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Research Article

Data Mining Application In Telehealth Settings And Disease Prediction

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Abstract

In telehealth contexts, data mining involves an analysis of data gained from ongoing healthcare practices or systems. It is important to make decisions based on evidence because it improves outcomes by aligning treatment to patient values, as well as improve the quality of health care by allowing clinicians to gain access to untapped, yet crucial data. Similarly, evidence-based decision making is important because it improves transparency and accountability in such a way that it justifies decisions based on valid data. Additionally, the process ensures that real-time and up-todate data aids in guiding decisions, ensuring further that physicians stay abreast of current developments in the field; hence, preparedness. In summary, the process reduces costs, improves patient satisfaction, and promotes the quality of health care.

1   Introduction

At united general hospital, only 10 beds are set for use in the icu section. The community served has expanded significantly, reaching 190,000 compared to the initial population of 90,000. Some of the resultant problems that have been reported include delayed scheduled surgeries, delayed transfer to the icu, and overcrowding in emergency rooms and post-operation departments. Hence, the need to expand the icu, especially using $15 million that is available, could not be overstated. Despite the availability of the funds, $15 million, how to expand the icu remains a problem. Particularly, the problem is on whether or not to accommodate the remote icu monitoring approach alongside icu expansion as preferred by the ceo and, if so, the specific path to follow (Belard, Buchman And Forsberg et al., 2016). Some of the available options include attending to rooms where patients have more serious problems, leaving the management to bedside teams, combining regular and icu beds and managing them collaboratively through the e-icu teams and bedside teams, and employing a per-usage model in which payment is only made for remote icu monitoring services that are offered. Every aspect requires efficient management (Abdul Jalil et al., 2021; Mohd Noh et al., 2021; Mustafa et al., 2021; Roszi et al., 2021; Tumisah et al., 2021). If it is managed well, various problems can be avoided (Irma et al., 2021; Suzana et al., 2021; Rohanida et al., 2021; Nazrah et al., 2021; Shahrulliza et al., 2021).

2   Methodology

Telehealth-based health information technology (hit) systems that are projected to play a crucial role in supporting the implementation of the decision-making process include electronic prescribing that would ensure that prescriptions are prepared and sent electronically, telehealth systems that would constitute

Computers and mobile devices, and electronic medical record systems for storing medical data for easy access, retrieval, and sharing from computers. Others include computerized provider order entries for sharing medication orders electronically and clinical decision support systems for ensuring that informed decisions are followed (Cánovas-Segura, Campos and Morales et al., 2016). All Aspects Require Effective Leadership And Management (Mohd Arafat et al., 2021; Sumaiyah et al., 2021; Hifzan et al., 2021; Shahrul et al., 2021; Helme et al., 2021)

3   Results And Discussion

One option involves subscribing to remote icu monitoring in which payment would be made only for services rendered. Another option entails icu expansion and remote icu monitoring room subscription only for patients with severe conditions. The third option entails icu expansion with more regular and icu beds, with the system management delegated to a combination of bedside teams and e-icu personnel. Notably, the first option does not require additional beds. Rather, it comes in the form of a subscription, implying that a third party vendor or vendors would be required, should the option be adopted. For the second and third options, they require additional beds. Every organization values perfect management in ensuring success (Farah et al., 2021; Syahrul et al., 2021; Quah et al., 2021; Ahmad Syarifuddin et al., 2021; Jumiah et al., 2021).

The first option is about subscribing to remote icu monitoring. The option ensures that payment is only made for services rendered. At the hospital, the community served is estimated to constitute a population of 190,000 individuals (Dagliati, Sacchi and Tibollo et al., 2018). Currently, only 10 beds are set aside for the icu section. Hence, this first option, if adopted and implemented, is poised to ensure that the burden of delays in scheduled surgeries and overcrowding in the emergency rooms and post-operative departments is addressed. Furthermore, there might be a reduction in the costs of running the icu expansion system because the pay-per-usage arrangement might not demand more physical infrastructural developments and expansions, especially because it option reflects bundle payments. Costs might be saved further in such a way that this option does not demand additional beds. The success of something depends on good and efficient management (Mohd Ali et al., 2021; Parimala et al., 2021; Siti Jamilah et al., 2021; Nor Fauziyana et al., 2021; Noel et al., 2021). The best way is to do efficient management (Ahmad Shafarin et al., 2021; Junaidah et al., 2021; Farah Adibah et al., 2021; Ahmad Shakani et al., 2021; Muhamad Amin et al., 2021).

