



Medical Support Application Using Node.Js Server

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Abstract : Information technology plays a pivotal role across diverse sectors, exerting a profound and indispensable influence on each. Its significant impact extends prominently to the healthcare sector, where innovations and digital advancements have transformed the landscape of medical practices. The Medical Support Server (MSSP) is a web application and Remote Patient Examining system designed to simplify healthcare services for doctors and patients. Focused on aiding COVID-19 and infectious disease patients, MSSP offers real-time information on bed, medicine, ventilator, and oxygen cylinder availability in hospitals. Benefiting rural patients, MSSP enables remote medical examinations with expert doctors. The user-friendly patient portal, accessible through a free website, provides real-time data on healthcare resources. MSSP aims to reduce repetitive tests by offering access to recent results, and optimizing resource utilization based on distance and bed availability in different healthcare facilities. The success of Medical Support Assistants in reaching private doctors and clinics is rooted in the receptiveness of these entities. The openness and practical acknowledgment of the service's value by private practitioners contribute significantly to the platform's effectiveness in connecting with this segment of the healthcare community. In essence, the Medical Support Assistant's overarching objective is ambitious yet clear: to offer a holistic service that seamlessly connects patients with the right doctor at the right time and place globally. This aspiration drives the platform's proactive efforts to reach as many patients as possible, employing diverse strategies and channels to ensure widespread accessibility and impact in the realm of healthcare delivery.

Index Terms – Medical server, Covid, Patient, Health-care Services, Oxygen supplies, Medical resources.

1. INTRODUCTION

The Medical Support server operates as a comprehensive web application service that integrates a Remote Patient Examining system. This multifaceted platform is meticulously crafted to enhance the healthcare experience for healthcare providers and patients. Within this application, a unified space is created, offering a seamless interface for doctors and patients to interact and access a myriad of medical services. A pivotal feature of this application is its ability to provide detailed information regarding the availability of crucial resources for COVID-19 patients, including bed occupancy, medicine stocks, ventilators, and oxygen cylinders at a specific location. This real-time data ensures efficient allocation and utilization of healthcare resources. Moreover, the application extends its functionality to facilitate basic medical services for patients within the comfort of their homes. This includes remote consultations, diagnostic assessments, and the prescription of essential medications, thereby promoting accessibility to healthcare services irrespective of geographical constraints. One of the notable advantages of this system is its capacity to bridge the gap between patients in rural areas and healthcare professionals situated in remote locations. Through the Remote Patient Examining system, individuals residing in underserved regions can connect with experienced doctors, ensuring that quality healthcare reaches even the most distant corners of the community. In essence, the Medical Support server not only serves as a hub for information and resource management but also acts as a catalyst for healthcare democratization, fostering inclusivity and improving health outcomes for diverse populations. The primary goal of the Medical Support Service Platform (MSSP) is to extend assistance to individuals grappling with health issues, particularly those afflicted by COVID or any other infectious disease. Through the utilization of this application, users gain access to vital information about their health status and receive guidance on managing their illness through straightforward steps. The application serves as a comprehensive resource by furnishing users with real-time data, including the current availability of hospital beds, medicine stocks, ventilators, and oxygen cylinders in each healthcare facility. This detailed information is categorized on a location-wise basis, providing users with a comprehensive listing of hospitals and their corresponding resources. By employing the MSSP, individuals can stay informed about the current state of their health, enabling them to make informed decisions on seeking medical attention or managing their condition at home. The platform acts as a conduit for transparency in healthcare infrastructure, offering users insights into critical factors such as bed availability, medicine supply, and life-saving equipment across various medical facilities. In essence, MSSP not only acts as a bridge between patients and essential healthcare information but also empowers individuals to take charge of their health by providing them with the necessary tools and knowledge to navigate their illness effectively. Accessing patient portals is incredibly

