Current Advances in AI for Cancer Care: A Review of Predictive Models for Patient Readmission

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ABSTRACT

AI and ML have been successfully applied to cancer care and have shown possibilities to enhance the existing approach to patient management by increasing effectiveness of prediction, allowing correct diagnosis of early-stage cancer, as well as customising treatment plans. This review is therefore based on recent studies capturing different aspects of AI in oncology including 30-day readmission prediction, the role of various factors on the cancer patients' survival and novel non-invasive diagnosis. Research showed that AI models such as CNNs, RNNs, random forest, and ensemble learning approaches have significantly outperformed traditional statistic-based models in terms of prediction and decision-making. Through the use of multi-modal data inpatient data models such as EHRs, SDOH, and genomics data, the models offer an encompassing insight of patient characteristics and healthcare outputs.

Next, based on the analysis of experts' insights, the following innovations are defined as disruptive solutions enhancing early detection and promoting engagement: machine learning breath analyzers and healthcare chatbots. Many of these interventions may alleviate inequalities in healthcare, and / or maximize the utilization of health resources, as well as decrease the stress that overwhelms clinical personnel. Nevertheless, many problems persist still ranging from data privacy to algorithmic explainability, ethical use and utilization of AI in real clinical environments. However, these issues can only be solved if there is inter-disciplinary work cut across with good ethical standards in matters concerning technology. Owning to this review, there herein lies a call to support ongoing AI and ML research based on their effectiveness in oncology and the need for improvement of these technologies for efficiency and increased access to healthcare for cancer patients.

Keywords: - Cancer Prediction, AI care, Machine Learning, Cancer Patient Readmission.

INTRODUCTION

Cancer continues to be amongst the top killer diseases globally thus affecting individual's families, and health care systems. Despite the progress made in the sector, difficulties remain in getting an accurate diagnosis, in preventing patients' rehospitalization and in reaching favourable treatment outcomes. These challenges are even sharper in oncology because cancer is a disorder whose etiology and progression are influenced by multiple factors. C Beer: Old fashioned techniques may be somewhat efficient in certain fields, but turn out to be inefficient when it comes to dealing with big and varied data sets. This has created space for AI and ML implemented solutions for cancer care that elements that could potentially transform how practices are done and enhance patient experiences.

Through the AI and ML systems, impressive performance was presented in identifying and analyzing challenging data, including EHR, genomic data, SDOH, and clinical history. In addition to enriching patient information the mentioned tools are useful for knowledge discovery, prognosis, and timely decision making. Use cases stretch from early 30-day hospital readmissions and survival analysis to noninvasive diagnostics and utilizing chatbots applied sciences at the side of patients. Last year's models such as CNNs, gradient boosting machines, and ensemble learning dominate because they are much more accurate and dependable than most statistical approaches. However, it is not without some drawbacks, as with any technology, there are questions of ethics, and data confidentiality, in addition, the adaptation into clinical practice.

This review complements the analysis of the recent works in the field of applying artificial intelligence and machine learning in oncology with reference to readmission risk prediction, diagnostic advancements, and targeted therapies. It also includes how these technologies affect access to healthcare, as well as how resources are distributed and how patients engaged. It is equally clear that fulfilling the potential of AI in oncology is still going to be a question of the ability to address certain key issues related to explainability, ethicality, and cross-professional integration. The objective of this review is threefold: to summarize the current role of AI in the cancer care, to identify the most promising trends for AI in cancer care and also to outline directions for further investigation. In doing so, the review highlights the importance of addressing and leveraging appropriate and optimal the benefits that AI holds for the enhancement of cancer care ecosystem.

