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The Emerging Role of Electronic Patient Records in Improving Drug Safety in Israel: A Paradigm Whose Time Has Come

El papel naciente de los registros electrónicos de pacientes para mejorar la seguridad en el uso de los medicamentos en Israel: un paradigma cuyo tiempo ha llegado

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ABSTRACT
The conditions which currently characterize the modern clinical setting which although emanating from unprecedented scientific progress, have paradoxically potentiated the likelihood that medicines may ironically harm those whom they were intended to heal. With this reality becoming ubiquitous throughout the Western world, new technologies and organizational cultures will need to be developed and implemented in all levels of the clinical setting to facilitate the safe use of drugs. Our recent experience in the Israeli primary care setting has demonstrated that the implementation of Electronic Patient Records (EPRs) systems in the managed care setting have provided expanded opportunities for drug utilization surveillance in the community setting. We therefore propose that electronic patient records (EPRs) should play an important role in efforts to improve drug safety in the community setting. Although EPRs data generated in the managed care setting most probably demonstrates the greatest potential to facilitate programs of this kind, it must be clarified that the validity of this data is highly dependant upon the quality of physician data-entry into the EPRs during patient visits. Thus, managed care organizations should dedicate resources to create an organizational culture that encourages complete and accurate information-recording during patient visits through the creation of a work environment conducive to this task.

Key words: Electronic patient records, Managed care, Drug utilization analysis.

RESUMEN
Las condiciones que actualmente caracterizan al escenario clínico moderno como consecuencia de un inaudito progreso científico, paradójicamente han potenciado la probabilidad de que los medicamentos puedan irónicamente dañar a quienes se debería intentar curar. En esta realidad se ubica actualmente el mundo occidental, en el que las nuevas tecnologías y culturas organizativas necesitarán ser desarrolladas e implantadas en todos los escenarios clínicos con el propósito de facilitar la utilización segura de los medicamentos. Nuestra actual experiencia en la Atención Primaria Israelí ha demostrado que la aplicación de los Expedientes clínicos electrónicos (ECEs) ha proporcionado amplias oportunidades para la vigilancia en el uso de fármacos en la comunidad. Por lo que proponemos que los ECEs deberían jugar un importante papel en el esfuerzo por mejorar la seguridad en el uso de los fármacos en la comunidad. Aunque los ECEs han generado información en el escenario de la contención del gasto sanitario es más probable que demuestren un gran potencial para facilitar programas de este tipo y se debería aclarar que la validez de estos datos es altamente dependiente de la calidad de la información generada por los médicos dentro de los ECEs en el desarrollo de la consulta con los pacientes. En consecuencia, las organizaciones de cuidados médicos deberían orientar recursos para crear una cultura organizacional que impulse y promueva una completa y precisa información durante la atención a los pacientes a través de la conformación de un ambiente favorable para la realización de estas tareas.

Palabras clave: Expedientes clínicos electrónicos, Contención del gasto sanitario, Análisis de utilización de medicamentos.

Introduction

Primum non nocere, the classic imperative of the medical professions has become increasingly significant to the prescribing and dispensing of medications in all clinical settings. Indeed, that medicines are often therapeutic do--

ses of lethal poisons and that precision is required on our part to avoid dug-induced morbidity and mortality is not a new phenomenon. However, the conditions which characterize the modern clinical setting which although emanating from unprecedented scientific progress, have paradoxically potentiated the likelihood that medicines may ironically harm those whom they were intended to heal. These trends include: the burgeoning quantity of information clinicians must grasp to safely administer drugs, the decreasing lengths of time available for patient-physician encounters, the explosion in technologies (especially drugs) accessible to primary care physicians, the numerous physicians of various subspecialties treating individual patients, and most significantly, the predominance of an ageing population with a high prevalence of impaired liver and kidney function and polypharmacy. With this reality becoming ubiquitous throughout the Western world, new technologies and organizational cultures will need to be developed and implemented in all levels of the clinical setting to improve the safe use of drugs. In Israel, we believe that electronic patient records (EPRs) may play an important role in this effort in the community setting.

The discussion concerning the potential of electronic prescribing to improve the safety, quality, efficiency, and cost-effectiveness of care has mostly focused on the implementation of clinical decision support (CDS) in electronic prescribing (eRx) systems in the hospital setting [1]. Recently, this interest has spread to managed care organizations (MCOs) that are investigating the potential of these systems to improve the safety and quality of care in the community setting [2]. However, decision support systems are not the only opportunities data technologies have provided. The implementation of electronic prescribing systems in MCOs providing primary care to large populations has created data bases of drug-utilization information creating valuable opportunities for pharmacoepidemiologists to monitor the way these drugs are being used within a defined population of patients and physicians.This setting therefore has the potential of providing a platform for postmarketing drug surveillance programs [3] that utilize the unique data capabilities of the managed care setting. On this issue, Shatin et al have suggested that population-based managed care claims data may provide a reliable source of data to assess adverse drug reactions amongst these patients [4].

