Electronic Health Records in an Occupational Health Setting—*Part II. Global Deployment*

by Jean M. Bey, RN, MPH, COHN-S, CCM, FAAOHN, Josiane S. de Magalhães, Lorena Bojórquez, and Karen Lin, RN, BSN

Electronic medical record systems are being used by more multi-national corporations. This article describes one corporation's considerations and process in successfully deploying a global electronic medical record system to international facilities in Brazil, Mexico, Singapore, and Taiwan. This article summarizes feedback from the experiences of occupational health nurse superusers in these countries.

With the proliferation of electronic medical records in acute care settings such as hospitals and clinics, occupational health and safety software has become more widely used. Large multi-national employers have become interested in single application software solutions to integrate first aid visits, occupational health examinations, and disability management information (Hunter, 2013). The benefits of using a single software system to integrate these health care records include secure storage and retrieval for long-term record retention requirements; cost savings from purchasing and maintaining a single software application and information technology support; the ability to compare health status met-rics and program evaluation within and between geographic boundaries; and remote quality assurance review for compliance with record-keeping standards. This article describes the experience of and process used by one U.S. multi-national corporation's Corporate Medical Department in deploying a single software solution to Brazil, Mexico, Singapore, and Taiwan from 2009 to 2011.

ASSESSING SOFTWARE PERFORMANCE CAPABILITIES

A Corporate Medical Department team was designated to review and recommend a software product that would most closely meet the needs of global occupational health nurses and physicians. Six Sigma tools and methods were used to compare available software capabilities using business requirements defined by U.S. and international corporate and non-corporate physicians and occupational health nurses. Occupational health software is considered a niche market, with a small number of products from which to choose. Careful selection of the product required matching users and business requirements with software capabilities. Software security was critical, and access by defined roles was essential to acceptability of the product.

Multiple language capability of the software was identified as a key criterion for facilities where health professionals and workers lacked proficiency in English. Health history questionnaires are widely used in the corporation's medical surveillance programs, and electronic capability for workers' questionnaire completion was needed to achieve a paperless system with electronic access for physician review at another location, if necessary. In addition, many of the occupational health nurses had limited English language skills, prohibiting use of the software and, in particular, recording of vital nursing notes.

In addition to multiple language capability, the software needed to meet the functionality of several existing systems currently used in other countries. Data conversion was considered to avoid the loss of historical health-related information under corporate guidelines and regulatory record retention requirements. In this corporation, the decision was made not to convert previous paper record files, but rather to retain paper records as they existed and begin electronic records on the date of "going live" with the new software. Records that already existed in electronic format were converted to the new software (e.g., historical audiogram records).

ABOUT THE AUTHORS
Ms. Bey is Occupational Health Manager, 3M Company, St. Paul, MN. Ms. de Magalhães is Occupational Health Supervisor, 3M Company, Sumare, Brazil. Ms. Bojórquez is Health Services Supervisor, 3M Edumex, Juarez, Mexico. Ms. Lin is Occupational Health Specialist, 3M Company, Yangmei, Taiwan.
The authors have disclosed no potential conflicts of interest, financial or otherwise.
E-mail: jmbey@mmm.com.

COUNTRY DATA PRIVACY REQUIREMENTS

As the software system was being selected, a second Six Sigma Black Belt team initiated a project to define a process for each country's on-site physicians and nurses to document data privacy requirements for each country. The team reviewed the intent of the Safe Harbor framework (U.S. Department of Health and Human Services, 2007), but instead found that a Transborder Data Flow Agreement provided the framework for the corporation's data privacy. Following the Human Resources function to the international locations that had recently installed a Human Resources information system involving private worker data was a strategy for easier implementation and deployment. The Black Belt project resulted in development of a template that was introduced to the international facilities' champions and key team members for the electronic medical record software project. The local country data privacy attorney worked collaboratively with the corporate data privacy attorney and the corporate software team to understand any unique data privacy requirements of each country. The template was completed by the country champion and the data privacy attorney to clearly communicate how data privacy would be ensured, and final approval was given by the corporate data privacy attorney.

A goal of the corporation was to host the software application on a single server based in the United States. This decision was due to cost considerations, allowing one staff of information technology (IT) professionals to maintain and upgrade the software, and for potential aggregate data comparisons across regions at some point in the future. This decision complicated the deployment process because data privacy in some regions (e.g., the European Union) would have more readily accepted the health information being stored on an in-country data server. However, the single server requirements were met for the countries discussed in this article, and the delays due to this requirement were not significant.