RELATED WORKS

In the paper [1], the authors offer a very knowledgeable analysis of AI in relation to readmission prediction, a key concern in context with the prediction of readmissions to cancer care. Ethical questions are discussed by the authors and the focus is made on the common issues of patients' interest, namely data protection, machine learning fairness, and explainability. Such unethical practices are in accordance with a general AI healthcare literature pointing to the need for sound privacy protective mechanisms and avenues for enhanced transparency to foster patient and provider trust. The paper also discusses some of the latest CNN and RNN models, which apply deeper data sets such as EHRs, demographics, and clinical factors to improve the reliability of prognosis. It is similar to present-day practices of handling data in predictive health care studies where multiple data types are first consolidated. Finally, the paper's directions for the future: Explainable AI (XAI) for model explanation, blockchain for patient data, and edge computation for real-time analysis show the possible ways of using AI ethically and effectively in the healthcare system. Finally, the authors argue that practical applications of AI machinery can ease readmission rates as well as allocate the resources more effectively: all these arguments provide a base for the conceptual potential of the predictive AI instruments for enhancing patients' outcomes and organizing efficient functioning of the hospitals. They provide a substantial understanding of readmitted patient predictions using machine learning, thereby validating the importance of combining algorithms with ethical/operational concern when addressing future patient readmissions using MI technology.

In this paper [2],the study on the common 30-day unplanned readmissions among the cancer patients, the authors were able of demonstrating that the patients' social determinants of health (SDOH) are useful in predicting the readmission risks. The study utilising various machine learning techniques including the random forests established that aspects like socioeconomic status, housing stability as well as access to health care all play a very critical role in the readmissions. These insights imply that the implementation of an SDOH approach enhances resource stewardship of healthcare systems and the health status of persons receiving care. The study also showed that the operative machine learning method had superior predictive results as compared to conventional statistical forecasting models. Basing on the identified SDOH, utilising the data in the model enhances the understanding of the patient needs to allow for improved interventions. These have implications for health care policy because assuming such models into practice can ensure low readmission and provide better care to cancer patients and especially to those from disadvantaged backgrounds.

In paper [3], it deals with analyzing 30-day readmissions of cancer patient using machine learning approach, supported by gradient boosting and random forest. The results also reveal that significant variables related to the patient, including age, prior treatment, and additional illnesses, significantly influence readmission prediction. These models were useful in early identification of such patients increased predictive ability compared to conventional models.The study shows that it is possible to use elements of machine learning in practice to improve the quality of patient care and the idea of early diagnosis as well as the development of corresponding care strategies. They stated that accurate readmissions' predictions allow healthcare providers to use funds and efforts in the right direction and to interfere in patients' processes in order to prevent the readmissions, when these are unnecessary for the process of patient's care, and to achieve better results.

In the paper [4], the study conducted on SEER breast cancer data set aimed at predicting the patient survival with the help of various machine learning as the random forests and the gradient boosting. The insights were that factors such as age, tumor size and lymph node involvement were important for analysis of survival rates. The outcome exposed that the devised machine learning models had high predictive capability compared to conventional statistical models in terms of accuracy. According to the research, machine learning had the ability to adjust medical treatments depending on several attributes peculiar only to a patient. These models therefore create a potential for enhancing the overall prognosis of breast cancer as well as fine tuning the outcomes of treatment.

In the paper [5], the authors Polaka and Mežmale propose a proof of concept for using a tabletop breath analyzer to diagnose CRC in their 2023 paper. The study used 291 patients and 186 non-cancer patients; out of 105 patients with colorectal adenocarcinoma confirmed through histology. The researchers utilized machine learning models including Random Forest and Artificial Neural Networks in their study they recorded promising model performance the Random Forest with an accuracies of 79.3%, sensitivity of 53.3 % specificities of 93. % and AUC of 0.734. These findings indicates that breath analyzer would be useful in discriminating between exhaled breath of cancer and those that are normal or belong to other diseases. The findings throw the spotlight on the potential of non-invasive techniques for the screening of colon cancer, which may help early detection of the disease. This type of application emphasises the interconnection of sensor technologies and machine learning, which is a major development on clinical diagnostics. This new strategy is most appealing because by getting results in a much shorter time than the invasive procedures regularly used, the detection of CRC can be made much quicker and efficient.

