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NEXT-GENERATION SEQUENCING IN CLINICAL PRACTICE: IMPLICATIONS FOR DISEASE DIAGNOSIS AND MANAGEMENT

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Abstract

Introduction: The main aim of this research is to identify the impact of next-generation sequencing in clinical practice for disease diagnosis and management. This process also has the capability to identify the response of individuals to using the drugs. Moreover, this information has the potential to optimize drug selection and dosages.

Literature Review: Accuracy of the diagnosis has to be fostered by this process. Moreover, with the aid of this process, genetic disorders become identified and diagnosed. Trust of the patients in the treatment process becomes fostered, and it helps to develop the diagnosis process. The personalized medicine process becomes facilitated by this process.

Methodology: This research study is based on the "theoretical analysis", therefore, researchers are capable of collecting data from different online sources. This data collection process helps to get a deep conceptual understanding. After that, better knowledge about this study has to be collected with the aid of this data collection process

Findings: Next-generation sequencing allows for the sequencing of the entire genome of an individual. Therefore, this has revolutionized precision medicine for personalized treatment. Better disease diagnosis, as well as genetic profile of patients is detected carefully with the aid of this process. Moreover, rare genetic diseases are also identified critically with the aid of this NGS process.

Discussion: Overall knowledge about this study has to be identified by this study. This study helps to understand that, "Next-generation sequencing has a significant impact on clinical practices. Therefore, it has a remarkable impact on disease diagnosis and management

Conclusion: Genetic mutation is an important factor that has to be facilitated by this process. Moreover, different types of heredity disease and infectious diseases are detected carefully with the aid of this advanced disease diagnosis process.

Keywords: Next-generation sequencing, Clinical practice, Disease diagnosis, Cancer detection, DNA strands, personalized medications

Introduction

Next-generation sequencing has a significant impact on clinical practices. Therefore, it has a remarkable impact on disease diagnosis and management. Comprehensive genetic analysis has to be facilitated with the aid of this next-generation sequencing process. Therefore, genetic variation has to be highlighted by this process (Rexach *et al.* 2019). Different types of

genetic variation like cancer, infectious disease, and rare genetic disorders have to be highlighted by this process. On the other hand, this process helps to identify the specific mutation and tries to guide treatment decisions. Medical treatment becomes more individual with the aid of this process. After that, these clinical practices help to detect the disease at an earlier stage.

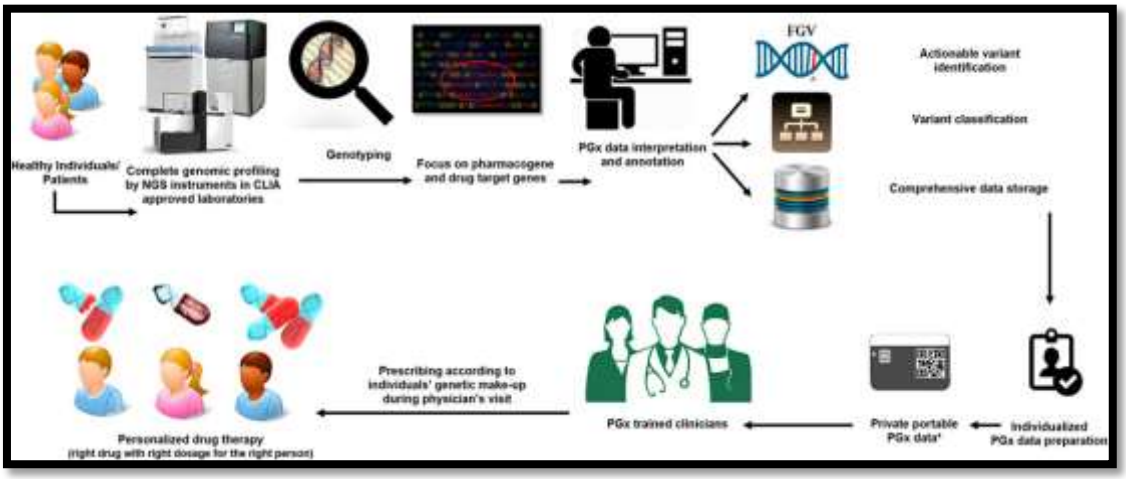

Figure 1: Next-generation sequencing in clinical practices

(Source: Zhong *et al.* 2021)