The second option involves combining icu expansion and remote icu monitoring but only applying the subscription to patients with more severe problems. Indeed, this option is projected to be beneficial and directly applicable to chronically ill patients, as the majority tend to have longer stays in hospital. Furthermore, this group of patients requires specialized attention. Therefore, this option might reduce the length of hospital stay. From previous studies, intensivists aid in reducing the lengths of hospital stay and mortality rate in patients such as those diagnosed with aortic aneurysms. Notably, this option calls for more beds. Some of the additional benefits with which it comes include alleviating overcrowding in emergency departments and reducing delays in scheduled surgeries. Overall, the option is predicted to ensure timely care (Harle, Lipori and Hurley, 2016). This demonstrates that the importance of something being managed well (Santibuana et al., 2021; Nor Diana et al., 2021; Zarina et al., 2021; Khairul et al., 2021; Rohani et al., 2021; Badaruddin et al., 2021, Abdul Rasid et al., 2021).

The third option involves icu expansion in such a way that there will be more icu beds and regular beds, as well as a system management approach that will involve collaboration between bedside teams and e-icu personnel. Indeed, the

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approach leverages an intensivist-led care team. Furthermore, the arrangement calls for the incorporation of remote monitoring technology and telemedicine into the icu expansion process. With the bedside team playing a

supportive role and complementing the work of e-icu clinicians, it is projected that hundreds of patients will be monitored remotely and in real-time.
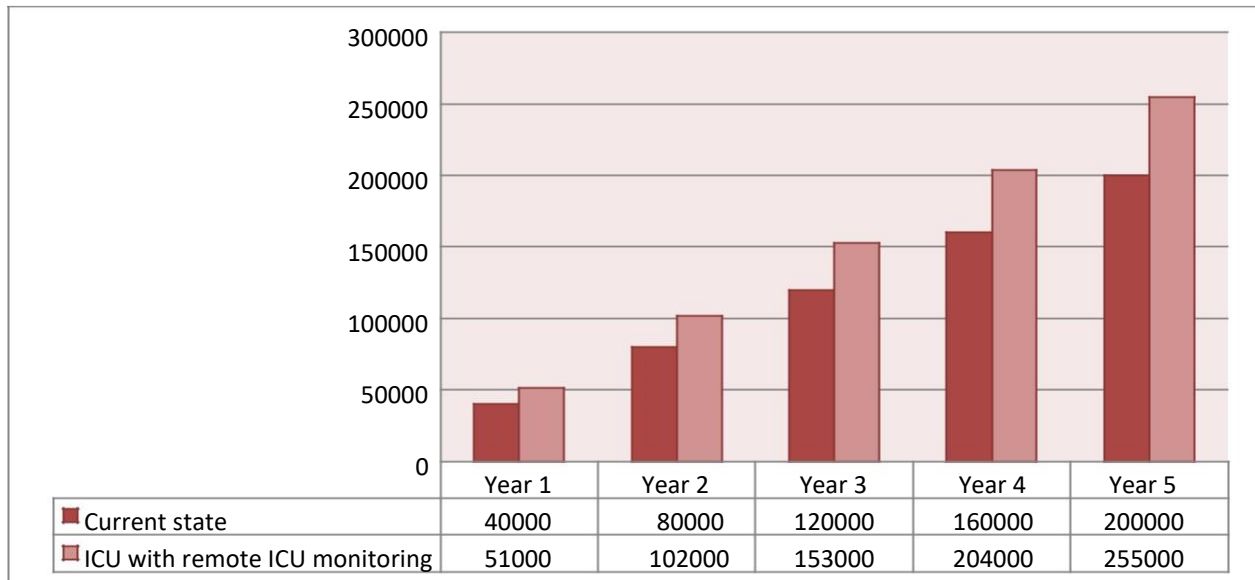
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While implementing the third option, potential patient complications will be avoided if e-icu clinicians track laboratory trends and vital patient signs, as well as guide the interventions of bedside team members. The eventuality is that the option's implementation will be in the form of several supportive sets of eyes. Specific benefits that are poised to arise include reduced wastage, improved patient outcomes, and a decrease in the length of stay in hospital.

In situations where strains are reported in the icu, some of the secondary problems that tend to arise include an increase in the risk of patient death and a risk of delays in the transition between the emergency rooms and the icu. To curb such adversities, there is a need to adopt an option that includes an increase in the number of icu beds at united general (Kohn, Sun and Knoop et al., 2014). Whereas the third option might come with some drawbacks such as increased fixed costs and possible wastage when some beds are unused in the icu, beneficial effects that it poses tend to outweigh its perceived demerits. Also, its benefits outweigh those that are likely to accrue from the first two options. As such, the final recommendation is that the hospital should adopt the third option involving icu expansion with more icu beds and regular beds while ensuring that the management of the new system involves a combined and collaborative effort between the e-icu personnel and bedside team members.

