Electronic Health Records and Occupational Data

A Call for Promoting Interoperability

Michele Kowalski-Mcgraw, MD, MPH, Robert K. McLellan, MD, MPH, Manijeh Berenji, MD, MPH, Kenji Saito, MD, JD, Judith Green-McKenzie, MD, MPH, Hannah Thompson, MD, and Thomas Warner Hudson III, MD

ACOEM Work Group on Electronic Health Records and Occupational Data

All clinicians who care for workers should have access to the invaluable knowledge of a patient's job duties and potential hazards. The American College of Occupational and Environmental Medicine (ACOEM) supports the secure collection and incorporation of data about a patient's job duties, occupational hazards, and function in electronic health records (EHRs).

In this article, the ACOEM proposes the criteria, which EHR systems should meet to effectively share occupational health information to optimize medical care and improve the health of American workers. We define EHRs as those used by primary care providers, hospitalists, and specialists, including Occupational and Environmental Medicine (OEM) specialists who function as treating providers. We use the term occupational EHR (oEHR) to refer to specialized electronic records used uniquely in the course of OEM practice, most commonly for examinations and tests required by employers or government agencies. A later article will detail the standards and best practices for oEHRs.

The United States Core Data for Interoperability (USCDI) is a standardized set of health data classes and constituent data elements for nationwide, interoperable health information exchange. The most recent version of USCDI, Version 3, now incorporates industry and occupation as core data elements that are anticipated to be part of regulatory requirements to meet electronic health record (EHR) certification. Reimbursement by Medicare and Medicaid requires that providers use a certified EHR. Furthermore, the 21st Century Cures Act normalizes sharing of occupational data with select stakeholders. The Cures Act requires that patients and other stakeholders granted privileges have access to injury and illness evaluation documentation. At the same time, data collected during some employee evaluations may contain sensitive information that requires unique privacy protections.

As the largest professional organization representing OEM specialists, ACOEM supports the secure collection and incorporation of data about a patient's job duties, occupational hazards, and function in EHRs. To recognize and treat work-related conditions and to prevent injury and illness in other workers, all physicians require a basic knowledge of a worker's job duties and hazards. Furthermore, a physician's understanding of a patient's job tasks facilitates prompt and safe return to work. Finally, incorporating basic occupational information into EHRs will contribute to public health practice and research.

Recommendations for Recording and Use of Occupational Information in EHRs

1. Enable recording and retention of the patient's current or usual occupation, work status, and industry using the US National Institute for Occupational Safety and Health (NIOSH) Occupational Data for Health (ODH) framework, which captures this information in the data-formatting interoperability standards for health information systems;
2. Collect and maintain industry and occupational information supplied by the patient as protected health information (PHI), which is to be used for the medical care of the patient independent of employer-directed requests for evaluation or surveillance;
3. Include standardized fields to capture a patient's physical, emotional, and cognitive function, with a required minimum set of data elements; and,
4. Record sentinel occupational exposures or risk factors on the problem list, with the capability to use these sentinel risks for later clinical management and decision support.

BACKGROUND

Approximately 158 million Americans are employed. Their health can affect their ability to work safely and productively, and in turn, their jobs can affect their health.[1,2] In 2020, the US Bureau of Labor Statistics reported a 2.9% incidence rate of nonfatal occupational injuries or illness in all industries. Although the magnitude is uncertain, the actual number of occupational injuries and illnesses likely exceeds the US Bureau of Labor Statistics reports based on surveys of employer-reported Occupational Safety and Health Administration (OSHA) logs.[3] This is likely due to underreporting and/or under ascertainment of occupational injury and illness.

The total cost to the American economy from illnesses and injuries covered under workers' compensation—including both direct costs as well as indirect costs of lost productivity—accounts for at least 5% of America's payroll. Lost productivity and disability payments due to nonwork-related illnesses and injuries are even more costly—accounting for up to 20% of payroll, rivaling the total costs of healthcare coverage itself.[4] The unexplained variance in work versus nonwork-related costs is enormous. Studies have shown that healthcare clinicians can do better at disability management. Potential savings resulting from optimal disability management may be as high as 10% of payroll,[5] when using several proven strategies.[6,7,8,9]

A large study of 43 employers performed in 1999–2000 demonstrated an annual cost of nearly $10,000 per employee for core programs related to health care and disability, including group health benefits, sick leave, nonoccupational disability, workers' compensation, and worker turnover.[10] Of those costs, approximately 26% ($2500 per employee/year) might be saved if organizations achieve best-practice levels of performance in disability management.