Potential outcome by initiative treatment has to be facilitated by this process. Moreover, this clinical practice uses parental testing which helps to detect genetic abnormalities in fetuses. After that, valuable pieces of information are collected with the aid of this process. After that, this clinical practice has the potential to revolutionize cancer care by characterizing the genomic landscape of tumors (Zhong *et al.* 2021). Moreover, the treatment process is considered a rare process, and capable of offering hope for patients who have spent years without a proper diagnosis. Rapid and cost-effective analysis has to be facilitated by this process. Moreover, the NGS process is capable of detecting the entire genome of individuals. More accurate pieces of information are collected by this process; therefore, this process is more effective than the traditional method. The genetic makeup of an individual becomes tailored with the aid of this personalized medication process. Specific mutation process has to be facilitated by this process, therefore, this process is also capable of identifying the variation of the genetic process, and genetic disorders are also diagnosed with the help of this process (Malla *et al.* 2019). This process also has the capability to identify the response of individuals to using the drugs. Moreover, this information has the potential to optimize drug selection and dosages.

Aim

The main aim of this research is to identify the impact of next-generation sequencing in clinical practice for disease diagnosis and management.

Research Objectives

RO 1: To find out the impact of next-generation sequencing in clinical practice

RO 2: To discuss the role of next-generation sequencing for disease diagnosis

RO 3: To analyze the differences between next-generation sequencing clinical practice and traditional treatment process

RO 4: To critically analyze the role of next-generation sequencing clinical process for cancer diagnosis

Research Questions

RQ 1: What is the impact of next-generation sequencing in clinical practice?

RQ 2: What is the role of next-generation sequencing for disease diagnosis?

RQ 3: How to find out the differences between next-generation sequencing clinical practice and traditional treatment process?

RQ 4: What is the role of the next-generation sequencing clinical process for cancer diagnosis?

Literature Review

Analyze the impact of next-generation sequencing in clinical practice

Diagnosis and disease understanding are two impact tasks of this next-generation sequencing process. Therefore, this process is considered a cost-effective process, capable of identifying the entire genome, and capable of enabling the identification of genetic mutations which is responsible for various disease. As commented by Singhi *et al.* (2020), accuracy of the diagnosis has to be fostered by this process. Moreover, with the aid of this process, genetic disorders become identified and diagnosed. Trust of the patients in the treatment process becomes fostered, and it helps to develop the diagnosis process. The personalized medicine process becomes facilitated by this process. Therefore, this process is beneficial for the oncology treatment.

