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MODERN TECHNOLOGIES WHICH CAN TRANSFORM HEALTHCARE INFORMATION SYSTEMS

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Annotation: Healthcare delivery organizations today collect and manage vast amounts of patient data through electronic health records (EHRs) and other health information systems. However, the full potential of this digital data to improve outcomes and reduce costs has yet to be realized. Legacy health information systems often consist of fragmented, siloed databases that do not interoperate effectively. This lack of interoperability hinders coordinated care and meaningful use of data across sites and systems. Exciting new technologies are emerging that promise to transform such fragmented healthcare information ecosystems into connected, intelligent systems capable of delivering safer, more affordable, and higher quality care. This paper examines some of the most transformative modern technologies that can overhaul traditional healthcare information systems to deliver better population health outcomes.

Key words: Business Process Management (BPM), Health care systems, Health information exchanges.

Introduction

Electronic Health Records:

Electronic Health Records (EHRs) are digital versions of patient health information, such as medical history, diagnoses, medications, immunizations, lab results, radiology images, and provider notes (Menachemi & Collum, 2011). EHR systems provide storage, retrieval, and sharing capabilities for such patient data that far exceed paper-based medical records. The Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009 mandated widespread adoption of interoperable EHRs in the United States because they enable significant improvements in quality of care and cost savings. EHRs support better coordinated, evidenced-based care across disciplines and sites. Real-time data availability prevents duplicate testing, fills information gaps at points of care, and reduces medication errors through drug interaction alerts (Walker et al., 2005). EHRs also facilitate robust analytics on treatment efficacy and patient outcomes using large, aggregated datasets. Population health trends, public health threats, resource utilization, and care protocols can be optimized based on such analytics. Patients also benefit from direct access to their medical history and enhanced engagement through patient portals integrated with EHRs.However, realized benefits depend heavily on interoperability between different EHR systems to enable unified patient records across providers (Ford et al., 2016). Varying vendor solutions, fragmented implementations, and lack of enforced standards have hindered interoperability.

Significant policy, governance, and technical infrastructure investments are still needed to maximize value from EHRs.

Telemedicine:

Telemedicine leverages telecommunication technologies to provide health services remotely through internet-enabled audio/video links, wireless tools, and smartphone apps (Marcin et al., 2004). It expands access to care for isolated groups via consultations with physicians through videoconferencing. Remote monitoring of vitals through connected devices also enables telemedicine. Technical capabilities, lower costs, and changing policies are driving rapid mainstream adoption of telemedicine.

In surgical care, telemedicine facilitates mentoring of less-experienced surgeons by specialists during complex procedures through live audio/video feeds (Allen & Hayes, 1995). Such tele-mentoring enhances outcomes in technically challenging surgeries. In chronic care, home-based monitoring of glucose, blood pressure, etc. coupled with video consultations improves self-management of diabetes, hypertension, and other conditions while reducing hospital visits (Pare et al., 2007). Telemedicine is also enabling specialized services like tele-psychiatry for incarcerated populations (Nelson et al., 2011).

Despite its promise, barriers like reimbursement policies, licensing restrictions, privacy/security concerns, and access inequities have slowed telemedicine adoption (Ross et al., 2018). More high-quality research, changes in physician training, and patient education can help address these barriers.

Health Information Exchanges (HIEs):

Health Information Exchanges (HIEs) enable digital health data sharing between healthcare facilities across a region or community. They provide authorized physicians, nurses, pharmacists, and other providers secure real-time access to vital patient health data from interconnected electronic health record systems (Vest & Gamm, 2010). This avoids fragmentation and fills information gaps when patients receive care from multiple providers. HIEs support better-informed decisions at the point of care based on comprehensive medical history including diagnoses, medications, allergies, radiology images, and lab results (Dullabh et al., 2015). They also enable improved public health disease surveillance and reporting by aggregating key EHR data like immunizations or reportable conditions. Population health insights from analytics on comprehensive data strengthen care delivery and coordination.

However, complex technical interfaces are required to interconnect the disparate EHR systems into HIE networks. Concerns around patient consent, data ownership, and privacy require robust policies to govern HIE data access. Competitive pressures between healthcare organizations also hinders data sharing. Addressing these challenges can fulfill the potential of HIEs to significantly enhance the quality and integration of care across fragmented health systems. Modern BPM technologies like Appian have prebuilt features for healthcare industry.

Patient Portals:

Patient portals represent personal health record systems tethered to the provider's EHR that allows patients secure online access to their individual medical data and care interactions (Otte-Trojel et al., 2015). Portals enable patients to view their visit summaries, lab/imaging results, immunization records, and pending referrals. Patients can also communicate with their providers, request medication refills or appointments, and upload health/fitness tracker data through integrated apps and wearable devices. By engaging patients as partners in managing their health, portals can improve outcomes in chronic disease and preventive care (Goldzweig et al., 2013). Portal use is associated with enhanced medication adherence, disease awareness, appointment attendance, and preventive screenings. However, disparities exist in adoption across age, race, and income groups. More widespread usage necessitates strategies to enhance portal usability, digital literacy, and trust.

Mobile Health Applications:

Mobile health (mHealth) leverages the growing ubiquity of smartphones and wearable devices like smart watches to provide personalized health monitoring, education, and interventions (Silva et al., 2015). Consumers use mHealth apps to track diet, physical activity, sleep, heart rate, blood glucose, and other biometrics. Hundreds of thousands of such health apps are available spanning wellness, chronic disease management, mental health, medication adherence, and women's health. Integrating validated mHealth apps more tightly with provider health information systems and care protocols could greatly strengthen remote patient monitoring and self-management (Wicklund, 2021). However, lack of interoperability, data privacy concerns, and minimal regulation currently limit such integration. Evaluation frameworks to assess app safety, effectiveness, and usability should be developed to guide consumers and physicians on optimal mHealth tools for their needs.

Conclusion:

In conclusion, state-of-the-art health information technologies like EHR systems, telemedicine, HIE networks, patient portals, and mHealth apps have vast potential to create a continuously learning and self-improving healthcare ecosystem. This can deliver more proactive, integrated, evidence-based, and patient-centered care at lower costs. However, major technical, policy, regulatory, and organizational barriers need to be holistically addressed to fully unlock the benefits of these technologies. If implemented thoughtfully, they can transform fragmented healthcare systems into high-performing platforms capable of managing population health effectively and efficiently.

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