The first step in improving disability management is to measure it. Unpublished

From the American College of Occupational and Environmental Medicine, Elk Grove, Illinois.

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Address correspondence to: Marianne Dreger, MA, ACOEM, 25 Northwest Point Blvd, Suite 700, Elk Grove Village, IL 60007 (mdreger@acoem.org).

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data from Kaiser Permanente in California and elsewhere have found that merely measuring and reporting aggregate physician performance on disability notes can decrease unexplained variance in disability determinations among different clinical departments by as much as 20%, even in the absence of other interventions. Accordingly, it is crucial that EHRs support information about a patient's occupation, industry, and functional status in a standard and interoperable way. ACOEM published an article detailing the economic, clinical, and social value of including functional status metrics in the EHRs. The position paper provided recommendations designed to facilitate the adoption of functional outcomes as a routine part of clinical documentation.[11]

Preventing work disability through primary, secondary, and tertiary levels starts with primary care. Approximately 25% of workers with work-related conditions seek care from their primary care physicians, which is about three times as many as see occupational medicine specialists. Primary care and other providers who see injured workers rely on an EHR to document care. [12] A physician's knowledge of a patient's work history, job hazards, and current job duties is foundational for accurate diagnosis, treatment, prevention of work-related conditions, and facilitating prompt and safe return to work. [13] Understanding a patient's work also can help the clinician better assess the role of factors, such as shift work or lack of proper storage for medications, that should influence the management of chronic diseases. [14] The US Center for Disease Control and Prevention's early *Healthy People* agenda included improving the collection of an occupational history as a national healthcare goal, but with little success. Occupational health data elements were present in only 27.8% of records at a major US academic medical center. [15] The EHRs that can facilitate collection of interoperable industry and occupation data elements available to inform every medical encounter when relevant are needed to improve patient health.

In 2011, the ACOEM provided testimony that informed the Institute of Medicine (IOM), now the National Academy of Medicine, Committee examining the value and feasibility of including occupational information in the EHR. The resulting document identified several benefits, including[16]:

- Improving the quality, safety, and efficiency of care
- Reducing health disparities
- Engaging patients and families with their health care
- Improving care coordination
- Improving population and public health

The report also concluded with 10 recommendations to advance the likelihood of incorporating occupational information into the EHR while protecting privacy. Shortly after publication of the IOM report, the ACOEM developed a white paper with specific recommendations. [17] In addition to ongoing advocacy with the US Department of Health and Human Services' Office of the National Coordinator for Health Information Technology for the benefits of adding this information to the EHR, the ACOEM has continued to work with the NIOSH to respond to these recommendations and develop a framework to collect standardized, interoperable occupational information.

Specifically, this has included the following contributions to the NIOSH:

- Participating in a workshop on ethical and privacy issues related to including occupational information in the EHR
- Helping the NIOSH develop a work and health functional profile designed to assure that the functionality of the EHR would make optimal use of occupational information
- Designing clinical decision-making tools that would support physicians
- Providing support for pilot testing of the NIOSH framework in community health centers
- Assisting with outreach to individual health care institutions and EHR vendors to develop best practices for collecting occupational information

Version 3 of the USCDI includes key elements of ODH (industry and occupation), which will support improved care of American workers. Industry refers to an economic sector, such as health care, education, or manufacturing. Occupation refers to a specific job, within an industry such as nurse, college professor, or foundry worker. The USCDI defines the set of health data classes and data elements for interoperable health information exchange. Federally certified EHRs must use USCDI. The core data elements of occupation and industry now comprise part of the voluntary Standards Version Advancement Process, which enables health information technology developers to incorporate newer versions of secretary-adopted standards and implementation specifications as part of the Real World Testing Condition and Maintenance of Certification requirement (§170.405) of the 21st Century Cures Act. [18] Given the vital role that industry and occupation play, the ACOEM urges EHR vendors to begin developing this capacity now.

