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Dose Optimization Techniques from the Perspective of Health-care Systems

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Abstract

Dose optimization techniques are important strategies used by healthcare systems to ensure that patients receive the right amount of medication. These techniques are designed to optimize the benefits of medication while minimizing the risks of side effects and adverse events. In this article, we will discuss dose optimization techniques from the perspective of healthcare systems. Medication reconciliation: Medication reconciliation is the process of creating a comprehensive list of a patient's current medications, including the dose and frequency of each medication. This process helps to identify potential drug interactions, duplicate therapies, and medication errors. By reconciling medication lists, healthcare systems can ensure that patients are receiving the right dose of each medication.

Keywords: Healthcare systems • Dose optimization • Health safety

Introduction

Pharmacogenetic testing

Pharmacogenetic testing is the use of genetic testing to identify genetic variations that may affect a patient's response to medication. By identifying these variations, healthcare systems can adjust the dose of medication to optimize the patient's response and minimize the risk of adverse events. Therapeutic drug monitoring: Therapeutic drug monitoring is the use of blood tests to measure the concentration of medication in a patient's blood. This technique helps healthcare systems to determine the appropriate dose of medication for each patient, based on individual factors such as age, weight, and renal function. Clinical decision support systems: Clinical decision support systems (CDSS) are computerized tools that provide healthcare professionals with information and recommendations to support clinical decision-making. CDSS can include dose optimization algorithms that take into account patient factors, such as age, weight, and renal function, to determine the appropriate dose of medication [1].

Personalized medicine: Personalized medicine is an approach to healthcare that uses patient-specific information, such as genetic data and other biomarkers, to tailor treatment to each patient's individual needs. By using personalized medicine, healthcare systems can optimize medication doses based on individual patient characteristics, rather than relying on a one-size-fits-all approach. Adverse event reporting and monitoring: Adverse event reporting and monitoring systems are used by healthcare systems to track and report adverse events associated with medications. By monitoring adverse events, healthcare systems can identify patterns and trends that may indicate the need for dose adjustments or changes in medication. Medication therapy management: Medication therapy management (MTM) is a patient-centred service that involves a pharmacist working with a patient to optimize medication therapy. MTM includes medication reviews, medication reconciliation, and patient education to ensure that patients are receiving the right dose of medication and are taking their medication as prescribed [2].

Literature Review

CT imaging is now widely available and used to enhance healthcare because to advancements in medical imaging using CT. Concurrently, there are growing worries about the potential health and safety risks associated with patients' exposure to ionising radiation over their lifetimes. Although there is consensus that imaging dosages should be as low as practically possible, actual practise continues to vary widely amongst institutions for similar operations. The use of dose tracking, dose auditing, and the adoption of best practises are some of the strategies that have been used to improve dose optimisation [3].

According to a recent study that compared the efficacy of a single strategy, audit feedback, with a multicomponent intervention, dose optimisation strategies that incorporate interventions like thorough audit and feedback with actionable suggestions and quality improvement interventions can significantly lower radiation dose within health systems. Nevertheless, multi-component treatments need extensive work, and numerous organisational obstacles may prevent successful CT dosage optimisation initiatives at the organisational level.

We conducted interviews with a diverse group of leaders in health care organisations in the United States and abroad to learn more about the methods they have successfully used to implement change and optimise CT dose within their organisations. Our goal was to gain a better understanding of the approaches health care leaders are using to reduce radiation dose at the organisational level. The Partnership for Dose Study, a multisite randomised controlled trial of quality improvement measures to optimise CT dose funded by the National Institutes of Health, provided the data for this qualitative study through semi structured interviews. In total, 100 imaging facilities from the United States, Europe, and Japan were included in the study. These organisations had a variety of organisational structures, including community hospitals, academic teaching institutions, and standalone radiological imaging facilities. The primary study's findings indicated a considerable increase in CT dose. The local institutional review board and the institutional review boards of the collaborating health systems approved and oversaw the conduct of this study in 2018 [4].

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Discussion

The institutions taking part in the study varied in size, were both university and private practises, offered various services, and differed in whether or not they shared best practises or had full-time medical physicists on staff. From the 19 healthcare organisations, 26 participants were selected for the trial who were leaders in dosage optimisation as determined by the major site investigators. To find participants who could provide specific information about dose optimisation initiatives taking place inside their workplaces, a purposive sample technique was adopted. The study's principal investigator sent out an introductory email to recruit participants, followed up with questions, and obtained their informed consent [5].

On efforts to optimise CT dose, we performed 21 semi structured telephone interviews, five of which each included two participants. The approaches or strategies they had employed for dose optimisation, as well as any facilitators and barriers they had encountered, were questioned in an interview guide with 13 open-ended questions. During the course of six months, one interviewer conducted interviews. The average interview lasted 30 minutes and was audio recorded and carefully transcribed. Healthcare systems are complex networks of organizations, institutions, and individuals that work together to provide medical care and support to individuals and communities. These systems are designed to improve the overall health and well-being of the population, prevent and treat diseases, and provide access to essential medical services [6].

The components of healthcare systems vary from country to country, but typically include healthcare providers, healthcare facilities, healthcare financing, and healthcare regulation. Healthcare providers are the individuals who provide medical care and support to patients. They can include physicians, nurses, pharmacists, and other healthcare professionals. These providers may work in hospitals, clinics, private practices, or other healthcare settings. Healthcare facilities are the physical locations where healthcare services are provided. These facilities can range from large hospitals to small clinics, nursing homes, and other healthcare settings. They may be publicly or privately owned and may provide a wide range of services, including primary care, emergency care, surgery, and specialized medical care.

Healthcare financing refers to the mechanisms used to fund healthcare services. This can include government-funded programs such as Medicare and Medicaid, private health insurance plans, and out-of-pocket payments by patients. The financing of healthcare services can have a significant impact on the accessibility and quality of care provided. Healthcare regulation refers to the laws, policies, and procedures that govern the provision of healthcare services. This can include regulations related to healthcare providers, healthcare facilities, healthcare financing, and healthcare delivery. Regulations are designed to ensure that healthcare services are safe, effective, and accessible to all individuals. One of the key challenges facing healthcare systems is the rising cost of healthcare services. This has led to a focus on healthcare reform and efforts to improve the efficiency of healthcare systems.

Another challenge facing healthcare systems is the need to improve health outcomes and reduce health disparities. Healthcare systems must work to address the social determinants of health, including poverty, access to education and healthy food, and environmental factors, that impact health outcomes. This requires collaboration across sectors and a focus on population health rather than individual healthcare. In recent years, healthcare systems have also been impacted by the COVID-19 pandemic, which has highlighted the importance of public health preparedness and response. The pandemic has highlighted the need for healthcare systems to be agile and adaptable in response to emerging health threats.

Conclusion

In conclusion, healthcare systems are complex networks of organizations, institutions, and individuals that work together to provide medical care and support to individuals and communities. These systems face challenges related to cost, efficiency, health outcomes, and public health preparedness, but are essential for promoting the health and well-being of populations. As healthcare technology advances and populations continue to grow and age, the need for effective and efficient healthcare systems will continue to be a critical issue facing societies around the world.

Acknowledgement

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Conflict of Interest

None.

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