user-friendly, and one convenient method to do so involves utilizing the server, a complimentary website developed and launched by our dedicated team. The Medical Support Server is instrumental in granting patients and individuals seamless access to real-time data concerning bed availability and oxygen cylinders across various clinics and hospitals within the current city's region. The Medical Support Services Portal not only serves as a gateway for immediate access to critical healthcare information but also plays a crucial role in optimizing healthcare resources. By leveraging this portal, users can effortlessly obtain up-to-date information on available beds and oxygen cylinders in different medical facilities, thereby facilitating informed decision-making during urgent healthcare situations. Furthermore, the Medical Support Services Portal contributes to the efficiency of healthcare services by minimizing redundant medical tests. Users can conveniently access recent test results through the portal, promoting a more streamlined and cost-effective approach to healthcare. The portal prioritizes data dissemination to those in need based on the principle of minimizing distance traveled and maximizing the availability of beds across diverse hospitals. In essence, the patient portal, coupled with the Medical Support Server, not only simplifies access to healthcare information but also fosters a more resource-efficient and patient-centric approach to healthcare delivery.

1.1 Problem Statement

The envisioned web-based solution aspires to be a universal repository for hospital information globally, providing a comprehensive platform for hospitals to transparently disclose critical details such as the number of doctors and their specialties, bed availability, oxygen cylinder status, and blood plasma inventory. This system seeks to empower patients by allowing them to securely share their medical records, and facilitating remote consultations with healthcare professionals. The platform will integrate cutting-edge AI-driven chat and video call features to enhance communication between doctors and patients, fostering a robust virtual healthcare ecosystem. Moreover, the system will incorporate automated reminders for both doctors and patients, ensuring timely appointments and updates. The emphasis lies on user authentication and data security, implementing robust measures to protect patient information, and comply with healthcare privacy standards. The platform will prioritize global accessibility, supporting multiple languages to cater to diverse user groups. A user-friendly interface for both hospitals and patients is paramount, promoting easy navigation and clear presentation of information. The system's scalability and integration capabilities will be designed to accommodate a growing number of hospitals, doctors, and patients, integrating seamlessly with existing hospital management systems and electronic health record (EHR) systems. Features such as feedback and ratings, an analytics dashboard, and continuous updates and support are integral components aimed at fostering transparency, accountability, and the ongoing enhancement of the platform's functionality. Compliance with regulatory standards and data protection laws in various regions will be a fundamental aspect of the platform's design. In essence, this web-based solution aspires to revolutionize healthcare communication and management on a global scale, ensuring efficiency, accessibility, and security in the provision of healthcare services.

1.2 Need and Importance of Study

The web-based solution centered around the Medical Support Server is indispensable in addressing critical needs and playing a pivotal role in modern healthcare delivery. With the escalating volume of patient data, efficient management is paramount, and the centralized storage offered by the server ensures seamless access and updates, fostering more coordinated and informed care. The ever-growing concern for data security and privacy is met through robust measures of encryption and access controls, instilling confidence in patients regarding the confidentiality of their sensitive health information. The ability to access patient data remotely is crucial for healthcare accessibility, especially in remote or underserved areas, bridging geographical gaps and ensuring timely healthcare services to a broader population. The solution facilitates interdisciplinary collaboration by enabling multiple healthcare providers to concurrently access and review patient data, promoting consultations, second opinions, and collaborative treatment planning. Moreover, it streamlines workflows, reducing administrative burdens and allowing healthcare professionals to dedicate more time to direct patient care. The global accessibility feature ensures that patients and healthcare providers can connect irrespective of location, promoting inclusivity and expanding the reach of healthcare services. Empowering patients by securely sharing and managing their medical records enhances patient engagement, fostering a more patient-centric approach to healthcare. Additionally, the real-time information on resource availability optimizes resource utilization, especially critical in emergencies, ensuring healthcare resources are allocated efficiently. Overall, the solution meets the evolving needs of modern healthcare systems, driving efficiency, collaboration, and patient empowerment.