The ACOEM supports using the NIOSH framework to develop EHR functionality that captures occupational data in a meaningful way in real-world scenarios and provides information vital to quality care, public health, and research. In addition to the core data elements of industry and occupation, the NIOSH framework also facilitates capture of employment status, an important social determinant of health, which should be incorporated into future versions of USCDI as a separate core data element. As core data elements, occupational information can be exchanged efficiently among stakeholders. Electronic health records should facilitate information sharing among all clinicians associated with the medical home, including occupational medicine physicians. However, when health personnel use the EHR for employer or government agency directed health assessments, the record should have the capacity to restrict access to nonwork-related personal health information. Health information specialists should maintain up-to-date knowledge of how the EHR should, in specific scenarios, restrict occupational health personnel access to sets of PHI to comply with existing and future laws, such as the Americans with Disabilities Act (ADA), Genetic Information Nondiscrimination Act (GINA), and the 21st Century Cures Act.

In considering whether occupational data might be significant enough to warrant inclusion in all EHRs, the ACOEM has considered the far-reaching clinical, societal, and public health benefits likely to result from greater attention to workplace risks and job demands. These elements, too often neglected in mainstream medical practice, deserve fuller attention and inclusion in all EHRs. In making these recommendations, the ACOEM has considered whether including occupational information in all EHRS will increase clinician burden. However, the NIOSH has developed a system for collecting self-reported, structured, and standardized patient work information. [19] This type of data collection, while leaving open the option for medical assistants or clinicians to assist in data entry, largely shifts the task of data entry to patients. This approach to data collection minimizes the potential for an increased administrative burden for medical practices. If all physicians were aware of the importance of occupational factors in patient care, the health of working Americans would improve significantly just as, for example, the requirement for recording blood pressure has helped control the burden of cardiovascular disease in the general population. The ACOEM believes that attention to occupational health data will be no less significant for the nation's public health.

OCCUPATIONAL MEDICINE PRACTICE AND USE OF EHRS

Occupational and Environmental Medicine is a specialty practice focused on the link between the environment (including occupational, ambient, and special environments such as space or undersea) and health. Occupational and Environmental Medicine practice is multifaceted, comprising both clinical medicine and population health in a range of practice settings, which include hospitals, free-standing

clinics, government agencies, the military, and businesses. In addition to clinical activities, the OEM professional may conduct epidemiological investigations, environmental assessments, create policy, and implement and manage health promotion programs and other interventions designed to protect and advance worker well-being. When the practice focuses on a particular, employed working population, it may be characterized as "employee health."

The OEM clinical practitioner may use both general medical EHRs and EHRs specific to oEHR. The OEM clinicians commonly care for patients who have chosen them to care for their work-related injuries or illnesses. However, OEM clinicians may also conduct a variety of medical evaluations as an agent of an employer, agency, or legal body. Such evaluations may include medical surveillance, fitness for duty, impairment, disability, and preplacement examinations. In these instances, the provider is not the treating provider for the patient or population in question and access to the medical record should be restricted to the information relevant to the specific request and released with appropriate consents. However, when the OEM clinician is the primary treating provider, such as in the instance of work-related injuries or illnesses, access to full medical information should be available to optimize and coordinate care. Work-related injuries or illnesses are also often seen by providers other than OEM specialists. These providers should have access to work information to leverage best practices to modify causative factors and enable return to healthy work for individuals seeking care. Through capture of standardized occupational health data, health personnel can deliver primary, secondary, and tertiary levels of preventive care to populations.

While OEM practice will benefit from work information captured in an interoperable way within the EHR ACOEM recognizes that the EHR will not meet some important specialized needs of occupational medicine practice. This article does not address these needs because many of the specific data elements and clinical tasks required in an OEM practice will be of limited interest to most general medical practices. Sharing of health information collected under employer direction will also be subject to different privacy standards. For example, internists and orthopedists will generally not have to use an EHR to track schedules for drug testing in commercial drivers or the timing of OSHA surveillance examinations. Accordingly, the ACOEM believes that there will always be a separate market for specialized EHR systems tailored for occupational medicine (oEHR). A later paper will address the evolving development of guidance and standards for oEHRs. This document focuses on improvements, which EHR systems should adopt to best capture work information that can be used by all medical providers.

OCCUPATIONAL DATA FOR HEALTH

Occupational Data for Health is a framework for self-reported, structured, and standardized patient work information. It is broadly applicable in health care as part of the medical record; it is suitable for many use cases supporting patient care, population health, and public health. [19] The NIOSH ODH occupation value set was derived from the Occupational Information Network-Standard Occupational Classification (O*NET-SOC) system, which may be used as a resource to facilitate collection of this information. The US Department of Labor/Employment and Training Administration sponsors Occupational Information Network (O*NET) through a grant to the North Carolina Department of Commerce. O*NET has extended the Standard Occupational Classification (SOC) system from 800+ to 1100+ classifications. O*NET's free database (https://www.onetonline.org) contains hundreds of job definitions with requirements such as work activities and physical, social, and organizational factors involved in the work. Linking ODH codes in an EHR to O*Net could offer providers a quick look at details of their patients' jobs.

