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The Role of Health Informatics in Improving Health Care Delivery and Patient Outcomes

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Abstract

1. Introduction to Health Informatics

Lack of standardized health informatics is a major concern towards the other inconsistencies of public health informatics, hence a more in-depth knowledge needs to be developed to avoid the vulnerabilities in public health (Alanazi et al., 2022). Interoperability is said to be one of the current concerns in Health Informatics as it relates to electronic medical records and health data. Health regulation and policy changes have recently been made, making health informatics more important at this time. Health Informatics is an overall health science and information technology branch. Because health informatics is a rapidly evolving and growing industry, the health field should obtain benefits in terms of the utilization and implementation of the database. This paper provides an assessment of the need for and planning of health informatic competencies. A look at the health informatics concept has been undertaken, reviewed the work under way in the world and determined possible competency needs. To establish this partnership, the system should develop and maintain strong collaborations between industry, governments, public and private hospitals, academia, consulting companies, and software vendors in the digital health industry. It is analyzed to know what demands for health informatics and competencies are needed. As the result, the development of a conceivable and internationally comparable health informatics framework that outlines health informatives competencies at a national level is essential. In public health, health informatics is involved in clearing standards (including training and education standards) for public health professionals.

Methods

Health Informatics is an interdisciplinary discipline that includes computer science, cognitive and organizational sciences, information science, and technology. Health Informatics addresses information acquisition, storage, analysis, distribution, retrieval, and use for healthcare applications. It investigates how information technology can be used to enhance

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quality care, health services, and outcomes. In the last decade, Health Informatics has gained global attention, as evidenced by the construction and maintenance of health information systems in most countries. More than half of the medical schools across the U.S are offering Health Informatics programs, and Health Informatics is also considered as a subspecialty by the American boards of medical specialties. Many health professionals have also joined various Health Informatics programs to pursue careers as Health Informatics specialists (Alanazi et al., 2022).

Conclusion

The field of health care delivery has undergone dramatic changes in the past years. The passage of Patient Protection and Affordable Care Act (PPACA) of 2010 has escalated healthcare reform to new heights. Delivery models have been proposed, advocated and implemented with the shared goals of improving the quality of care and reducing costs (Alanazi et al., 2022). All healthcare professionals, from those providing direct care to those in the supporting roles, are in need of new skills and knowledge to meet the requirements that come with these models. Health Informatics, as a science of managing health information including the analysis and optimal utilization of it, has become imperative and is one major goal of the health care reforms undertaken recently.

There are three groups of healthcare professionals who can benefit the most from health informatics training. First group includes those are currently making managerial decisions based on intuition or infrequent, traditional reports. Knowledge on what informatics performs, what is available, and what standard should be incorporated should be acquired. Also, the presence of a person with knowledge of informatics would be beneficial during the development of their reports to see if the reports can be made optimally. Second group includes those who work with data in their daily routine but lack of knowledge and skills to perform meaningful analysis and presentation on that data. Therefore, they are still unable to optimally interpret their findings and incorporate the findings into their decisions. Third group includes the new generation of health-care professionals who have been trained in informatics as part of their curriculum.

1.1. Definition and Scope

Health Informatics is an emerging field that uses information technology and management systems to improve the delivery of health care. Health Informatics is an indispensable science in light of the massive reform healthcare has undertaken recently (Alanazi et al., 2022). The field is now considered integral to health management, patient care, quality assurance, and research. A combination of technical and managerial as well as clinical knowledge and skills are required to address these requirements and assume leadership roles in health informatics nationally and globally, to develop applications, information systems and infrastructure to

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support and coordinate patient care, analysis, research, and decision-making. To achieve this goal, health care professionals need to be trained not only in the clinical aspects of health care but also in a wide range of IT applications and their implementation techniques. Furthermore, health care professionals need to be educated about management aspects of health service delivery and the fundamentals of IT infrastructure and applications be widely used in health care sector. Currently, professionals in the health care area do not have a clear career path in health informatics due to a lack of recognized education and training opportunities beyond the general IT knowledge.

1.2. Historical Development

The interactions between academia, relief organizations and government officials are currently primarily conducted via events and professional literature. Current practices are slow to establish common ground and inconsistencies in terminology and understanding prevail. We introduce the use of microblogging as a correctly aged IT technology in order to establish a permanent online expert network. As proof of concept a Facebook pen page, the Health Informatics Expert Network, is already operational, information is emailed to future end users on an ad-hoc base. The Health Informatics Expert Network blog service eliminates the need for such interactions, while providing instant access to the scattered expertise pool of communities in academia, relief aid organizations, and government administration. An initial pilot has shown the feasibility of the proposed approach (NØHR et al., 2019).