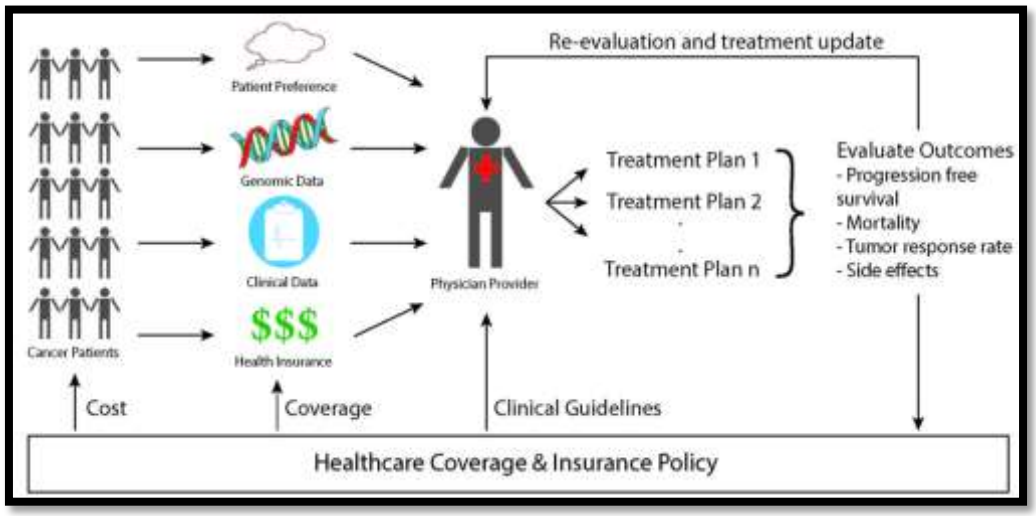

Figure 2: impact of next-generation sequencing in clinical practice

(Source: Symonds and McTague, 2020)

Moreover, specific genetic mutations in the treatment of patients are highlighted by this process. On the other hand, this process also helps to identify the rare disease. Therefore, disease diagnosis and family planning have to be fostered by this process. On the other hand, as stated by Maljkovic Berry *et al.* (2020), optimizing drug choice is another important factor that has to be fostered by this process. After that, this clinical practice helps to optimize the drug choice, and the treatment process becomes more effective. NGS has efficiency for revolutionizing cancer research as well as cancer treatment. Therefore, it allows us to identify tumors and try to develop targeted therapies.

Discuss the role of the next-generation sequencing clinical process for cancer diagnosis

Next-generation sequencing has a remarkable impact on cancer diagnosis. This process helps to take part in genomic profiling of a patient's tumor. Therefore, this process has the potential to identify the mutations, genetic alternation, and gene fusions. After that, with the aid of this information, researchers are capable of determining the best treatment and capable to guide targeted therapy selection. As commented by Symonds and McTague, (2020), personalized medication as per the requirements of the patients has to be detected by this process. Therefore, based on the unique genome practices, researchers are capable of providing medicines which is beneficial for the patients. Therefore, this process is allowed to lead to more effective as well as less toxic therapies.

