A.

Health Information Technology (HIT) have taken over the traditional practices of patient data maintenance (Shortliffe & Chiang, 2021). This facilitates the need to switch from paper-based records to electronic health records. Primarily this approach has improved the ease of clinical research as it made bibliographic search simple with the documented information (Shortliffe & Chiang, 2021). It aided in analysis of treatment outcomes in clinical trials and assisted in clinical decision making (Shortliffe & Chiang, 2021). Secondarily, electronic versions helped clinicians save a lot of time as they previously looked up for paper records organized chronologically (Shortliffe & Chiang, 2021). Also, clinicians can effectively retrieve data needed and at the same time integrate it from various connected systems (Shortliffe & Chiang, 2021). Thirdly, a lot of scope was provided to evidence-based guidelines with aid of HIT (Shortliffe & Chiang, 2021). This provides a means for improved treatment outcomes and high-quality care (Shortliffe & Chiang, 2021). Further, improvements in the communication systems globally provided a better scope to telemedicine (Shortliffe & Chiang, 2021).

B.

Computer based integrated environment comprises of various tools for managing the health data effectively (Shortliffe & Chiang, 2021). These include filling the patient details by the clinician, analysis of various treatments and outcomes, quality assurance and play a key role in evidence-based guideline (Shortliffe & Chiang, 2021). In addition to clinical applications, these also aid in workflow and administrative functions (Shortliffe & Chiang, 2021). These advancements made clinical research more effective by eliminating manpower in data collection, filling data sheets etc. (Shortliffe & Chiang, 2021). Moreover, clinical information management finds application in various domains like Consumer and Public health informatics, Translational bioinformatics etc. (Valenta et al., 2018).

The brighter aspect of information technology in health care is quality assurance (Shortliffe & Chiang, 2021). Implementation of these EHRs in Long Term Care (LTC) facilities showed significant improvements in clinical documentation and contributed to enhanced decision making (Kruse et al., 2017). Workflow for clinicians is made simpler as it became easy to look up any information and accessed from various locations (Shortliffe & Chiang, 2021). Establishment of registries pooled the essential data that helped in prevention of illness and patient counselling (Shortliffe & Chiang, 2021).

The databases can aid in evidence-based practice and develop clinical research protocols (Shortliffe & Chiang, 2021). Detection of various trends and disease patterns are made possible with these tools which further expanded the scope of clinical research based on EHRS (Shortliffe & Chiang, 2021).

The negative side of the coin include data breeches and ransomware attacks. Data encryption is indicated to prevent such incidents (Shortliffe & Chiang, 2021).

C.

EHRs effectively documents all the demographics of the patient, reports, treatment protocols and their outcomes which can be used in future to study various patterns of disease and detect the trends (Shortliffe & Chiang, 2021).

EHRs play a key role in evidence-based guidelines which has the highest possibility to reduce medical errors (Shortliffe & Chiang, 2021). The previously stored data can be retrieved to perform analysis to make meaningful conclusions (Shortliffe & Chiang, 2021). Added to this, predictive analysis by EHRs employing various models offered satisfactory results for improving patient outcomes (Lee et al., 2020).

EHRs compensates for misplaced documents which can ensure safe treatments (Shortliffe & Chiang, 2021).

EHRs find practical application in clinical research to improve the safety and efficacy of new treatments. Here the data from the patient can be analyzed to get insights about disease processes (Shortliffe & Chiang, 2021).

There are very high chances for data mis entry by the clinician (Shortliffe & Chiang, 2021). There has been no general standardization for clinical terminology which could lead to difficulties in data integration (Shortliffe & Chiang, 2021). Challenges arise from poorly developed software, data entry screen and flaws in the design of user interface (Carayon et al., 2017). Sometimes, the models employed by EHRs to make predictions fail to form apt inferences (Carayon et al., 2017). As this is a new and emerging technological tool, adapting to it takes time which can pave path for medical errors.

D.

The emergence of operational EHRs began in the early 1970s and out of these HELP and RMRS carry historical importance in providing the clinical decision support with their initial design (Melton et al., 2021, p.471). These EHRs were designed for in-patients and with this design many outpatient EHRs were developed by the vendors (Melton et al., 2021, p.471). These EHRs served as a good start for proving the clinical assistance and ensure patient safety.

**References:**

Carayon, P., Du, S., Brown, R., Cartmill, R., Johnson, M., & Wetterneck, T. B. (2017). EHR-

related medication errors in two ICUs. *Journal of healthcare risk management: The Journal of the American Society for Healthcare Risk Management*, *36*(3), 6–15. <https://doi.org/10.1002/jhrm.21259>

Kruse, C.S., Mileski, M., Vijaykumar, A.G, Viswanathan, S.V., Suskandla, U., & Chidambaram,

Y. (2017). Impact of Electronic Health Records on Long-Term Care Facilities: Systematic Review. *JMIR medical informatics*, 5(3), e35. <https://doi.org/10.2196/medinform.7958>

Lee, T. C., Shah, N. U., Haack, A., & Baxter, S. L. (2020). Clinical Implementation of Predictive

Models Embedded within Electronic Health Record Systems: A Systematic Review. *Informatics (MDPI)*, *7*(3), 25. <https://doi.org/10.3390/informatics7030025>

Melton, G.B., McDonald, C. J., Tang, P. C., & Hripesak, G. (2021). Electronic health records. In Shortliffe, E. H.  & Cimino, J. J. (Eds.)  & Chiang, M. F. (Co-Ed.).  (2021). *Biomedical informatics: Computer applications in healthcare and biomedicine.*(5th ed.). New York: Springer.

Shortliffe, E. H.  & Chiang, M. F. (2021). Biomedical informatics: The sciences and the pragmatics. In Shortliffe, E. H.  & Cimino, J. J. (Eds.)  & Chiang, M. F. (Co-Ed.).  (2021). *Biomedical informatics: Computer applications in healthcare and biomedicine.*(5th ed.). New York: Springer.

Valenta, A. L., Berner, E. S., Boren, S. A., Deckard, G. J., Eldredge, C., Fridsma, D. B., Gadd,

C., Gong, Y., Johnson, T., Jones, J., Manos. E., L.V., Phillips, K. T., Roderer, N. K., Rosendale, D., Turner, A. M., Tusch, G., Williamson, J. J., & Johnson, S. B. (2018). AMIA Board White Paper: AMIA 2017 core competencies for applied health informatics education at the master’s degree level. Journal of the American Medical Informatics Association, 25(12), 1657–1668. <https://doi.org/10.1093/jamia/ocy132>