next generation of wearable will be equipped with multimodal sensors, wherein capacity will be able to gather several parameters of monitoring at once including skin temperature frequency, pulse, and SpO2. The investigated health status of a user could be described in more detail if other parameters are learned and, AI can use these parameters to identify intricate patterns and tiny changes in cardiovascular health [69].

Artificial Intelligence systems, which refers to AI models, as well as, AI algorithms for purposes of inspection and diagnosis of faults.

Regarding forecast with AI, it is likely that the AI algorithms will increase more currently than before and the new models would be more accurate and explainable. Future cardiac monitoring AI algorithms would probably prioritize:

Deep Learning for Complex Pattern Recognition: As the computational power increases as well as availability of larger datasets, the CNNs and RNNs that are belonging to the deep learning category, will be applied to identify still more complex patterns in ECG and other data related to cardiology [70]. This will facilitate the diagnosis of arrhythmias, first cardinal manifestation of heart disease and other non-rhythm related cardiac conditions.

Explainable AI (XAI): However as these systems become more complex it will be necessary that they give out information that a user or clinician is able to comprehend and respond to. That is why Explainable AI intends to make the AI model clearer for the user who received one warning or another, or the suggestion is given. This is applicable in the context of the healthcare facility because in order the clinicians have to be in a position to make sensible and rational clinical decisions then they have to first understand the outcome produced by the AI [71].

Predictive and Prescriptive Analytics: The current applications of algorithms are only diagnostic being in the forms of diagnostic models; the predictive and prescriptive models will enable the artificial intelligence algorithms to predict probable future cardiac events, both from historical data and data from the current period. For instance, it was claimed that one can get the factor correlates of heart failure risk employ predictive models to that will enable early action [72]. Prescriptive AI, in turn, might prescribe according to the clients' overall health habits such recommendations that might reflect of what could be changed, for example, doses of medication, intensity of movement.

Combining Multi-Modal Health Information: In the future, brand wearable technology will integrate other data types other than physiological data from different sources in order to give a more comprehensive picture on the health of the patients. In this, it is about connecting the data from the wearable's with data from genetics, lifestyle, and other health monitoring devices alongside the environment. Some factors are interrelated while others are single and their link to cardiovascular well-being could be uncovered through mSalus integrated health data [73]. Among the encouraging avenues are:

Integration with Genomic Data: Since wearable data can be combined with genomic data, physicians can develop very individual prevention and treatment strategies based on small amounts of data about a patient's risk for some issues related to the cardiovascular system.

Cross-Device and Cross-System Interoperability: These improvements can be made concurrently, while incorporating data from an EHR, smart home appliances, and other medical grade monitoring device [74]. And may let the patient and the care provider to talk one after the other which could be useful in real time intervention if needed now.

PROGRAMMABLE AND PROTECTIVE FOR HUMAN HEART.

In the healthcare delivery technology is quickly turning to the preventive kind where constant checks result in intercessions before a damaging state is reached due to; Wearables and AI. Someday, it will be more feasible to create a new system of divisions of work where each patient would be treated differently, based upon the data that is found in the Cordial Information. The following are some future trends in tailored and preventive care:

Real-Time Risk Stratification: The wearable devices that are backed by Artificial Intelligence will assist in screening the individuals who can get diseases such as heart attack, hypertension or arrhythmia and make such a person seek medical attention [75].

Programs for Behavioral and Lifestyle Modification: In terms of being equipped with a specific device, people are encouraged to act more deliberately in issues presipe to their dietary habits, sleeping pattern and physical activities, thus can always obtain-online cardiac and fitness data at their fingertips. For instance, depending on some health indicators, goals that may include, thus personal data, wearable's may provide activities for stress reduction, helping to support sleep, or provide the necessary level of cardiotal pulse [76].

Patient Engagement and Self-Management: This means that through wearable technology patients are becoming progressively more capable of self-managing aspects of their own care. This proposes that it will become significantly more interactive in the future to be able to offer patients features such as insight, reminder, and encouragement that will show that wearable technology shall play an important role in increasing the patient engagement. Pursuant to some concepts of patient-driven social networks of some experienced patient-driven social networks, patient will be in a better position to empower themselves and meaningfully seek to enhance their healthy status through real information [77].

REGULATION CHANGE UPDATE AND ETHICAL ISSUES

Wearable technology is gradually finding its way into health care to issues of privacy, efficacy and fairness in delivery, hence its appearance before them has to pass regulatory and ethical test. Future paths for ethics and regulation include:

Dynamic Regulatory Frameworks: In light of this rapid development in technology, the FDA and EMA and others are adapting new and efficient mechanism for clearance to advances in digital health [78]. Subsequent architectures could therefore adopt dynamic regulatory paradigms which welcome concurrent software updates so long as the created iterations are within set performance and safety benchmarks.

