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National Insurance

Integrating Occupation and Employment History into Electronic Medical Records

Summary of Findings from a Multinational Survey and Recommendations for the Integration of Occupational Data in Israel's Healthcare System

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Abstract

Background: In recent decades, numerous changes in labor market structure and diverse employment arrangements have necessitated a shift in the response required for protecting workers' health. These changes have created a gap between the regulations and the systems that provide occupational health services and the existing need. It is estimated that there is significant underreporting and acute information gaps regarding work-related morbidity and mortality. Concurrently, immense technological advancements have occurred, enabling the storage, access, and analysis of information on an unprecedented scale. This presents an opportunity for a substantial advancement in workers' health by integrating occupational and occupational history information into Electronic Health Records (EHR). This study was conducted to recommend a process for connecting occupational identity to medical records, based on existing international models and adapted to the specific context of Israel.

Methods: The research was conducted through interviews, correspondence, and questionnaires with professionals from both Israel and internationally. It was also based on a comprehensive literature review.

Findings: A broad consensus was found regarding the potential contribution of incorporating occupational information into Electronic Health Records (EHRs) for diagnosing, treating, preventing, and researching work-related morbidity. Despite the existing consensus and operational recommendations in several countries, we found no country that had implemented a national-level incorporation of occupation and occupational history into its EHR systems.

The structure of general and occupational health services in numerous countries differs from the Israeli model and, accordingly, influences the way information is documented and organized. The prevailing model in these countries is dichotomous, with a split between the occupational and general healthcare systems. In these countries, most employees are under the medical supervision and care of occupational medicine. In Israel, however, occupational health services are provided within the primary care system by the Health Maintenance Organizations (HMOs). Yet, employment-related data and information are not shared with family physicians. Furthermore, most employees are not under the medical supervision of occupational medicine.

Key Insights and Implications: Occupational health services play a vital role in the medical surveillance of employees at risk. In alignment with regulations and general health services, they can function as a complementary system for the detection and potential diagnosis of occupational diseases. Integrating occupational information into the medical record would establish a decision-support system to facilitate the referral of patients to occupational health clinics. This integration would lead to a more reliable diagnosis of a wide range of occupational diseases, optimal treatment, improved work environments, and the complete fulfilment of employees' rights in cases of work-related disease. The structure of Israel's healthcare system, combined with technological advancements, creates a unique opportunity to link occupational and medical information, promoting employee health.

Recommendations: Two models were proposed: (1) implementing digital data fields for occupation and employment history; and (2) shifting the focus to occupational medicine, similar to the split model. Yet, the research team recommends the first option. The primary recommendations focus on the process of building and implementing this model in Israel. The recommendations outline the composition of a steering committee to represent diverse stakeholders, including the healthcare system, the Ministry of Labor, the National Insurance Institute, and the public, comprising both employees and employers, acknowledging the inherent complexity of implementing such a system. The recommendations further specify the main issues the model must address, including professional expertise and training required for data intake and proper use, the implementation process that accounts for costs and priorities, technical issues, employees' rights, and ethical concerns related to the storage, transfer, and processing of information.

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Introduction

The Israeli healthcare system implemented electronic health record (EHR) systems—familiar to the public as the "patient file" within HMO apps and websites—more than two decades ago. These records document a wide range of variables and metrics for each patient, enabling medical surveillance for the prevention, diagnosis, and treatment of diseases. However, these records lack a structured and systematic documentation of the occupation and occupational history of the HMO members. As a result, a significant aspect of a working or retired individual's life—one that could be crucial to their overall well-being—is often overlooked.

An occupational disease is a condition that develops as a result of exposure to a workplace hazard or risk factor. For an occupational disease to be diagnosed, two conditions must be met: (1) a causal link between exposure in a specific work environment, or a specific occupational activity, and a particular disease; and (2) a morbidity rate among exposed workers that is higher than the average for the general population (excess morbidity).[1] Occupational diseases can develop from physical, chemical, biological, ergonomic, or psychological factors to which a worker is exposed in their work environment and during work processes. These can lead to various types of morbidity, such as hearing loss, as well as diseases affecting the respiratory, nervous, cardiovascular, and musculoskeletal systems, among others. Additional harmful exposures can also affect emotional aspects, such as stress and psychological distress.[2]

In terms of quality of life, lost workdays, loss of work capacity, mortality, and economic loss, occupational morbidity is a global health challenge. Over 160 million cases of non-fatal occupational morbidity are estimated to occur worldwide each year.[3] The International Labor Organization (ILO) estimates that 5% (2.93 million)[4] of global annual deaths are work-related, of which 89% (2.58 million) are fatalities stemming from occupational diseases (as opposed to deaths from accidents). In economic terms, occupational morbidity results in a loss of 5.8% of the global GDP,

[1] https://openjicareport.jica.go.jp/pdf/11868221.pdf Retrieved 8 December 2023.

[2] Ibid

[3] Sehsah, R., El-Gilany, A. H., & El-Hadidy, S. S. (2023). Physicians' Knowledge, Attitudes, and Practice of Occupational Diseases Diagnosis and Occupational History Taking. *Journal of Occupational and Environmental Medicine*, 10-1097.

[4] https://www.ilo.org/publications/call-safer-and-healthier-working-environments Retrieved 9 September 2024.

due to a decline in worker productivity, an increase in healthcare service utilization, and disability benefit payments.[5] In the United States, for example, the economic burden of work-related injuries is estimated at approximately 250 billion, constituting 1.861 billion, which is 4.8% of the Australian GDP.[6] These figures are based on estimates that do not include ancillary costs. The social and economic costs of work-related injuries, which are not included in these estimates, add to the tangible costs. It was also found that those who bear the financial burden of work-related injuries are primarily the workers themselves, their families, and the primary care system, followed by employers, and finally, the public system.[7]

According to various estimates, between 500 and 1,200 people in Israel die annually from occupational morbidity. However, it is assumed that these estimates are an underestimation due to underdiagnosis and underreporting, as well as the difficulty in establishing a causal link between occupational exposures and disease.[7] This situation compromises the ability of both the healthcare and occupational health and safety systems to implement prevention effectively, enable early diagnosis, and provide optimal treatment. This is also true for individuals, as well as for identifying at-risk populations due to occupational exposures.[8] As a result, the conduct and decision-making processes of the various government bodies responsible for building safer work environments, preventing occupationally-related morbidity, and providing insurance compensation for morbidity are compromised.[9]

This research is driven by an understanding of the potential benefits of integrating information on occupation and occupational history, along with workplace conditions,

[5] Sehsah, R., El-Gilany, A. H., & El-Hadidy, S. S. (2023). Physicians' Knowledge, Attitudes, and Practice of Occupational Diseases Diagnosis and Occupational History Taking. *Journal of Occupational and Environmental Medicine*, 10-1097.

[6] Tompa, E., Mofidi, A., van den Heuvel, S., van Bree, T., Michaelsen, F., Jung, Y., ... & van Emmerik, M. (2021). Economic Burden of Work Injuries and Diseases: A Framework and Application in Five European Union Countries. *BMC Public Health*, *21*, 1-10.

[7] A 2022 survey conducted by the Israel Institute for Occupational Safety and Hygiene (IIOSH) (in Hebrew): https://www.osh.org.il/UploadFiles/11_2022/Occupational_health_survey_2022.pdf

[8] See the National Center for Disease Control's update on occupational morbidity 2020-2021, January 2025, publication no. 443.

[9] National Academies of Sciences, Engineering, and Medicine. 2018. *A Smarter National Surveillance System for Occupational Safety and Health in the 21st Century*. Washington, DC: The National Academies Press. https://doi.org/10.17226/24835.

environmental exposures, and their connection to morbidity, with the patient's health status.

Combining these data domains can lead to improved and more tailored treatment for patients and to a stronger evidence base regarding exposures and consequent morbidity. Establishing these connections based on reliable data will promote improved work environments, enable the assessment of the burden placed on the economy by non-beneficial work environments, lead to the streamlining and enhancement of decision-making among governmental bodies, such as the National Insurance Institute, and provide a data-driven tool for regulators.

In the past, the National Council for Worker Health carried out work aimed at promoting the registration of occupations, and preparatory work was done on a technical infrastructure for reporting. However, for various reasons—systemic, organizational, and technical—the implementation did not materialize. The purpose of this study is to recommend a process tailored to the State of Israel that will lead to the development of a mechanism linking a worker's occupation and potential exposures in their role with their medical record. To this end, the study was designed to assess the current situation in Israel and to examine models used by other countries to link information on occupational exposures with medical information.

Background

An individual's work environment is a key factor influencing their health. This influence can be positive, by providing good conditions that enable fulfillment, productivity, livelihood, and a beneficial lifestyle. However, it can also be negative if it exposes the worker to risk factors that may harm their physical and/or mental health, as well as their emotional and social well-being.[10] Workers exposed to chemical, biological, physical, ergonomic, or psychosocial risk factors experience adverse health effects related to these factors at higher rates. Furthermore, a person's health status is affected by their employment structure. Whether they are employed stably,

[10] Oosting, I. J., Kluit, L., Schaafsma, F. G., Beumer, A., van Bennekom, C. A., de Boer, A. G., & de Wind, A. (2023). Patients' Experiences, Needs, and Expectations of Cooperation Between Medical Specialists and Occupational Health Physicians: A Qualitative Study. *Journal of Occupational and Environmental Medicine*, *65*(6), e395-e401.

unemployed, or underemployed, this has an impact on their health and well-being.[11] For this reason, the World Health Organization included work among the social determinants of health (SDOH).[12]

While all parties understand the link between occupational hazards and potential health damage, the complex connections between specific risk factors and specific morbidities are not well-known and are sometimes outside the awareness of family physicians or specialist doctors. This situation can harm the diagnostic process for the disease and its causes, impede the prevention of continued exposure, and hinder the provision of tailored treatment. Furthermore, there is a lack of reliable information based on complete data. Such information would enable professionals in medicine, hygiene, and occupational health research to enrich existing knowledge, thereby improving work environments, preventing diseases, standardizing practices, and providing tailored treatments.[13]

Expanding the Concept of "Occupational Health" to "Worker Health" in a Changing Labor Market

The labor market has undergone significant changes in recent decades compared to earlier periods, when employees typically worked at a single workplace throughout their careers. In the current employment structure, workers frequently change jobs, and some split their work among different workplaces and occupations. These shifts in the structure of employment and the relationship between employers and employees have an impact on worker health, the level and consistency of their health surveillance and supervision, the commitment of employers toward them, and, consequently, on public health.[14] The professional literature indicates the necessity to create new or additional conceptual frameworks for existing occupational health

[11] Kvart, S., Cuervo, I., Gunn, V., Lewchuk, W., Bosmans, K., Davis, L., ... & Baron, S. L. (2025). Labour and social protection gaps impacting the health and well-being of workers in non-standard employment: An international comparative study. *PloS One*, 20(3), e0320248.

[12] Schmitz M, Forst L. Industry and Occupation in the Electronic Health Record: An Investigation of the National Institute for Occupational Safety and Health Industry and Occupation Computerized Coding System. *JMIR Med Inform*. 2016 Feb 15;4(1): e5. doi: 10.2196/medinform.4839. PMID: 26878932; PMCID: PMC4771928.

[13] National Academies of Sciences, Engineering, and Medicine. 2018. *A Smarter National Surveillance System for Occupational Safety and Health in the 21st Century*. Washington, DC: The National Academies Press. https://doi.org/10.17226/24835.

[14] Ibid

services and worker protection. For example, in countries within the European Economic Area, it was found that occupational health services are primarily dedicated to assessing occupational competence in the workplace. Additionally, when necessary, these services focus on adapting the work environment to the worker's needs, diagnosing and treating work-related morbidity, and providing medical surveillance, professional consultation, and guidance to employees and employers for diagnostic and preventative purposes. Furthermore, researchers have recommended connecting occupational health services with preventive medicine and public health services. This assumes that for some workers, occupational health services are more accessible than primary care services. Therefore, it was recommended that this accessibility be leveraged to promote a healthy lifestyle.[15]

The "Future of Occupational Health Project," an initiative of the University of Oxford,[16] was launched to examine the challenges facing the field of occupational health in a rapidly changing world of work. The project brought together a diverse range of experts from the fields of employment, occupational hygiene, and health to identify these challenges and develop models suitable for the present and future of employment structures and work environments. Economic, social, technological, and political changes are shaping the labor market and workplaces; yet, the field of occupational health continues to primarily rely on outdated models that examine the relationships between specific occupational exposures and morbidity too narrowly. According to the researchers, there is a need to examine both existing and future work environments and adapt occupational health services to them. Among the issues to be considered are not only those related to the industry but also to the employment structure. They also note the negative impact of particular processes and the globalization of the labor market on working conditions, as well as a decline in supervision and regulation in some places, which they refer to as "the race to the bottom" in terms of work conditions.[13] In addition, other issues were identified in the study that highlight the need for a response within the healthcare system to address the impact of work on individual health.