1.3 Objective of Study

- The study aims to assess the solution's ability to efficiently manage patient data through centralized storage, ensuring seamless access and updates for healthcare providers.
- To comprehensively analyze and evaluate the effectiveness, feasibility, and impact of the proposed web-based solution centered around the Medical Support Server in the context of healthcare delivery.
- To explore how the solution facilitates remote healthcare access, addressing the need for broader accessibility, especially in remote or underserved areas.

2. REVIEW OF LITERATURE

The purpose of this research is to examine the potential of e-health by focusing explicitly on the delivery of healthcare products and services. The examination of e-health activity is guided by one broad research question, "What is the potential for constructing e-health strategy as an innovative health technology?". A great amount of attention has been given to e-health activity in the present day. However important this form of e-health is, this type of service does not face the same constraints that must be addressed by those delivering health care services. Design/methodology/approach the researchers employed a qualitative data collection technique to formulate more examples and cases to derive lessons for Jordan. Phone interviews in a random sample were conducted with corporate officers in Jordan to reveal the internal organizational structure and business trends, interface issues, and marketing strategies, as well as compare and contrasting the online health world to the traditional healthcare realm. Findings Internet-related

projects are a top priority for healthcare information technology executives in the present day, with a cautious approach toward "e-health", as many products have yet to mature, and that the "click and mortar" model may perhaps be the optimal strategy for e-health in Jordan. Research limitations/implications this paper reviews the e-health trends to demonstrate the tremendous potential for health-related commercial activity on the Internet. However, the researcher examining the barriers facing e-health in the Jordanian health system also pointed out almost insurmountable challenges. A practical implication despite the apparent promise of e-health, its instability is measured by its failure so far to systematically penetrate the organization of healthcare. Beyond the pragmatic negotiation of e-health in the immediate context of clinical practice, there are wider issues about how the development/implementation of e-health is funded, about its organization and management at the policy level; and about its potential medico-legal risks. Originality/value it is hoped that the handful of ventures into cyber medicine appears to be coming from a few enterprising physicians who have set up medical practices on the Web [1].

Abu Saleh Mohammad Mosa and others concluded that health professionals and patients have witnessed the widespread development and utilization of numerous medical applications for smartphones. The increasing focus on smartphones in healthcare is evident, with these devices evolving into essential tools for practicing evidence-based medicine at the point of care and facilitating mobile clinical communication. Beyond their conventional functions, smartphones assume a crucial role in patient education, disease self-management, and the remote monitoring of patients. The escalating attention toward smartphone usage in healthcare underscores their expanding significance in enhancing medical practices and patient-centric services. Within the scope of this research, 57 healthcare professional applications were discovered through analysis of 43 eligible articles. These applications were categorized into 7 groups, organized by functional similarities. The identified categories include disease diagnosis, drug reference, medical calculators, literature search, clinical communication, HIS clients, and medical training. Notably, certain applications did not align with any of these specific categories, prompting their discussion in the section labeled "general healthcare applications." [2].

Maaß L, Freye M, Pan C, Dassow H, Niess J, Jahnel T. defined the medical applications as Health apps, generally employed for clinical and medical purposes, may or may not fall under the regulatory framework for mobile medical devices. Emphasizing secondary (early diagnosis and treatment of acute diseases or injuries) and tertiary (rehabilitation and management of chronic diseases) prevention from a public health standpoint, medical apps face a challenge wherein certain apps, like fitness trackers or diary apps, could be categorized as medical apps when utilized for self-monitoring by individuals with chronic illnesses. This potential reclassification poses delineation challenges. To address this issue, we suggest incorporating the manufacturer's intention into the health aim of the app, aligning with the legal definition of medical devices. Consequently, medical apps are those explicitly intended for medical purposes, as indicated in the app's description, privacy policies, or terms and conditions. Proposing a comprehensive definition, medical apps are considered a subgroup of health apps concentrating on secondary and tertiary prevention, sharing similar technological functions (processing health-related data) with health apps, and adaptable for use on mobile devices. Although health professionals, patients, and family caregivers are primary target groups, the definition does not exclusively limit them. In accordance with legal definitions, both DiPA and DiGA are subsets of medical apps. DiGA, being medical devices, inherently necessitates usage for medical purposes, while DiPA indirectly shares the intended use for medical purposes, particularly in the context of caregiving, as implied by legislations. [3].