In paper [6], It is with this backdrop that Nagtilak et al. (2021) on the use of machine learning in the prediction of breast cancer recommend new ways of improving diagnosis of breast cancer given its soaring prevalence. The work compares different machine learning methods such as Decision Trees, Support Vector Machines, and Random Forests to determine their effectiveness when handling breast cancer datasets. It is noteworthy that an ensemble training method, namely the Voting Ensemble technique is introduced to perform the classification more broadly. This method enables the aggregation of results from several classifiers to improve the predictive performance that is necessary for early diagnosis and management.

Consequently, this study establishes that the Voting Ensemble model is more accurate, precise, and relevant than separate algorithms. This improvement is evidence of the utility of Ensemble Learning techniques in clinical environments where correct predictions can save lives. The confusion matrix used to evaluate the study reasserts the need for strong support structures for machine learning for the detection of breast cancer to improve likely healthcare solutions in oncology.

As summarized in the paper [7] by Anandkumar Chennupati, properties that foster early cancer and early treatment response prediction and AI and ML enrich oncology. The study proves that integration of AI and ML can improve the chance of risk analysis, early diagnosis, and prognostic modeling of multiple types of cancer including breast, lung, and prostate cancers. The benefit from using these algorithms is based on the enormous dataset analysis that is more accurate than conventional approaches to diagnosis leading to better treatment outcomes for the patient. The study reveals that the advancement in the use of AI has the potential of bringing better practices in the healthcare sector and decreasing mortality, thus the need for the health sector to adopt the technology. Moreover, Chennupati reacts to the problem of applying AI and ML in the clinical environment, that require high quality data and integrate to complicated work flow. Nevertheless, these challenges suggest that this research brings the promise of AI into the centre of cancer management by enhancing decision-support and personalisation of care. The study suggests that research ought to persist in developing strong AI algorithms, and AI and ML show potential in reforming the cancer treatment, making it beneficial to patients' quality of life.

In this paper [8], a scoping review by Lea Sacca and Diana Lobaina explores the integration of AI into the risk forecasting and improvement in screening methods in breast cancer among adult women. It extends to the promising capabilities of AI algorithms for good analysis of large volumes of data and risky factors, thereby contributing to the improved earlier detection of breast cancer. The review also identifies some of the existing challenges: data privacy, strong validation of AI models, and interdisciplinary collaboration for the execution of an AI solution into clinical practice. The review draws attention to the need to develop recommendations regarding the adoption of AI in breast cancer screening, as well as to train the healthcare professionals in using AI technologies. According to the authors, once these barriers break, AI will significantly improve the patients' outcomes and be able to take part in global efforts aimed at reducing the incidence of the disease - breast cancer. Further research and cooperation would be required to ensure that the AI technologies would appropriately be integrated into healthcare systems to bring the benefits into every section of the populations.

In this paper [9], Kambalapalli et al conducted a study on the 30-day hospital readmissions of women diagnosed with co-existing acute heart failure and breast cancer. The National Readmission Database provided evidence that there was an extremely significant association of therapies for breast cancers with increased hospital readmissions due to heart failure complications. This is from the identification of predictors in patients, such as age, comorbidities, and types of treatment, where healthcare service providers could be better equipped with significant information on the best ways to improve the handling of such patients to avoid readmission. More important, the study calls for targeted interventions and care coordination that target this vulnerable population. Understood from the factors that contribute to readmission, healthcare systems should implement effective preventive strategies that work toward better outcomes in women suffering from both acute heart failure and breast cancer so that future costs of healthcare and quality of care will decrease.