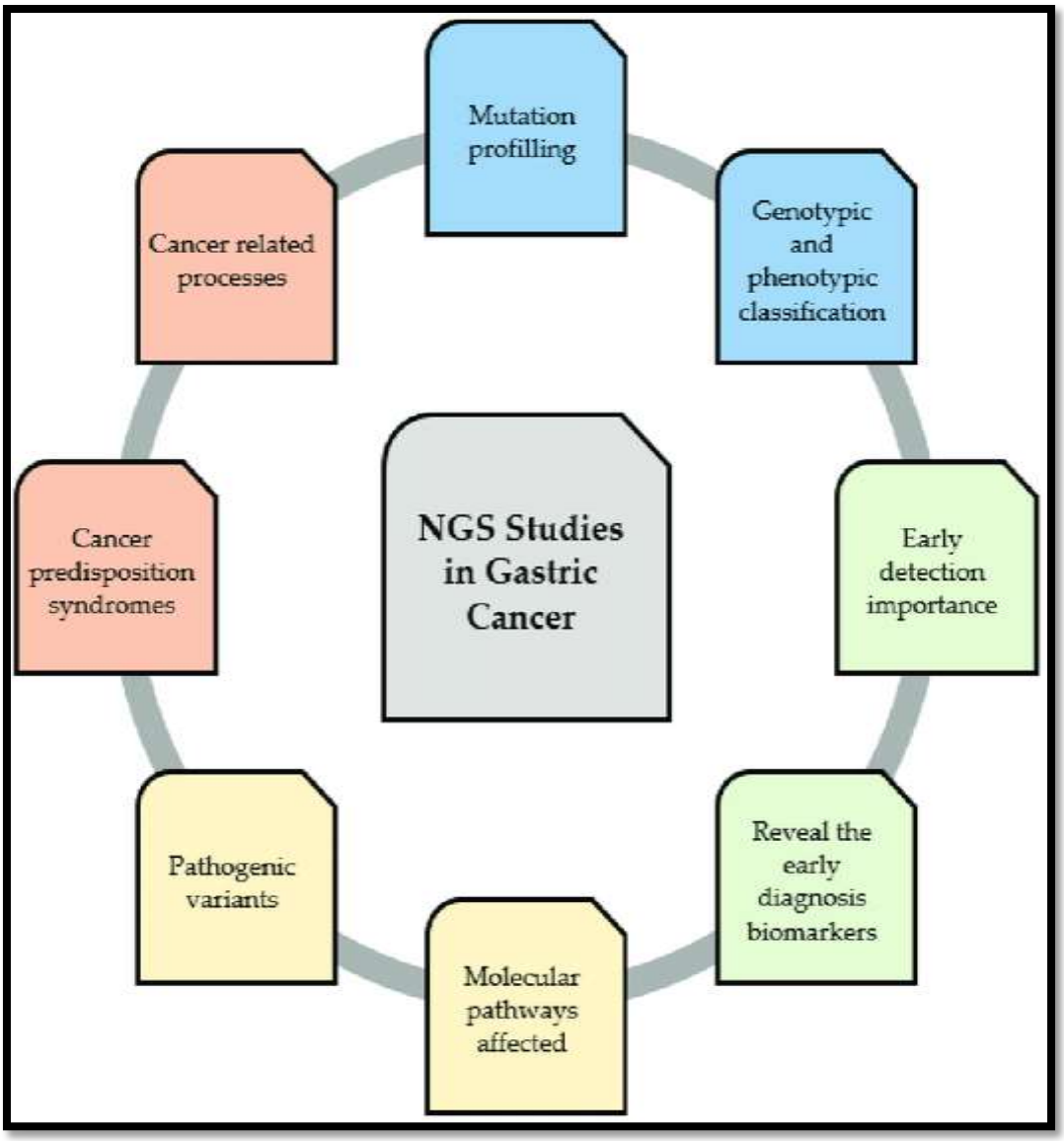

Figure 3: NGS studies in Cancer Treatment

(Source: Bulun *et al.* 2021)

Evaluation of tumors over time has to be diagnosed by this process. Therefore, these process insights into how cancer adopts. Based on this identification, researchers are capable of providing a proper treatment process. On the other hand, as mentioned by Bulun *et al.* (2021), hereditary cancer syndrome has to be identified by this process, and cancer risk assessment has to be facilitated with the aid of this clinical process. A detailed understanding of the

genetic basis of cancer has to be facilitated by this process. Therefore, it helps to provide personalized patient care.

Theoretical framework

DNA Sequencing Technological Theory

DNA sequencing is a process that helps to determine the order of nucleotides. This process helps to collect DNA sampling therefore, based on the target sequence, researchers are capable of adjacent with the target region. After that, the introduction of the DNA polymer is another factor that helps to synthesize new DNA strands. Fluorescent labeled nucleotides are conducted by this process (Coccaro *et al.* 2019). Therefore, with the aid of this theory, researchers are capable of using gel electrophoresis to separate the DNA strands. On the other hand, with the aid of this theory, the laser detection process has to be facilitated. Therefore, many DNA fragments are repeated by this process.