The ACOEM advocates that standardized work information, such as ODH, should be incorporated immediately into patients' EHRs to allow all medical clinicians to be aware of this clinically relevant information. This will serve as a foundation to promote health in workers and society. The challenges of the climate crisis and COVID-19 pandemic illustrate the need to mitigate disparities, address the needs of underserved communities, and support public health responses. Addressing these challenges demands the inclusion of job, industry, usual work, and other work data to fulfill the promise of timely and equitable care. Occupational data for health will also more easily facilitate the consultation of occupational medicine specialists for work-related conditions when more specialized care is needed. The 2016 Cures Act has made information sharing the expected norm in health care to optimize care coordination. Except as required by law or specified in an information blocking exception, electronic health information, including ODH, should be accessible and exchanged interoperably. Certain confidentiality structures under ADA and GINA and other regulations such as the Equal Employment Opportunity Commission (EEOC) and OSHA will require some information firewalls within EHR systems. However, our key message is that broader sharing of occupational data among multiple users and multiple EHR systems should significantly improve quality of care and public health outcomes for the American workforce.

Recommendation for the Recording and Use of Occupational Information in All EHRs

1. **The EHR should enable recording and retention of the patient's current or usual occupation, industry, and work status (employed, not employed, not in workforce), in data-formatting interoperability standards for health information systems. The ACOEM advocates that vendors immediately begin incorporating standardized work information, using the NIOSH ODH framework into patients' general EHRs to inform all clinicians of this clinically relevant information.**

PROPOSAL

Since 2011, when the IOM report described the benefits of incorporating occupational information into the EHR, several agencies, including NIOSH and Office of the National Coordinator for Health Information Technology, have studied the best ways to accomplish this objective. The ACOEM supports the use of ODH, which enables capture of a patient's work information. This framework contains standards and tools to support the collection and use of self-reported data in a standardized, interoperable way within the EHR. Occupational data for health is consistent with the key data-formatting interoperability standards for health information systems. These standards include the three product lines of Health Level Seven, International (HL7®) and the technical frameworks of Integrating the Healthcare Enterprise International. Electronic health records and other health information systems may use these standards to share information within and across healthcare organizations. Including ODH in all of these standards ensures and supports opportunities to collect the data once and then have it shared with other healthcare personnel.

Occupational data for health can assist clinicians in identifying important occupational risk factors by recording and updating the patient's occupation and industry dating this data entry at each encounter with the medical system. Certified EHRs may also assist future epidemiological work on population health. Several coding schemes, including emerging autocoding software, could serve this purpose. Although the optimal level of granularity in such coding systems has yet to be ascertained, The NIOSH ODH, based on the SOC system, [20] supplemented by job descriptions as contained in the O*Net system, [21] and industry information contained in the North American Industry Classification System represents a reasonable framework with which to begin.

Once recorded in a standardized way, codes for occupation and industry may improve the recognition of and research of

preventable occupational injuries, illnesses, and cancers. Occupational illnesses and injuries cause a large burden of preventable morbidity and mortality in the United States, comprising up to a few percent of all deaths, and a large but poorly characterized percent of chronic morbidity. [22,23] Occupationally related cancers are estimated to comprise 3.9% of all cancer deaths globally. [24] Indeed, deaths from occupational causes, if aggregated as a single reportable cause of death, would rank as the eighth leading cause of death in the nation, behind diabetes but ahead of motor vehicle accidents. Current data systems, including workers' compensation systems, capture only a portion of the true burden of occupationally related illnesses and injuries. [25] Preventing such injuries and illnesses, including new or poorly defined conditions or those with unclear causality, depends on a better understanding of their epidemiology. Recognition of occupational injuries and illness relies on the treating clinician's awareness of the patient's job tasks and associated risks. Electronic health record systems that capture this information in a standardized way, based on SOC and O*net classifications, will facilitate appropriate treatment, such as changes in the patient's job duties or work practices, use of personal protective equipment, or recommendations for engineering controls.

