APPLICATIONS OF MATHEMATICAL SIMULATION IN HEALTH CARE USING QUANTUM COMPUTING

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Abstract

The current article has been analysed to observe the application of mathematical stimulation in health care by using quantum computing. The reason for growing dependency and the impact on healthcare efficiency has been covered in this discussion. Quantum computing proposed benefits and the chances of getting support for the fastest and most efficient service delivery are noticed. Current changes for health care services for this technology and computing and future scope of development are covered.

Keywords*: Quantum Computing, Mathematical Stimulation, Health Care Services.*

DOI Number: 10.14704/nq.2022.20.13.NQ88321 Neuro Quantology 2022; 20(13):2574-2577

1. Introduction

The growing burden of disease probability over the world and the increasing need for accuracy in treatment plan makes the need of including mathematical stimulation. It has been noticed that with mathematical stimulation chances of surgery or medication efficiency both have been developed for health care services. Quantum computing is one of the emerging technologies that have been used for solving complexities which is limited to classical computers. A different perspective of including quantum computing and its benefits has been observed for health care services. 47% accuracy and efficiency have been developed for the integration of quantum computing applications (Cao et al. 2018).

2. Aim and Objectives

Aim: Current research is aimed at observing the application of mathematical stimulation in health care by using quantum computing.

Objectives:

- To analyse the benefits of the use of mathematical simulation for health care.
- To analyse the existing area of including quantum computing for developing the efficiency of health care services.
- To analyse the changes occurring from the previous to the current way of using an updated mathematical solution
- To analyse the current market condition for the growing efficiency of quantum computing.

3. Literature Review

3.1 Identification of Mathematical Stimulation Benefits for Health Care Services

The purpose of this developing mathematical modelling is to bring efficiency to service delivery and quick decision-making. It has been noticed that mathematical computational technology provides improved healthcare system management. The data-driven approach of modelling improves the chances of information gathering that can be used for customised service delivery. Specific developing model and their delivered services in the healthcare context have been evaluated and discussed. Modelling in medicine enhances the probability of accuracy. As per Moore and Chow (2021) 37% changes of errors controlling have been developed from the integration of mathematical stimulation.

Mathematical simulation Area	Benefits
Data-driven approach	Better healthcare system management
Medicine (predictive modelling)	Improved planning accuracy which decreases the error or any delayed probability
Outcome assessment	Financial security and effectiveness both can be developed through this stimulation.
Physiological health	Sensor stimulation and way of using it for better diagnosis and prediction is noticed.

Table 1: Mathematical Stimulation-Specific Benefits
(Source: Created by Author)

Having the purpose of using mathematical skills chances of accuracy and precise outcome formation becomes easier. It provides the establishing pattern for the understanding of the involved health variables for the concerning aspect (Perez-Castillo et al. 2021). It makes the time-saving quicker solution giving chances as it is a faster processing system with lesser chances of result volatility. It has been noticed that mathematical stimulation pattern and the developing model brings change to the health outcome which supports the services of health care delivery. An improved math formula provides the chances of preferable choices for estimating or measuring value.

3.2 Quantum Computing Application for Health Care Development

- **Radiotherapy**

It is one of the growing application areas for quantum computing. With the help of this application chance of malignant cells, and removal is happening for which need of developing a suitable strategy is required. Along with identified benefits of using this application, it has been noticed that there is a limitation for the presence of different variables. The presence of considering an approach for possible stimulation makes the scope for developing an ideal approach. Marinho et al. (2021) knowledge about the possible stimulation and having control over the variable's presence can make the outcome suitable for healthcare support delivery.

- **Drug interaction**

From the observation of medication design formation, it has been noticed that molecule comparison is required. Identified limitation of conventional computing for molecule size estimation has been noticed that has been solved with quantum computing application. With the improved capability of quantum computing, it has been noticed that chances of giant molecule comparison are possible. Padhi et al. (2020) mentioned that atomic-level molecule interaction opportunity has been provided by quantum computing applications. The scope of medical development and improved research has been raised from the use of this computing. The process of interaction for newer and modern medication has been developed from the use of the quantum application.

- **Health care information**

Security and protection for the involved patients' data of health care services have been considered essential for making the optimised services. It has been detected that quantum physics has been used to safeguard the involved patient information for health care services. It has been noticed that improved security and creating the opportunity for better data handling make the research scope (Sarkar et al. 2021). It has been noticed that genomic filed get support from the use of this application. The opportunity for further study by separating DNA and RNA has been developed and this improving research process enhances the way of improving the help for health care services. Quantum application is the path which provides the scope for improving diagnosis that can ensure the accuracy of the treatment plan.

