**Discussion2:**

**Main post**

**Article used**

Gorham, G., Abeyaratne, A., Heard, S., Moore, L., George, P., Kamler, P., Majoni, S. W., Chen, W., Balasubramanya, B., Talukder, M. R., Pascoe, S., Whitehead, A., Sajiv, C., Maple-Brown, L., Kangaharan, N., & Cass, A. (2024, March 28). Developing an integrated clinical decision support system for the early identification and management of kidney disease-building cross-sectoral partnerships - BMC Medical Informatics and decision making. BioMed Central. https://bmcmedinformdecismak.biomedcentral.com/articles/10.1186/s12911-024-02471-w

**CDS system highlighted**

Territory Kidney Care (TKC) was the CDS system highlighted in the article The review of previous CDS designs showed CDS is often single-disease focused and rarely incorporates sufficient EHR data to be applicable in multimorbidity. Along with this up to 80% of user interfaces, are focused on alerts and reminders, which are associated with alert fatigue and overriding behaviors. To improve on the design of previous CDS tools, the approach TKC was introduced where communicating clinical decision support is primarily via an automated patient summary, similar to the problems list of a physician letter or discharge summary.

An incremental software development model that included: requirement gathering, design, development, validation and testing, requirements adjustment, knowledge acquisition, knowledge engineering, validation and testing, and deployment was used, which resulted in the development of a novel digital clinical decision support system for people at risk of developing kidney disease or with kidney disease.

**Practice setting used**

Remote areas of the Northern Territory in Australia.  TKC approach to communicating clinical decision support was primarily via an automated patient summary, which is similar to the problems list of a physician letter or discharge summary.**“**56 government primary health services, 6 government hospitals, and 11 out of the 13 ACCHS in the Northern Territoty have DPAs in place and are participating in TKC” (Gorham et al., 2024)

**Requirements and guidelines that influenced the design**

There was a growing burden of chronic conditions mainly kidney disease in remote areas of Australia. Health care was complicated by a mobile population, high staff turnover, poor communication between health services, and complex comorbid health conditions requiring multidisciplinary care Sharing of patient clinical information among health services can decrease preventable hospital admissions by improving communication and coordination between healthcare providers as suggested by evidence.

Necessity gave birth to TKC and is a product of clinician and patient needs to find a new way of addressing the growing demand for renal services and understand the true burden of kidney disease in Australia. The design of TKC were informed by collaborative partnerships with ACCHSs and NT Health and extensive research undertaken by Menzies over many years.

**Benefits to the practice setting**

Clinicians in primary health have seen the benefits of the patient summary function for immediate summation of longitudinal data, which reduces the time required to collect, analyze, and synthesis information from multiple sources. The patient synopsis presents data intelligently, reflecting clinician thought processes and outlining diagnosis dates significantly reducing cognitive load and clinician fatigue. They noted ease of navigation, data comprehensiveness, and the benefits of managing complex conditions along with the Potentially avoidable medical events. TKC can be used to prepare clinic lists, based on CKD category, to regularly identify undiagnosed cases of CKD, allowing early referral and appropriate management plans.

**Potential problems that could arise**

If poorly designed or implemented, clinical decision support systems can cause more problems than they solve. Alarm fatigue, physician burnout, and medication errors are all detrimental side effects of unintuitive clinical decision support technology, with these events harming patient outcomes and organizations’ bottom lines. According to HealthITAnalytics, per a national survey, co-authored by the American Medical Association (AMA), physician burnout rates spiked to 63 percent at the end of 2021 because of the poorly designed CDS system.

**References:**

Gorham, G., Abeyaratne, A., Heard, S., Moore, L., George, P., Kamler, P., Majoni, S. W., Chen, W., Balasubramanya, B., Talukder, M. R., Pascoe, S., Whitehead, A., Sajiv, C., Maple-Brown, L., Kangaharan, N., & Cass, A. (2024, March 28). Developing an integrated clinical decision support system for the early identification and management of kidney disease-building cross-sectoral partnerships - BMC Medical Informatics and decision making. BioMed Central.

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[Links to an external site.](https://bmcmedinformdecismak.biomedcentral.com/articles/10.1186/s12911-024-02471-w)

*What are the top challenges of Clinical Decision Support Tools?*. HealthITAnalytics. (2024, February 1).