As mentioned earlier, the third option, which has been recommended for adoption and implementation at united general, involves a combination of icu beds and regular beds. Also, the option involves combining e-icu personnel and bedside team members. Indeed, several reasons justify the selection of this option. Some of the beneficial outcomes projected to arise include reduced lengths of stay in hospital, reductions in the adjusted odds of mortality, decreased mortality rate, reduced rate of icu-related complications, reduced posttraumatic stress and burn out among nurses and intensivists, and a reduction in medication errors, specially because the option is likely to reduce employee burn out significantly.

From an analysis of the current and projected figures, the proposed option is likely to yield two benefits. These benefits include an increase in the volume of patients served in the icu in time and an increase in the overall income at united general. At the moment, the amounts received include $40,000 per day, with the number of beds standing at 10. The implication is that $10,000 is received per bed per day, translating into 120% capacity. This capacity reflects a significant loss of income and poor outcomes because delays in scheduled surgeries continue to be reported, a trend that reflects system inefficiency. However, if five standard beds are introduced, for instance, alongside e-icu clinicians' intervention, the outcome would translate into $51,000 per day, with each regular bed having been associated with $2,200 per day. The eventuality is that there would be a significant increase in the amount of income received, the volume of patients served on each day also increasing significantly.

	Year 1	Year 2	Year 3	Year 4	Year 5
Current state	40000	80000	120000	160000	200000
ICU with remote ICU monitoring	51000	102000	153000	204000	255000

As illustrated in the figure, a five-year implementation of the proposed option demonstrates that on each day and in each year, if most of the other external factors surrounding hospital operations and patient flows are kept nearly constant, the proposed option of icu expansion would outperform the current option in terms of the overall income received at united general. For patients and the rest of the community at large, a key benefit would be a significant increase in the number of patients served in the icu timely, with sets of eyes from bedside teams and e-icu clinicians aiding further in minimizing cases of possible medication errors. It is also notable that whereas the implementation of the new system requires new infrastructure, this demand might not affect the financial position of the organization significantly because $15 million is available to counter the costs with which new system implementation would be associated.

The proposed option will shape staffing practices at the hospital whereby it will require that more personnel are hired to attend to additional patients on the created regular and icu bed spaces. Also, the option requires that staff members are trained on new technology such as electronic medical record systems, especially in terms of data storage, access, retrieval, sharing, and interpretation. From a productivity perspective, it is likely to improve in such a way that the proposed system might reduce congestion in emergency rooms and post-operative departments, as well as reduce delays in scheduled surgeries. Similarly, productivity might improve in such a way that alongside bedside teams, e-icu clinicians might monitor many patients simultaneously and in real-time. In relation to organizational competitiveness, this proposed option might ensure that united general monitors patient progress on a 24/7 basis; hence, improvements in health care delivery and the served population's access to health care services. Financially, the new option is projected to steer significant improvements in the overall income received annually, as more patient will be served in real-time.

In future, data validity and reliability could be improved by presenting information from different viewpoints, ensuring data depth or focusing on comprehensive information, and control for more variables to discern how they could shape the performance of a proposed option. In this study, some of the factors that informed the advocacy for the recommended option included the ability of bedside teams to complement the role of e-icu clinicians, the ability of the option to reduce medication errors (via collaboration between e-icu clinicians and bedside teams), and the ability to ensure that overcrowding in emergency departments and possible delays in scheduled surgeries are minimized. While implementing the proposed healthcare system

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Of icu expansion, it is recommended that united general embraces cloud computing because this option is not only responsive to the needs and preferences of most of the current community members but also reflects a platform through which real-time data acquisition, storage, retrieval, and sharing might be realized.

4   Conclusion

This study has gained data from reliable sources in relation to the development of the recommendation and opportunity statement. Some of these sources include the center for disease and control and health care institutions that have implemented a similar approach. The validity of the data is also confirmed in such a way that the presentation has provided a visual analysis and predicted trends based on different scenarios that united general could experience in a period such as that which stretches to about five years. The proposed option is predicted to pose direct effects on three sets of stakeholders. For the hospital, outcomes might include an increase in profitability, an improvement in productivity, and a reduction in staff burn out. In relation to patients, there is likely to be a significant reduction in the length of hospital stay and also healthcare expenditure at the individual and family levels. For the case of the community that united general serves, healthcare costs are predicted to reduce significantly, with a reduction in the lengths of hospital stays projected further to translate into a trickle-down and tertiary effect of improved economic productivity, as members will recover from sickness in real-time and attend to tasks in their workplaces.

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