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[15] Sakowski, P., & Marcinkiewicz, A. (2019). Health Promotion and Prevention in Occupational Health Systems in Europe. *International Journal of Occupational Medicine and Environmental Health*, *32*(3).

[16] Trevor K. Peckham, Marissa G. Baker, Janice E. Camp, Joel D. Kaufman, Noah S. Seixas, Creating a Future for Occupational Health, *Annals of Work Exposures and Health*, Volume 61, Issue 1, 1 January 2017, Pages 3–15. https://doi.org/10.1093/annweh/wxw011.

The "Future Project" team argues that while estimating the burden of work-related injuries and morbidity is challenging due to multifactorial etiologies, latency, and underreporting, the influence of psychosocial factors and working conditions on individual health is even less understood. They further contend that researchers and professionals entering the field of occupational health are trained with tools and approaches developed under models that were suited to past employment patterns, rendering them ill-equipped to provide an adequate response to the health risks of the present and future workplace.[17]

Employment Structures: The world of employment is undergoing a shift from a traditional structure that consists of stable, long-term work with a single employer toward structures based on temporary, contract-based, or fragmented employment. This fragmented or part-time employment structure is associated with increased risks to occupational health and a higher likelihood of occupational injuries. Organizational indicators also suggest potential harm to workers' health and well-being, including an increase in presenteeism (attending work despite morbidity), a decline in job satisfaction, and a worsening of self-reported health status. Furthermore, this fragmentation across employers and work sites, combined with short-term assignments, is not adequately addressed by existing regulations that provide health protection and surveillance for workers. This fragmentation also creates a lack of clarity for employers regarding their responsibilities for work conditions, making it challenging to provide appropriate training on the risks associated with materials, equipment, and the work environment at various work sites.[18]

Demographic Shifts and Globalization Processes: Numerous issues such as the rise in the working age and an increase in the retirement age, the higher rate of female employment, the greater diversity in the workforce and their origins, as well as the rise in the percentage of migrant workers entering high-risk occupations and industries like agriculture, healthcare, and construction create new exposure and risk factors. These tendencies also present a challenge in tracking the health of mobile workers. Correspondingly, these workers are at an increased risk of occupational injuries and

[17] Trevor K. Peckham, Marissa G. Baker, Janice E. Camp, Joel D. Kaufman, Noah S. Seixas, Creating a Future for Occupational Health, *Annals of Work Exposures and Health*, Volume 61, Issue 1, 1 January 2017, Pages 3–15. https://doi.org/10.1093/annweh/wxw011.

[18] Ibid

death. Alongside these factors, globalization influences the movement of workers between countries, where competition for work may strengthen the flexible employment structure, leading to greater job insecurity and the restriction of workers' rights.

The Climate Crisis: This phenomenon affects the expansion of areas where workers are exposed to extreme weather conditions, extreme heat, or solar radiation, thus increasing the number of exposed workers compared to the past. In addition to workers who are exposed to such conditions on a relatively regular basis, other groups of workers are also exposed to health risks during extreme events. This includes, for example, rescue, medical, and emergency services personnel who respond to those affected by these events, as well as those involved in subsequent cleanup and recovery processes.

Within the framework of the "Future Project," experts proposed a new, expanded conceptual framework that shifts from "occupational health," which is job-focused and managed by the employer, to "worker health," which focuses on the full range of a worker's occupational experiences and exposures. This is not merely a semantic change; it broadly links work-related morbidity to the role of work in public health and the creation of health disparities within the population. Subsequently, occupation is recognized as one of the key social determinants of an individual's health. This approach facilitates for recognition of causal relationships among additional factors, addressing not only physical aspects or the absence of disease, but also the mental and emotional aspects related to employment and the work environment. In their view, the inclusion of these aspects of worker well-being necessitates a shift from the existing paradigm, which focuses on industry, regulation, and healthcare services, to a broader approach that addresses the full range of factors and conditions supporting worker health and well-being in the workplace.[19]

[19] Trevor K. Peckham, Marissa G. Baker, Janice E. Camp, Joel D. Kaufman, Noah S. Seixas, Creating a Future for Occupational Health, *Annals of Work Exposures and Health*, Volume 61, Issue 1, 1 January 2017, Pages 3–15. https://doi.org/10.1093/annweh/wxw011.

Creating Meaningful Information by Documenting Occupational History in Medical Records

Occupational diseases and injuries are amenable to primary, secondary, and tertiary prevention. Effective early prevention requires identifying risks and having knowledge of related health conditions.[20] Including information about occupation and occupational history in medical records can contribute to all three levels of prevention in several ways. First, knowing a patient's occupation can help physicians and other health professionals identify work-related diseases and injuries. This information can highlight working conditions that affect a worker's health and well-being, contributing to treatment efforts and preventing recurrent exposure and morbidity. At the same time, Electronic Health Records (EHR) have been used in healthcare systems in a wide range of countries for over two decades. These systems enable closer surveillance of an individual's health and utilize comprehensive knowledge to provide alerts and highlight connections that general practitioners or less specialized physicians may overlook. Second, documenting occupational variables enables research and surveillance of work-related disease and injury patterns at a population level, facilitating the planning of tailored interventions.[21] In the era of artificial intelligence, such information also opens up new possibilities for generating meaningful insights, which can aid in providing personalized medicine and addressing broader epidemiological aspects. Nevertheless, existing opportunity, the occupational field remains outside the scope of medical records, perpetuating a tendency of underdiagnosis, underreporting, and under-documentation of morbidity and mortality due to occupational morbidity.

Underdiagnosis of Occupational Morbidity: Causes and Potential Implications

The underdiagnosis, underreporting, and poor documentation of diseases originating from occupational exposures are challenges for all professionals in the field and have been reported worldwide. This condition impairs the ability of healthcare systems and research bodies to identify occupational risk hotspots by occupation, industry, and

[20] Schmitz M, Forst L. Industry and Occupation in the Electronic Health Record: An Investigation of the National Institute for Occupational Safety and Health Industry and Occupation Computerized Coding System. *JMIR Med Inform*. 2016 Feb 15;4(1): e5. doi: 10.2196/medinform.4839. PMID: 26878932; PMCID: PMC4771928.

[21] Ibid

workplace.[22] [23] [24] [25] As a result, there is difficulty in providing an adequate response at the individual level in the processes of prevention, diagnosis, and treatment. This condition also makes it difficult to gain recognition to receive compensation and insurance indemnity. Underdiagnosis is due to the difficulty in distinguishing between the clinical and pathological expressions of a disease with an occupational origin vs. one with a non-occupational origin. Additionally, a wide variety of occupational diseases can be caused by an equally wide variety of factors (multi-causal morbidity), which makes it difficult to pinpoint the source of the disease. Furthermore, in many diseases, there is a long latency period after occupational exposure, and sometimes a person becomes ill many years after leaving a workplace, making it challenging to identify the primary workplace that caused the morbidity and to examine the exposures the worker was subjected to.[26]

At the systemic level, the lack of proper documentation in medical records and the absence of awareness among family and primary-care physicians regarding potential occupational risk factors also emerged as contributors to under-reporting.[27] Another reason for under-diagnosis, as highlighted by this study, is that many workers are not under medical supervision at their workplace due to the specific characteristics of their job or the nature of their role, which may not be covered by regulatory requirements. Furthermore, individuals who are temporarily or permanently outside the workforce are, in most cases, not under the medical supervision of occupational health services. As a result, they may not be examined or may receive a delayed

[22] Politi, B. J., Arena, V. C., Schwerha, J., & Sussman, N. (2004). Occupational medical history taking: how are today's physicians doing? A cross-sectional investigation of the frequency of occupational history taking by physicians in a major US teaching center. *Journal of occupational and environmental medicine*, *46*(6), 550-555.

[23] Sehsah, R., El-Gilany, A. H., & El-Hadidy, S. S. (2023). Physicians' Knowledge, Attitudes, and Practice of Occupational Diseases Diagnosis and Occupational History Taking. *Journal of Occupational and Environmental Medicine*, 10-1097.

[24] Carder, M., Bensefa-Colas, L., Mattioli, S., Noone, P., Stikova, E., Valenty, M., & Telle-Lamberton, M. (2015). A review of occupational disease surveillance systems in Modernet countries. *Occupational Medicine*, *65*(8), 615-625.

[25] National Academies of Sciences, Engineering, and Medicine. 2018. *A Smarter National Surveillance System for Occupational Safety and Health in the 21st Century*. Washington, DC: The National Academies Press. https://doi.org/10.17226/24835.

[26] Luckhaupt, S. E., Calvert, G. M., & Sweeney, M. H. (2011). Documenting occupational history: the value to patients, payers, and researchers. *Journal of AHIMA*, 82(7), 34-37. PMID: 21848097

[27] Kuschner, W. G., Hegde, S., & Agrawal, M. (2009). Occupational history quality in patients with newly documented, clinician-diagnosed chronic bronchitis. *Chest*, *135*(2), 378-383.

diagnosis. Moreover, even after a diagnosis is made, their morbidity may not be linked to their working conditions, and no report is submitted to the relevant professional bodies.[28]

Lack of training in taking an occupational history emerges as another reason for the underdiagnosis of work-related morbidity. A 2004 study in the United States found that despite the significant role of occupation in public health, clinical personnel frequently neglect to ask patients about their occupational history. This problem probably derives from sufficient training of clinical personnel on diagnosing work-related morbidity during their professional education. A subsequent study examining this tendency for underdiagnosis over the years found no change in the rates of inquiry and documentation of occupation and occupational history, which remained below 30% among the physicians surveyed. The study also found that the likelihood of a physician performing and documenting an occupational health inquiry increased when the patient was a middle-aged man with a history of cancer and/or a smoker.[29]

In a study conducted in Ontario, Canada, which compared physicians' perceptions with those of patients regarding the inquiry into occupational history, higher rates of clinical inquiry were found than in the research above. Among the physicians who reported asking about occupational history, the rates were 57% for family physicians, 92% for pulmonologists, and 91% for dermatologists. However, from the patient's perspective, among those who were asked about potential work-related skin inflammation, only 67% reported being asked by their family physician, and just 53% reported being asked by their dermatologist.[30]

In Thailand, it was found that only 24.8% of physicians who documented medical information fully recorded a patient's occupational history. Similarly, the rates were low for documenting combinations of information such as occupation and job

[28] Kuschner, W. G., Hegde, S., & Agrawal, M. (2009). Occupational history quality in patients with newly documented, clinician-diagnosed chronic bronchitis. *Chest*, *135*(2), 378-383.

[29] Politi, B. J., Arena, V. C., Schwerha, J., & Sussman, N. (2004). Occupational medical history taking: how are today's physicians doing? A cross-sectional investigation of the frequency of occupational history taking by physicians in a major US teaching center. *Journal of occupational and environmental medicine*, *46*(6), 550-555.

[30] https://www.ontario.ca/document/occupational-disease-landscape-review Retrieved 11 September 2024.

description (33.9%), occupation and occupational risks (36.5%), and job description and occupational risks (33%).[31]

A study conducted in Egypt found that among primary-care physicians who inquired about their patients' occupational aspects, the most common questions related to the patient's occupation, hazardous working conditions, and changes in health symptoms according to various work routines. Physicians were less likely to ask about the prevalence of these symptoms among co-workers or the patient's past or additional occupations.[32]

Questioning, Reporting, and Documenting Occupation

The prime-care healthcare system is exposed to a significant volume of occupational morbidity cases. Questioning patients about their occupational information and history is crucial for primary-care clinical personnel to make more accurate diagnoses and provide more precise treatment. This information can also influence the course of a disease by enabling the cessation or reduction of occupational exposure, preventing morbidity in other workers, and guiding the workplace accordingly. Moreover, without identifying an individual's history of occupational exposures, etiological diagnoses may be compromised.[33] [34] In addition to responding to individual workers or specific workplace levels, the systematic questioning and documentation of occupational history and occupation enable the performance of epidemiological studies and the adaptation of regulations. This supports the continuous enhancement of work environments, which helps prevent the worsening of existing diseases and reduces future morbidity. Furthermore, this questioning and documentation can help

[31] Manotham, M., Chaiear, N., Yimtae, K., & Thammaroj, T. (2015). Completeness of occupational history taking record for out-patients with potential work-related disorders at a university hospital in northeast of Thailand. *Srinagarind Medical Journal*, *30*(6), 562-571.

[32] Sehsah, R., El-Gilany, A. H., & El-Hadidy, S. S. (2023). Physicians' Knowledge, Attitudes, and Practice of Occupational Diseases Diagnosis and Occupational History Taking. *Journal of Occupational and Environmental Medicine*, 10-1097.