Enterprise Resource Planning (ERP) systems offer organizations the opportunity to integrate various functionally-oriented information systems. While much attention has been directed towards ERP systems in large for-profit organizations, small hospitals, and clinics can also benefit from their implementation. This study emphasizes the significance of focusing on Critical Success Factors (CSFs) when utilizing information systems, allowing organizations to address specific areas associated with performance. By concentrating on a limited number of factors, management gains insights into the dimensions of information that a system must address. The study specifically explores CSFs for small healthcare organizations and factors critical to the implementation of healthcare information systems. Two cases are presented, indicating support for the continued use of CSFs to focus on the benefits of ERPs. The study highlights that concentrating on groups of tangible and intangible benefits can assist rural healthcare organizations in effectively utilizing ERPs, providing a valuable perspective for smaller entities in the healthcare sector [4].

In their research paper titled "Trending Now: Future Directions in Digital Media for the Public Health Sector," Garcia and Scally explore the use of digital media as a tool in the public health sector. They examine how digital media can be employed to monitor the spread of diseases and mobilize responses to emerging health issues. The authors highlight that the internet, serving as a diverse source of information, enables users to access a variety of healthcare-related data, thus improving their awareness of health issues and preventive measures. Overall, the paper underscores the significance of digital media in keeping the public well-informed and engaged in health-related content [5].

This essay emphasizes Practo's focus on IT industry integration, aiming to provide a comprehensive service for patients to connect with suitable physicians. Through widespread outreach efforts, Practo seeks to raise awareness among both patients and medical professionals, fostering overall growth and advancement in the healthcare sector [6].

The absence of well-established laws mandating electronic patient data capture, coupled with a lack of comprehensive regulations addressing data protection and security on the cloud, poses challenges for the sales team in promoting cloud services. Additionally, the absence of an international agreement safeguarding patient confidentiality or the cross-border transfer of medical data further complicates this landscape [7].

Informed health decisions and adherence to treatment recommendations rely on the ability to comprehend fundamental health information, as highlighted by the American Medical Association. The book "Health Literacy: New Directions in Research, Theory, and Practice" by R.A. Logan and E.R. Siegel emphasizes the importance of health literacy in navigating the healthcare system and controlling one's health, with implications for patient outcomes and healthcare expenditures [8].

Irena Heszen-Klemens, studied that discussions surrounding doctor-patient communication center on factors influencing patients' adherence to medical instructions. However, many patients, instead of or in addition to following prescribed advice, engage in supplementary activities to improve their well-being. This study aims to comprehensively investigate the spectrum of patients' health behavior, its correlation with the doctor-patient interaction process (considered as an independent variable), and its impact on treatment outcomes (considered as a dependent variable). Additionally, the study examines the direct influence of the doctor-patient relationship on treatment outcomes. The study involved 62 out-patients, with two recorded visits for each patient analyzed. To collect data on patients' health behavior, interviews were conducted twice for each case. Physicians evaluated treatment outcomes. Results indicated that certain aspects of doctor-patient interaction, such as doctors' directiveness, emotional attitude, patients' activity, and partnership status, influenced patients' health behavior, impacting both compliance with medical instructions and spontaneous health-related activities. The connection between these factors and patients' compliance with doctors' instructions was significant, with a positive correlation observed with the extent of patients' spontaneous health-related activities [9].

