EDUCATION
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ORIGINAL ARTICLE

Attitudes and behaviors of chiropractic interns toward occupational history taking

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Objective: This study uses a pre- and post-training program evaluation of chiropractic interns to (1) describe changes in their frequency of occupational history taking before and after a 1-hour training and (2) to document the attitudes and beliefs regarding occupational health and history taking.
Methods: All chiropractic interns at 1 clinic location completed questionnaires assessing their attitudes and perceptions regarding documenting the occupational history of their patients each trimester they were enrolled in the study. Each intern enrolled in the study for 2 or more trimesters participated in a 1-hour-long training session on taking an occupational history. The supervising clinician independently evaluated charting behaviors of interns for the duration of the study.
Results: The supervising clinician assessed 20 interns' level of documenting occupational history for 202 new patient or reexamination visits. A majority of interns (85% at baseline) were interested in occupational health, and 80% believed that occupational history taking was "very important." Intern charting behaviors increased after training related to documentation of past occupation (62.9% from 32.4%) and relating the chief complaint to work (59.7% from 30.0%). Detailed occupational history taking remained low throughout the study but demonstrated a doubling in documentation after training (16.1% from 8.6%).
Conclusion: Chiropractic interns and clinicians should be adequately trained in occupational health history documentation practices as they are likely to care for work-related injuries. Short training modules appear to be effective in demonstrating small changes in documentation related to occupational history taking.

Key Indexing Terms: Occupational Health; Chiropractic; Education; Medical History Taking

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INTRODUCTION

Occupational illnesses and injuries are a major health burden. In general health care practices, work-related diseases most commonly involve musculoskeletal complaints of the low back, neck, and shoulder.[1] Because of this, health care providers should understand the role of work in causing or exacerbating many musculoskeletal conditions. However, few clinical programs include occupational health as a major focus in their training.[2,3]

There are simple employment questions that may be included in a patient intake form to screen for potential work-related health problems that can then be expanded on if indicated.[4] While it is largely accepted that clinicians should assess the contribution of work to health concerns, few health histories ask for anything more than a simple description of the patient's current occupation. Rarely do clinicians inquire about work histories and potential on-the-job hazards.[5,6] Additionally, studies show that the comprehensiveness of occupational history taking is inconsistent based on patient characteristics (eg, gender, age, and other work or clinical factors that may be perceived to not be associated with hazardous work).[5]

Use of patient-reported occupational intake questionnaires identified that 23% of patients were presenting symptoms, signs, and job hazards that related to their current health.[7] However, integration of these questionnaires into the intake forms decreased the level of occupational history detail in patient charts by physicians, suggesting that a questionnaire is not sufficient.[7] Other studies indicate that intensive training programs for health care providers, containing activities such as worksite visits and learning through case studies, are effective and increase the number of occupational and environmental exposures questions asked by the provider.[8,9]

The clinical settings in which patients seek health care is diverse, with 35 million Americans receiving chiropractic

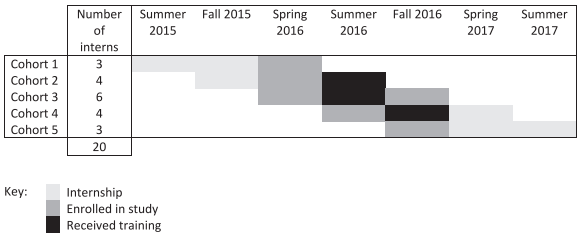

Figure - Intern enrollment in the study by cohort, indicating when they received training. The lightly shaded box indicates the interns were in their clinic internship, but the study was not active. The darker boxes indicate which cohorts were participating during the trimesters the study was active. The black boxes indicate they received the intervention during that trimester.

care in 2015.[10] Despite chiropractors' focus on treating musculoskeletal conditions, the most common work-related conditions, to the best of our knowledge no data exist on chiropractic interns' or clinicians' occupational history–taking attitudes and behaviors. Research assessing the efficacy of occupational history–taking training programs are needed to identify optimal training designs and to determine if these programs are effective across clinical disciplines.

This study uses a pre- and post-training program evaluation of chiropractic interns to (1) describe changes in their frequency of occupational history taking before and after the training and (2) to document the attitudes and beliefs regarding occupational health and history taking.

