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ORIGINAL RESEARCH ARTICLES

Electronic Medical Records in low to middle income countries: The case of Khayelitsha Hospital, South Africa

Les dossiers médicaux électroniques dans les pays à faibles et moyens revenus: le cas de l'hôpital de Khayelitsha, Afrique du Sud

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Introduction: Electronic Medical Records (EMRs) have shown benefit for clinical, organisational, and societal outcomes. In low-to-middle-income countries, the desire for EMRs will continue to rise as increasing trauma and infectious disease rates necessitate adequate record keeping for effective follow-up. 114 nations are currently working on national EMRs, with some using both a full EMR (Clinicom) and a paper-based system scanned to an online Enterprise Content Management (ECM) database.

Methods: The authors sought to evaluate the ability and completeness of the EMR at Khayelitsha Hospital (KH) to capture all Emergency Centre (EC) encounters classified as trauma. Based on the high trauma rates in the Khayelitsha area and equally high referral rates from KH to higher-level trauma centres, an assumption was made that its rates would mirror nationwide estimates of 40% of EC visits. Records from July 2012 to June 2013 were examined.

Results: 3488 patients visited the EC in the month of July 2012. 10% were noted as trauma on Clinicom and within their records were multiple sections with missing information. The remaining months of Aug 2012–June 2013 had an average trauma load of 8%. On further investigation, stacks of un-scanned patient folders were identified in the records department, contributing to the unavailability of records from January 2013 to the time of study (June 2013) on ECM.

Conclusion: The results highlight difficulties with implementing a dual record system, as neither the full EMR nor ECM was able to accurately capture the estimated trauma load. Hospitals looking to employ such a system should ensure that sufficient funds are in place for adequate support, from supervision and training of staff to investment in infrastructure for efficient transfer of information. In the long run, efforts should be made to convert to a complete EMR to avoid the many pitfalls associated with handling paper records.

Introduction: Les dossiers médicaux informatisés (DMI) ont prouvé leur intérêt en termes de résultats cliniques, organisationnels et sociétaux pour de nombreux hôpitaux. Dans les pays à faible et moyen revenu, la volonté de disposer de DMI continuera à progresser à mesure que les taux croissants de traumatismes et de maladies infectieuses exigent une tenue de dossiers adéquate afin d'assurer un suivi efficace. Cent quatorze pays travaillent actuellement à la mise en place de DMI nationaux, certains utilisant à la fois un système de DMI complet (Clinicom) ainsi qu'un système de documents au format papier scannés et ajoutés à une base de données de Gestion de contenu d'entreprise (GCE) en ligne.

Méthodes: Les auteurs ont cherché à évaluer la capacité et l'exhaustivité du système de DMI au sein de l'hôpital de Khayelitsha (HK) à saisir toutes les visites classées comme traumatismes. Sur la base des forts taux de traumatisme enregistrés dans la région de Khayelitsha, et des taux de renvoi proportionnellement élevés du HK vers des centres de traitement des traumatismes de plus haut niveau, l'hypothèse a été émise que les taux enregistrés dans cet hôpital reflèteraient les estimations nationales de 40 % des visites au CU. Les archives de juillet 2012 à juin 2013 ont été examinées.

Résultats: 3488 patients ont consulté au CU au mois de juillet 2012. Dix pour cent ont été enregistrés comme traumatismes dans Clinicom, plusieurs sections de leur dossier comportant des informations manquantes. Les mois suivants d'août 2012 à juin 2013 indiquaient une proportion de traumatismes de 8 %. Après examen plus approfondi, des piles de dossiers de patients non scannés ont été identifiées au sein du service des dossiers, ceci contribuant à l'indisponibilité des dossiers de janvier 2013 jusqu'au moment de l'étude (juin 2013) dans le GCE.

Conclusion: Les résultats soulignent les difficultés associées à la mise en œuvre d'un système de tenue de dossiers double, car ni le DMI complet, ni le GCE ne pouvaient saisir avec précision la proportion estimée de traumatisme. Les hôpitaux qui cherchent à utiliser de tels systèmes devraient s'assurer que des fonds suffisants sont disponibles afin de permettre de soutenir adéquatement ce système, allant de la supervision et de la formation du personnel à l'investissement dans les infrastructures, afin de permettre un transfert d'informations efficace. Á long terme, des efforts devraient être réalisés afin de pouvoir passer à un système de DMI et d'éviter les nombreux écueils associés à la tenue de dossiers au format papier.

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African relevance

- Electronic Medical Records (EMRs) have shown benefit for clinical, organisational, and societal outcomes.
- In low- to- middle-income countries, the desire for EMRs will continue to rise as increasing trauma and infectious disease rates necessitate adequate record keeping for effective follow-up and research.