In the perspective articulated by Schuster et al., good healthcare quality encompasses the delivery of services that are not only technically competent but also tailored to the specific needs of patients. This involves effective communication between healthcare providers and patients, fostering shared decision-making processes. Additionally, cultural sensitivity is deemed integral to ensuring that healthcare services are respectful and considerate of diverse backgrounds and beliefs. By emphasizing these components, the definition underscores a holistic approach to healthcare quality that goes beyond technical proficiency and embraces patient-centered care [10].

The enactment of the Health Information Technology for Economic and Clinical Health (HITECH) Act marked a significant milestone by allocating an unprecedented investment of nearly \$30 billion in health information technology (IT), according to the Bipartisan Policy Center in 2012. A substantial portion of this investment is directed as incentive payments to clinicians and hospitals, promoting the meaningful use of electronic health records (EHRs) in specific ways to enhance patient care. Widely referred to as the "meaningful use" program, it has become a catalyst for substantial technology investments, exerting both direct and indirect influences.[11]

The adoption of cloud computing comes with undeniable benefits, but it also introduces new technological and business risks for organizations. One prominent concern revolves around the resiliency of cloud computing, given that data may be distributed across multiple servers and geographical locations, making it challenging to identify specific data for a given point in time. The sales teams encounter challenges in promoting cloud services, primarily due to the current lack of well-established laws or regulations mandating the electronic capture of patient data. This is compounded by the absence of comprehensive legislation addressing the protection and security of healthcare data stored in the cloud. Notably, there is a general absence of laws protecting patient privacy and governing the international exchange of medical data, as pointed out by **Kaletsch and Sunyaev** in 2011.[12]

The shortage of adequate healthcare institutions and medical professionals in rural areas poses a significant crisis for residents. Public healthcare centers and community health care facilities suffer from inadequate management, a shortage of skilled human resources, and limited medical resources. Specialized centers are also scarce, leading to a situation where local medical centers may have basic medications for first aid but lack the necessary expertise. Living in rural areas often means facing the challenge of traveling long distances to access proper healthcare, which can be critical in emergency situations, potentially making the difference between life and death. Additionally, the scarcity of ambulances in both remote and urban areas poses difficulties in pinpointing the exact location of a patient swiftly. Therefore, there is a pressing need for an interface between patients and hospitals to save crucial time. To address these challenges, it becomes imperative to provide proper first aid to patients during the waiting period until expert help arrives, considering that not everyone is well-versed in the right kind of first aid for every situation.[13]

Proposing a revolutionary healthcare model for India, one that is digitized and holds the potential to transform how populations engage with national health services while also bolstering health systems. This model will play a crucial role in preventive, promotive, and curative health measures. An essential advantage lies in its ability to accurately, easily, and swiftly detect and predict diseases through the utilization of machine learning. This is crucial because a specific set of symptoms may not always indicate a particular disease and could instead be associated with a different set of diseases. Thus, through analysis, we can effectively identify the appropriate set of diseases linked to the symptoms.[14]

Lam meng chun stated that Efficient bed management stands as a pivotal responsibility in hospital operations, traditionally facilitated by desktop-based information technology systems. Smartphones offer distinct advantages, particularly in terms of mobility, enabling users to update information from any location and at any time. Our objective was to assess the practicality of a mobile-based application designed to support bed management operations. The application encompasses modules for ward-based bed information visualization, bed information updating, and ward information updating. Through observations and interviews with expert users, we delineated the essential functions of the application. Rated on a Likert 1-5 scale, the mobile application garnered a mean score of 3.45 for usefulness, 3.40 for ease of use, and 3.42 for satisfaction. Notably, respondents expressed concerns about the mobile data consumption, constituting 45.8% of the negative feedback. Despite this, the positive consensus among respondents affirmed that the mobile application significantly aids in streamlining bed management operations.[15].