METHODS

Study Site

The study site was at a clinic embedded in a residential rehabilitation program in which more than 170 individuals may reside and participate in work rehabilitation. The 12-month program includes counseling and substance abuse recovery, employment preparation, and work experience through various program-related jobs. Many of these residents have a history of precarious housing, incarceration, unemployment, and other life stressors. The turnover of residents is high, with approximately 50% of residents new to the facility at any given time and each resident being required to participate in a physical exam at entry. None are required to continue care.

Study Sample

The interns at this clinic are students completing their last year of chiropractic school with the academic requirement of participation in a 12-month clinical internship. Under the supervision of a licensed chiropractor, chiropractic interns staff the clinic to perform physicals and address other health concerns for both residents and employees. Interns may see patients alone or in partnership with another intern, depending on the experience level of the intern and the complexity of the patient visit. This project received institutional review board approval from the National University of Health Sciences (#H-1504) and University of Illinois at Chicago (#2016-0213).

Subject Enrollment

Using a rolling hierarchical case-crossover design, 5 clinical internship cohorts were enrolled in the study for a duration of 1 to 3 trimesters (Fig.), which coincided with the 1-year time frame for recruitment, training, and follow-up. The 1st trimester served as the nonintervention baseline period. Each intern then participated in 1 training session within the 1st month of the 2nd trimester (3rd trimester for cohort 2). Similar to other training sessions during their internships, the training session was mandatory, took place midweek at the end of the shift, and lasted approximately 1 hour. The final cohort recruited in the study did not receive training, and we have only baseline data from the initial questionnaire. Students received the general questionnaire during the middle of each trimester that they were enrolled in the study. Interns completed the same questionnaire up to 3 times during the period of follow-up.

Training Program

Based on materials used by occupational health experts, including occupational medicine physicians, and other materials,[4,5,11–14] a 1-hour training program on occupational history taking was developed by the principal investigator with input from the study team. The training program consisted of an interactive discussion-based curriculum covering the importance of occupational history taking, utilization of an occupational history template, working through a case study, performing hazard categorization, and familiarizing interns with online resources. Interns were trained to gather information regarding past occupations, detailed occupational history of workplace hazards and tenure, whether the chief complaint was related to current or past work, and to provide clinical recommendations for managing musculoskeletal issues while working.

Instruments

Aim 1, the description of changes in the frequency of occupational history taking, was assessed using a behavior-tracking tool designed to be filled out by the supervising clinician as interns' charting of patients was reviewed. The supervising clinician used this tool to track whether the interns' charts captured key elements of a patient's occupational history and generally accepted standard elements of a clinical history, such as smoking, use of medications, and gender as a comparison. These comparisons were included in alignment with other studies assessing occupational history taking[5] and served to assess general history taking. There was no change to the clinic's standard forms throughout the study period, and each chart included a standard medical history form with only 1 work-related question: "What is your occupation?" The interns were required to remember to ask other occupational history questions and document the responses. Chart evaluations did not include additional information

Table 1 - Charting Behaviors Before and After Training

Element of History	All Visits (n = 202), n (%)		New Patient Visits (n = 168), n (%)		Reexamination Visits (n = 32), n (%)	
	Before Training (n = 140)	After Training (n = 62)	Before Training (n = 110)	After Training (n = 58)	Before Training (n = 30)	After Training (n = 2)
Current occupation	128 (91.4%)	60 (96.8%)	103 (93.6%)	56 (96.6%)	25 (83.3%)	2 (100.0%)
Past occupation	51 (36.4%)	39 (62.9%)	40 (36.4%)	37 (63.8%)	11 (36.7%)	0 (0.0%)
Detailed occupational history	12 (8.6%)	10 (16.1%)	9 (8.2%)	10 (17.2%)	3 (10.0%)	0 (0.0%)
Chief complaint related to work	42 (30.0%)	37 (59.7%)	36 (32.7%)	36 (62.1%)	6 (20.0%)	0 (0.0%)
Gender	140 (100.0%)	62 (100.0%)	110 (100.0%)	58 (100.0%)	30 (100.0%)	2 (100.0%)
Smoking history	140 (100.0%)	62 (100.0%)	110 (100.0%)	58 (100.0%)	30 (100.0%)	2 (100.0%)
Medications	139 (99.3%)	62 (100.0%)	110 (100.0%)	58 (100.0%)	29 (96.7%)	2 (100.0%)

that may have been discussed but was not documented in the chart. A subset of 50 (24.8%) patient files was reviewed by the lead author to assess the reliability of the behavior-tracking tool; reliability was high (94% agreement; Cohen's $\kappa = 0.88$, 95% confidence interval [CI] 0.82–0.93).