[33] Bachman J. Improving care with Automated Patient History. Family Practice Management 2007. *Fam Pract Manag.* 2007 Jul-Aug;14: 39–43.

[34] ATSDR Case Studies in Environmental Medicine: Taking an Exposure History. 2015. Agency for Toxic Substances and Disease Registry. U.S. Department of Health and Human Services. https://stacks.cdc.gov/view/cdc/44197/cdc_44197_DS1.pdf.

ensure continuity of care and prevent redundancies.[35] [36] [37] For example, identifying a lung disease as an occupational morbidity can help both prevent similar morbidity among other workers in that workplace and reduce occupational exposures. In cases where appropriate regulation has not yet been developed, this epidemiological information can serve as a data-driven basis for decision-making processes regarding the causal link between exposure and morbidity or changes in existing disease patterns. It can also assist professional and regulatory bodies in adapting work environments to be safer and prevent future morbidity. However, this data is crucial when the causality between exposure and morbidity at the individual level is uncertain. The accumulated information can bring this causality to light and highlight the need for prevention at the level of all workers in a specific occupation or workplace.[38] [39]

The information included in the inquiry processes should cover questions regarding both past and present occupational exposures, as well as military service. To ensure a professional and thorough inquiry, primary-care clinical personnel must have access to the appropriate tools and knowledge. Providing medical teams with means of identifying information with significant health implications is crucial. In particular, recognizing the need for a more in-depth assessment is crucial in cases where positive responses indicate exposures with a risk of acute or chronic morbidity.[40]

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[35] Towle M, Tolliver R, Bui AG, Warner A, Van Dyke M. Adding industry and occupation questions to the behavioral risk factor surveillance system: new opportunities in public health surveillance. *Public Health Rep.* 2015 Mar-Apr;130(2):153-60. doi: 10.1177/003335491513000208. PMID: 25729104; PMCID: PMC4315856.

36 He, W. J., Wang, D. Q., Zhang, P. P., Fu, P. L., & Li, Z. J. (2019). The importance of occupational history in clinical thinking from the diagnosis and treatment of a case of Tsutsugamushi disease. Zhonghua lao dong wei sheng zhi ye bing za zhi= Zhonghua laodong weisheng zhiyebing zazhi= *Chinese journal of industrial hygiene and occupational diseases*, 37(8), 639-641.

[37] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023AP0462&qid=1724054191754 Retrieved 12 August 2024.

[38] Gandhi, S. A., Heinzerling, A., Flattery, J., & Cummings, K. J. (2023). Occupational Contributions to Respiratory Health Disparities. *Clinics in Chest Medicine*, *44*(3), 635-649.

[39] Alex, R., Francis, M., Prashanth, H. R., & Kundavaram, A. (2013). Occupational history: A neglected component of history taking. *Indian Journal of Occupational and Environmental Medicine*, 17(1), 29-30.

[40] Examples of questions can be found in the appendix of the case study in: ATSDR Case Studies in Environmental Medicine: Taking an Exposure History. 2015. Agency for Toxic Substances and Disease Registry. U.S. Department of Health and Human Services. https://stacks.cdc.gov/view/cdc/44197/cdc_44197_DS1.pdf.

In addition to professional training during medical studies and clinical work, the issue of the time required for an occupational history is also addressed, mainly when conducted comprehensively. Specialized questionnaires have been developed for patients at the clinics, facilitating assistance if needed and reducing the time required for this task during the clinical encounter with the clinical personnel.[41]

Documenting Occupational History

The literature suggests that integrating information about a patient's current occupation is not sufficient; there is also considerable importance in documenting their full occupational history. This is particularly critical for occupations involving long-term exposure and for those with high-risk morbidity factors. Moreover, it is important to document not only the patient's field of work but also the industries in which they were employed, the types of exposures that could affect their medical condition, and the specific tasks involved in their work. While acute conditions such as dermatitis and asthma may be linked to occupational exposures in a patient's current job, chronic conditions like cancer, hearing loss, or chronic kidney failure may be attributed to jobs the patient held in the past for extended periods.[42] In a clinical setting, morbidity identifying the source of an exposure is crucial as it provides physicians with complementary information essential for effective treatment selection. A prevalent example of this diagnostic gap is seen in the treatment of adults with newly diagnosed asthma. When clinicians do not adequately and systematically inquire about the patient's occupational history, it can lead to a failure to diagnose work-related asthma, a condition that is often preventable with proper intervention. Failing to recognize a disease can have significant implications for both the patient's prognosis and the prevention of the disease in other exposed individuals.[43]

However, a thorough investigation into an individual's work history is crucial. For example, a study examined the quality of occupational history interviews for patients

[41] Gandhi, S. A., Heinzerling, A., Flattery, J., & Cummings, K. J. (2023). Occupational Contributions to Respiratory Health Disparities. *Clinics in Chest Medicine*, *44*(3), 635-649.

[42] Luckhaupt, S. E., Calvert, G. M., & Sweeney, M. H. (2011). Documenting occupational history: the value to patients, payers, and researchers. *Journal of AHIMA*, 82(7): 21848097.

[43] Kuschner, W. G., Hegde, S., & Agrawal, M. (2009). Occupational history quality in patients with newly documented, clinician-diagnosed chronic bronchitis. *Chest*, *135*(2), 378-383.

diagnosed with bronchitis[44] asked about the following: (1) their employment status (e.g., employed, retired, unemployed, or disabled) and if they had ever been employed; (2) their job title; (3) specific occupational roles; (4) types of occupational exposures; (5) types of protective equipment used at work; and (6) a history of prior occupational exposures.[45] The study concluded that to obtain meaningful information about occupational exposure, a complete occupational history should include a description of work duties, the types of past and present exposures at work, the presence of symptoms at work, and, if relevant, the type of protective equipment used. The research also indicated that listing a job title by itself does not provide enough occupational history and is insufficient for diagnosing an occupational lung disease. Furthermore, adequate questioning and documentation of an occupational history can lead to a failure to identify the disease's etiology or a delay in diagnosis.

The following two chapters will examine the opportunity presented by the processes of digitization and the creation of Electronic Health Records (EHR) for building a clinical decision support system.

Electronic Health Records (EHR)

The digitization of medical records has been taking place in various countries for over two decades.[46] The transition to digital medical records has, from its inception, underscored the critical importance of documenting a patient's occupation and occupational history within their medical file. Consequently, numerous systems failed to recognize the occupational context of an injury or morbidity properly.[47]

The term "health records" or "electronic health records" refers to an integrated electronic documentation system for medical/health records, which is accessible for viewing and editing by medical teams and other service providers involved in care

[44] Kuschner, W. G., Hegde, S., & Agrawal, M. (2009). Occupational history quality in patients with newly documented, clinician-diagnosed chronic bronchitis. *Chest*, *135*(2), 378-383.

[45] Medical records documenting absence of respiratory occupational exposures were counted as containing documentation of the "occupational exposure" element of the occupational history (Ibid p. 3).

[46] World Health Organization. Regional Office for the Western Pacific. (2006). *Electronic Health Records: A Manual for Developing Countries*. WHO Regional Office for the Western Pacific. https://iris.who.int/handle/10665/207504.

[47] Luckhaupt, S. E., Calvert, G. M., & Sweeney, M. H. (2011). Documenting occupational history: the value to patients, payers, and researchers. *Journal of AHIMA*, *82*(7), 34-37. PMID: 21848097.

from different fields, institutions, and sectors.[48] An additional definition of an EHR refers to the location of care providers across various settings (e.g., hospitals and the primary care) and the inclusion of information on the patient's medical profile, as well as behavioral and environmental data, and the time of data entry, which enables long-term tracking.[49]

The transition to digital records enables faster access to information and the ability to process and analyze metrics and findings at both the individual and population levels, including those in the field of occupational health.[50] The collected information can assist in providing a better response to the patient while also creating databases at the national, regional, or any other chosen category level, and enhances the ability to examine the collected information against data from different countries.[51] The digitization of medical records has established an expanded framework for the management and analysis of occupational data, therefore contributing to the development of personalized medicine models.

In this manner, periodic screening tests are conducted and documented in accordance with accepted protocols for occupational exposures. This enables the integration of supplementary patient and lifestyle data–including age, general health status, smoking habits, and other factors)–to inform a more nuanced risk analysis, facilitate targeted patient counseling, and enable the precision of treatment protocols for emergent morbidities.

One of the central challenges in using EHR systems is determining how to collect information in collaboration with the patient, as well as what information should be

[48] Rau, E., Tischendorf, T., & Mitzscherlich, B. (2024). Implementation of the electronic health record in the German healthcare system: an assessment of the current status and future development perspectives considering the potentials of health data utilization by representatives of different stakeholder groups. *Frontiers in Health Services*, *4*, 1370759.

[49] World Health Organization. Regional Office for the Western Pacific. (2006*). Electronic Health Records: A Manual for Developing Countries.* WHO Regional Office for the Western Pacific. https://iris.who.int/handle/10665/207504

[50] Sehsah, R., El-Gilany, A. H., & El-Hadidy, S. S. (2023). Physicians' Knowledge, Attitudes, and Practice of Occupational Diseases Diagnosis and Occupational History Taking. *Journal of Occupational and Environmental Medicine*, 10-1097.

[51] See a comprehensive comparative review of Germany, Estonia, and Denmark in Rau, E., Tischendorf, T., & Mitzscherlich, B. (2024). Implementation of the electronic health record in the German healthcare system: an assessment of the current status and future development perspectives considering the potentials of health data utilization by representatives of different stakeholder groups. *Frontiers in Health Services*, *4*, 1370759.

entered, by whom, and when.[52] Another challenge lies in creating uniform classifications that ensure the consistent and reliable entry of information across different systems, facilitating comprehensive analyses.[53] Beyond its general relevance, the significance of documenting occupational information has been emphasized in a targeted effort to address specific morbidities and, by extension, reduce cancer rates within the United States. A 2010 report recommended the routine tracking of occupational history and integrating this information into medical records to identify and evaluate risks associated with occupational exposures that could cause cancer.[54]

Clinical Decision Support (CDS)

In light of the challenges faced by primary-care medical teams in preventing, identifying, and treating occupationally induced morbidity, a need has emerged to develop a clinical decision support system within this field.[55] As noted, with the normalization of electronic health records in healthcare systems, the integration of occupational information into medical records in the primary-care health system was recommended as early as 2011. This was intended to provide access to occupational data for family medicine practitioners and for various professional specializations where the prevalence of occupational morbidity is high, such as oncology, dermatology, pulmonology, and others.[56] In 2011, the National Institute for Occupational Safety and Health (NIOSH) appointed a professional committee in the United States[57] to examine the benefits and challenges associated with integrating occupational information into electronic health records (EHRs).[58] After an extensive

[52] Bachman J. Improving care with Automated Patient History. Family Practice Management 2007. *Fam Pract Manag.* 2007 Jul-Aug; 14:39–43.

[53] Dixon, N., Goggins, M., Ho, E., Howison, M., Long, J., Northcott, E., ... & Yeats, C. (2023). Occupational models from 42 million unstructured job postings. *Patterns*, *4*(7).

[54] http://deainfo.nci.nih.gov/advisory/pcp/annualReports/pcp08-09rpt/PCP_Report_08-09_508.pdf Retrieved 2 December 2024.

[55] Baron S, Filios MS, Marovich S, et al. Recognition of the relationship between patients' work and health: a qualitative evaluation of the need for clinical decision support (CDS) for worker health in five primary care practices. *J Occup Environ Med* 2017;59(11): e245–50.

[56] Luckhaupt, S. E., Calvert, G. M., & Sweeney, M. H. (2011). Documenting occupational history: the value to patients, payers, and researchers. *Journal of AHIMA*, 82(7), 34-37PMID: 21848097.

[57] NIOSH: National Institute for Occupational Safety and Health.

[58] National Academies of Sciences, Engineering, and Medicine. 2011. *Incorporating Occupational Information in Electronic Health Records: Letter Report*. Washington, DC: The National Academies Press. https://doi.org/10.17226/13207.

study, the committee recommended incorporating occupational data into medical records to elevate the clinical team's ability to make informed diagnoses and individualized medical treatment. The committee also highlighted the contribution of this data to research, policy formulation, intervention programs, and effective prevention strategies for enhancing worker health. At the operational level, the committee suggested examining the feasibility of this initiative through dedicated projects to demonstrate and evaluate the implementation.[59]

A study initiated by NIOSH in the United States in 2014 sought to evaluate the necessity and viability of developing a Clinical Decision Support (CDS) system. The system was designed to help primary-care medical teams establish the link relationship between occupational factors and patient health outcomes. The research focused on three components: the diagnosis and management of occupational morbidity, environmental factors in the management of chronic diseases, and guidelines for decision-making regarding the return to work after a change in health status stemming from occupational exposure.[60] The study's findings highlighted the importance and necessity of receiving support on these three topics, as well as their positive impact on the decision-making processes of primary-care medical teams. Additionally, the study's findings highlighted several issues that make it challenging for physicians to record occupation and occupational history in medical records accurately. One major issue is the complexity of occupational exposures and their connection to health problems. While clinical personnel generally understood the link between occupation and health, they lacked the specific knowledge and tools for a deeper understanding of occupational exposures and their implications. This awareness, however, proved difficult to translate into tangible clinical action within their daily workflow. A second issue is that the organizational system didn't provide them with the necessary tools or support to address these work-related health issues. A deficit in awareness concerning the utility of current resources and available tools also prevented them from effectively using medical records. Finally, there was concern that expanding the scope of their

[59] See more information on the committee's practical recommendations in this report's discussion of issues to be considered during the model's implementation.