Future investigations related to population epidemiological and clinical quality assurance can make use of these codes along with a matching date. While the patient's current occupation may be updated with a new date, previous SOC codes and their accompanying dates are retained within the EHR. Furthermore, documentation of a patient's SOC and O*Net codes allows searching records for all patients with a particular SOC code.

USE CASES

a) The NIOSH has developed a prototype that demonstrates the features and the necessary ODH value sets to collect self-reported ODH in EHRs and other health information systems. It aligns with the instructions found in the HL7® Work and Health, EHR Functional Profile. This documentation enables work information to be captured and used directly for health assessment and planning, aside from billing or administrative purposes. Healthcare clinicians and software vendors may build the ODH vocabulary into their solutions now.

b) At the time of registration in a health plan, and periodically thereafter, staff could request information from the patient (verbally, by short questionnaire, or directly input by the patient via a secured device). The information could be entered via functionality offered by the NIOSH framework, which uses a standard vocabulary to identify an interoperable occupational code. At the time of data entry into the EHR, the field would be date stamped, with the date of entry retained indefinitely.

c) Periodically, staff in the health plan or medical office can query the patient about any recent job change and may enter new information with a new date stamp via software based on the ODH framework.

d) At a future time, clinicians or researchers may retrieve the records of patients with particular occupation and industry codes during particular time intervals.

2. The EHR should protect patient health information and should collect and maintain industry and occupational information supplied by the patient as PHI. The general EHR used by OEM clinicians to perform employer or agency-required examinations should have firewalls to protect PHI, which is irrelevant to the patient's ability to work safely.

PROPOSAL

Industry and occupation are not routinely collected at most medical encounters. [26] The ability to work is a critical social determinant of health, which may be addressed through multiple different contacts within the medical system. Information on employment status, industry, and occupation should be readily available to all medical clinicians, but like other social determinants of health may contain sensitive information in certain circumstances.

For example, an employer might consider a patient working a second job as conflicting with their primary job or as responsible for an injury. Alternatively, the patient may work in an occupation considered as socially undesirable, such as sex work. As such, information supplied by patients on their job status, industry, and occupation should be maintained as PHI. This information may or may not be the same as information supplied by the patients' employer with requests for work-related evaluations or surveillance. In this case, the record would record both the employer and patient provided information.

In addition to the Health Insurance Portability and Accountability Act regulations, EEOC, ADA, GINA, OSHA, and local, state, federal and regulations, and state-specific workers' compensation programs regulate workers' digital privacy. On May 31, 2011, The EEOC recommended the use of firewalls to limit access to employee EHR information to only job-related medical information. [27] Title I of the ADA and Title II of GINA limit employer access to PHI. Regardless of whether an employer or an occupational health provider maintains information in paper or electronic files, both must ensure that personal health information about applicants or employees cannot be accessed, except under certain circumstances. The EEOC has stated that both ADA and GINA require that an employer maintain confidentiality of employees' PHI, including electronic PHI. Moreover, although ADA and GINA contain exceptions permitting disclosure, "none of these exceptions specifically authorize an employer to allow access to medical information related to employment by individuals providing health services unrelated to employment." Thus, the EEOC opined that the storage of PHI and occupational health information in a single EHR, especially absent any access limitations, may contravene ADA and/or GINA. Before EHR integration, this was not a concern because of the complete separation of the two EHRs. However, in accordance with this recommendation, and following digital privacy requirements for employees, some medical centers are developing a firewall within their own health system.

Privacy and compliance legal experts suggest including firewall building and postimplementation testing as part of the framework of system-wide initiatives to protect sensitive employment information from being released without patient consent from the mainframe records. Firewalls can also protect the occupational medicine provider when providing services outside the role of the treating provider from seeing employee PHI not relevant to the employee safely performing their work duties. Work-related information, such as vaccination, tuberculosis testing, employment-related medical examinations, and drug testing should be maintained separately from the information collected as USCDI elements. [27] The availability of the Work and Health Functional Profile, HL7® EHR System-Functional Model Release 2: Functional Profile; Work and Health, Release 1–US Realm, can inform EHR system software developers about useful features to expand her capabilities for managing a patient's ODH (as opposed to occupational data for administrative or billing purposes) as does the *International Classification of Diseases*, *10th Revision*, *Clinical Modification*, external cause of morbidity and mortality codes. [28]

USE CASES

a) In a primary care clinic, the front desk staff would ask the patient to fill out demographic information pertaining to work history (including industry and occupation) via secured portal.

b) The patient would be able to confirm that this information is considered PHI and the data inputs would be saved as such.

c) Only appropriately designated clinical personnel, not their employer or governmental agency, will have access to this information.