In addition to basic demographics and training information, a questionnaire was developed for aim 2 to assess the attitudes, beliefs, and self-perceived behaviors of the chiropractic interns regarding the taking of occupational histories. The questionnaire was the same for each of the 3 iterations, but the hypothetical clinical encounter case vignette changed in each version. This brief vignette was followed by a series of questions asking interns to identify additional information interns would like to know and how they would proceed with the hypothetical clinical encounter.

Statistical Analysis

Data were analyzed descriptively for this exploratory mixed-methods study comparing pre- and post-training responses. Statistical software (SAS, v.9.4; Cary, NC) was used to analyze quantitative data and carry out statistical analyses. Open-ended responses were assessed in a spreadsheet program (Microsoft Excel; Microsoft Corp, Redmond, WA) using content analysis to understand the context and application of self-perceived clinically relevant occupational health behaviors.[15]

A generalized estimating equation (PROC GENMOD) was used to assess behavior changes pre- and post-training using a binary distribution and Toeplitz working correlation structure. The main fixed effect is training completion, and the individual intern is a random effect. Due to small numbers, cohort effects and visit types could not be properly evaluated as there were multiple cohorts that did not have measures after training because of the design of the follow-up. Grade point average (GPA) was imputed for 1 intern who did not provide this information, using the median GPA of the cohort. This intern contributed 12 patient evaluations. Due to sample size, modeling using a continuous measure of days since training could not be completed. To descriptively evaluate the effect of time from training on charting behaviors, a variable that reflects time since training in months was created.

RESULTS

Demographics and Interest in Occupational Health

Of the 20 participating interns, the majority were female ($n = 12$; 60%), with a median age of 27 years (range 25–48 years), were in the program for approximately 11 trimesters (range 10–14 trimesters), and had GPAs that were evenly distributed as follows: 2.50–2.99 GPA, $n = 6$ (30%); 3.00–3.49 GPA, $n = 7$ (35%); and 3.50+ GPA, $n = 6$ (30%). A total of 202 patient charts were evaluated, with 83% being new patient visits (Table 1). While interns can see patients in partnership with another intern, this was only done in 56 visits (27.7%), and there were no visits in which the secondary intern had completed the occupational history training when the primary had not.

The majority (85% at baseline) were interested in occupational health, and 80% believed that occupational history taking was "very important." For example, one 27-year-old female wrote, "I believe work is a strong component of health for 2 main reasons. (1) That access to meaningful work is one of many factors determining health. (2) That an individual may be exposed to hazardous materials or physically/emotionally challenging work places." Similarly, a 26-year-old male commented, "I would say it has a large influence on health. Many people who work spend more time at work than anywhere else during the day. Thus, if there was a poor work environment, it could certainly affect one's health dramatically."

Occupational Health History Taking

Documentation of the patient's current occupation was high throughout data collection (Table 1). Intern charting behaviors increased after training related to documentation of past occupation (all visits, 62.9% from 32.4%) and relating the chief complaint to work (all visits, 59.7% from 30.0%; Table 1). Detailed occupational history taking remained low throughout the study but demonstrated a doubling in documentation after training (16.1% from 8.6%; Table 1). Other standard components of clinical history taking, including gender, smoking history, and medications, were nearly universally documented by the interns (Table 1).