[60] Baron S, Filios MS, Marovich S, et al. Recognition of the relationship between patients' work and health: a qualitative evaluation of the need for clinical decision support (CDS) for worker health in five primary care practices. *J Occup Environ Med* 2017;59(11):e245-50.

work to include patient questioning and assessing occupational exposures would unreasonably increase their workload and the burden of care.[54]

Based on the findings and conclusions of this study, the need and importance of developing Clinical Decision Support (CDS) tools for primary-care medical teams became evident. A well-structured CDS system, tailored to the specific requirements of primary care physicians, can effectively facilitate clinical practice. Such a system would provide physicians with relevant information, purpose targeted questions to guide diagnosis and prevention, and offer evidence-based recommendations for treatment and continuous professional development. Continuous guidance and training in the field of worker health can enhance doctors' knowledge and confidence in addressing this issue, and reduce their tendency to avoid questioning patients about their occupation.

Another conclusion concerned interprofessional collaboration among primary-care medical and nursing staff, social workers, and other professionals, which can enhance patient care for individuals with work-related issues. A shift in the organizational perception of healthcare institutions—one that acknowledges the importance of integrating occupational aspects, allocating resources, and providing administrative support—is crucial for the effective and beneficial incorporation of occupational history into medical records. The researchers argue that implementing these recommendations will help improve patient health, reduce the burden on the healthcare system, and lead to greater patient satisfaction by providing comprehensive, needs-based care.

Ethical Considerations in Developing a Medical Records System That Includes Occupational Information

The potential benefits of collecting occupational information to improve patient care and prevention are clear. However, the data collected and documented is personal information that requires extreme caution and maximum confidentiality. Following the amendments to the European Health Data Space adopted by the European Parliament on December 13, 2023, the system being developed in Europe (The European electronic health record exchange format) is designed to ensure that the information is entered into the system consistently and under the quality requirements

for the data entered.[61] The amendments adopted by the European Parliament promote the inclusion of comprehensive information regarding occupation, while adhering to the principle of providing only the minimal, necessary access to different parties to maintain data confidentiality and patient privacy. These amendments highlight the need to balance the comprehensive and in-depth collection of occupational information with ensuring the individual's ability to decide on the scope of information to be collected and who will have access to it. To facilitate an informed decision-making process, it is proposed that individuals be informed of the implications of any restrictions they choose to impose. These restrictions should be flexible and modifiable according to life circumstances and health status, enabling the provision of high-quality, continuous medical care. The adopted amendments further propose that specific health data be systematically and electronically recorded, subject to particular data quality requirements. The European Electronic Health Record Exchange Format is intended to serve as the foundational specification for the recording and exchange of electronic health data.

To summarize, based on the review above, the importance and significance of comprehensively and in detail documenting occupation and occupational history for prevention, diagnosis, and treatment processes are clear. Such documentation would enable the extraction of meaningful information for the benefit of the patient and the development of personalized medicine. This proposal advocates for a paradigm shift in occupational health, reorienting the field's focus from the of the job and its associated exposures to the level of the worker and the full range of exposure of a single occupation to a holistic assessment of the worker's cumulative exposure profile throughout their career.

Furthermore, integrating the field of occupation and occupational history into electronic health records (EHRs) would enable the inclusion of occupational history in the analysis of all social determinants of health (SDOH) affecting the individual. It would also facilitate an examination of how occupation interacts with other aspects relevant to health risks, such as gender, place of residence, socioeconomic status, education, and others. In addition, advanced technologies and artificial intelligence

[61] https://eur-lex.europa.eu/legal-ontent/EN/TXT/?uri=CELEX%3A52023AP0462&qid=1724054191754 Retrieved 12 August 2024.

would make it possible to integrate this information both as part of preventive medicine and as part of personalized surveillance, diagnosis, and treatment. Alongside these benefits, there are also challenges regarding the consistent and high-quality implementation of this information, as well as the ability to utilize it intelligently. These include a lack of awareness and necessary knowledge among primary-care clinical personnel, as well as concerns about creating an additional burden on them.

Therefore, there is a need to examine the readiness of the healthcare system, as well as the opportunities and barriers to integrating an occupational field into medical records and making it a routine part of medical care in Israel.

Research Methodology

The study was conducted from May to December 2024 and employed a range of qualitative methodologies.

Semi-structured interviews: Ten interviews were conducted to gather insights into the attitudes of various experts in Israel. Their areas of expertise included occupational health, public health, occupational medicine, family medicine, research, and public roles in the fields of safety and hygiene. Additionally, three interviews were conducted with experts from Finland, the United States, and South Africa to gain insight into the models developed in those countries.

Correspondence: Email correspondence was conducted with professionals from various countries, including Germany, the United States, Finland, Australia, England, and Estonia.

A Qualitative Questionnaire: A dedicated questionnaire was developed for members of the Sheffield Group, which includes directors of research institutes in the fields of occupational health and safety from around the world. Representatives from South Korea, Singapore, France, Canada, and South Africa responded to it.

Literature Review: The literature review was conducted based on the broad issues of integrating occupational history into Electronic Health/Medical Records. Searches were also conducted for models developed in specific countries and for particular etiological factors.

Findings

This chapter presents the global situation, the prominent barriers to implementing an integrated system, and describes the current situation in Israel. The research findings from all information sources indicate a general recognition of the importance of documenting occupation and occupational history. Nonetheless, the implementation has yet to be undertaken at a national level in any country, leaving the issue without an adequate systemic response.

Significantly, the structure of general and occupational healthcare services in many countries differs from the Israeli model, which, in turn, affects how information is documented and organized. This report will extensively review the Finnish model (the separate systems model), which serves as a foundation for occupational healthcare services in many countries worldwide, as well as the processes related to the integration of occupational information that have been carried out in the United States. Findings from Japan, Australia, the Republic of Korea, France, South Africa, and Singapore will also be presented.

Finland

In the Finnish system, there is a separation between general healthcare services and occupational healthcare services. Occupational healthcare services are provided at workplaces and are accessible to 92% of employees. These services are provided under the law (The Occupational Health and Safety Act (738/2002)) and following International Labor Organization (ILO) Convention No. 161.

Finnish legislation establishes a framework that enables the majority of the population to access occupational healthcare services through a dedicated law. In contrast, those not covered by this framework receive occupational healthcare services under the National Health Insurance Act. Under Finnish law, employers are required to provide preventive occupational healthcare services. The law also mandates the assurance of safety and health in the work environment through cooperation between employers, employees, and occupational healthcare services, with a commitment to helping all employees apprehend their occupational potential at various stages of their

professional careers.[62] Occupational medicine is a component of comprehensive occupational healthcare services that encompass prevention, promotion, protection, treatment, and rehabilitation. The Finnish occupational healthcare services system includes approximately 2,500 occupational physicians, 70–80% of whom are specialists in occupational medicine, 2,500 occupational nurses, 700–800 occupational psychologists, and a similar number of ergonomists and physical therapists.

The Finnish legislation also includes provisions for small businesses, which constitute the majority of employers in the Finnish economy, with additional legislation concerning the responsibility of local authorities. Chapter 14 of the Finnish Health Care Act stipulates that every local authority must provide occupational health services if no other entity is supplying them. Furthermore, occupational health services are also offered at primary-care clinics to supplement the services provided at workplaces.[63]

The Finnish socio-managerial context demonstrates a substantive commitment to worker health, a principle intrinsically linked to economic realities. With the fiscal burden of occupational-related morbidity estimated at 5% of the GDP, the dedication to preventative care throughout the Nordic region is strategically aimed at mitigating these significant economic costs.

These financial considerations are evident at the employer level, where they are required to bear costs related to occupational health and medicine. In addition to these costs, an incentive system exists within employer payments to national insurance, based on compliance with legal requirements, to promote employers' preventive measures and improve working conditions and safety.

In recent years, Finland has addressed not only occupational morbidity (morbidity defined as stemming from a specific occupational exposure). Finland also addresses work-related diseases, which, from a preventive standpoint, have an even greater

[62] Sormunen, E., Pesonen, S., Toivio, P., & Nissinen, S. (2024). Characteristics of Multiprofessional and Client-Oriented Approach in Occupational Health Services: A Cross-Sectional Survey Among Occupational Health Professionals. *Journal of Multidisciplinary Healthcare*, 2121-2132.

[63] Significantly, the occupational health services system in Finland is undergoing privatization, and currently, 85% of these services are provided by private companies, resulting in fewer workplace visits.

impact on a person's ability to work than strictly defined occupational morbidity. The rates of occupational morbidity in Finland have been significantly reduced due to the success of long-standing efforts to prevent occupational morbidity, improve work environments, increase awareness of risks, and adapt to changes in the labor market. Nevertheless, occupational health services have not been reduced and continue to be readily available to workers on a daily basis, underpinned by a multidisciplinary team of experts in occupational health.

Data-Driven Information for All Stakeholders: In addition to providing occupational health services, legislation also ensures the operation of a department dedicated to research and information, as well as the management of a record-keeping system that serves as a basis for decision-making. Despite the absence of a singular source for occupational health information, a dedicated mechanism facilitates the consolidation of diverse data streams, thereby enabling the comprehensive collection, analysis, and dissemination of research findings. The registration of occupational morbidity has been legally mandated since 1964, and the registration of occupational exposures to carcinogenic agents has been mandated since 1979. Additional records concerning working conditions and occupational hygiene metrics have been maintained since 1974, and biological surveillance of workers has been conducted since 1973.[64]

Documenting Occupational Information in the Healthcare System: The working assumption in the Finnish healthcare system is that family physicians lack sufficient knowledge regarding occupational morbidity and are therefore not expected to address the issue. The effective incorporation of a patient's occupational history into medical records is contingent upon the specialized training and proficiency of clinical personnel. Within the Finnish occupational health system mandates the systematic documentation of workers employed in professions with exposure to carcinogenic substances. All registered individuals are subsequently required to participate in a series of commensurate periodic medical examinations. The system is based on risk assessment and prevention according to the workers' age (dedicated examinations are performed for those over 45). These periodic checkups are conducted within the occupational healthcare system rather than the general healthcare system. The

[64] Rantanen, Jorma. 2016. "Evaluation of National OSH Surveillance Systems in Finland". The US National Academies of Sciences, Engineering and Medicine. *Developing a Smarter National Surveillance System for Occupational Safety and Health in the 21st Century*. Washington DC.

information collected from these examinations is utilized not only for medical follow-up but also for research.

Information Management System: The Finnish information management system integrated data from a diverse array of records, comprising periodic surveys, clinical examinations, and distinct datasets from both the public and occupational health sectors. The system considerable importance prioritizes the integration of information from various records and annual workplace surveys to provide a comprehensive situational picture. The findings from these registrations are published every three years. Furthermore, the collected information is accessible to anyone who meets the access conditions and is used for epidemiological research, for research aimed at identifying occupational sources of morbidity, and for training and the formulation of policies and strategies.

In the Finnish model, where occupational healthcare services are accessible to 92% of workers daily, and where a wide range of occupational medicine and health specialists work alongside primary-care health services that cater to the remaining 8%, government officials and policymakers have access to information from a wide variety of records for data cross-referencing and the creation of a comprehensive database. Concurrently, there is no interface with the general healthcare systems, and they operate in parallel. In this model, there has been no need to integrate fields for occupation, occupational history, or other occupational information into general medical records. This is due to the sustainability of the occupational healthcare system, which already considers the relevant exposures in every industry where it operates. Furthermore, its funding structure, which is based primarily on employers who are also rewarded directly and indirectly for meeting legal requirements regarding the safety and well-being of work environments, does not promote integration with the general healthcare system.

This model is also prevalent in other countries surveyed in this study, including Germany,[65] England, South Africa, Australia, Estonia, Japan, the Netherlands, and Denmark. In these nations, some of which have had functioning EHR systems for over

[65] Based on an electronic mail correspondence with a German expert about this topic.

a decade,[66] the need has arisen to create an interface and connection between the public and general healthcare systems. The creation of a comprehensive data repository, with access defined by various keys, forms the basis for research and policy formulation.