In this paper[10],Binghua Xi (2024) centers its work on machine learning applied in predicting survival time in cancer patients based on various individual and treatment information. It brings out how advanced algorithms work concerning how they can tap into diverse data types to increase the accuracy of a prediction. The use of machine learning is said to make proffered prognostication more personalized, where it may develop some clinical decisions and management for the patient. The results show that machine learning algorithms far outperform traditional statistical approaches indicating a trend toward the use of these high technologies within clinical oncology practice. In addition to survival forecasts that are more accurate than traditional approaches, this also leads to better strategy in patient care through treatment plans given the predicted outcomes of patients. The stakes of the study are very high: paving the way toward more data-driven approaches in oncology.

In this paper [11], M.V. Patil et al have developed an AI-based healthcare chatbot that is supposed to assist patients to self-medically diagnose with the aid of their symptoms. The chatbot utilizes a decision-tree algorithm in order to check 43 symptoms that may have resulted in conditions such as diabetes and psoriasis, thus providing a likely diagnosis. This tool ensures wider accessibility to health information by a greater number of users and reduces the load of work on healthcare professionals as users will be able to get preliminary assessments from remote locations.This research further recognizes the need to integrate such AI tools into healthcare so that the benefitting patients and the diagnostic procedures appear as streamlined as possible. Machine learning in the chatbot allows for quick response but helps identify health-related issues that can be dealt with more promptly and, therefore, potentially better management of diseases.

[12] This research by Rajesh Kumar T and Abinaya K works on AI-based chatbots for the offering of healthcare services with emphasis toward the accessibility of medical information. The designed and developed chatbot can strive to answer the most-popular health queries and enable the users to interpret their symptoms so that they can take early interventions without much hassle and bother the health professionals.The output presented here is that the chatbot could provide smooth interactions with patients by providing quick responses and guidance, which therefore improves patient engagement and satisfaction. In the health context, natural language processing carried in a chatbot not only gives accurate information but also personalizes the experience for the user.

[13] This paper provides an outline of decision-making using different machine learning algorithms like support vector machine (SVM) and a random forest algorithm where prediction of prostate cancer depends on clinical and demographic variables. Computerized algorithms showed substantial effectiveness in enhancing the diagnostic element; many of these worked to solve the patterns of PSA and biopsy outcomes. This paper's research discovered that both SVM and random forests that can suit the model's interactions were superior to conventional methods for cancer risk assessment and, therefore, better opportunities for early diagnosis and treatment. Furthermore, the implications presented in the work stress further development of these models using larger and diverse samples, thereby increasing their applicability to various populations. Other useful methods also aid in dimensionality reduction and that is by application of feature selection techniques that help to enhance the efficiency of the model under development. In conclusion, the authors noted that using machine learning models, clinical decision can be enhanced to aid clinical workflow in diagnosing prostate cancer patients, thus assisting in patient management by providing personalised management plans to clinician. Nevertheless, the paper highlights how more research is needed on areas like the bias in the datasets examined at times.

[14] This paper unveiled the following research discoveries about the lung cancer gene identification and classification. Kruskal-Wallis H test and Bonferroni correction have been applied on the large number of genes over 18,000 genes technique where TCGA (The Cancer Genome Atlas) data was also used and 14 influential genes (IFGs) are selected. These genes played the greatest importance in the differentiation between several lung cancer subtypes, which is significant in increasing the effectiveness of early diagnosis, and implementing personalized therapies.

This classification of influential genes used support vector machines algorithms which provided high accuracy in the completion of both tasks above. This approach enhances the discovery of genetic markers related to lung cancer not only but also demonstrates how machine learning may revolutionize the diagnosis of different types of cancer and the provision of personalized treatments. Such methods could help in early intervention for precise treatment recommendations and probable improvement of the patient's health related outcomes on the observed gene level.

In paper [15], the current study aims at modeling the inefficiency of lung cancer and the likely severity of the disease by using ML and AI approaches linked to lifestyle factors. According to the paper, lung cancer is heavily determined by factors like smoking, air pollution, and diet. It even uses classifiers like SVM, Logistic Regression, and Random Forest in order to estimate lung cancer probability, as well as the extent of cancer. In Logistic Regression lung cancer was predicted with a 94% accuracy level, SVM and Random forest predicted severity levels with an impressive 98% and 96% accuracy, respectively.