Recent experience in Israel

Our recent experience in Israeli managed care organizations (MCOs) has demonstrated that the implementation of EPRs systems in the managed care setting have provided expanded opportunities for drug utilization surveillance in the community setting [5-8]. Israeli MCOs have developed and implemented over the past two decades central information systems in which computerization has been fully employed in all levels of the organizations. This comprehensive information system facilitates the maintenance of central databases containing information emanating from all levels of care. Data elements are extracted and routinely channeled from the distributed local data sources into central databases at the national headquarters with a unique patient identification number designated as the key field for linking data from the different sources. For each physician visit, these elements include: the date, patient and physician identification numbers, up to five diagnosis codes (ICD-9CM), prescriptions for drugs, and referrals. Data pertaining to type, quantity, and cost of all medications dispensed to patients are obtained from the pharmacy database. Similarly, data are extracted from the laboratory database and in some MCOs, hospital services (inpatient, outpatient, and emergency room) databases are also accessed. The data generated for these sources can then be integrated into relational databases that facilitate retrospective analysis of drug prescribing and dispensing behavior within the system.

These advantages of the current Israeli system have aided researchers in surmounting the difficulties encountered in other clinical setting which rely on claims data for pharmacoepidemiological analyses. Although claims data has provided researchers with valuable data on drugs dispensed, the comprehensiveness of this data may be limited since it usually does not include the diagnosis for which the drug was prescribed. Additionally, for analyses of physician prescribing behaviour regardless of whether or not the patient in fact filled the prescription, this data may be incomplete due to uncashed prescription bias [9]. This is significant since in addition to the identification of populations at risk for suboptimal drug therapy, current efforts are concentrating on the identification of subgroups of physicians less likely to provide evidence based care to the patients as well as individual physicians to be targeted for remedial education programs [5,6].

Studies of this kind may also elucidate on patterns of subspecialty variance in the treatment of specific diseases which may provide information pertaining to currently accepted treatment strategies being used by specialists in a particular field of medicine [7]. This information may be useful for identifying gaps in the knowledge base of general practitioners as compared to specialists in given fields thereby providing targets for educational implementations amongst primary care physicians. Furthermore, these systems provide opportunities to identify off-label prescribing drugs [8] which can potentially provide researchers with a cohort for drug surveillance in populations for whom target drugs were not studied in randomized controlled trials. Additionally, since EPR data includes diagnoses registered, these systems can be utilized to flag potential adverse drug-disease interactions either before dugs are prescribed or before they are dispensed.

Conclutions

Future efforts for drug safety assurance will depend on the capabilities of health care providers to both disseminate evidence-based information to physicians and pharmacists and to monitor how drugs are actually being used by the patients they cover. Currently, drug utilization surveillance of this kind is often the only option available to monitor the outcomes of drug use since randomized controlled trials are not always feasible to study the potential toxicities of drugs, especially after long-term use. Although EPR data generated in the managed care setting most probably demonstrates the greatest potential to facilitate studies of this kind, it must be clarified that the validity of this data is highly dependant upon the quality of physician data entry into the EPR during patient visits. Thus, MCOs should dedicate resources to create an organizational culture that encourages complete and accurate information-recording during patient visits through the creation of a work environment conducive to this task. Additionally, since these systems rely primarily on diagnosis-data entry based on International Code of Disease (ICD) classifications, efforts will need to be made to better familiarize physicians with this system. Specifically, since the ICD system includes detailed subcategories of diagnoses, study protocols which rely on EPR data must be meticulously designed to account for possible variance in physician interpretation of these codes. Physicians will therefore need to communicate with each other in order to obtain better levels of uniformity and standardization in the recording process. The subsequent high quality data accrued can then be used by pharmacoepidemiologists either in-house or in conjunction with government agencies or academic institutions to conduct long term population-based drug surveillance. The magnitude of the populations studied will invariably facilitate analysis of drug use in subpopulations stratified by age, gender, disease including multiple comorbidities, and most significantly concurrent extended drug therapy with numerous medications. Programs of this type will be of mutual benefit to both patients and health care providers through the identification of drug related risks and the subsequent reduction in preventable adverse drug events. Likewise, these programs may be cost-effective since they may prevent portions of the unnecessary health care expenditures to MCOs caused by the drug induced morbidities prevalent in the community setting.

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