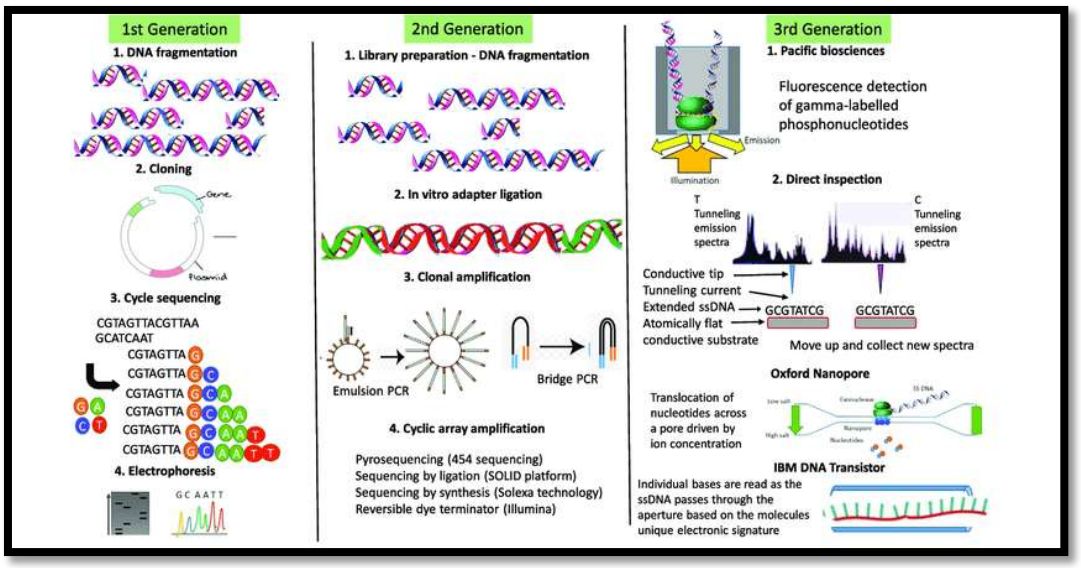

Figure 4: DNA Sequencing Technological Theory

(Source: Costain *et al.* 2019)

The genome detection process becomes facilitated with the aid of this process. Moreover, implementing this theory helps to diagnose the disease and the cancer detection process becomes facilitated by this process (Costain *et al.* 2019). Therefore, implementing this theory helps to record the fluorescence data and is capable of generating a sequence based on laser detection. On the other hand, this process is repeated for many DNA fragments. Therefore, with the aid of this process, researchers are capable of providing high-throughput which is beneficial for clinical practices.

Literature gap

Identifying the literature gap for next-generation practices is important for research and advancement. Proper clinical utilization and guideline is required which helps to develop the clinical practices. After that, standardized guidelines help to get better outcomes of the disease diagnosis (Pulsipher *et al.* 2022). On the other hand, an efficient as well as accurate data interpretation process is facilitated by this process, and a better clinical decision-making process is facilitated by this process.

Methodology

This research study is based on the "theoretical analysis", therefore, researchers are capable of collecting data from different online sources. This data collection process helps to get a deep conceptual understanding. After that, better knowledge about this study has to be collected with the aid of this data collection process (Pulsipher *et al.* 2022). A possible outcome of the research has to be predicted by this data collection process. After that, with the aid of this process, researchers are allowed to collect vast amounts of data which is beneficial for this study. Therefore, this research study helps to identify the importance of next-generation sequencing in the clinical process and identify and properly diagnose the treatment that is beneficial for this diagnosis process (Brenner *et al.* 2021). In this study, researchers are capable of using thematic analysis which helps to gain deep knowledge about this study. Moreover, generalizable pieces of information are collected by this process; therefore, this data collection process becomes cost cost-effective process (Yska *et al.* 2021). On the other hand, with the aid of this process, the problem-solving capabilities of the researchers are facilitated by this process, moreover, advanced knowledge about this study, and vast amounts of data have to be collected with the aid of this data collection process.

Findings and Analysis

Theme 1: Critically discuss the impact of next-generation sequencing in clinical practice

Next-generation sequencing allows for the sequencing of the entire genome of an individual. Therefore, this has revolutionized precision medicine for personalized treatment. Better disease diagnosis, as well as genetic profile of patients is detected carefully with the aid of this process. Moreover, rare genetic diseases are also identified critically with the aid of this NGS process. This process has the capability to improve the accuracy of the disease diagnosis process (Gwinn *et al.* 2019). Therefore, this process becomes faster with the aid of this disease detection process. Genetic mutation is an important factor that has to be facilitated by this process. Moreover, different types of heredity disease and infectious diseases are detected carefully with the aid of this advanced disease diagnosis process. Non-investing potential treatment has to be facilitated by this process. Therefore, a wide range of genetic conditions become highlighted with the aid of these clinical practices. After that, with the aid of this process, genome detection, and infectious disease detection processes become fostered (Yska *et al.* 2019). Therefore, researchers are capable of collecting more information about this process which has a potential impact on the next generation sequencing clinical practices.