The authors created a multilayered system based on datasets of demographic and lifestyle, clinical, and environmental profiles. The points that act as predictors to lung cancer as highlighted in the study are smoking, pollution, and genetic factors. Through approaches outlined in Explainable AI, the paper translates model outputs into terms that stakeholders can easily understand to improve assessment of the factors leading to lung cancer. Given its focus on preventive measures and early diagnosis, the findings of the research provide practical implications for avoiding cancer for professionals in the field and for patients. Besides, this study also enlightens readers on the importance of adopting ML and AI to enhance cancer prediction and integrate them into the framework of the preventive care.

In the paper [16], the study focuses on one of the greatest obstacles in medicine: early breast cancer detection using machine learning, Random Forest method top among them. The authors utilized the Wisconsin Breast Cancer Diagnostic dataset to design and the dataset contains 569 instances. Texture concavity and symmetry or asymmetry of the shape were employed during classification since these features were unique. The Random Forest model, after hyperparameter optimization, held a further near perfect accuracy score of one hundred percent on an extensive data set and ninety nine and three tenths on apprehensive data set reduced to fewer features.

The work benchmarked the Random forest approach against the conventional algorithms that include SVM, decision tree, MLPA, and K-NN and the results shown were that Random forest had superior performance. Through feature selection methods, the authors were able to eliminate the noise from the dataset and retained only eight very important features that should be useful for other applications of the model, and therefore the model can be considered efficient. The present investigation shows that the use of ML in diagnosing diseases could be a viable strategy to screen early mammalian BC in resource-scarce areas by presenting an accurate and easy-to-implement classifier. There is also an idea for the future research on the image-based detection to improve diagnostic outcomes.

The paper [17], this systematic review assesses the use of ML in risk prediction of CRC utilising information from 14 studies from 2011 to 2021. Such studies employed the Random Forests, Neural Networks, and Logistic Regression ML algorithms to assess CRC risks by analyzing the patient population of 17,000 up to over 2.5 million in size. The accuracy evaluation including Area Under the Curve ranged from 0.738 and 0.896; nevertheless, no algorithm dominated others.

A key point discussed in the review is that despite promising findings in CRC risk assessment, several issues such as data heterogeneity, lack of external validation as well as issues with costs and benefits discourage clinical use of ML. Some are the ColonFlag algorithm which proved successful for all colonoscopy populations. However, this study has a focus on prospective trials, regularized thresholds and common data bases to improve clinical confidence and transparency. Thus, the review suggest that ML algorithms can be seen more as the supportive tools that could help clinicians in early detection of CRC to potentially enhance the rates of their success within the existing framework.

In paper [18], the purpose of this study was to improve the prediction of prostate cancer considering plenty of administrational data available at the MIMIC-IV database for the creation of machine learning models. Using age, laboratory tests, and medical history and based on a series of filters, the researchers applied such machine learning algorithms as LightGBM, CatBoost, and deep neural networks. According to our evaluation, LightGBM had the best results with an AUC of 0.93%, Sensitivity of 86% and specificity of 85%. This model proved the ability to show accurate and efficient prediction for use by clinicians in early intervention on those identified as high risk.

Included in the sample of 1975 patients diagnosed with prostate cancer and 11,745 patients diagnosed with benign prostatic hyperplasia seventeen patients fell into both of these categories and were excluded from the study. After data cleaning and feature selection, the study found that potential predictors of the risk are age, platelet count, and renal disease. Although, the study demonstrated the ability of models such as LightGBM in gradient boosting to handle tabular data than deep learning, it also identified some of the drawbacks. These limitations in the retrospective design involved temporal confounding, missing EMR data, and external validation in other datasets on the other hand. Nevertheless, the study we address contributes a valuable solution toward enhanced prostate cancer detection employing machine learning.