United States

The effort to integrate occupational information into electronic health records (EHRs) in the United States has been ongoing since the early 21st century. Notably, the work of a committee that operated in 2011 provided operational recommendations to support the implementation of its proposed structure for ultimate integration of occupational data into medical records. The recommendations included testing small-scale models to evaluate and integrate information regarding a person's occupation, industry, and other work-related data. These pilot/initial projects would enable the examination of workflows with various target audiences, facilitate the two-way use of information collected in the databases, and facilitate the evaluation of data integration at different stages of the healthcare system's processes. Based on these projects, it would be possible to define requirements for developing a model to store and transmit occupational information, adopt standard coding protocols for occupational classification, and assess the feasibility of automated coding for occupational data collected within the medical system. This information would then facilitate for the development of meaningful utilization and performance metrics.[67]

Research: The integration of occupational information is part of the thought and planning processes aimed at systematically and reliably collecting data. This serves as a foundation for research in occupational health services and for evaluating the factors that influence a worker's health and well-being. This research-based information will be utilized for the proactive prevention and systematic surveillance of occupational-

[66] See, for example, the EHR system in Estonia, which is regarded as the most successful EHR system in Europe.
https://e-estonia.com/solutions/e-health/e-health-records/ Retrieved 29 August 2024.

https://digiexpo.e-estonia.com/healthcare/national-electronic-health-record/?_gl=1*q4b6a4*_ga*OTE2ODk2MTg4LjE3MjQ3NjQ2MDA.*_ga_YNZ3BGVZ68*MTcyNDg0NTgyNS4zLjAuMTcyNDg0NTgyNS42MC4wLjA Retrieved 29 August 2024.

[67] National Academies of Sciences, Engineering, and Medicine. 2011. *Incorporating Occupational Information in Electronic Health Records: Letter Report*. Washington, DC: The National Academies Press. https://doi.org/10.17226/13207.

related morbidity and injuries, as well as for the development of worker health programs and policies. The collection of this information can contribute to promoting the organization of occupational health services, improving workers' access to them, enhancing the quality of prevention and treatment, and increasing the efficiency and cost-effectiveness of occupational health services and related healthcare systems.[68] Another aspect that emerged in the United States relates to the quality of the data input. Data quality is crucial for establishing a data-driven healthcare services system and for developing trustworthy artificial intelligence systems. The basis for the optimal function of these systems is the quality and reliability of the data entered into them from various and diverse sources, as well as the ability to comprehensively analyze information from a wide range of data sources.[69]

Based on interviews and correspondence with experts in the United States' occupational health system, it is evident that occupational information has not yet been effectively utilized in the general healthcare system. The approach is primarily retrospective, failing to consider prevention and treatment needs proactively. In the current situation, despite widespread recognition of the considerable importance of systematically questioning and documenting occupational history, medical teams, in most cases, do not conduct an occupational history elicitation, or if they do, it is in a very general manner. A significant contributing factor is the demonstrated deficiency in formal medical education, which provides only four hours of dedicated training on the subject throughout the course of study. Proper training is required not only for effective questioning but, even more critically, for the accurate interpretation of the data collected concerning work processes, the nature of exposures, and the associated risks. The knowledge required for understanding and making informed decisions is broad and diverse, and primary-care medical teams often lack sufficient expertise in this field. Another aspect that emerged regarding occupational history taking is the reluctance of medical teams to address issues related to compensation or legal matters; avoiding intake facilitates them avoiding these topics. To address this situation, it was

[68] Sears, J. M., Wickizer, T. M., Franklin, G. M., Fulton-Kehoe, D., Hannon, P. A., Harris, J. R., ... & McGovern, P. M. (2023). Development and maturation of the occupational health services research field in the United States over the past 25 years: Challenges and opportunities for the future. *American Journal of Industrial Medicine*, *66*(11), 996-1008.

[69] Matheny, M., Israni, S. T., Ahmed, M., & Whicher, D. (2019). Artificial intelligence in health care: The hope, the hype, the promise, the peril. *Washington, DC: National Academy of Medicine*, *10*.

noted in the interviews that a comprehensive and in-depth integration of occupational health into the medical training curriculum is crucial. The prevailing view is that institutionalizing the subject as a mandatory component, particularly through its inclusion in the licensing examination, is causally linked to its serious engagement and professional uptake. A further contribution of occupational history elicitation was manifested in the interviews. At the individual level, understanding a person's occupational background facilitates regular surveillance, enabling the prevention of diseases and facilitating early identification, which in turn improves treatment and increases the probability of recovery. Beyond this, the encounter between the medical team and the patient involves an unequal relationship between the caregiver and the patient. To address this gap, a key strategy is to foster patient empowerment, enabling individuals to provide critical contextual information from their unique, lived experiences of work processes and exposures, thereby facilitating more informed and collaborative clinical management. *Economic Considerations and Documentation:* The implementation of early diagnosis protocols yields substantial fiscal benefits, both directly and indirectly. These economic gains are primarily achieved through the mitigation of morbidity and its associated healthcare expenditures, as well as the enhancement of continued occupational retention. Conversely, implementing a system for surveillance and adding occupational information to medical records will incur expenses. In the United States, the financial burden is likely to fall more heavily on insurance companies that provide individual coverage, rather than on workers' families, whose health will improve, and correspondingly, so will their direct and indirect economic situation.

Another aspect that emerged in interviews and correspondence concerns the definition of the cause of death. The absence of comprehensive occupational information in medical records impedes the precise classification of mortality as work-related. This deficiency carries significant implications, compromising both the fulfilment of worker’s entitlements and the precise recording, documentation, and research of mortality stemming from occupational diseases. *Occupational Data for Health (ODH):* In 2020, an additional process was undertaken in the United States to propose an applied guide for integrating occupational information into Electronic

Health Records (EHR).[70] The guide, developed by the National Institute for Occupational Safety and Health (NIOSH)[71] and a wide range of stakeholders—including physicians, nurses, public health teams, and patient representatives—proposes consistently and specifically integrating occupational data with the following components: employment status (currently employed, unemployed, retired, etc.), current and past occupational history (occupation, industry, and job title; employer's name and location; start and end dates of employment; job scope (full-time/part-time) and night shifts; managerial level; and a brief description of job duties and the work-related risks reported by the patient), usual occupation and industry (the occupation and industry where the person has worked for the most extended duration of their life). It is also recommended to document military service where relevant, as well as the occupations of household members, to assess potential health risks from indirect exposure.

The developers of the model emphasize the potential benefits of integrating occupational information into electronic health records, aiming to enhance medical care through more accurate and personalized diagnosis and treatment. The creation of meaningful information from medical records promotes the development of personalized medicine. Another potential contribution of the model is in identifying health risks among specific populations. This would enable the development of tailored prevention and public information programs, the enhancement of public health surveillance, and the facilitation of identifying new tendencies and disease outbreaks. Alongside the model's advantages, several challenges were also identified. These include the difficulty of accurately and entirely collecting information and data on patients' occupations, the need to protect the privacy of employee/patient information, and the time and resources required to integrate the model into existing healthcare systems.[72]

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[70] Marovich, S., Luensman, G. B., Wallace, B., & Storey, E. (2020). Opportunities at the intersection of work and health: Developing the occupational data for health information model. *Journal of the American Medical Informatics Association*, *27*(7), 1072-1083.

[71] NIOSH (2021). A guide to the collection of occupational data for health (ODH) by Wallace B, Luensman GB, Storey E, Brewer L. Morgantown, WV: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. DHHS (NIOSH) Publication No. 2022-101.

[72] Marovich, S., Luensman, G. B., Wallace, B., & Storey, E. (2020). Opportunities at the intersection of work and health: Developing the occupational data for health information model. *Journal of the American Medical Informatics Association*, 27(7), 1072-1083.

Electronic Occupational Health Records: In addition to integrating occupation and occupational history into Electronic Health Records (EHRs), a recent proposal in the United States is creating a separate system of Occupational Electronic Health Records (OEHRs).[73] According to the developers of the proposed model, a specialized system would assist clinicians by collecting, analyzing, and presenting relevant information for treatment processes and by supporting clinical decisions through leveraging access to existing information resources. OEHR systems are capable of furnishing clinicians with pertinent occupational information, including job descriptions sourced from human resources departments and routine work tasks associated with specific occupational roles, which are retrieved from a centralized data repository. An epidemiological dashboard has the capacity to facilitate comparative analyses between an organization's internal injury reports and the injury rates for corresponding occupational roles, as reported by the Bureau of Labor Statistics. Occupational Rehabilitation Programs' guidelines based on professional knowledge resources could present clinicians with recommended timelines for returning to work after specific injuries and morbidity, such as low back pain. Furthermore, this system could help create a uniform and consistent documentation framework that would improve the quality of medical records and facilitate organizational uniformity in examinations, as well as information on common injuries and prevalent occupational exposures.

Furthermore, this repository would facilitate the systematic documentation of patients' occupational histories by implementing standardized documentation forms. A template library, for example, might improve the consistency of clinical documentation of occupational histories and exposure assessments by providing structured input fields for the date, time, duration, location, exposure intensity, or suspected injury mechanism. Although the duration of data input might be prolonged during a session, the data can often improve clinical efficiency later on by pre-filling forms and letters. It can also enhance clinical workflows by providing what is known as the "Five Rights": "The right information to the right person in the right intervention

[73] Fazen LE, Martin BE 4th, Isakari M, Kowalski-McGraw M, McLellan RK, Ahsan R, Berenji M. Occupational Electronic Health Records: Recommendations for the Design and Implementation of Information Systems in Occupational and Environmental Medicine Practice-ACOEM Guidance Statement. *J Occup Environ Med.* 2024 Nov 1;66(11): e614-e627. doi: 10.1097/JOM.0000000000003236.

format through the right channel at the right time in the clinical workflow."[74] OEHR systems that present clinicians with relevant data and evidence-based referral materials can facilitate more informed decision-making and promote safe and effective occupational rehabilitation programs, a shared goal for both employees and employers.

Japan

The healthcare system in Japan, like that of Israel, is universal.[75] However, the digitization of medical records in Japan has been only partially implemented over the last decade, and interoperability between different providers has yet to be achieved. The Japanese government is currently addressing technical and legal issues before developing a national healthcare information network that will facilitate access to medical records for patients, clinicians, and researchers.[76]

Similar to the United States, Japan is also exploring the option of implementing a dedicated medical records system for occupational health services.[77] This system is designed to address the challenges posed by a demographic shift toward an aging workforce and the future need to balance disease treatment with continued employment among workplaces, workers, and occupational health teams. To achieve this objective, it is proposed that an integrative interface be established among key stakeholders, including hospitals, workplaces, and workers, with the coordination of data facilitated via Personal Health Records (PHRs) and securely hosted on cloud-based platforms governed by encryption protocols. In other words, data concerning a patient's clinical care policy and prescribed medications can be utilized to facilitate the alignment of an individual's occupational status and work-related stressors, which is transmitted from the occupational physician (at the workplace) to the primary-care

[74] Fazen LE, Martin BE 4th, Isakari M, Kowalski-McGraw M, McLellan RK, Ahsan R, Berenji M. Occupational Electronic Health Records: Recommendations for the Design and Implementation of Information Systems in Occupational and Environmental Medicine Practice-ACOEM Guidance Statement. J Occup Environ Med. 2024 Nov 1;66(11):e614-e627. doi: 10.1097/JOM.0000000000003236. p.621.

[75] https://www.commonwealthfund.org/international-health-policy-center/countries/japan Retrieved 8 December 2024.

[76] Tikkanen, R., Osborn, R., Mossialos, E., Djordjevic, A., & Wharton, G. (2020). International profiles of health care systems. *The Commonwealth Fund*, *12*.

[77] Ogami, A. (2024). The Use of Digital Personal Health Records (PHR) in Occupational Health. *Journal of UOEH*, *46*(1), 67-72.

physician, thereby informing future therapeutic strategies. The PHRs can serve as a link between occupational medicine in the workplace and the broader healthcare system, including hospitals, as well as for research purposes.[78]

In Japan, there has also been a focus on technological developments that facilitate the monitoring and documentation of biometric indicators during working hours, using digital devices worn on the employee's body. These devices enable the continuous measurement of fatigue, stress levels, activity levels, working hours, temperature, blood pressure, heart rate, and blood sugar. This information can be stored and documented in personal health records. A more advanced stage of using these indicators can be achieved by integrating information collected about the conditions in the work environment. Starting in 2024, Japan has implemented voluntary self-monitoring of chemical substances in workplaces. The implementation of such monitoring facilitates the real-time measurement of an employee's occupational exposure to risk factors. The resulting data can then be systematically integrated into both their PHRs and their professional occupational history summary.