The efficient management of blood is explained by **Devik Bagadiya** as Annually, the nation necessitates approximately 4 Crore units of blood, but only a minimal 40 Lakh units are currently accessible. While numerous blood banks exist worldwide, none facilitate direct communication between donors and recipients. Blood donation encompasses the voluntary act of drawing blood, involving either whole blood (WB) or specific components. In developed regions, most blood donors are unpaid volunteers contributing to a communal supply. Modern technology, particularly web-based applications, has seamlessly integrated into our daily lives. This web application, designed to address this gap, enables the easy identification of nearby blood donors during emergencies. Registered users' details, including location, contact number, blood group, and additional information, are readily

accessible. The primary objective is to connect those in need of blood with willing donors efficiently, ensuring timely access to the required blood type.[16].

3. SYSTEM ARCHITECTURE AND DESIGN

An Architectural Block diagram is a visual representation of a system or processing using blocks to represent different components or stages. It helps to illustrate the overall flow of information or signal within the system. Each block represents a specific function or operation, and the connection between the block show how they interact or communicate with each other.

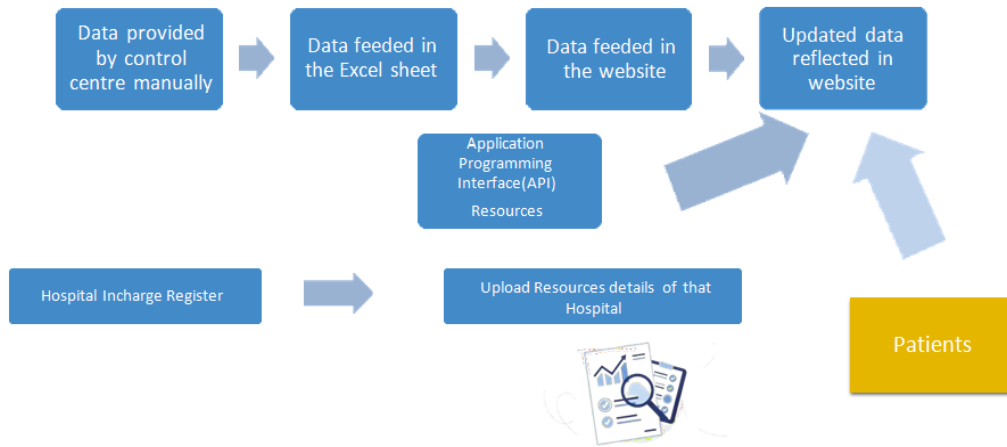


Figure 3.1: Architectural Block Diagram of Medical Support Application

Let's take a closer look at the Medical Support Application block diagram to understand the main parts and how they work together:

- 3.1 Manual Data Retrieving through Control Center:** The Control Center serves as a central hub where authorized personnel manually update and retrieve data to be displayed on the portal. Staff members responsible for data management can access the Control Center to input or modify information related to bed availability, medicine inventory, oxygen cylinders, ventilators, and other resources. They ensure that the data is up-to-date and accurately reflects the current status of hospitals or medical facilities.
- 3.2 Data Feeding:** The gathered data, either manually entered or automatically registered from hospitals, is updated in the server database. The server database serves as the backend storage system for the website, ensuring that the latest information is accessible to all users. Staff members responsible for data feeding regularly update the server database with new data and make necessary modifications as needed.
- 3.3 API Integration:** The web server integrates with various Application Programming Interfaces (APIs) to gather additional data resources. These APIs provide access to information about various diseases, their symptoms, and other relevant medical data. Users can utilize the search functionality on the website to type the name of a disease or symptoms, which triggers API calls to retrieve relevant information. The APIs also provide information about medications, allowing users to access details by searching for the name of a disease or specific medications.