3. The EHR should contain standardized fields to capture a patient's functional capacity or work capacity, with a required minimum set of data elements. Furthermore, the EHR should be able to

transmit, as a message, the patient's functional status, including the possible need for total temporary disability or requirements for activity/functional restrictions at work, and the duration. This information can serve to meet nonwork-related needs as well, such as for participation in sports, camp attendance, or nonwork-related disability benefits.

PROPOSAL

Because appropriate assessment of functional ability and work restrictions can prevent needless disability, promote recovery, enhance safety at work, and lead to significant cost savings, the EHR should include tools to allow clinicians to record a patient's functional capacity in a standardized way and to share that information with other stakeholders. [11] Much misdirected medical care occurs because clinicians fail to focus on a patient's reaction to treatment or ability to function at work or other activities of daily living. The burden of prolonged disability in the US is significant, reflecting the American medical establishment's underclassification of work-related morbidity and mortality. Too often, workers with a range of medical problems, which may or may not be work related, are given off-work notes or are otherwise labeled as disabled, when in fact they may be capable of continuing to work at modified duty or otherwise participate safely in gainful employment. Furthermore, delayed return to work increases the risk for permanent total disability, which burdens society as a whole and worsens health disparities.[29] Conversely, workers with certain risk factors too often are not counseled to avoid certain activities and risks in the workplace. Similarly, tools to collect and transmit information about a patient's functional capacity may serve to meet the needs for participation in sports, camp attendance, or nonwork-related benefits.

Functional assessment is not a static measure, and the ascertainment of function may be based on information from several sources including patient reports, physician observation, and both subjective and objective testing. Assessment of work ability also depends on a patient's job tasks. A more physically demanding task relies more on musculoskeletal function than a cognitive task. Psychological conditions such as depression and anxiety can affect some job tasks more than others. [30] The O*NET-SOC upon which the NIOSH ODH occupation value set was derived may help the clinician assess job activities and the physical, social, and organizational factors involved in the work.

Validated tools to measure patient self-reported function can be completed before the visit. For example, the Patient-Reported Outcomes Measurement Information System questionnaire bank is an National Institutes of Health-funded initiative available to clinicians at https://commonfund.nih.gov/promis/index. It covers issues from musculoskeletal pain to quality of life to cognition. If completed, these data can be captured and added to the EHR, indicating how the patient reports that they feel at that point in time. If completed at each visit, they can provide a rich database to health personnel to assess progression, or lack thereof. Other validated self-report questionnaires specific to work ability include the Work Limitations Questionnaire and the Work Ability Index. The 36-Item Short Form Health is a general questionnaire reflecting the impact of the respondent's health on their function. Several questionnaires query the musculoskeletal system such as the Disabilities of the Arm, Shoulder, and Hand Questionnaire and others that assess physical function in the office such as the 3-minute step test. In addition to questionnaires, more objective testing can be used to assess functional capacity. Trained physical therapists can conduct different types of functional capacity evaluations, but these can take several hours. Cardiac and pulmonary exercise stress tests provide evidence of cardiopulmonary functional status. At this juncture, there is no one test known to assess every aspect of a person's functional abilities and each test has limitations. Rather, several sources should be used to assess function.[30] Some can be quite labor intensive and expensive, such as the functional capacity evaluations and exercise stress tests. However, patient-reported function has been shown to be quite accurate and can be used in conjunction with other assessment data when available.

The well-designed work-ability or other activity note should exclude personal health information (unless released by patient consent) but contain, at a minimum, the following elements:

a) Is the patient totally temporarily disabled? If so, what specific reason, or category of reasons, would prevent the patient from engaging in any meaningful employment or other activity at this time? (ie, infectious risk, significant trauma with inability to travel, cognitive impairment, risk of fall, postsurgery, etc.
b) If the patient can do modified or transitional work, what specific functional limitations and/or altered capacities does the patient have, taking account of essential job or other social functions?
c) What is the prescribed length of the current restrictions, if any?
d) Are there affirmative recommendations for transitional work or other types of graded increase of activity?

Finally, the EHR should document how, when, and to whom the work or activity note was sent, as a secure message, or otherwise. Structured recording of functional capacity associated with standardized occupational information will allow clinicians and epidemiologists to track physician performance on disability management, and to identify opportunities for clinical improvement, with a potential for improved functional status for the worker and significant cost savings.