UN agencies like PAHO, WHO, UNOCHA and also the World Bank provide generally applicable data and research results about mortality, immunization coverage and the economic and social context. Unfortunately, their publications are not very accessible for a wider public and are rarely cited in recent papers. I track back their information sources, which are mainly statistics bought by them from other actors or “open” sources like agencies of ministries in high income countries. I analyze how data turns into assessments, predictions and eventually publication texts, to show how conceptual framing is playing a relevant role and to then pose the question of the political implications of the narrative form of the data representation (Lun, 2018). So the blog just is the text, the main body, without introduction and model; The introduction to the model then describes type of data and exchange with professionals; The templates used for the data publication are at the end of this blog.

2. Health Information Systems

Improving the health care systems can improve the quality of patient care and reduce health care cost. To improve health care systems, the first and the most important thing is to encourage HIS/HIT development and deployment. How to use HIS/HIT to support the emerging trends towards evidence-based, prevention-oriented, and population healthcare will become an increasingly important research area for health service community. To implement

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and use a health information system, the following key elements needs to be considered: (a) health data or data generated by other sectors may act as facts for a particular intelligent system or human expert system. It underlies many intelligent software systems, and a common implementation is in the form of a database management system. The database can either be centralized or distributed, (b) information denotes processed data with some interpretation, or representation, i.e., knowledge. Information can be used to make decisions. The healthcare information in HIS/HIT is not only from data, but also from expert doctors, nurses, and researches, (c) healthcare system from providers to patients, is very complex, which may involve diagnosis, therapy, observation, and prevention of diseases, illness, injuries, and other impairments. Healthcare information system is described as any computerized system or related equipment, software, manufactured product of system that is used to manage health data as defined under the act (Fu, 2015).

2.1. Electronic Health Records (EHRs)

At the pulse of modern day medicine, electronic health records (EHRs) are essential clinical tools for physicians. Part of the US Federal health IT stimulus funding enforced in the Health Information Technology for Economic and Clinical Health Act, one of the most controversial topics today is the Meaningful-Use Program that mandates EHR implementation timelines to maintain existing Medicare payments to providers. The literature raised notable features and difficulties of the EHRs in relation to these Meaningful Use objectives during their extensive literature review (Nii Koppoe, 2018). The review process covered current literature on EHR attributes and their influence on the implementation and adoption of EHRs, which are relevant to the objectives detailing Meaningful Use-program related benefits and challenges of EHRs. The review also addressed benefits and challenges of EHRs related to the improved patient safety, quality, and cost of care mandated by the current stage of Meaningful Use. Paradoxically, these ambitious objectives have resisted quantitative measurement. In a study, only about 48 months following the Meaningful-Use implementation, the dependency structure of the Meaningful-Use objectives were characterized. There, it was also found that a provider's efficiency in accomplishing certain objectives would predict their relative bipartite standing in other objectives to be accomplished within a single stage before the two-year timeline had lapsed.

It has taken on greater importance within the framework of minimising healthcare costs, as it is a significant investment in financial terms, and it has the potential to dramatically improve health outcomes. Concentrating nursing informatics research in the wider European context would be beneficial to enhancing appreciation and understanding of the unique challenges that are present. However, it is evident that there is a lack of research and development investment in health informatics and coupled with the delays in resourcing the current National Health Service digital plan, competitiveness and sustainability could be greatly

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hindered. Health informaticians shouldn't merely rely on their expensive state-of-the-art research degrees to corner the job market in health informatics. Policy makers and NHS executives should be encouraged to exert political and financial support in reforming and modernizing national health informatics capacities, in the sense of a timely know-how rather than an ever-learned wisdom.

2.2. Clinical Decision Support Systems (CDSS)

Clinical Decision Support Systems (CDSS) are being used worldwide in various capacities to help physicians to diagnose, manage, and treat patients. Some of these CDSS systems are used to check for drug interactions when prescribing medications, other systems are embedded in diagnostic equipment to help interpret images, and some are standalone programs that advise on a broad range of treatments, drug dosages, and expected outcomes. Many of the CDSS systems in use and development come from the fields of artificial intelligence (AI), machine learning, and deep learning. These systems work on vast datasets which have made them successful in situations where statistical probabilities were well documented (Elhaddad & Hamam,). However, in the clinical setting, much of the information needed for effective treatments or diagnoses is not contained in patient health records, is unrecorded, or is uncommon. This begins to show the limits of AI in improving patient outcomes and the need for a transformation of the field to a multi-disciplinary one.

CDSS has improved considerably by incorporating patient data to some of today's systems. They often offer actionable insights, evidence-based recommendations, and patient-specific information at the point of care. More advanced systems contain a broad or deep understanding of physiology and medical treatment strategies, which together with patient-specific data, can not only offer more informed recommendations, but can also assess network behavior, and analyze the effects of interventions. In effect, the more advanced systems can foresee treatment and disease dynamics over long time spans. Medics are often faced with making uncertain decisions which can place significant emotional and fiscal stress on institutions and families. This is particularly the case for intensive care units where diseases can progress quickly and deteriorate further, despite treatment interventions.