Data Privacy and Ethical AI Use: Maintaining the rights of data subjects and guaranteeing that AI as applied and integrated into products will be used appropriately are going to emerge as important goals to achieve as wearable technology progresses. After this; AI systems must also be explained, unbiased, and they have to be built with privacy shield where privacy should be integrated into every stage of design and development in an organization following the principles openness that highlight access permission and ownership of the used data. With literally everyone having the access to the internet, there is a probability that the use of a blockchain can securely maintain and disseminate medical records while giving full control of the records to the patients [79].

Equity in Access to Wearable Health Technologies: Several points were pointed out especially in regard to the applicability and accessibility of wearable health technology to the excluded. This means that for fair healthcare wearable technology, and AI-driven insights should be cheap, reachable and understandable by all. He believed that advanced technologies such as wearable devices integrated with artificial intelligence present an opportunity part of a shift in the healthcare model as more personalized, preventive and even predictive. In management of cardiovascular health, future improvements will be made in different sectors for example; management of the sensor technology, AI improved algorithms, data integration and a novel patient focused method [80]. However, to produce the results expected in real clinical settings, the technologies being adopted have to overcome issues concerning data confidentiality, fee reinforcement as well as approval, data compatibility, and access. Technological improvement in the wearable's by the use of AI will become further effective in preventive health care as patients and healthcare begin to exercise control on cardiovascular health which was previously inconceivable.

ETHICAL DILEMMAS CONCERNING THE WEARABLE TECHNOLOGY IN MONITORING HEART HEALTH; IT: ARTIFICIAL INTELLIGENCE

Ethical concerns the author explains are now central given wearable technologies and artificial intelligence (AI) in healthcare, especially in cardiac health monitoring. But when incorporated with wearable technology the following ethical issues arise and ensures that technology is well utilized: Some of them are permitted, algorithmic bias, openness, balance in acquiring and using tremendous volumes of information and figures and analytics, data confidentiality and sanctity; and how the use of results from big data and analytics affect the doctor-patient relationship. Consequently, for wearable and AI not to become a tool that kills people or makes the poor poorer than innovation must meed ethical responsibility at middle [81].

Security and Privacy of Data: Collection, archiving, and occasionally disclosure of personal health data is one of the primary ethical issues of wearable technologies propelled by AI. Smart clothing tracks pulse, respiration, blood pressure and ECG and these acquired data feeds periodically to cloud servers. This freely opens the door to data leakage of residents' private health information, varying cases of unlawful access amongst other entities. However, the users and patients should be confident that their information is safe and can only be used in medicine. The ethical concern regarding data privacy is that the individual should have a right to privacy and to decide who might be allowed to access personal data while health data should not be shared with 'enemies' [82]. This is even so in Wearable Technology devices that sometimes send the received information to another party or a doctor, probably exposing sensitive details.

Knowledgeable Consent: Informed permission is one of the base strategies within moral healthcare practice and pertains to wearable technology and AI systems regarding cardiac health monitoring. If wearable technology is to be moral acceptable, people must be made aware of the implications of streaming their health data and the likewise implications of sharing their health data. For such users, it is suggested that they be offered the provisions regarding the gathering, procurement and utilization of their data when the use of AI algorithms is in play [83].

Algorithmic Fairness and Bias: Wearable technology has joined other technologies such as artificial intelligence as some of the technologies that present algorithmic prejudice as the ethics problem. Wearable health devices, and other AI systems are trained effectively at the templates or databanks, generated from real world populations, which might bebiased. This can come out as wrong stereotyped or plain wrong predictions based on the input information datasets used to feed the model and regrettably these might be predisposed towards the minority socially excluded minorities. For instance, the algorithm can do a poor job or get it absolutely wrong for women, ethnic minorities, or the elderly if the input data feed through the algorithm mainly consist of the data in an integrated team, say the patients were all males. In the case of heart health monitoring the situation might turn into overtreatment of the patient, underdiagnosis or misdiagnosis of certain diseases and all of them would have extreme impact as to the health state of the patient [84].

Accountability and Transparency: The call to incorporate AI solutions raises an issue of who is responsible for decision making by the system. The problem is that the outputs of the details AI algorithms researched are often hard coded, so the users, including the healthcare personnel, are often hard to follow the workings of the AI algorithms. By not detailing how the process of arriving at a particular decision or diagnosis, patients and doctors will have faith and trust in an AI generated advice. The positive use of AI systems for a particular task requires employment that is sufficiently mindful of all the various forms and purposes of the data processing and the decision-making that it supports [85]. For the patients and the physicians to make good decisions based on the AI outputs, the output must also be explainable by the developers. For example, to help the clinician, the AI system should output information on the set of data that lead to the warning that somebody using a wearable device has had some cardiovascular issues [86]. This can motivate the union between the human knowledge-based information and machine Intelligence in the same breath that eliminates the risk of the occurrence of an error or over reliance on the prediction made by the machine Intelligence. That leads me to another problem, which is related to a lack of clarity in the current AI policies: accountability. I think that in the context of organization decision making, it is essential that when the decision turns out to be wrong or produces an adverse outcome, you should be able to lay the blame at the door of some one. Developer's clinicians along with device manufactures have to define professional roles particularly when clinical decision is contextualized by AI [87].