Table 2 - Self-Perceived Frequency of Charting Behaviors Before and After Training

	Before Training ($n = 20$)		After Training ($n = 20$)	
Behavior Frequency	***n* Surveys**	**%**	***n* Surveys**	**%**
Frequency of taking occupational histories on new patient visits				
Every new patient	15	75.0	17	85.0
Most new patients	3	15.0	2	10.0
Some new patients	2	10.0	1	5.0
Few new patients	0	0.0	0	0.0
Never	0	0.0	0	0.0
Frequency recording current occupation on new patient visits				
Every new patient	19	95.0	19	95.0
Most new patients	1	5.0	1	5.0
Some new patients	0	0.0	0	0.0
Few new patients	0	0.0	0	0.0
Never	0	0.0	0	0.0
Frequency recording past occupation on new patient visits				
Every new patient	3	15.0	7	35.0
Most new patients	5	25.0	6	30.0
Some new patients	9	45.0	3	15.0
Few new patients	3	15.0	3	15.0
Never	0	0.0	1	5.0
Frequency raking occupational history on reexamination visits				
Every patient	2	10.0	4	20.0
Most patients	6	30.0	5	25.0
Some patients	4	20.0	4	20.0
Few patients	6	30.0	5	25.0
Never	2	10.0	2	10.0
Frequency recording current occupation on reexamination visits				
Every patient	3	15.0	3	15.0
Most patients	3	15.0	6	30.0
Some patients	7	35.0	2	10.0
Few patients	6	30.0	5	25.0
Never	1	5.0	4	20.0
Frequency recording past occupation on reexamination visits				
Every patient	1	5.0	2	10.0
Most patients	1	5.0	2	10.0
Some patients	4	20.0	2	10.0
Few patients	6	30.0	6	30.0
Never	8	40.0	8	40.0

In the self-assessment, all interns perceived they asked about current occupation for all or most new patient visits, but other occupational history–taking documentation behaviors varied greatly with limited positive changes after training (Table 2). Self-reporting reflected more consistent documentation of components of occupational history taking for new patient visits as opposed to reexaminations; however, there were so few reexamination visits after training that it is difficult to compare the self-report with actual charting behaviors (Tables 1 and 2).

Comments at baseline and after training showed changes in awareness and the value of more detailed occupational health histories. At baseline before training, a 27-year-old female wrote, "Past occupation history is reported if brought up." Another 26-year-old female stated, "I only take past occupational [history] if there may be a symptom/problem that could be caused by a past exposure. Or if they recently changed jobs. Or other random things."

After training, interns seemed to recognize there were additional needs in practice and scope of what was asked during patient encounters. Comments indicated a diffidence in how assertively occupational histories should be asked and reported. For example, one 26-year-old female intern commented, "I ask [patients] what work they used to do before coming here and then what they do here now. That's it as far as occupational history." Another 27-year-old female intern said, "I need a lot more practice w/taking occupation histories," and "I have not taken a full/complete occupational history so may not include everything."

All interns identified the case vignette on the questionnaire as possibly being related to work. Before training, most interns (85%) asked for additional information about the hypothetical patient's work, and this increased to all

Table 3 - Documentation Present in Visits by Time Since Training

Time Since Training	Patient's Current Occupation		Patient's Past Occupation		Detailed Occupational History		Chief Complaint Related to Work	
	n	%	*n*	%	*n*	%	*n*	%
Before, $n = 140$	128	91.4	51	36.4	12	8.6	42	30.0
1st month, $n = 17$	16	94.1	8	47.1	0	0.0	6	35.3
2nd month, $n = 16$	16	100.0	12	75.0	7	43.8	12	75.0
3rd month, $n = 18$	17	94.4	12	66.7	2	11.1	11	61.1
4th+ month, $n = 11$	11	100.0	7	63.6	1	9.01	8	72.7

interns inquiring about the occupational history after they received training.

Time Since Training

Charting behavior changes peaked during the 2nd month after training and then exhibited varying levels of decay over time (Table 3). These changes appear to be least sustained in taking detailed occupational history, with less decay in documenting past occupation or relating the chief complaint to work (Table 3).

Hierarchical Models

The multivariable hierarchical models confirmed significant changes after training in charting behaviors related to documenting past occupation (adjusted odds ratio [aOR] = 2.77; 95% CI 1.03–7.44) and relating the chief complaint to work (aOR = 4.09; 95% CI 1.85–9.01) when adjusting for intern gender, intern age, intern GPA, and the presence of an additional intern (Table 4). Documentation of current occupation (aOR = 5.94; 95% CI 1.34–26.25) also improved, with the wide range in CI reflecting the high documentation throughout the study. A subsequent adjusted model also showed a statistically significant impact of training on documentation of more detailed occupational histories (aOR = 2.95; 95% CI 1.12–7.82).