In the field of work management, the development of wearable devices facilitates the real-time documentation of working conditions and biometric information in the field. For example, it is now technologically possible for employees to wear small, portable electronic devices in workplaces where there is a risk of heatstroke, facilitating the monitoring of their body temperature, heart rate, arterial oxygen saturation, activity level, and blood pressure, and saving this data to their personal health records. Alongside the benefits of interoperability and information integration between systems, particularly the enhanced ability to perform etiological analysis, predict and prevent future morbidity, and connect information about work environments with employees' health status, there are also rising concerns regarding employees' personal health records. These concerns include misuse of information by the employer, data breaches, and exploitation by commercial and other entities. Therefore, it is proposed that the protection of privacy in workplace Personal Health Records (PHRs) be given the highest priority from the initial operational phase. The purpose of data collection must be made clear. Furthermore, the use of information for purposes other than

[78] Ogami, A. (2024). The Use of Digital Personal Health Records (PHR) in Occupational Health. *Journal of UOEH, 46*(1), 67-72.

those intended should be explicitly prohibited, and comprehensive measures for data security and access control should be implemented. The accuracy, safety, and quality of the information will be a crucial issue in the continued development and dissemination of PHRs, especially within the field of occupational health.[79]

France

In France, every employer is legally required to join occupational health services to monitor employee health, regardless of the organization's size or field of activity. Similar to the Finnish occupational health system, France also maintains a separation between the general healthcare system and the occupational healthcare system. Consequently, there is no evidence of occupational information being integrated into the electronic medical records of the general healthcare system.

Occupational health information is managed and documented in occupational health departments, including data on occupational exposure and the employee's health status. The information is collected by various disparate systems that are not interconnected. A comprehensive informational framework is established through the systematic conducted of periodic surveys, which investigate the relationship between workplace conditions and their impact on employee health outcomes. This is complemented by a national infrastructure in France, which is dedicated to the surveillance and prevention of occupational diseases, providing specialized consultation at university hospitals. dedicated to the surveillance and prevention of occupational diseases and provides expert clinical consultations within university-affiliated medical centers. Generally, the collection of occupational information within primary care and hospitals is considered insufficient. This is primarily due to an insufficiency in medical education concerning the occupational etiology of specific pathologies, coupled with the absence of a systematic framework for data collection, and other factors. *Coding Systems:* In France, the ICD-10 coding system is used to record morbidity and its causes, while NAF business codes are used for sectors of activity, and PCS codes are used for occupations,[80] without distinction between professions and industries. The country also has an automatic coding system and uses

[79] Ogami, A. (2024). The Use of Digital Personal Health Records (PHR) in Occupational Health. *Journal of UOEH*, *46*(1), 67-72.

[80] CIM-10 for diseases and causes. NAF code for activity sectors (French national nomenclature of activities) and PCS (French nomenclature of professions and socio-professional categories).

the HL7 system,[81] which is linked to the digital health authority.[82] Since 2019, the French Ministry of Health has been implementing a national digital health strategy aimed at accelerating the secure transmission and sharing of information.

Ethical Considerations in Integrating Occupational Information into Medical Records and Data Confidentiality: Data management activities are conducted in accordance with European regulatory requirements[83] and in compliance with employee consent. In France, as in the rest of Europe, there is strict adherence to privacy and data security.

Technological Barriers: Information is not shared between the different information systems in the field of occupational health. Several bodies collect data and provide numerous occupational health services. Still, there is no centralized system for the systematic collection of occupational data, and resources for this purpose remain insufficient. Furthermore, a structural and administrative separation persists between public health and occupational health entities. The issue of skilled personnel also affects the quality of the data entered into the system. A decline in the number of occupational physicians has created a problem in the systematic collection of information due to gaps in the training of medical specialists regarding the occupational causes of certain diseases. The inability to synchronize information and data between the occupational health system and the public health system has been identified as a significant disadvantage.

South Africa

In South Africa, occupational health information is fragmented among various government departments and is collected according to specific sectors or industries. The Department of Employment and Labor receives information from businesses regarding occupational morbidity and injuries, except for the mining sector, which employs a significant percentage of the workforce. In that sector, the information is submitted to the Department of Mineral Resources and Energy. The Department of

[81] https://www.hl7.org/ Global Health Standardization System.

[82] CIM-10 for diseases and causes. NAF code for activity sectors (French national nomenclature of activities) and PCS (French nomenclature of professions and socio-professional categories).

[83] European General Data Protection Regulation (GDPR) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R0679.

Employment and Labor is also responsible for compensation claims across all professions. The Department of Health also receives information on worker health; however, this information is not integrated into the health system and is not utilized for policy development. Within the primary-care system and hospitals, data is collected in district-level health information systems; however, it generally does not include occupational aspects, as this type of information is not typically collected by these settings unless an occupational injury clearly occurs. Furthermore, data on the health status of employees, collected from large employers and the mining industry, is not integrated into the general healthcare systems. The National Institute for Occupational Health (NIOH) is working to establish collaborations with various government bodies and a wide range of stakeholders to serve as a central hub for occupational health data, to support the regular analysis and dissemination of findings. *Coding:* South Africa utilizes a local coding system[84] that is based on international coding standards.[85] There is no known system for automated coding, nor is there any known use of HL7.

Ethical Considerations in Implementing Occupational Information into Medical Records and Information Confidentiality: The collection and implementation of this information are carried out in alignment with legislation that protects private data. The legislative framework grants every individual the right to determine the disposition of their personal information and to withdraw their consent at will. Furthermore, national health legislation mandates specific consent requirements for the use of data in research protocols, in contrast to anonymized information that can be used permissibly for public health surveillance. Possible Technical and Technological Barriers: Implementing occupational information into EHRs presents a dual challenge, requiring substantial capital investment in new IT systems and often necessitating reliance on external private sector expertise. Another aspect is the widespread scarcity of IT professionals with the requisite technical competencies for such a specialized task.

[84] SASCO (South African Standard Classification of Occupations).

[85] Ibid

Singapore

In Singapore, occupational information is not integrated into Electronic Health Records (EHRs). Similar to the countries surveyed above, there is a separation between the information systems for occupational health and general health, with no data integration between them. Under the provisions of the Workplace Safety and Health Act, both employers and registered medical practitioners may be mandated to report to the Commissioner upon the occurrence of a work-related accident, a hazardous incident, or an occupational disease. Additionally, occupational data may be collected by physicians at healthcare facilities as part of the medical treatment process. *Ethical Considerations in Integrating Occupational Information into Medical Records and Data Confidentiality:* It is essential to provide an explanation to the patient/employee and to establish a consent process for the integration of occupational information. It is also imperative to critically examine the legal implications and contextual aspects of this integration. Certain occupational groups may be more susceptible to specific occupational hazards. Consequently, it may be necessary to implement supplementary safeguards to ensure that the full spectrum of occupational implications is adequately addressed.

Potential Technical and Technological Barriers: The variety of vendors and systems necessitates the creation of shared standards for information collection and management.

Republic of Korea (South Korea)

In Korea, there is a systemic separation between occupational health, which falls under the responsibility of the Ministry of Employment and Labor, and public health, which is overseen by the Ministry of Health and Welfare.[86] This separation creates a challenge for integrating occupational information with aspects of chronic and acute morbidity. For example, the integration of patients' occupational history was examined in hematologic oncology clinics. Four challenges were identified in the clinic's workflow: no immediate benefit was found to aid in diagnosis or treatment; concerns

[86] Domyung Paek, Kyung Ehi Zoh, Yongho Kim, Mo-Yeol Kang, Jungwon Kim, Jin-Ha Yoon, Eunsuk Choi, Dong-Uk Park, Yun-Keun Lee, Kanwoo Yoon, P-094 Taking Occupational History into Electronic Database in Public Health, The Key to the Integration of Two Different Systems: Occupational vs. Public Health. *Occupational Medicine*, Volume 74, Issue Supplement 1, July 2024.

over information privacy and confidentiality; time constraints under the clinic's workload; and the lack of a uniform and in-depth approach to data collection, even though a field for occupational documentation exists in the EHR.

Korea's occupational health system primarily focuses on managing work-related accidents and diseases, with limited integration into the general healthcare system. Medical surveillance for occupational diseases is typically conducted through specific health examinations for workers. However, there is growing awareness that the need to integrate occupational history information into the medical system is expected to increase in the future. Essentially, some emergency departments already operate a surveillance system that facilitates the identification of occupational diseases by systematically eliciting patients' occupational histories during clinical encounters. This process plays a vital role in the early detection and prevention of occupational diseases.

Coding: Coding is performed according to the 8th edition of the Korean Standard Classification of Occupations (KSCO). Occupation and industry are distinguished from each other, with sectors classified under the 10th edition of the Korean Standard Industrial Classification (KSIC). There is no automated coding system. HL7 also serves as a standard protocol for exchanging medical information. However, the connection between HL7 and the occupational health system is currently unclear.

Ethical Considerations in Integrating Occupational Information into Medical Records and Data Confidentiality: When integrating occupational data into electronic health records, issues such as privacy invasion or unnecessary exposure of information may arise.

Therefore, critical ethical considerations in this domain necessitate strict adherence to the principles of data minimization, securing informed patient consent, and establishing transparent data utilization practices. In the context of Korea, these ethical imperatives are legally reinforced by the provisions of the Personal Information Protection Act and the Medical Service Act, which rigorously protect patients' personal and medical information. Key provisions include minimal data collection, obtaining prior consent, data encryption, managing access control, and appointing a data protection officer.

Technological Barriers: The process of integrating occupational history into medical records may face significant technical barriers, including compatibility issues with existing systems and the complexity of data entry.

Canada

In Canada, healthcare data are collected and managed at the provincial level, whereas data on occupational aspects are typically collected at the national level. Occupational information is not integrated into the general healthcare system. A standardized occupational coding system is used in Canada, but information on occupation or industry is not recorded as part of healthcare records. While a dedicated billing field for emergency department visits is used to determine the appropriate payer—either the workers' compensation system or the publicly funded healthcare system—the documentation of occupational Data within this field is notably absent. Consequently, the integration of occupational information into healthcare records is accomplished through a separate data linkage process managed by Statistics Canada, which acquires occupational data from the Canadian census and the Canadian Community Health Surveys. The data repositories can be linked for research and general data analysis. Treating physicians may ask about a patient's occupation during the diagnostic process, but this is done on an ad hoc basis rather than systematically, and the occupational information is not recorded electronically.

Coding: Separate coding systems exist for occupations and industries. Occupation is coded to the National Occupational Classification (NOC),[87] and industry is coded to the North American Industry Classification System (NAICS).[88]

Potential Barriers: A lack of trust in the physician when documenting occupational histories would constitute a significant barrier, as would time constraints in emergencies.

[87] https://noc.esdc.gc.ca/.

[88] https://www23.statcan.gc.ca/imdb/p3VD.pl ?Function=getVD&TVD=1369825.

Table 1. Summary of Occupational Healthcare System Characteristics in Various Countries

State	Key Characteristics of the Occupational Healthcare System	Challenges and Barriers
Finland	Separation of general and occupational health services. Broad coverage of occupational health services (92% of workers). The establishment of comprehensive legislation is necessary to mandate employers to provide preventive occupational health services. Consequently, an extensive information system is required for the systematic collection, analysis, and presentation of findings.	No interface with general healthcare systems.
United States	Attempts to integrate occupational information into electronic health records. Development of a practical guide for incorporating occupational data (ODH). Proposal to create a separate system for Electronic Occupational Health Records (OEHR).	Difficulty collecting accurate and complete information due to a lack of training and awareness, fear of legal aspects, the need for privacy protection, and the investment of time and resources.
Japan	Examination of the possibility of implementing a dedicated medical records system for occupational health services. Use of digital devices for surveillance and documenting biometric measurements.	Concerns regarding information misuse and data breaches necessitate comprehensive data security measures.
France	Mandatory employer participation in occupational health services. Separation of the general and occupational health systems. Use of different coding systems.	Technological barriers include a lack of interoperability between systems, resource scarcity, and a shortage of skilled personnel.
South Africa	Occupational health is provided at the workplace by dedicated health services. There is no integration of occupational information into general health systems.	Technical and technological barriers (including IT system costs and a shortage of skilled IT staff).
Singapore	Separation between occupational health information systems and general information systems. Collection of occupational information as part of medical treatment.	The need for a consent process to integrate occupational information, and technical and

		technological barriers (shared standards for data collection).
Republic of Korea (South Korea)	Systemic separation between occupational and public health. An emergency room surveillance system for identifying occupational diseases.	Issues related to privacy protection, time limitations, a lack of standardized data collection, and technological barriers (compatibility challenges, complexity in data input).
Canada	Data collection at the district level, with occupational data at the national level. No integration of occupational information into the general health system. Data pooling by the Central Bureau of Statistics.	A lack of trust in the physician regarding the recording of occupational histories and time constraints in emergencies.