Theme 2: Negative impact of next-generation sequencing in clinical practice for disease detection

The vast amount of data has to be collected by the NGS process. Therefore, sophisticated infrastructure and data management system has to be facilitated by this process. This data management infrastructure becomes expensive and becomes more challenging to implement. Genetic data complexes become a more expensive process; therefore, skilled counselors are required to manage the collected data (Brenner *et al.* 2021). After that, actionable insights have to be facilitated and it has a potential impact on clinical practices. Ethical dilemmas for the privacy of the patients become dilemmas which bring trouble for the patients. Therefore, misuse of the potential data has to be facilitated, and it is the major drawback of this process. NGS is an expensive process; therefore, this process becomes less accessible for the patients

which are the negative side of this process. Therefore, all healthcare institutions cannot afford this process; therefore, this advanced technology is not used by every sector (Pulsipher *et al.* 2022). Data management, ethics, interpretation, and costs are various issues that have to be faced by implementing this technology. Therefore, eliminating these issues helps to implement these clinical practices and is successfully used by the healthcare sectors.

Theme 3: Discuss the differences between next-generation sequencing clinical practice and traditional treatment process

NGS is capable of providing personalized treatment plans which are based on the genomic profile of the patients. On the other hand, traditional treatment is capable of following a one-size-fits-all approach. The genetic mutation which is associated with NGS has to be identified by this process (Costain *et al.* 2019). After that, traditional treatment is based on physical examination which leads to misdiagnoses. Specific molecular targets for drug helps to foster the effectiveness of treatment, therefore, the traditional treatment has more side effects. On the other hand, an efficient as well as accurate data interpretation process is facilitated by this process, and a better clinical decision-making process is facilitated by this process.

Theme 4: Identify the role of next-generation sequencing for disease diagnosis

Comprehensive analysis of genome profiling has to be fostered with the aid of this NGS process. Therefore, genetic mutation, disease identification, diagnosis process, and identification of rare genetic disorders become facilitated by this process. Tailor treatment is facilitated by this process. Therefore, treatment decision has to be fostered by this process. The genetic make-up process has to be identified by this process (Coccaro *et al.* 2019). After that, more effective medicine choice has to be facilitated by this NGS process. With the aid of this process, pathogens can be identified rapidly, and the diagnosis process becomes fostered. After that, a more effective treatment process has to be facilitated by this process.

Discussion

Overall knowledge about this study has to be identified by this study. This study helps to understand that, "Next-generation sequencing has a significant impact on clinical practices. Therefore, it has a remarkable impact on disease diagnosis and management (Costain *et al.* 2019). Comprehensive genetic analysis has to be facilitated with the aid of this next-generation sequencing process. Therefore, genetic variation has to be highlighted by this process". In the introduction section, the aim of the research study is highlighted which is discussed in the paper. Therefore, research objectives and research questions are also highlighted in this study. With the aid of this study, it has to be noticed that, "Diagnosis and disease understanding are two impact tasks of this next-generation sequencing process. Therefore, this process is considered a cost-effective process, capable of identifying the entire genome, and capable of enabling the identification of genetic mutations which are responsible for various diseases" (Brenner et al. 2021). "Theoretical analysis" is highlighted within this study, which helps to analyze the collected data thematically.

Conclusion

Genetic mutation is an important factor that has to be facilitated by this process. Moreover, different types of heredity disease and infectious diseases are detected carefully with the aid of this advanced disease diagnosis process. Non-investing potential treatment has to be facilitated by this process. Therefore, a wide range of genetic conditions become highlighted

with the aid of these clinical practices. After that, with the aid of this process, genome detection, and infectious disease detection processes become fostered.

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