Fairness in Access: An extension of wearable technology and AI in encouraging and strengthening the heart's health, and improving its monitoring can exacerbate the increase of inequality in health care delivery. There might be or no amenities, an individual lives in a certain country or lack digital devices and applications in wearing wearables and Artificial Intelligence to monitor health. For instance in such places, one may not be very certain of an assured link or relationship to the internet to feed in data to be solved or analyzed in areas such as low income areas the people cannot even afford to purchase the costly wearable's [88]. The other weakness is that it is also difficult for the elderly or even almost anyone that has a low technological knowledge when it comes to the effectively use of wearable technology. Such inequitous could lead to some populations receiving worse health care service since they are restricted from embracing implementing advanced care practices while other populations are being deprived the benefits of periodic check-ups on their heart health [89]. The issues stated above are a result of bio-tech being marketed to the middle and upper class; therefore it should remain relatively cheap and as simple to use as a wrist wearable such as the smart-watch or a fitness tracker. It was felt that as the overall awareness campaigns, financial aid/ insurance coverage might be required to extend in the impressionist groups and the underprivileged, might be required to guarantee that the enhancements within the current monitoring of cardiac health does not exclude those communities [90].

Effect on the Physician-Patient Bond: This implies that other emergent issues which are also alleged to be occasioned by the application of wearable technology and artificial intelligence in health care, are also ventilated on the doctor-patient relation [91]. The noted developments in Pt tracking and improvements in health can be problematic because they detract from a more personal human aspect that is between the patient and the clinician. Wearable's and AI systems give more information to patients and patients lean on this information not the relationships like they used to. Likewise, application of AI generated concepts may extend the gap between the capability of the algorithm and the physician wherein the clinician might depend on the suggestions of the application than what they see clinically [92]. This may in turn undermine the patients' confidence in other aspects of the health care services downstream including the treatments which human clinicians recommend. The social deformity of wearable technology and artificial intelligence means that it should only augment labour to keep the relationship healthy between the doctor and the patient. To ensure the doctors are able to utilize the technology as an adjunct to clinical reasoning to interpret the patient care, the technology specifications must include an understanding by the doctors on how to interpret what the AI has produced and where this should fit in comprehensively in the management of a patient.

CONCLUSION

Wearable gadgets with artificial intelligence may change the approach to cardiovascular diseases by having a constant check of the primary health issue of the patient. These technologies are expected to improve early signs of a cardiac event, to improve real time tracking and for patients to be better informed & get control of their diseases. To ensure that full utilization of benefits of the said innovations is feasible, some implementation aspects do require enhancement. Advanced technologies such as wearable technology and improved artificial intelligence in algorithms for cardiology have not been seen in other disciplines, and can have a positive impact on the condition of cardiologic care. The impact that people will experience from Biometric data consumers from wearable's may likely be predicted and dealt with accordingly by AI models by simply using huge amounts of data as their basic input. The pulse oximeters, and simple heart rate, some even with animation but mostly the more complex ECG devices allow what is called constant cardiac check-up, which benefits the patients and the health care workers, they can see for themselves and know infallibly the instant a thing is awry with very easy access to important figures, read-outs, results.

In other words, these technologies are not oblivious of some of the most profound moral and legal issues. For this reason, any object in the wearable technology context will bring questions to data privacy and security and that of informed permission because the gadget gathers and can unveil the user's private health details. This means that the disparity in

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performance needs to be fixed with algorithmic fairness being required to take out bias and ensure equal performance for all or to prevent the application of the AI system from reducing health equity. Moreover, to sustain the confidence in these systems, the principles of responsibility for clinical outputs, and capability of AI decisions should be met. Of course, both the wearable technology and artificial intelligence is quite new and is changing with each passing day, the legal regulators require same. However, for these technologies to be safe and efficient the following has to be done: categorizing the wearable technology, accreditation of the AI systems and the procedures for checking and updating as often as possible. To foster usage on all sides and to make wearable technologies more accessible for all patients including those with fewer means the reimbursement structures of the above devices should also be challenged.

However, the application of these technologies has consequence that cannot be reduced to its, technological and legal significance. It means that nature of those interactions should therefore take into account while assessing the contribution of AI towards enhancement of clinical decisions. In my opinion, with AI, there are benefits to the healthcare sector as AI can also consult and suggest information Because of this, AI should not take over an individual's decision but also not undermine the doctor-patient relationship. But they will have to in a way that will allow for policies that would help to close these gaps and bring about equity in the type of innovation as adoption of these technologies in healthcare draws innovation equality. Unfortunately, wearable technology and artificial intelligence especially has the potential to improve the patient status, check the occurrence of heart related ailments, and decrease cases of CVS across the globe. These innovations bring out cultural, legal and ethical concerns that have to be addressed. To secure the value add of these technologies and do it right for all the participants which are skilled workers, patients and customers, it is necessary to build the solid ground for implementing the best regulation and transparency of the AI algorithms, data security for the patients and fair share. For those objectives and for the future positive impact of wearable's and Artificial Intelligence on heart disease, the cooperation between patients, legislators, health care professionals, and technologist must be constant.

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