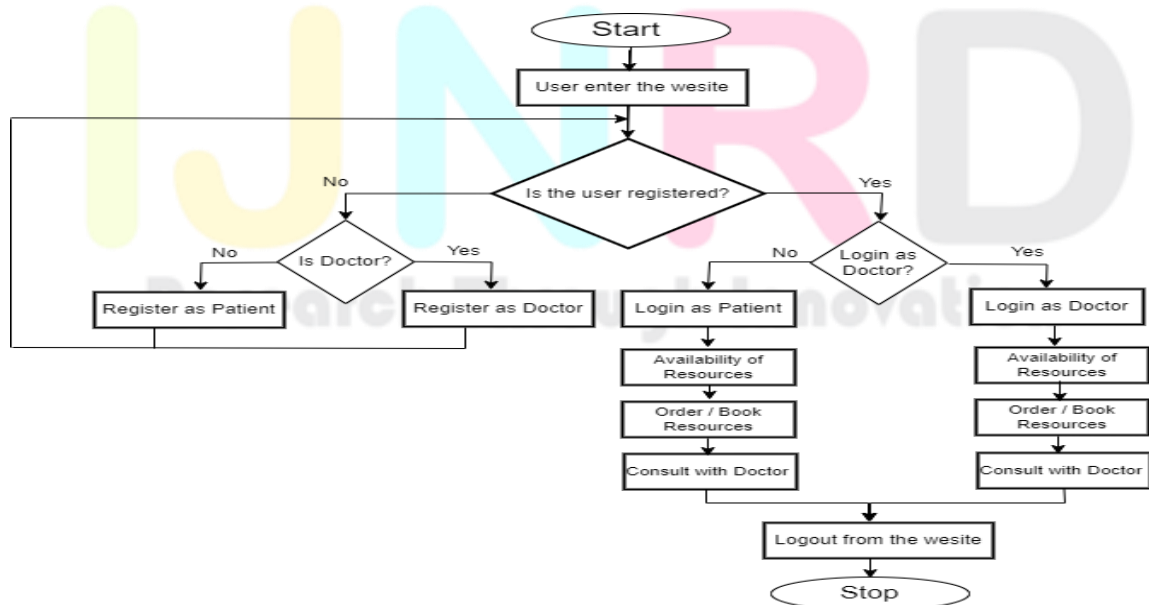


Fig 3.2: Flowchart of Medical Support Application

4. CONCLUSION

In conclusion, the Medical Support server represents a groundbreaking service provider committed to simplifying healthcare processes by establishing a centralized platform catering to both patients and governmental entities. Through its intuitive application, the platform offers real-time information on the availability of critical medical resources like beds, medicine, ventilators, and oxygen cylinders in specific locations. This innovative approach enables patients to conveniently access essential medical services from the comfort of their homes.

The increasing integration of wireless technology within the healthcare sector is of paramount importance. This integration facilitates seamless communication, remote patient monitoring, and efficient data management, thereby contributing to an overall enhancement in the quality of healthcare services. The incorporation of wireless technology in medical devices and systems not only enhances their portability but also ensures user-friendliness, facilitating easy access and mobility for both patients and healthcare professionals.

The age-old adage "prevention is better than cure" assumes significant relevance in the realm of healthcare. The adoption of advanced technologies, such as remote patient examination and monitoring, plays a pivotal role in enabling early detection of health issues. This proactive approach allows for timely intervention, preventing the progression of diseases and ultimately improving patient outcomes. As modern technologies continue their relentless evolution, they offer solutions that extend beyond mere advancements in healthcare – they empower individuals to take control of their health and well-being. This empowerment, in turn, enables people to lead more comfortable and fulfilling lives. Through the strategic leveraging of technology, the healthcare landscape can undergo a transformative shift, becoming more accessible, efficient, and inherently patient-centric.

In summary, the integration of technology, exemplified by the innovative capabilities of the Medical Support server, coupled with the pervasive influence of wireless communication and a proactive emphasis on preventive measures, holds immense potential to significantly improve healthcare services and contribute substantially to the creation of a healthier society.

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