GAP ANALYSIS

To increase the likelihood of successful deployment in international locations, Six Sigma tools, which had been adapted as software development methodology tools by the corporation's IT department, were used. These tools included periodic gate reviews for which project champions, project IT, and core business team members presented and reviewed progress, time lines, financials, potential risks, and strategies to manage risks. A country champion from either Environmental Health and Safety or Human Resources was selected from the international facility to support occupational health nurses in the project, and a team of occupational health nurses was assigned to accept responsibility for the project at the international facility. Biweekly core team web teleconferences were held to review modules of the software, evaluate country processes, and ensure that the software met country needs. The gap analysis provided a preliminary assessment of the business processes to understand how current use of the software could require adaptation to fit particular country processes. Business processes changed more often than the software changed. Process flow diagrams provided mapping of processes to compare with system capabilities. One example of gap analysis was the realization that health surveillance requirements may vary from country to country and differ from corporate standards. The corporation mandates the most stringent requirements be met to ensure compliance with all country laws. Discrepancies must be addressed. If a software product is purchased, processes may require adaptation to fit the product. The gap analysis engaged the international occupational health nurses and enhanced the likelihood of success.

PRIORITIZATION OF COUNTRIES FOR IMPLEMENTATION AND DEPLOYMENT OF THE ELECTRONIC MEDICAL RECORD SYSTEM

Several factors were evaluated in determining the order for country implementation and deployment:

• Capability of the occupational health nurses to communicate with the corporate team and the availability of the local language from the vendor's software product.

• Availability of standardized business processes in each facility.

• Ability to meet or exceed identified country legislation and data privacy requirements.

• Working relationships and previous collaboration experience with country physicians and occupational health nurses.

• Expressed desire and need from the country health professionals to achieve the benefits of an electronic medical record (i.e., commitment and support in working through the process).

• Support from a higher-level Environmental Health and Safety or Human Resources business representative who could champion the project on behalf of the health care staff.

• Number of workers in the country whose records could be impacted by the electronic medical record system, with larger facilities having greater impact on achieving the total project goal.

• Growth indicators for the businesses. Global expansion plans for the corporation identified several high priority countries where rapid growth was expected.

After evaluating the above considerations, the corporate project champion, with the core software implementation and deployment team, selected the following countries: Brazil, Mexico, Taiwan, and Singapore.

EXPERIENCE OF COUNTRY OCCUPATIONAL HEALTH NURSES

The lead supervisory occupational health nurses for Brazil, Mexico, and Taiwan were designated as project leaders for working through implementation and deployment issues, and translation of base tables and training materials. Although the software selected had multiple language capabilities, a need for translation of base tables and training materials still

existed. In addition, the lead occupational health nurses were assigned superuser status with additional administrator software privileges (e.g., problem solving when users have difficulty accessing employee records for which they are allowed access by their security role). This role has been significant in training respective country occupational health nurses and physicians when staff turnover occurs, and for the corporate software team to have a designated point of contact in each country with thorough understanding of the software.

Although Asia Pacific was a growing region for the corporation, the current version of the selected software did not include double-byte capability required for certain language characters (e.g., Mandarin Chinese). Because the selected software was expected to be upgraded, allowing double-byte characters, the decision was made to deploy to Taiwan and Singapore because their language was English and Asia Pacific was a high priority region. With smaller numbers of occupational health nurses and workers in Singapore and Taiwan, the decision was also made to have only one superuser for both countries.

As key occupational health nurse leaders to the successful deployment of a global electronic medical record system, the country superusers shared their perspectives on the following questions:

1. What concerns were present prior to implementation and deployment of the electronic medical record system in their country or facilities?

2. What strategies did the Corporate Medical Department use that helped implement and deploy the new system?

3. What strategies were used at the country and facility levels to implement and deploy the new system?

4. What are the perceived benefits of using the electronic medical record system?

Brazil

The first and primary concern in Brazil was confidentiality. More specifically, the concern was the security of information kept in a database without a breach.

The strategy from the Corporate Medical Department was use of Six Sigma methodology. Six Sigma methods had been a corporate priority providing a common language for everyone involved with the project. Also, selection of the corporate team members was vital. The corporate team was committed and had vast knowledge of the electronic medical record system, which pushed the country project forward. The biweekly conference calls provided the opportunity to discuss the system itself, along with the differences in legislation and business processes among sites.

Having the corporate team provide training in Brazil was valuable. This strategy enabled the superuser to orient the other country facilities about the importance of the system and how much it would improve occupational health nurse and physician work, providing enhanced quality of data collected.

A benefit of using an electronic medical record system is that the work of the on-site physicians is more efficient and precise because all the employees' information is kept in the electronic medical record system. All the health professionals involved in the department can access the data and gather the information necessary to improve the quality of the work, the quality of workers' lives, and consequently the overall results for the plants.

The system provides a consistent source of clinical and occupational information for occupational health professionals to use. Graphics are available to support the work of the health team, including employee blood pressure results; employee lists of similar risk exposure groups; and comparisons of audiometric examinations. Employee health information is in one place, compared to being in multiple systems and paper records.

The work of the medical department improved with the software; it is possible to obtain more precise results in all aspects related to worker well-being. The clinical and occupational charts, graphics, and data in general detect any issue, problem, or condition that may affect workers' health and well-being.

Overall, the most significant outcome is that the medical department now has better control of health-related information at the facilities.

Mexico

One of the primary concerns prior to implementation and deployment was the disposition of the current medical records of employees. Many Excel spreadsheets were used for employee health programs, and the risk of losing valuable information was an issue.