3. Telemedicine and Telehealth

Wide advances in internet technology, electronic devices, artificial intelligence approaches, and the big data revolution have significantly improved data exchange across the health care ecosystem, patient care quality, and outcomes. The rapid increase of the aging population and the rise in the prevalence of chronic diseases necessitate further improvement in health care quality and innovation in care delivery models. Responding to the increasing demand for health care services, innovative telemedicine and telehealth services that include health professionals, devices, and information contain medical data are quickly increasing in the

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health care landscape. Telehealth services can improve access to care, enhance information exchange, and provide person-centered services to physicians and patients. Utilization of telemedicine services that are medical, surgical, therapeutic, diagnostic, and direct-to-consumer services is increasing in health care across the globe using internet, mobile devices, smartphones, wireless tools, and other telemedicine technologies. Services delivered through telemedicine technologies include remote patient-monitoring (RPM), store-and-forward, and live interactive services. Telemedicine technologies are used effectively in intensive care, emergency, and follow-up care to enhance the health care quality and patient outcomes (Zhang & Saltman, 2022).

4. Data Analytics and Population Health Management

Data analytics has emerged as a powerful tool for studying patient populations and predicting health events. Access to claims data for millions of patients has enabled health services researchers to study patient risk factors and treatment outcomes over long periods. This information has contributed greatly to our understanding of health care delivery and the effectiveness of treatment for various diseases. Today, big data are being generated in the clinical setting from electronic health records generated during care delivery, as are the patient lifestyle data generated from wearable health monitoring devices. The availability of data from these sources enables researchers to focus their investigations on smaller patient populations who share common disease characteristics or health events. Health care is undergoing a transition from a sick care model to a health promotion model. This change requires a deep understanding of the factors that lead to the development of chronic illness and lifestyle-based interventions that can prevent chronic illness. The availability of data on everyday living generated from wearable health monitors can help researchers determine the onset of chronic illness with better accuracy. Data on where people live and work, eat, and shop can be paired with occupational and environmental data to reveal associations between lifestyle and various health outcomes. In addition, insights can be gleaned from the factors affecting health care access and utilization. With this information, patient education activities can be better tailored to meet the needs of the patient population, and interventions can be launched to improve outcomes.

5. Challenges and Future Directions

Health informatics is expected to be a potential technology to improve the quality of health care, reduce the cost of health technology and improve access to patients. Although the positive feedback has been obtained from the developed health informatics, there are also challenges that are necessary to further improve the performance of health delivery, especially for developing countries like Indonesia. Current and future challenges on the health informatics will be presented in the paper. These include health care quality, patient

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treatment, particularly inpatient treatment, the cost of health technology, health treatment cost, health treatment access, and the user do not trust the health informatics (W Bates, 2002).

The improvement of the quality case program on the inpatient and various treatment, monitoring and outcome may not be performed by a hospital. In such case, there are spread of the need of a hospital network for treating and prevention of dangerous diseases, an acceptable explanation for the treatment program, and easy access to medico-social information on the health over the hospital. The monitoring and better regulation of inpatient treatment, health care quality, inappropriate treatment of diseases and cost of health technology may be considerable pressure to hospital financial survival. Since hospital may respond by cost-shifting, it will result in more cost of health treatment. In turn, patient access will be constrained (NØHR et al., 2019).

References:

1. Alanazi, A., Mohamud, M., & Aldosari, B. (2022). Establishing a Graduate Certificate in Health Informatics: Need Assessment and Competency-Based Framework. ncbi.nlm.nih.gov
2. NØHR, C., E. KUZIEMSKY, C., L. ELKIN, P., MARCILLY, R., & PELAYO, S. (2019). Sustainable Health Informatics: Health Informaticians as Alchemists. ncbi.nlm.nih.gov
3. Lun, K. C. (2018). The Datafication of Everything — Even Toilets. ncbi.nlm.nih.gov
4. Fu, L. (2015). The Value of Integrated Information Systems for U.S. General Hospitals. [PDF]
5. Nii Koppoe, S. (2018). Predictive Relationships Between Electronic Health Records Attributes and Meaningful Use Objectives. [PDF]
6. Elhaddad, M. & Hamam, S. (2022). AI-Driven Clinical Decision Support Systems: An Ongoing Pursuit of Potential. ncbi.nlm.nih.gov
7. Zhang, X. & Saltman, R. (2022). Impact of Electronic Health Record Interoperability on Telehealth Service Outcomes. ncbi.nlm.nih.gov
8. W Bates, D. (2002). The quality case for information technology in healthcare. ncbi.nlm.nih.gov