USE CASES

a) During an encounter with a patient, a provider learns that patient needs a work or other activity note. The provider then determines and records:
- whether total temporarily disability (TTD) is needed
- the reasons for TTD, if any; or
- what activity or functional restrictions are needed at work; and
- the likely duration of the TTD or recommended restrictions; and
- other optional comments, such as suggestions for transitional work or other activity and whether the restrictions seem compatible with the usual and customary job.

b) The provider or staff determines whether other stakeholders should receive the work or activity note and how the communication should be transmitted.
c) The provider or staff transmits the "work or activity note" as a message to the appropriate stakeholders, as the EHR documents the transmission of the message.
d) At a future time, a user of the EHR may choose to retrieve, by date, a previously written "work or activity note" and any message recipients.
e) Clinical decision support tools can be designed to aid the clinician in determining and completing work and activity notes. [31]

4. The EHR should record sentinel occupational exposures or risk factors on the problem list, with a capability to use these sentinel risks for later clinical management and decision support. Conditions accepted by workers' compensation insurance as "work related" should be flagged on the problem list.

PROPOSAL

Accurate diagnosis and treatment of conditions that might have an occupational and/or environmental component depends on recognizing those exposures and controlling them to the best extent possible. For primary care clinicians who may be unfamiliar with all of the health and safety risks that may occur with certain jobs, the mere presence of a dated occupation or industry code in the health record may not suffice to alert them to intervene appropriately. Accordingly, the EHR should assist in capture and incorporation of additional data about high-risk workplace exposures associated with some jobs.

These additional data will fall into two broad categories:

a) Is the patient exposed to any one or more of the following at work: dusts, fumes, chemicals, metals, radiation, loud noise, cumulative trauma, and/or other recognized environmental hazards?
b) Do any of the patient's current or past job exposures trigger a requirement for specific medical surveillance, under federal/state OSHA rules or other government agency rules?

Active treatment for a condition covered by workers' compensation and patient reports of an occupational environmental exposure risk should be recorded and flagged in the health record for further review and analysis. The *International Classification of Diseases*, *10th Revision,* provides codes for many exposures and when possible should be used. Because these data expand and evolve, exposure codes may be linked to jobs to facilitate preventive efforts for both individuals and populations.

Some health care systems, in conjunction with their respective EHR vendor(s), may have existing clinical decision support tools in place, prompting the clinician to ask about related symptoms or to suggest relevant diagnostic studies or other interventions. Others may have to custom design such tools within their EHR, using advanced health information technologies (like natural language processing, artificial intelligence) to create occupationally driven algorithms. Using knowledge of both occupation and potential exposure, the clinician may use data bases such as HazMap (https://haz-map.com/) to explore relationships between symptoms, findings, and exposures. Alternatively, the clinician may recognize the value of referring the patient to an OEM specialist.

USE CASES

a) At an initial screening examination for a patient who works at a fabricated stone shop, a medical assistant will administer a standard brief occupational questionnaire to the patient and record the presence of specific exposure risks. [32] The information will be either manually entered or electronically captured in the EHR, with the specific risk factors or exposures highlighted in the problem list, or other designated section of the record. Based on the standardized industry and occupation information also captured, the clinician discovers that this patient is at risk for developing silicosis. The EHR system makes clinical support suggestions to