The Corporate Medical Department eased concerns by sending two members of the project team to the facility to demonstrate the new software—how it worked and the benefits from using it. Next, weekly meetings were held with corporate and facility teams. Corporate provided access to a test environment where users could learn how to use the system and become familiar with the software screens. At the time of "going live," the corporate team provided a 3-day, on-site training for users in Mexico. Ongoing communication with all the plants in Mexico employing on-site physicians and nurses, Monterrey, Mexico City, and San Luis Potosi, made the implementation and deployment successful.

Strategies for the superuser at the facility included reserving time each week for one meeting with the Mexico core team and one meeting with the corporate team. Assigning responsibilities and weekly tasks prioritized the tasks and resulted in accurate time lines, as well as specified the roles of each team member. For nurses in Mexico, it was necessary to provide internal training on the system to answer their questions and help them learn how to use the system. Staff turnover of nurses resulted in the need for additional training. Another strategy for success was to practice before "going live" with the new system. The test environment or training database was useful for practicing data entry.

The benefit for Mexico facilities was a reliable and consistent elec-

tronic medical record system that supplies clinical and occupational information and:

• Eliminates the manual process of data entry for medical surveillance and health-related data. A link of information now exists directly from the software to the database that stores medical surveillance metrics.

• Eliminates paper records and multiple Excel spreadsheets to capture employee health data.

• Allows staff to increase reporting capability for management reports and clinical metrics.

• Provides retrieval and maintenance of historical data.

• Connects with the Human Resources database to access employees' demographic information.

For example, the electronic medical record system prepares reports faster with reliable data; provides the medical record in one place, which allows occupational health nurses and physicians to review specifics of employees' health-related information; and easily schedules examinations and consultations.

Taiwan and Singapore

A concern prior to implementation and deployment of the electronic medical record was that current information could not be used effectively. Considerable time was used to analyze data and produce useful information. Paper documents were occupying too much storage space.

The Corporate Medical Department organized a deployment team that included IT personnel, trainees, and a trainer. Cross-communication was used to garner support from management and related departments throughout the project. Weekly teleconferences were used to solve problems and answer questions, provide training, and remain current with the launch schedule. The training from corporate used new system demonstration and online practice in a test environment. Templates were created in the software based on specific country demands (e.g., a clinical testing battery).

At the facility level, attending regularly scheduled teleconferences

and completing all training courses made the transition to the electronic medical record system easier. Practicing before "going live" with the new software was valuable. Support from the IT personnel at the facility was also essential. It was important that contract health providers, a physician and a local hospital, supplied needed clinical information (e.g., laboratory results and equipment calibration dates) for the clinical record. Reporting progress regularly to the occupational health nurse's manager provided ongoing support for the project.

After using the electronic medical record, the benefits include:

• Easier access to medical records with an encrypted laptop at any location, without finding paper records in the office.

• Improved worker safety due to the software's warning functions (e.g., allergies, medications, assigned medical surveillance groups based on exposure).

• Efficient scheduling of examinations, appointments, and monitoring.

• Easier data comparisons due to lists of employee records by year (e.g., audiograms).

• Ability to retrieve and maintain historical data.

• Generation of reports (e.g., chief complaint, abnormal data, occupational injury or illness).

• Decreased paper records filing and storage.

• Decreased manual data entry; most testing data can be uploaded to the system.

• Decreased paper use with electronic notes and electronic questionnaires.

LESSONS LEARNED AND NEXT STEPS

From one multi-national corporation's experience with international deployment of an electronic medical record system, numerous factors were considered in the planning phases for success. Careful consideration of country-specific data privacy requirements with legal review and approval is critical. Definition by role as to who will have access to individual employees' records is of utmost importance for

security purposes and controlling software access.

Another consideration is balancing the need for consistent application of the software with configuration to meet country business requirements. This consideration is important in aggregate reporting and comparisons that might be desired across regions. As more countries are added, and staff may transition, maintaining records of how the business processes define software use in each country if not consistently applied is essential. A balance must be found between standardized business processes at the corporate level that have been established within the selected software and the needs of individual countries. Customization should be avoided whenever possible because it is often costly to build and maintain, and software versions will likely change.

Investing time in enlisting country champions, completing a gap analysis, and engaging country users has resulted in successful deployment. The core country teams support each other toward achievement of the common goal. Management at both the corporate and the international facility levels should be informed of potential issues and progress.

The superuser has been the point of contact in communications and training. A train-the-trainer approach, relying on the corporate training team to develop electronic self-study training modules with essential screen exercises translated by superusers, and webinars to demonstrate navigation for superusers who in turn trained their health services staff, have been used.

Additional countries deployed for this corporation in 2012 included Canada and the United Kingdom. Plans for additional countries in the Asia Pacific region are to follow.

REFERENCES

Hunter, E. S. (2013). Electronic health records in an occupational health setting: Part I. A global overview. *Workplace Health & Safety, 61*(2), 57-60. doi:10.3928/21650799-20130129-02

U.S. Department of Health and Human Services. (2007). *Recommended requirements for enhancing data quality in electronic health records, final report.* Retrieved from www.export.gov/safeharbor

www.manaraa.com