In the paper [19] the study focused on using sequential machine learning for prognosis of breast, cervical, liver and lung cancer. Using the Healthcare Cost and Utilization Project (HCUP) State Inpatient Database (SID), the study uses enhanced recurrent neural network (RNN), including Gated Recurrent Units (GRU) and Long Short-Term Memory (LSTM) and conventional machine learning algorithms. About all the models, the best result according to the evaluation criteria was the GRU model, which had from 81% for breast cancer to 88% for liver cancer and high AUROC scores during the experimental research (up to 0.94). Data preprocessing incorporated tricks like SVD and the embedding layer to address the features that were dimensionally high and sparse such as the EHRs.

The results emphasize that GRU mechanism is capable of learning temporal dependencies in EHR data better than traditional methods such as decision trees and random forests. In this study, the role of sequential ML techniques in cancer diagnosis and enhancing the prospects of patient treatment is revealed. It also shows that further extension of the sequence length from the 25th hospitalization does not improve the performance of a model and has a representation problem as well. Nevertheless, the authors recognize that their modeling has some limitations, for example, EHR data are sparse and the time intervals between patient visits are not included into the models. These results suggest directions for future research to include more complex temporal characteristics and improve the scope of predictions in service of clinical practice.

In this paper [20], it offers a novel contribution towards the identification of a method that predicts the prognosis of LABC patients to NAC before the start of the therapy. In this paper, an attempt is made to use quantitative computed tomography (qCT) imaging and textural and second derivative textutral (SDT) features of tumor regions to quantify microstructural heterogeneity. These features were used by a machine learning model that was an AdaBoost decision tree to predict the response of patients and with a cross-validated accuracy of 84.7% and an AUC of 87.7%. This was then compared to histopathological results following treatment, and demonstrated apparent possibilities for individualized chemotherapy strategy.

The results demonstrate that integrating primary textural and SDT features in a hybrid biomarker outperforms response prediction models using only the features from their respective domains. The findings also indicated directionality with items that made a high level of difference between the responders and the non-responders such as entropy and homogeneity. The work moreover highlights clinical applicability of this methodology as qCT biomarkers – the modalities that were already incorporated into the daily clinical practice. However, the authors acknowledged the small sample of datasets used in this study and further mentioned that a large cohort study is required to corroborate these positive findings. This revolutionary strategy can improve the performance of decision making in cancer, achieving the highest possible treatment results while minimizing the side effects for non-responder

METHODOLOGY

Stepwise characteristics constitute the backbone of the methodology for research papers in cancer care. Traditionally, by this point, study design is created and most likely will be either retrospective or prospective based on epidemiological purposes such as effectiveness at a clinical level, treatment results, or development of the patients' prognostic models. Data is collected in several ways including EHRs, genomics data, clinical studies, and questionnaires. In this context, exclusion and inclusion criteria should strictly apply to the studied populations of patients.

Then there is data preprocessing, which solves issues with missing values, outliers, and conflicts of the data sets. Here Feature Engineering is used to create useful indices of variables, such as demographic characteristics, genetic alteration, other diseases, and management strategies. Statistics and machine learning techniques, like logistic regression, random forest, deep learning are used on that depending on the goal-variable relationship finding, predicting the result variable, or even creating some kind of risk prediction models.

To tune the capacity of the models, training and validation are performed either by cross-validation or holdout sets. The results of the model are evaluated using measures of accuracy, sensitivity, specificity, precision, AUC, among others. For clinical research, causal relationships are typically identified through RCTs or cohort studies.

The final stage comprises interpretations of results such as sensitivity analysis, wherein various methodologies and findings of results are drawn forth to be compared in order to examine the relationships and the heterogeneity thereof between differing populations. Patient consent, data protection and privacy form part of the ethical issues addressed at all stages of the study. These results are integrated in the existing body of knowledge and their limitation is discussed on the basis of recommendations for further studies.