Israel – Current state of affairs

In Israel, there is a separation between hygiene and safety supervision, which is responsible for surveilling and overseeing the work environment and its associated health risks, as well as monitoring worker health. While the former falls under the responsibility of the Ministry of Labor, the latter is under the Ministry of Health. Occupational medicine is situated at the intersection, examining both the work environment and the health status of workers employed in high-risk occupations that require close supervision. In Israel, there are regulations (most of which are outdated, according to the Adam Committee report) for the periodic surveillance of workers in hazardous professions. Employees in regulated and supervised workplaces are required to undergo medical surveillance as part of their employment, as stipulated by these regulations. Concurrently, a segment of the workforce remains subject to occupational hazards without formal health surveillance. Among this segment are workers in small workplaces that are not required to have a safety officer, temporary workers, those with split jobs, "invisible workers," and workers who have left a workplace or changed professions. Additionally, there are risk factors that have not yet been officially identified by regulators (such as exposure to sun and heat) and are not covered by workplace safety regulations. Consequently, workers exposed to these risks are not under the medical supervision of the occupational and/or general healthcare system for morbidity related to these risks.

Here is a summary of the key points that emerged from interviews conducted with various experts in Israel, including occupational physicians, family and public health doctors, and other stakeholders from a range of organizations and fields of knowledge. These issues will be utilized in the development and implementation of the Israeli model.

Partial collection of occupational information in a way that is not usable for a systemic approach: Currently, when occupational information is collected by family or specialty physicians, it is documented in the medical record ("patient file") as free-text narrative rather than in a defined field. This means that even when documentation exists, its narrative format makes the information inaccessible for retrieval and analysis. It is essentially lost within the records and does not become part of future prevention, diagnosis, and treatment processes in the primary-care system and hospitals.

Lack of Access to Occupational Information for Community-Based Medical Teams: Information related to occupational medicine is not readily available to family physicians, who typically receive only summaries. Currently, referrals for centralized examinations are made by employers. In cases where examinations are routine, the family physician is often unaware that they have been performed. Only in cases where abnormal findings are discovered, requiring further investigation, is a referral made to the family physician. Currently, the occupational medicine system operates independently, and family physicians only receive feedback when the initial referral originated from them. This is exemplified in cases of periodic audiometric screening for occupational noise exposure, where the detection of a unilateral hearing deficit necessitates a referral back to the family physician for a neurological evaluation due to the asymmetrical finding. The test results will then be sent to the family physician.

Attitudes Toward Integrating Occupation into Medical Records

All interviewees expressed unequivocal support for the importance of integrating occupational information into electronic medical records, stating that synchronizing information between occupational and general medicine is crucial for effective patient care. The following are the specific points raised in the interviews regarding the integration of occupational information into medical records.

Occupational inquiry is perceived as important, if not critical, within the healthcare system, and there is a growing recognition that occupation is one of the key social determinants of health. However, despite its considerable importance, it is unknown whether physicians other than occupational physicians conduct structured occupational inquiries. As one interviewee stated: "Every medical file has an anamnesis, and there should be a field for occupation, preferably based on a search from a list of occupations in Hebrew. It should be added to the HMOs, and family physicians should be trained on it." Another aspect raised was a concern among occupational health professionals that primary-care medical teams lack sufficient familiarity with occupational risk factors due to inadequate training in their curricula.

Integrating occupational information will facilitate medical follow-up and enhance the interface between the primary care system and occupational physicians. Interviewees noted the considerable importance of collecting information for both epidemiological prevention and at the individual level. Currently, family physicians refer patients to

occupational physicians mainly when the patient complains of a work-related difficulty. There is a lack of awareness of periodic examinations, which are sometimes required by law. Therefore, medical records utilized in primary or secondary prevention are crucial for stopping damage in a timely manner. For this reason, it was recommended that the occupation field be mandatory in the system and that the system be able to alert for occupations with potential risks. It was also posited that accessibility to this field is essential, alongside information on tobacco and alcohol consumption, among other relevant topics. *Specialist Consultation:* Occupational documentation is necessary not only for primary care but also for specialist consultation. For example, a liver disease specialist who sees a patient with impaired liver function but fails to ask about their occupation—for instance, if they are a painter who works with organic solvents—might provide an inadequate or unsuitable treatment. Occupational exposures can also cause diseases, serve as primary etiological agents for hepatic pathology, or be aggravating or exacerbating factors or a cause of liver distress stemming from different diseases in individuals with pre-existing comorbid conditions. *Research:* Integrating occupational information into electronic medical records could help in more reliably assessing occupational morbidity rates and causes of death. This could serve as a basis for intervention and prevention programs, policy-making, and decisions regarding insurance compensation, among other purposes.

Israel: Considerations Regarding Implementation

Stakeholders in the Development and Implementation of the Israeli Model

Interviewees suggested various entities for the development and implementation of the model within Israel's healthcare system. Some also proposed a two-stage process, beginning with a pilot phase followed by a broader, horizontal implementation. Another suggestion was to first choose between two possible courses of action: (1) integrating the model as part of the medical records in the HMOs, or (2) integrating it as part of employer reports to the National Insurance Institute. The decision on the course of action would then determine which stakeholders should participate in the development.

The stakeholders identified as essential for the implementation process are detailed in Table 2.

Table 2: Stakeholders in the Process of Implementing Occupational History in Medical Records

The Stakeholder	Areas of Interest
Ministry of Health	Health Division, in contact with various healthcare providers; Government Hospitals Division; Quality Measures Program for primary care and hospitals; Occupational Diseases Registry.
Ministry of Labor	Occupational Safety and Health Administration.
The Institute for Occupational Safety and Hygiene	Research and Public Outreach.
The National Insurance Institute	Department of Work Injuries.
Health Maintenance Organizations (HMOs)	Primary care and medical records managers in the HMOs; technological systems.
Occupational Medicine	Health surveillance; hygiene data inspections.
Family Medicine	Association of Family Physicians.
The National Council for Community Health	Among the Council's roles, reviewing and advising the Ministry of Health's management on the following areas: formulating a comprehensive policy for the field of primary care vs. secondary services, hospitalization, and the interface between them; developing standards, guidelines, and tools for quality control in the field of primary care; examining models for operating the primary

	care services; and discussing aspects of registration and continuity of care in the healthcare system.[89]
Academia	Researching public health, occupational medicine, and all occupational health fields related to chemical, physical, biological, ergonomic, organizational, and psychological risk factors. Training physicians in medical schools.
The Israeli Medical Association	Institute for Qualitative Research.
Labor Unions	Dealing with the workload stimulated by the process of integrating this field. Questioning the workers' occupational history.
Non-profit and Civilian Organizations	Maintaining worker rights, individual rights, privacy, and digitization.

In addition to the opportunities and the involvement of various stakeholders, the interview data also revealed significant barriers and ethical considerations that warrant attention during the implementation process.

Professional and Technical Aspects

- *Job Characteristics and Employment Patterns:* The record must reflect not only the job title but also its actual nature. It is crucial to account for additional aspects of employment structure, such as part-time work, simultaneous employment in multiple workplaces, self-employment, and frequent job changes.
- *Adaptation of Occupational Lists for Israel:* This should include a framework for establishing interoperable interfaces with international organizations to facilitate cross-national research, comparative analysis, and the identification of emerging tendencies. *Migration and Work in the Global Era:* The system needs to document occupational history from work in other countries. Many workers were not born in Israel or did not work there for part of their lives, and morbidity can arise from past exposures abroad.

[89] https://www.gov.il/he/departments/units/national-council-community-health-unit

- *Building Interoperability:* A connection between various systems—medical records, national insurance, and occupational safety and hygiene—must be established, while addressing ethical aspects and privacy concerns.
- *Quality Metrics as a Means of Support:* There is potential for integration with a quality metrics program as part of the implementation process for occupational information.
- *Integrating Occupational Information into Personalized Medicine:* This would involve combining occupational data with information on the living environment as part of a comprehensive risk assessment.
- *Interface between Occupational and Family Medicine:* The inclusion of an occupational within medical records could facilitate long-term medical surveillance for at-risk workers even beyond the term of their employment *User Interface - System Definitions:* The model must define the location and level of detail for documentation, the location and visibility of information in the records (who is exposed to the information, and under what circumstances or treatments), and the frequency of information updates.
- *Artificial Intelligence as a Supporting Tool:* The use of AI systems by healthcare providers for risk analysis and alert generation is gaining attention in healthcare systems in general and was mentioned as a significant opportunity for development, particularly with the integration of occupational information.
- *Specialized Training for Non-Occupational Health Physicians:* This is essential for the effective integration of occupational data and history into medical records. The success of this implementation depends on enhanced communication between information systems and improved collaboration between occupational and family physicians.
- *Developing a Training System:* A training system on occupational health and practical support for primary-care teams will be crucial for successful implementation.
- *Target Populations:* The model's planning and pilot implementation should consider representation from various populations, including the periphery versus the center, different types of industries (starting with high-risk professions), and all health maintenance organizations (HMOs).

Existing Resources Supporting the Process

- *Strong Infrastructure:* Israel has optimal conditions for integrating occupational information into general medical records due to the combination of a universal healthcare system and some of the world's most advanced electronic medical records. Due to these conditions, implementation can commence with a government decision to add an occupation field to health records. Once the information is integrated, annual surveillance can be conducted as part of the healthcare system's quality metrics, with the guidance and consultation of the Worker Health Council and the Ministry of Labor.
- *The C-Pi Application at Clalit Health Services*:[90] The integration of occupational information into this software can complete the individual-level data analysis and assist in collecting epidemiological information.
- *The Information Mobility Law (2024):* This law is intended to lay the necessary regulatory foundation to enable a patient, if they wish, to make their health information accessible for receiving healthcare services from various entities. This can be legally executed at the point and time of necessity, while upholding the principles of patient privacy and data security.[91]
- *The Ministry of Health's Information Mobility Certification Program:* The program defines what constitutes "transferable information" that all organizations in the healthcare system must be able to share in a standardized, high-quality format. Additionally, the program specifies the requirements for establishing the technological infrastructure for information management and mobility, as well as the testing processes that will facilitate the organizations themselves and the Ministry of Health to verify that the information defined as transferable is indeed available, of high quality, and can be shared according to the defined standards.[92]

Barriers

[90] See information about AI-powered platform for family medicine (in Hebrew): https://www.clalit.co.il/he/clalitai/Pages/ai_article.aspx

[91] https://main.knesset.gov.il/activity/legislation/laws/pages/LawBill.aspx?t=LawReshumot&lawitemid=2197450

[92] See information about the Health Information Mobility Certification Program (in Hebrew): https://www.gov.il/he/pages/cfb-data-portability-certification-program

- *Concerns about Lack of Cooperation from HMOs*: There is a concern that Health Maintenance Organizations (HMOs) may not cooperate with both the development process and the implementation and use of the model. This concern is based on the fiscal burden associated with implementing new data fields within the EHR system, as well as the potential for questioning and integrating occupational information, which could impose a significant time commitment on clinicians. Furthermore, the process requires the requisite training of both clinical and support staff to ensure its professional and proficient execution. *Avoidance:* Primary-care physicians avoid asking about a patient's occupation due to a deficiency of relevant knowledge in the fields of hygiene and occupational medicine. They do not acquire the knowledge needed to utilize occupational information. As one professional noted, "It might be that I'd prefer not to know so I don't have to face information that is a hot potato and not know what to do with it."
- *Employees:* There is a possibility of deficient cooperation from employees. Some workers are unwilling to report their occupation for reasons of data privacy or professional concerns.
- *Information Quality:* There is a concern that the quality and completeness of data based on self-reported information may be insufficient.
- *Fragmentation:* There is a challenge in consolidating information for a specific workplace or industry when employees are dispersed across multiple occupational health clinics in different HMOs, with no single clinic treating all employees of a single workplace. For example, due to the fragmentation of real-time data collection, there is a lack of epidemiological insight into specific workplaces or particular job positions. This fragmentation makes it challenging to identify acute morbidity and to provide a real-time response from the healthcare system. Additionally, risk factors are not flagged due to the inability to consolidate information related to morbidity.

  Further fragmentation exists between different health sectors, particularly between public health and occupational health, as well as between occupational health clinics and primary-care clinics, specialist clinics, and other similar settings.
- *Ethical Considerations:* Maintaining the confidentiality of personal information and minimizing its use are essential. It will be necessary to address concerns regarding the potential for breaches of medical confidentiality in the workplace, as well as the risk

of biases in attitudes and treatment that may arise from a worker's occupational background. *Data Accessibility and Updates:* It will be necessary to determine which fields in the system will be visible and modifiable by both the healthcare system and patients.