Additional Self-Reported Behaviors

It appears that interns using additional resources related to occupational health decreased after training (40.0% before and 20.0% after). Upon further examination, the resources were from more narrow sources, focusing on materials from classes and seminars regarding environmental health and clinical treatments related to rehabilitation, before the training and after the training transformed to wider searches using the internet and PubMed, which suggests looking for more information about diverse work-related exposures and conditions.

When asked in the self-assessment, half of the interns reported that they would differentially ask about occupational histories based on patient demographics such as age and gender, as well as other clinical characteristics (such as body habitus and comorbidities). This study was unable to document how this would manifest or link these perceptions to behaviors in this cohort.

DISCUSSION

Despite the atypical clinical setting, the importance of occupational health history taking for chiropractors and patients with atypical employment and social histories remains germane. Appropriately taking an adequate clinical history, of which occupational information would be relevant, and integrating that information with other assessments to develop patient diagnoses is required by The Council on Chiropractic Education.[16] At baseline, documenting current occupations was relatively high among the chiropractic interns, which is likely due to it being an available field on the original comprehensive history intake form. However, additional detailed occupational information was not usually included in the intern's documentation of the patient encounter, which may be related to their lack of using additional resources, such as peer-reviewed literature and resources published by governmental organizations focused on occupational health, to learn more about potential occupational exposures and work-related conditions. This is similar to other assessments that find health care providers deficient in their occupational health history taking.[5–7,17] This forms the basis for the National Institute for Occupational Safety and Health's interest in implementing work-related variables into the electronic health record and also in the development of autocoding software for narrative data on industry and occupation.[18,19]

Table 4 - Hierarchical Models of Pre- Versus Post-training Charting Behaviors

Element of History	Crude				Fully Adjusted			
	OR	CI		*p*-Value	OR	CI		*p*-Value
Current occupation	2.82	0.82	9.73	0.10	5.94	1.34	26.25	0.02
Past occupation	2.93	1.06	8.08	0.04	2.77	1.03	7.44	0.04
Detailed occupational history	2.02	0.67	6.05	0.21	2.95	1.12	7.82	0.03
Chief complaint related to work	3.42	1.74	6.70	0.00	4.09	1.85	9.01	0.00

Additional training on occupational history taking did not substantially change the occupational history record-keeping behaviors related to documenting current occupation and providing a more detailed occupational history, but we did observe a significant increase in the proportion of patient visits where their chief complaint was related to their work, and past occupations in addition to the current occupation were documented. The interns' perceptions of the frequency of documenting specific elements of occupational health histories, such as current or past occupation, coincided with their actual chart behaviors. Conversely, interns perceived they were documenting complete occupational health histories at a higher rate than were actually documented. This may be related to their beliefs that work impacts health and their interest in learning more about occupational health. While the training emphasized that a comprehensive occupational health history includes details on job activities and exposures, it appears that interns perceived simply documenting current and past job titles as sufficient and representative of a comprehensive occupational history.

It is impossible to determine if some interns were asking detailed questions about occupational history but failing to adequately document the occupational history on the patient records. Interventions aimed at increasing occupational health training, not necessarily occupational health history documentation, have previously focused on teaching through worksite visits, case studies, clinical skill evaluations, and lectures.[3,8,9,20–22] Other interventions that focused on documentation relied on the use of augmented questionnaires for history taking.[7,23,24] These are many potential avenues for improving comprehensive occupational health history taking; however, they have limited effectiveness. While electronic health records may offer many possibilities related to documentation of occupational health history taking, the structure should be carefully examined to ensure that the appropriate level of detail is being included.

To further develop occupational history–taking training, 1 concern to address is how to better incorporate occupational history taking in reexamination visits as opposed to new patient visits. Medical history taking tends to be most comprehensive during new patient visits, thus it appears this is where the occupational history taking is more readily addressed; however, occupational exposures and how an individual is affected by them can change over time. Workplace hazards and their effect on human health are significant public health problems. It is important for clinicians to regularly ask about workplace hazards just as is commonly done for smoking, alcohol consumption, and diet.

Additionally, occupational history–taking training may be enhanced by periods of reinforcement. While the data are limited in this study, it suggests that training could be reinforced after the original contact to target those that were resistant to the original training or those that are having difficulty implementing these practices in their clinical encounters. This study saw the peak effect of training in the 2nd month, suggesting it takes some time for these behaviors to become a habit. An additional training session may also be of value even further from the initial training as the effects of training wear off, which was seen in our study beginning 3 months after training.