4. Data Analysis and Findings

4.1 Growth of Quantum Computing in Real-Life Practices

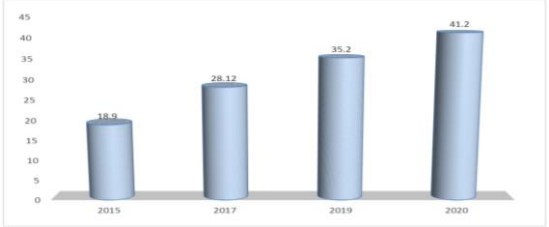

Figure 1: Year Wise Growth of Quantum Computing Application
(Source: Created by Author)

From the above figure, it has been noticed that quantum computing growth has become spontaneous from the year of introduction. As per Menard et al. (2020) it has been detected that in the previous year 2015 market growth was only 18.9% which was uplifted by just one year gap which become 28.12%. Growth can be measured from the above-presented graph. The reason for presenting this percentage of quantum computing market growth is just to add specifications about the benefits coming from the integrated decision. It has been noticed that the 2020 report showed that the value of this quantum computing application reached 41.2% (Bhatia et al. 2019). From this warded value of this quantum application, it can be understood easily that benefits adding opportunities make them useful for a different part of health care services. The growing rate of disease burden and the need for prompt decision-making and quicker saving solution makes the increased dependency on the use of quantum computing application. From the current analysis, the specification has been added for the market growth understanding so that value can be created for the approach of mathematical stimulation.

4.2 Changes that are happening from Mathematical Stimulation

Disease Control	Before the mathematical model application	After the mathematical model application
Respiratory and digestive	10.9%	45.3%
Maternal	4.3%	18.34%
Injuries	9.3%	25.3%
Cardiovascular disease	28.5%	33.2%
Cancer	11.6%	20.3%

Table 2: Changes from Mathematical Stimulation

(Source: Created by Author)

From the above table, it has been noticed that there is a clear change from the previous use of the mathematical solution and the developed approach. It has been noticed that in the aspect of respiratory and digestive disease control previous scope was near about 10.9% which has reached 45.3% (Outeiral et al. 2021). The reason for this developed opportunity of burden reduction is because of the building up accuracy.

Findings

- Compared with the previously used traditional approach to disease control it has been noticed that changes have been developed from the integration of mathematical modelling. 37% development has been raised for disease control that ensures the safety and efficiency of health care services. As per Hoo Teo et al. (2021) from 2017 resources shortage data has been analysed it can be noticed that around a 13.7% gap in requirement is there. With the integration of mathematical modelling, changes have occurred for the safety of resource management. 45% of resource management has been developed from the use of mathematical stimulation. 23% of changes have been occurring in the chances of developing the use of economic's data (Hassija et al. 2020). It has been noticed that the decision-making process gets the way of improving through the use of mathematical stimulation. Comparing the beneficial scope which has been developed from the integration of the mathematical model includes financial and operative safety in the health service aspect.

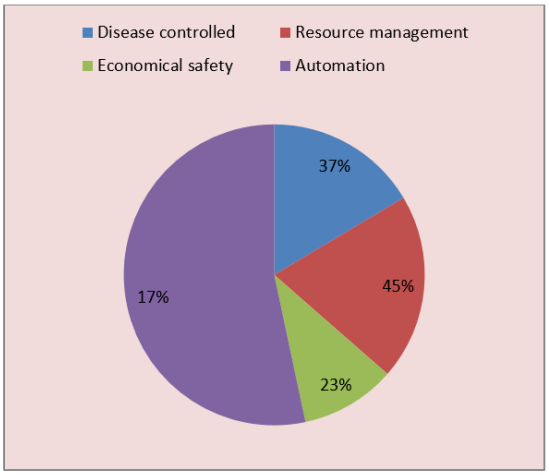

Figure 2: Mathematical Stimulation Impact on Health Care Services

(Source: Created by Author)

From the application of quantum computing application, it has been noticed that benefits are developed for health care services. Around 17.30% of benefits have been developed for molecular stimulation whereas 26.40% support has been developed for radiotherapy (Gencoglu and Agarwal 2021). A different aspect of health care delivery has been developed from the use of quantum computing. From the below figure

specification has been added for the application of quantum computing for health care services.

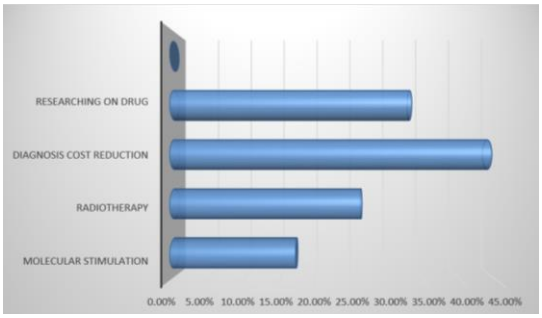

Figure 3: Quantum Computing Benefits for Health Care
(Source: Created by Author)

5. Conclusion and Future scope

From the above-developing research, it has been noticed that mathematical stimulation improves the scope of service accuracy and efficiency build-up. It has been noticed that market growth remains spontaneous for the integration of computing techniques of quantum computing. Different area of development like radiotherapy, and drug modification through quantum computing has been discussed.

Future scope

Improved training and security knowledge for the integration of quantum computing can bring a higher potential for efficiency build-up. It has been noticed that security has been updated and benefits are growing higher, so the scope of services efficiency and wider coverage is possible.

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