- *Purpose of Data Collection:* The primary benefit should be prioritized for the patients/employees themselves, with a secondary benefit for research. It will be necessary to regulate the ethical issues of data use through legal means.
- *Integration with AI Systems:* The integration with AI systems raises a host of ethical issues inherent to this relatively new field, including accuracy, professional responsibility, and so on. Since this topic is broader and not unique to the occupational field, it will not be expanded upon in this context.
- *Epidemiological Information:* The primary objective is to augment the precision of morbidity and mortality rates associated with occupational diseases, thereby allowing for a more refined delineation of at-risk populations and a more strategic focus for preventive efforts. *Promoting Individual Health and Workers' Rights:* At the individual level, the integration of occupational data is expected to enhance the capacity for identifying occupational diseases. This, in turn, would empower affected workers to exercise their rights, implement preventive measures, and access targeted treatment.

Summary of Findings in Israel

Interviews with a wide range of stakeholders reveal a consensus on the importance of integrating occupational information into the general healthcare system's medical records. There is a broad recognition that this step could significantly contribute to the health of both individuals and the population as a whole. Connecting occupation to medical records would aid in diagnosing workers who are not under the supervision of occupational health services—for example, a worker exposed to the sun, such as in the case of skin cancer.

The main concerns raised are related to the lack of organizational cooperation from the HMOs due to budgetary barriers and increased workload for clinic staff. There is also apprehension regarding a lack of collaboration from medical teams in implementing the information and the extent to which they would utilize it, due to a

deficiency in hygiene-related and clinical knowledge about its significance. An additional concern is the level of cooperation from the workers themselves, who may wish to maintain confidentiality and privacy.

The interviews further indicate that adding a field for occupation and occupational history is not merely a technical change within the primary care system's electronic medical records system. It also necessitates the training and continuous mentorship of medical teams across various specialization tracks and throughout their work.

Documentation of Occupational Diseases: Digitizing this information would assist the reporting process from various entities within the healthcare system, particularly from specialist physicians, and is therefore expected to increase the rate of reported occupational morbidity. This would utilize a collection of information that more accurately represents the reality of occupational diseases, facilitating government bodies to take correctly prioritized and targeted preventive action.

The accessibility of integrated clinical and occupational information to various specialists is not only clinically and epidemiologically essential but also crucial for effective patient care. Still, it can also serve to advance occupational hygiene, thereby improving health-promoting work environments. At a technical level, creating an interface between the occupational health system and the general health system could receive a boost from the Ministry of Health's certification program and the Information Portability Law. Simultaneously, it is crucial to carry out this process with maximum protection due to ethical considerations and the need to safeguard the privacy and rights of employees.

Conclusions and Recommendations

Over recent decades, with numerous changes in the labor market structure, the shift from industry to services, and the rise of diverse employment arrangements, there have also been changes in the responses required to protect workers' health. These changes have created a gap between the regulation and systems providing occupational health services and the existing need. Simultaneously, frequent technological advancements have enabled the storage, access, and analysis of information on an unprecedented scale, which presents an opportunity for substantial progress in worker health by integrating occupation and occupational history into the Electronic Health Record (EHR).

This research was conducted to recommend a process for connecting occupational information to the medical record, based on global experience and the existing healthcare services in Israel. It was found that there is broad agreement worldwide, and among the interviewees in Israel, regarding the potential contribution of integrating occupational information into EHRs for prevention, diagnosis, establishing a causal link to morbidity, treatment, and research on occupation-related morbidity. Despite these consensus and operational recommendations in several countries, we did not find any country that has implemented the national integration of occupation and occupational history into EHRs within the general healthcare system.

In most of the countries surveyed, the structure of the healthcare system differs from that of Israel, with occupational health services being separate. This structure is based on two parallel systems—one for occupational health services and the other for general health services—which have almost no interface. In these countries, a significant amount of information is collected within the occupational health services system, which is then integrated with data from additional sources, such as surveys, health metrics, and workplace exposure data. A similar system for managing occupational health information is also found in the United States (OEHR).

Due to its unique structure, the Israeli healthcare system presents an opportunity to create an interface between occupational and general health services. In contrast to the structural separation that exists globally, in Israel, these services are regulated under a single legal and organizational framework (the National Health Insurance Law), and occupational medicine services are provided through the health funds. The opportunities arising from this structure are detailed in the recommendations below.

Drawing upon the research findings, three alternative models for integrating occupational data into the Israeli medical record system are proposed:

(1) Integrating Occupational Health Information into Medical Records

One option involves integrating occupational information fields into the existing Electronic Health Records (EHRs) of HMOs. In this alternative, occupational data would be embedded within the family medicine framework of the HMOs. This integration would serve as a supporting factor in identifying and diagnosing diseases that may be occupationally-caused, with the system then recommending a referral for further diagnosis at an occupational health clinic. This would create a significant new

channel for diagnosing and documenting a wide range of occupational diseases for workers who are not currently monitored by occupational health services.

As discussed previously, this is not merely a technical process; it requires, alongside technical changes, training and education for professional teams to ensure effective implementation and use of the information. Furthermore, this option requires extensive cooperation among multiple stakeholders to establish a uniform and reliable database that can interface with all relevant systems and address technological, organizational, inter-organizational, ethical, and research-related issues.

(2) Developing a Dedicated Occupational Electronic Health Record (OEHR) within Occupational Medicine.

This alternative, based on the separate systems model, would be implemented within the occupational medicine bodies of the HMOs. It would require a significant expansion of occupational medicine services to ensure that a substantial percentage of workers receive health monitoring and care. The advantages of this alternative are that occupational physicians already hold the fundamental professional knowledge about exposures and morbidity in clinics, so it does not require additional training. A database similar to the Finnish model could also be developed to aggregate information from multiple sources for use at both the individual and general population levels. The main drawback of this option is the immense investment required to train dozens of occupational physicians and expand clinics to provide medical care for most workers. Such a system could create redundancies between the occupational and general healthcare systems, and simultaneously lead to a loss of information regarding a specific employer or industrial area, as data would be scattered among different HMOs. This would make it difficult, if not impossible, for primary-care systems to participate in the prevention and diagnosis of occupational diseases, necessitating foundational work to support technology and coding standardization.

(3) Connecting the information collected in the second alternative with the records in the HMOs

Data permissions would be controlled and used in a manner defined and agreed upon by the patient, under the Ministry of Health's Information Mobility Certification Program. This alternative involves significant responsibility on the patient's initiative.

It fails to address the core impediment to effective clinical decision-making, which stems from critical information discontinuity and insufficient awareness of the potential link between disease and occupational exposures. It is essential to note that during the interviews, a possibility was raised that employers, when reporting a new employee to the National Insurance Institute and tax authorities, would also be required to disclose the nature of the employee's occupation. This information would then be linked to a database of occupations and their relevant exposures. This alternative involves aggregating data from various databases across different government ministries and is beyond the scope of this report's recommendations. The alternative recommended by the research team and most of the Israeli interviewees is Alternative No. 1. This option is preferred due to its suitability for the Israeli healthcare system and its existing infrastructure, including its healthcare service structure, legislation, and digitization. Furthermore, this alternative significantly increases awareness of family physicians and other medical professionals regarding occupational risk factors. This is expected to contribute to the advancement of worker health and occupational medicine, in addition to its research and epidemiological benefits.

Recommendations for the Process

Drawing on our research, the following recommendations are proposed for the development of an Israeli model of integrating occupational data and history into Electronic Health Records:[93] [94]*Establish a Steering Committee:* The interviews suggest that, as a first step, a small team should work on the proposed model before it is reviewed and approved by a broader team. Concurrently, the team should include representatives from the entities responsible for the model's actual implementation and budgeting, as well as representatives of employees and employers.

We suggest that the steering committee include representatives of the following stakeholders:

- Ministry of Health:

[93] In formulating these recommendations, we relied on the following source:
Institute of Medicine. 2011. *Incorporating Occupational Information in Electronic Health Records: Letter Report*. Washington, DC: The National Academies Press. https://doi.org/10.17226/13207.

    - Chief Occupational Physician and a representative from the Strategy Division and the Health Division
    - Occupational Disease Registry
    - Council for Worker Health
- Ministry of Labor: Chief Occupational Physician at the Occupational Safety and Health Administration
- HMO Representatives: Occupational medicine and information systems or AI professionals
- Israel Public Health Physicians Association
- Israel Association of Family Physicians
- Employee or Civil Society Representatives
- Employer Representatives
- National Insurance Institute Representatives
- Ethics: from academia or the Ministry of Health
- The Israel Institute for Occupational Safety and Hygiene (IIOSH). The Institute can act as the integrating body for the team's work if requested, or as a partner if the Ministry of Health coordinates the process.

The steering committee will select one of the three alternatives presented in the previous section. Accordingly, the development process, the decision-making processes, the implementation timelines, and the goals of the first stage of the development and the integration will be defined.

Key Challenges to Be Addressed by the Model

1. *Method of Data Collection:* This concerns how, when, and with what frequency data will be collected, as well as the duration for completing historical data. Various options for data collection have been proposed, including patient-entered data refined at the clinic, entry by clinic staff, or entry by family physicians. Regarding the "when" and "how often," a decision will need to be made on priorities during system implementation, including periodic update times and updates upon changes. The nature of the update—whether it's upon patient entry into their medical file, via a link

sent to patients for completion, upon diagnosis of a new morbidity, or as a routine procedure—will vary. The approach will, of course, differ between the initial implementation phase and routine use.

2. *Content of Collected Data*: This includes a patient's current occupation and occupational history, the selection of key substantive exposures based on their risk level, and the collection of historical data regarding prolonged exposures. It also involves a decision on the specific questions to be included in the questionnaire.

3. *Coding Standardization:* A uniform coding system for occupations and workplaces[95] must be established under existing coding systems in Israel and worldwide. This will enable international collaboration and research for the prevention, diagnosis, and treatment of health issues at the individual, occupational, industry, and workplace levels. The Council for Worker Health has developed a coding system, and its integration into the model's development process should be examined, either within the medical record itself or through an alternative, such as a database from which the required information would be pulled.

4. *Information Accessibility:* In line with the Information Portability Law, it is necessary to examine the most suitable method for the Israeli system to collect data and for viewing accessibility. This includes who will have access to view the various types of information, receive alerts, and update information.

5. *Desired Interface Between Primary Care and Occupational Medicine:* This refers to defining the optimal connection and communication between these two domains.

6. *Use of AI as a Supporting Tool:* This involves using artificial intelligence to assist with data analysis, diagnostic and therapeutic decision-making, and integration into a system for periodic alerts, preventive medicine, and more.

7. *Quality Metrics:* The use of quality metrics will serve as an incentive for implementation and application within the healthcare system.

8. *Connection to the National Insurance Institute:* It will be needed to examine the interfaces with the National Insurance Institute regarding information collected in the

[95] Research is currently being conducted in various locations to evaluate the effectiveness of automated coding.

system and its transfer for the review of claim files, as well as the parallel updating of claims that were not reported as occupational in the medical record.

9. *Protection of Workers' Rights:* This includes protecting both their health and their ability to work, as well as addressing additional barriers related to the direct and indirect effects of preventive medicine.
10. *Training Medical Teams in Conducting Inquiries about Occupation and Exposures:* It will be needed to examine the possibility of integrating this training into the curriculum and/or residency programs, especially in family medicine and specialist medicine, which are characterized by significant rates of occupational morbidity, such as oncology, pulmonology, and dermatology. During the implementation phase, training will also be required for clinic staff (depending on the decision regarding who will be the initial data entry person), family physicians, and specialists to ensure accurate data entry and effective system use.
11. *Planning and Execution of a Pilot:* During the pilot's planning, the topics detailed regarding high-risk occupations, underrepresented populations, fields for which standards already exist, and more, will be taken into account. The pilot will be executed in collaboration with an existing system, such as Clalit Health Services' C-Pi platform.
12. *Defining Metrics:* It is required for the evaluation of the success of the implementation, the contribution of the process, and the efficient linking of the occupation to the occupant's medical record.
13. *Legislative/Regulatory Amendments:* It is necessary to examine whether the proposed model requires changes to the National Health Insurance Law or any other regulations.
14. *Budgeting:* The steering committee will be required to assess the project's costs, including the necessary infrastructure and data entry, as well as appropriate sources of funding.

Summary

The necessity to integrate occupational information into the broader healthcare system is a challenge in many countries worldwide, affecting the ability to diagnose, treat, and prevent occupational morbidity. The State of Israel can become a global

pioneer in this field, thanks to the structure of its healthcare system and its existing technological infrastructure, if it successfully integrates occupational information into the existing system. Such integration will enable the development of a high-quality, standardized, and coded data and information collection infrastructure, which can primarily facilitate the provision of optimal care for patients and contribute to creating healthier and safer workplaces. This information infrastructure could be foundational for any future development in the treatment and research of occupational health and medicine.