The number of chief complaints related to work in this patient population was high (interns related work to the chief complaint in 59.7% of visits after training). While studies have shown that work-related conditions are encountered in approximately a quarter of patients treated in general medical practice,[1,7] our findings indicate that chiropractors may encounter work-related musculoskeletal issues at a substantially higher rate. Musculoskeletal disorders are the most common adverse health effects reported in the Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses.[25] The high correlation between work and the chief complaint is likely a reflection of this clinic serving patients primarily involved in new job tasks, particularly manual labor, without having become sufficiently physically conditioned. Further studies should determine if similar behaviors and attitudes are observed in more traditional chiropractic practice settings.

Additionally, the possibility of differential documentation of occupational health histories related to age, sex, and comorbidities should be further explored, as social biases may lead to decreased identification of occupational health-related risks or conditions, particularly in women, the elderly, the newly employed, those with informal employment (eg, volunteers or compulsory employment), and those employed in jobs not perceived as hazardous. While perceived discrimination of patients in clinical encounters has been reported,[26] more work needs to be done to determine the effect of social biases on clinical encounters and how they may impact medical history interviews and clinical outcomes, particularly in relation to work-related conditions. It would also be important to further explore the establishment of these biases in clinical care, such as whether students enter training programs with these biases, whether the curriculum and training reinforce these biases, or if they develop in response to clinical experiences and constraints (eg, limited duration of the patient encounter).

Limitations

While the small sample size restricts the conclusions that may be drawn, it demonstrates that a more comprehensive study of this nature is feasible in chiropractic clinical training programs. Due to low power, the CIs are wide and are close to 1 on their lower bounds, thus the point estimates should be cautiously interpreted until confirmed by a larger study.

The generalizability of this study may be limited as these are interns at 1 clinic site, seeing a specific patient population and using templated forms that may be different in other clinic systems. However, many chiropractic schools have clinical internships at community clinics that may see similar populations. The patient population in the residential rehabilitation program may not be representative of most other precariously housed and precariously employed populations. Also, as these patients are not engaged in formal employment, the occupational history–taking behaviors may be different from that which interns do in other clinical settings

treating patients with more typical or standard employment. Regardless, occupational history taking should not be limited to patients with formal employment or those employed in specific jobs.

This study did not identify barriers to taking occupational histories by the chiropractic interns, was unable to link occupational history–taking behaviors with patient characteristics, and could not separate the effects of increased clinical experience because participants were all interns. The interns were required to remember to ask and document the responses to occupational history questions without the assistance of additional guides within the patient chart, which may have reduced adoption of new charting behaviors, but this helps us better assess if interns internalized the training because it required them to remember to ask the questions.

CONCLUSION

Chiropractic interns and clinicians should be adequately trained on occupational health history documentation practices as they are likely to care for work-related injuries. Short training modules, as done with other health disciplines, appear to be effective in demonstrating small changes in documentation related to occupational history taking. This may be expanded through additional exposure over the course of the chiropractic training and during continuing education programs. Additional research needs to be done to determine the most effective ways to foster occupational health history taking related to educational and policy changes that are meaningful for improved patient outcomes. Attention needs to be directed toward making sure students and clinicians are not neglecting to ask important clinical questions related to occupation based on social biases, especially when in unique clinical settings.

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REFERENCES

1. Weevers H-JA, van der Beek AJ, Anema JR, van der Wal G, van Mechelen W. Work-related disease in general practice: a systematic review. *Fam Pract*. 2005; 22(2):197–204.
2. Wynn PA, Aw T-C, Williams NR, Harrington M. Teaching of occupational medicine to undergraduates in UK schools of medicine. *Occup Med (Chic Ill)*. 2003;53(6):349–353.
3. Gehanno JF, Bulat P, Martinez-Jarreta B, et al. Undergraduate teaching of occupational medicine in