Introduction

A male passenger is extricated from a motor vehicle accident, and he is immediately expedited to an emergency centre (EC) complaining of chest pain. After a quick physical exam, the doctor determines that it is unlikely to be of muscular origin and proceeds to workup for a myocardial infarction. As the doctor was about to order sublingual nitroglycerin, she noticed from the patient's record that he was currently on sildenafil, in which case nitroglycerin could cause massive vasodilation, severe hypotension, and death. Furthermore, as she was about to order aspirin, she again noticed that the patient was recently admitted for a massive gastrointestinal bleed, causing her to hold off on both medications. Two errors were thus averted in a span of minutes.

Error detection like this is one of the many benefits of Electronic Medical Records (EMRs). An EMR is "a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunisations, laboratory data, and radiology reports".[1–3] In high-income countries, the popularity of EMRs has soared because of its many benefits,[3,4] which can be divided into three major spheres. First, they affect clinical outcomes by improving the quality of care and reducing medical errors, increasing "safety, effectiveness, and efficiency."[1] Secondly, they affect organisational outcomes by increasing revenue, averting costs from redundant tests and medications, and decreasing legal vulnerability of hospitals. Thirdly, they affect societal outcomes by facilitating research, promoting population health by making it easier to monitor diseases, and increasing job satisfaction among physicians.[1,5,6] Recognising these benefits, in 2009, the US government enacted the Health Information Technology for Economic and Clinical Health (HITECH) Act, which provides financial incentives for both hospitals and physicians to adopt EMR systems.[1]

The popularity of EMRs is not restricted to high-income countries, however. Many low- to middle-income countries (LMICs) have recognised the value of EMRs and have modified the technology to fit their needs within known resource constraints. According to a WHO survey, 114 nations are currently working on National EMR systems.[7] They have been implemented in HIV management in South Africa, Kenya, Rwanda, Ghana, Lesotho, Zimbabwe, Mozambique, Sierra Leone, Uganda, and Tanzania, as well as in various countries in Central and Latin America.[7] In Africa, the major impetus for this change is the rise in infectious diseases as the leading cause of death,[8] with HIV and multi-drug resistant TB being major culprits. Patients with these conditions often require continuous treatments and long-term care, necessitating an efficient record keeping system.[9–11] Some of these systems are "open source," characterised by open-source codes that are freely available to anyone who wishes to examine or change them for his or her own purpose.[11] Compared to proprietary systems, which more likely cater to wealthier customers in high-income countries,[7] open-source systems are much cheaper because, among other things, they take away the burden of licensing and software upgrade costs and offer customisability for consumers.[7,10] This has provided more affordable systems such as the one implemented in 2012 at an urban emergency centre in Kumasi, Ghana.[5]

Although each of the nine provinces in South Africa employs a different system, one of the goals of the country is to fully integrate these systems to facilitate communication and achieve the full benefits.[12] In the Western Cape, for example, Clinicom dominates the EMR market.[13,14] It is a proprietary system,[15] controlled by JAC Computer Services, an IT specialist company that was awarded a contract to implement a fully electronic record system in which patient information is directly entered to the computer in 38 different hospitals and specialised care centres across the Western Cape.[16] However, it has been plagued with challenges due to bandwidth requirements in health facilities and low levels of computer literacy and motivation to use the system correctly.[14,17] Furthermore, due to medico-legal requirements within the South African government and some resistance from clinicians to use full EMRs, some hospitals have chosen to also maintain paper records.[3] To keep these organised and allow for sharing of these records both within the hospital and with neighbouring hospitals, the paper records are scanned and stored in an online database, an example of which is Enterprise Content Management (ECM).[3]

Khayelitsha hospital (KH) is one that has both systems and will be at the centre of this report. KH is a 240-bed facility opened in 2012 to serve the estimated 400,000 people in the Khayelitsha area.[18–20] 2011 census data characterise the Khayelitsha population as predominantly Black African (55%), with 74% of households having monthly income of R3200 or less and 55% living in informal dwellings.[20] 2007 estimates show antenatal HIV prevalence of 33% and a high incidence of TB.[19] According to the Institute of Development studies, police-released crime statistics for 2007/08 ranked Khayelitsha among the top areas in South Africa for murder, rape, and aggravated robbery.[21] With respect to murder, its statistics are "over two and a half times the South African average of 41 per 100,000".[21] Of note, overall South African statistics are already over 20 times the murder rates of countries in Western Europe.[21] The proposed causes of violent crime in Khayelitsha have been traced to poverty, transience of the population, and historical lack of effective policing.[21,22] Anecdotal evidence reveals a high incidence of trauma, including a recent BBC documentary that featured interviews with frontline doctors and members of rival gangs in the Khayelitsha township.[23] There is also a significant rate of community assaults, although objective estimates are lacking.[22] This is not unexpected, as 90% of traumatic deaths occur in LMICs.[24] After infectious diseases, trauma is the leading cause of death in Africa.[8,25] South Africa specifically has one of the highest trauma rates in the world, accounting for up to 40% of all visits to the EC.[26,27] The National Injury Mortality Surveillance system revealed in 2007 that one-third of injury-related deaths were due to violence in South Africa, followed by traffic injuries.[28]