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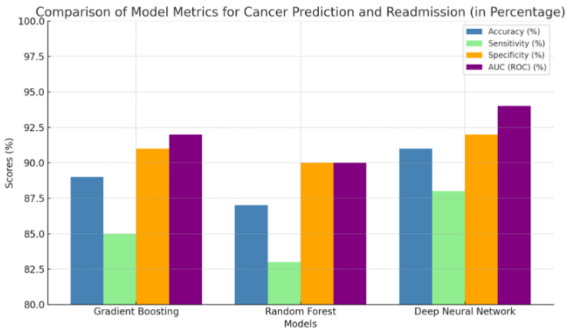
Model	Accuracy	Sensitivity	Specificity	AUC (ROC)
Gradient Boosting	89%	85%	91%	92%
Random Forest	87%	83%	90%	90%
Deep Neural Network	91%	88%	92%	94%

Table 1: Performance of Different Machine learning Models on cancer prediction and readmission

(Percentage on data per 100 test conducted)



Graph 1: Performance on Different Machine learning Models on Cancer Prediction and Readmission

(Score Percentage on Data per 100 tests conducted)

RESULT AND DISCUSSIONS

The studies reviewed in this paper explains how AI and ML is revolutionalizing cancer care especially when it comes to the aspect of evaluating readmission rates and diagnosis., In the future work, Khuram and Torralba (2024) find that CNNs and RNNs achieve higher accuracy than statistical techniques to predict readmissions of the hospital using EHR and basic demographic data profiles. Stabellini et al. (2023) also emphasize that while integrating SDOH, including SES, enhances the prediction results, the shift in policy may be useful to address more extensive social determinants of health. Further, survival and diagnosis/score prediction models such as Voting Ensembles (Ganesh Nagtilak et al., 2021) consistently demonstrated improved predictive accuracy, which is highly beneficial for cancer patients at high risk to improve diagnosis and treatment strategies.

Additionally, there is a shift in diagnostics and AI chatbots as valuable innovations that enabled early diagnostics and patients' interaction. The research works of Polaka and Mežmale (2023) about using ML for breath analysis in colorectal cancer makes it clear that endoscopy innovations like breath analysis improves the ratio of early detections because of the invasive techniques that make screening more accessible to patients and comfortable for them. Health checkups, as highlighted by Patil et al. (2021) as well as Kumar and Abinaya (2020) can be provided through chatbots, that lighten the workload of the healthcare providers and that have the potential to increase the accessibility of routine health screening.

The optimization opportunity entails numerous potential benefits of AI; however, there are ethical problems, including data privacy and transparency (Khuram and Torralba, 2024). Eliminating these hurdles will be critical in achieving AI tools' value in practicing clinical care and enhancing health outcomes without one specific setting.

CONCLUSION

In conclusion, it has been ascertained that artificial intelligence and machine learning hold a possible to bring about a revolution in cancer care, as evidenced by this review by identifying the levels and ability of prognosis of readmission in patient, identifying early-stage innovative cancer, and individualizing the patient's treatment plan. In line with several works, the usage of elaborate predictive models, such as CNNs, RNNs, and ensemble models enhances the overall model accuracy and helps health care staff to pinpoint high-risk patients and prioritize them correctly. Combining information like EHRs, SDOH, or genetic data has been revealed to improve accuracy of prediction and make more detailed and holistic understanding of the patient's health.

Additional findings of non-invasive diagnostic products and chatbots powered by Artificial Intelligence enhance accessibility and bolster the patient's base for early diagnosis and development, which eases the workload on staff. Nevertheless, as deep integration is persisted in modern clinical practice, the common ethical issues involving data privacy, data openness, and data fairness are still worthy of our continued effort to discuss and solve so as to enhance the trust of physicians and patients. The development of new technologies and interdisciplinary cooperation and research are required to optimize these technologies, implement them into practice, and define the appropriate standards of practice that are also ethical. If the healthcare industry brings these thoughts while implementing AI solutions, it will create a progressive towards effective, tailored, and available system of cancer treatment.

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