[https://healthitanalytics.com/news/what-are-the-top-challenges-of-clinical-decision-support-tools#:~:text=Alarm%20fatigue%2C%20physician%20burnout%2C%20and,outcomes%20and%20organizations’%20bottom%20lines](https://healthitanalytics.com/news/what-are-the-top-challenges-of-clinical-decision-support-tools#:~:text=Alarm%20fatigue%2C%20physician%20burnout%2C%20and,outcomes%20and%20organizations%E2%80%99%20bottom%20lines)

[Links to an external site.](https://healthitanalytics.com/news/what-are-the-top-challenges-of-clinical-decision-support-tools#:~:text=Alarm%20fatigue%2C%20physician%20burnout%2C%20and,outcomes%20and%20organizations%E2%80%99%20bottom%20lines)

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**Response: One**

Hello Adriene

         Nicely done, really enjoyed reading your post. You have mentioned Alarm fatigue as a potential problem that arises from CDS. CDS generates a high volume of irrelevant alerts, resulting in alert fatigue among clinicians. Alarm fatigue is the mental state of alerts consuming too much time and mental energy, which often results in relevant alerts being overridden unjustifiably, along with clinically irrelevant ones. Generated alerts are mostly irrelevant or low priority, and fortunately, they are not life-threatening. However, some alarms are important ones require attention, but clinicians become less responsive which opens the door to medication errors. These alerts have desensitized clinicians, resulting in high overriding rates ranging between 77% and 90% which opens the door to preventable medication errors. It is now a national concern due to the lack of an action plan. CDS failures and errors caused by individuals have resulted in direct costs of more than US $20 billion in the United States.  (Wan et al., 2020) We cannot completely stop the CDS system from getting rid of this problem as “Success will be achieved when health care incorporates technology systems in a way that they are not viewed as separate tools to support healthcare practices but rather as necessary instruments to provide health care”. (McGonigle & Mastrian, 2022). Therefore there is a need to seek an alternative, innovative approach to improve the management of clinical alerts and reduce alert fatigue among clinicians.

         Blockchain-based solutions can help with this issue by sharing alerts and thus enhancing collaborative decision-making. Both MedRec and MedAware fall under blockchain-based solutions, they focus on reducing alert fatigue by filtering irrelevant alerts. MedRec utilizes a smart contract embedded in a blockchain platform, from which CDS retrieves medical records via MedRec to retrieve relevant patient information and generate more context-based alerts. EMRshare, Medchain, FHIRchain, and MedBlock are examples of blockchain-based solutions that ensure high levels of data integrity and privacy for sharing medical records.  (Wan et al., 2020)

**References:**

McGonigle, D., & Mastrian, K. G. (2022). *Nursing informatics and the foundation of knowledge* (5th ed.). Jones & Bartlett Learning. Chapter 9, “Systems Development Life Cycle: Nursing Informatics and Organizational Decision Making”

Wan, P. K., Satybaldy, A., Huang, L., Holtskog, H., & Nowostawski, M. (2020, October 28). *Reducing alert fatigue by sharing low-level alerts with patients and enhancing collaborative decision making using blockchain technology: Scoping Review and proposed framework (MedAlert)*. Journal of medical Internet research. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7657729/

**Response:Two**

Hi Berenice

AI-driven sepsis models have been a game-changer in today’s world. Early identification and interventions have potentially saved so many lives. Sepsis is the leading cause of death in United States hospitals accounting for half of all hospital deaths therefore Early prediction of sepsis is crucial in preventing mortality. Sepsis management is based on a standardized management approach, early sepsis identification can be practically challenging, and operational constraints in healthcare delivery can lead to unacceptably high mortality rates. For instance, communication delays among healthcare professionals in sepsis management. Hence, the early prediction of sepsis before its onset in a patient gives clinicians additional lead time to plan and execute treatment plans. (Goh et al., 2021)

After reading your post I further wanted to do more research about AI and sepsis and found that An artificial intelligence algorithm, the SERA algorithm, uses both structured data and unstructured clinical notes to predict and diagnose sepsis. The algorithm was tested with independent, clinical notes and achieved high predictive accuracy 12 hours before the onset of sepsis, the SERA algorithm when compared against physician predictions shows the algorithm’s potential to increase the early detection of sepsis by up to 32% and reduce false positives by up to 17%. (Goh et al., 2021)

One of the drawbacks of these AIs in health care is that they are not programmed to have any feelings of compassion for patients, especially those who are in deep pain or suffering during the medical procedure. While there are AI technologies that are being developed to enhance caring and compassion for patients, the human touch and voice can’t be compared with the machine’s performance in providing hope and assurance in the alleviation of pain and suffering.

To solve this issue, both AI and humans must work hand in hand for the success of health care without enslaving each other but providing the best possible care for the public. (Cordero, 2024)

**References:**

Goh, K. H., Wang, L., Yeow, A. Y. K., Poh, H., Li, K., Yeow, J. J. L., & Tan, G. Y. H. (2021, January 29). *Artificial intelligence in sepsis early prediction and diagnosis using unstructured data in healthcare*. Nature News. https://www.nature.com/articles/s41467-021-20910-4

Cordero, D. (2024a, January 1). *The downsides of artificial intelligence in Healthcare*. The Korean journal of pain. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10764219/