European schools of medicine. *Int Arch Occup Environ Health*. 2014;87(4):397–401.
4. Taiwo OA, Mobo BHP, Cantley L. Recognizing occupational illnesses and injuries. *Am Fam Physician*. 2010;82(2):169–174.
5. Politi BJ, Arena VC, Schwerha J, Sussman N. 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. *J Occup Environ Med*. 2004;46(6):550–555.
6. Shofer S, Haus BM, Kuschner WG. Quality of occupational history assessments in working age adults with newly diagnosed asthma. *Chest*. 2006;130(2):455–462.
7. Thompson JN, Brodkin CA, Kyes K, Neighbor W, Evanoff B. Use of a questionnaire to improve occupational and environmental history taking in primary care physicians. *J Occup Environ Med*. 2000; 42(12):1188–1194.
8. Braeckman L, Bekaert M, Cobbaut L, De Ridder M, Glazemakers J, Kiss P. Workplace visits versus case studies in undergraduate occupational medicine teaching. *J Occup Environ Med*. 2009;51(12):1455–1459.
9. Storey E, Thal S, Johnson C, et al. Reinforcement of occupational history taking: a success story. *Teach Learn Med*. 2001;13(3):176–182.
10. Daly J. *Gallup-Palmer College of Chiropractic Inaugural Report: Americans' Perceptions of Chiropractic*. Washington, DC: Gallup; 2015.
11. National Institute for Occupational Safety and Health. International Chemical Safety Cards (ICSC). https://www.cdc.gov/niosh/ipcs/ipcscard.html. Published 2012. Accessed November 29, 2017.
12. Yu D. Agency for Toxic Substances and Disease Registry. Case Studies in Environmental Medicine. Taking an Exposure History. https://www.atsdr.cdc.gov/csem/exphistory/docs/exposure_history.pdf. Published 2015.
13. Haddon W. The changing approach to the epidemiology, prevention, and amelioration of trauma: the transition to approaches etiologically rather than descriptively based. *Am J Public Health*. 1968;58(8): 1431–1438.
14. Forst L, Nickels L, Conroy L. The WHO modules in occupational safety and health: training for prevention. *Public Health Rep*. 2009;124(1):169–176.
15. Vaismoradi M, Turunen H, Bondas T. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nurs Health Sci*. 2013;15(3):398–405.
16. The Council on Chiropractic Education. *CCE Accreditation Standards-Principles, Processes and Requirements for Accreditation*. Scottsdale: The Council; 2018.
17. Cimrin AH, Sevinc C, Kundak I, Ellidokuz H, Itil O. Attitudes of medical faculty physicians about taking occupational history. *Med Educ*. 1999;33(6):466–467.
18. Institute of Medicine. *Incorporating Occupational Information in Electronic Health Records: Letter Repor*t. Washington, DC: The National Academies Press; 2011.
19. National Institute for Occupational Safety and Health (NIOSH). Industry and Occupation Computerized Coding System (NIOCCS). https://www.cdc.gov/niosh/topics/coding/overview.html. Published 2018. Accessed March 7, 2019.
20. Kipen HM, Craner J. Sentinel pathophysiologic conditions: an adjunct to teaching occupational and environmental disease recognition and history taking. *Environ Res*. 1992;59(1):93–100.
21. Koh D, Chia KS, Jeyaratnam J, Chia SE, Singh J. Case studies in occupational medicine for medical undergraduate training. *Occup Med (Chic Ill)*. 1995;45(1): 27–30.
22. Schenk M, Popp S, Bridge P, Gallagher R, Petrusa ER, Frank RR. Effectiveness of an occupational and environmental medicine curriculum as indicated by evaluation of medical student performance on an objective structured clinical examination. *J Occup Environ Med*. 1999;41(11):954–959.
23. Lewis RJ, Friedlander BR, Bhojani FA, Schorr WP, Salatich PG, Lawhorn EG. Reliability and validity of an occupational health history questionnaire. *J Occup Environ Med*. 2002;44(1):39–47.
24. Rosenstock L, Logerfo J, Heyer NJ, Carter WB. Development and validation of a self-administered occupational health history questionnaire. *J Occup Med*. 1984;26(1):50–54.
25. US Bureau of Labor Statistics. *2017 Survey of Occupational Injuries and Illnesses Charts Package*. https://www.bls.gov/iif/osch0062.pdf. Published 2018.
26. Hall WJ, Chapman MV., Lee KM, et al. Implicit racial/ethnic bias among health care professionals and its influence on health care outcomes: A systematic review. *Am J Public Health*. 2015;105(12):e60–e76.