Terminology Chart

Term	Acronym	Definition
United States Core Data for Interoperability	USCDI	Standardized set of health data classes and constituent data elements for nationwide, interoperable health information exchange.
National Institute for Occupational Safety and Health	NIOSH	US research agency focused on the study of worker safety and health. Part of CDC/DHHS.
Electronic Health Record[a]	EHR	Record of a patient's medical history curated by health care providers and available electronically.
Work-related Injury and Illness	WRII	Any work-related injury and/or illness. Used for patient's medical care independent of employer-directed requests for evaluation or surveillance.
Health Level Seven[b] https://www.hl7.org/fhir/overview.html	HL7®	Standards developed to improve data exchange for health care.
Integrating the Health Care Enterprise[c] https://www.ihe.net/	IHE	A health care professional along with industry initiative to improve health care information systems' interoperability.
Occupational Data for Health[d]	ODH	Framework for self-reported, structured, and standardized patient work information. Patient's work information is collected via self-report and entered into the EHR in a structured/standardized manner.
Occupational Electronic Health Record	oEHR	A specialized EHR utilized by OEM practitioners.
Occupational Information Network[e]	O*NET	Current database of occupational information and descriptors based on worker surveys from various occupations with augmentation from occupational experts as needed.
Occupational Information Network-Standard Occupational Classification[f]	O*NET-SOC	Organizational system for occupational categories based on SOC system.
Occupational Safety and Health Administration	OSHA	Created in 1970 to ensure safe and healthy working conditions by setting and enforcing standards and by providing training, outreach, education, and assistance. Part of the US Department of Labor.
Standard Occupational Classification[g]	SOC	Federal statistical standard code used to categorize occupations with the goal of gathering, calculating, and sharing data.
Standards Version Advancement Process[h]	SVAP	Voluntary process through Office of National Coordinator for Health Information Technology that allows certified health information technology developers to perform updates with approved, more recent versions of standards than are currently in the regulation.
Americans with Disabilities Act	ADA	1990 civil rights law; prohibits discrimination against individuals with disabilities in all areas of public life including employment.
Protected Health Information	PHI	Defined by HIPAA as individually identifiable health information, held or maintained by a covered entity or its business associates acting for the covered entity, which is transmitted or maintained in any form or medium (including individually identifiable health information of non-US citizens).
Temporary Total Disability	TTD	A functional status determination that a worker is unable to work at all temporarily.

[a]Electronic Health Records. Centers for Medicare and Medicaid Services. 2021. https://www.cms.gov/Medicare/E-Health/EHealthRecords.

[b]What is HL7® FHIR®? Office of the National Coordinator for Health Information Technology. https://www.healthit.gov/sites/default/files/page/2021-04/What%20Is%20FHIR%20Fact%20Sheet.pdf.

[c]Integrating the Healthcare Enterprise (IHE). IHE International. 2020. https://www.ihe.net/

[d]A Guide to the Collection of Occupational Data for Health: Tips for Health IT System Developers. DHHS (NIOSH) Publication No. 2022-101. https://doi.org/10.26616/NIOSHPUB2022101.

[e]O*net. Employment and Training Administration, US Department of Labor. https://www.dol.gov/agencies/eta/onet.

[f]Coding Assistance. O*NET Code Connector. https://www.onetcodeconnector.org/oca/step1.

[g]Standard Occupational Classification. US Bureau of Labor Statistics. https://www.bls.gov/soc/.

[h]Standards Version Advancement Process (SVAP) 2022 SVAP Fact Sheet. The Office of the National Coordinator for Health Information Technology. https://www.healthit.gov/sites/default/files/page/2022-06/2022%20Approved%20SVAP%20Fact%20Sheet.pdf.

the clinician, complete with evidence-based guidelines. The support prompts guide the clinician to conduct further evaluation for silicosis and an appropriate referral is made for specialized care.

b) A patient complains of fatigue and stomach pains ongoing for years. Based on the patient's chief complaint(s) and symptoms, in combination with standardized occupational data, environmental history and laboratory work with trend data, an algorithm can amalgamate the information and provide context. The analysis indicates that the patient's presentation may be related to lead exposure as a result of possible work-related activities.

c) A patient presents with an acute onset of low back pain triggered by a lifting activity at the warehouse. The clinician free texts this information into the EHR. Through natural language processing linking to standardized vocabulary for work information, the EHR recognizes that this is a work-related event and subsequently a return-to-work activity prescription tailored to the patient's occupation is generated for the clinician to give to the patient with instructions. [31]

CONCLUSIONS

All clinicians who care for workers should have access to the invaluable knowledge of a patient's job duties and potential hazards. Achieving improved health outcomes depends on the recognition of work as a social determinant of health and appreciation of the interplay between work, home, and community exposures. [33] Treating work-related conditions and caring for patients holistically relies on occupational information, and it is foundational for facilitating prompt, safe return to work. In addition, standardized interchange of occupational health information may prevent injury and illness in groups of workers and assist in public health research. Electronic health records need specific functionalities for effective communications with both medical and nonmedical stakeholders, for compliance with existing confidentiality rules, and for exchange of clinical information among separate EHR systems. For these reasons, the ACOEM urges the adoption of the four new recommendations, which promote use of occupational information consistent with the intent for interoperability, patient data access, and system-wide health information exchange. The ACOEM recommends that software vendors immediately begin incorporating these capabilities into their EHR systems to enable occupational health information to be integrated into the general medical care of patients and populations.

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