Occupational and environmental medicine in a family medicine residency

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Well-rounded instruction in occupational medicine as part of family medicine residency training is feasible through a program that balances a longitudinal curriculum of monthly occupational and environmental medicine (OEM) lectures, community-based OEM patient care, and worksite assessment. Such training would help equip family medicine residents to integrate occupational medicine into their practices, which, in light of a shortage of board-certified practitioners in OEM, would help fill community needs.

The Intern-Resident Training Committee of Carson City Hospital in rural Michigan established both learner and institutional goals and objectives for such a program of instruction. A learner-needs assessment found appreciable interest among the residents for occupational medicine training. In addition, results of a survey of the occupational health community suggested there is inadequate coverage of OEM in medical schools and residencies. Furthermore, a focus group of occupational health managers revealed that clarity of communication and standardization of reporting were paramount concerns. Instruments for standardized OEM history and for OEM case management were developed for use within the residency continuity clinic.

The curriculum was implemented with a variety of teaching strategies, including worksite assessment. Practice-based, case-oriented instruction was subsequently phased into the program as residents assumed responsibility for managing cases under the supervision of family medicine preceptors knowledgeable in OEM. An occupational medicine rotation was developed that included focused clinical exposure to OEM patients and studies that would lead to eligibility for a certificate of additional qualification in occupational medicine.

Learner evaluations included chart reviews and patient satisfaction surveys. Program evaluations included interviews with occupational health managers. The residents were judged by their preceptors to have performed well. The responses of the health managers and the patients were positive. This program in occupational medicine was found to be educationally sound with demonstrated community benefit and patient satisfaction. Further, it is cost-effective, requiring no external funding.

(Key words: medical education, occupational and environmental medicine, primary care)

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This faculty development project was supported by faculty development grant No. 5 D45-PE 50045 from the Division of Medicine, Bureau of Health Professions, Department of Health and Human Services.

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Occupational diseases affect 15% to 20% of all Americans. The US government predicts that by 2000, 50% of the American workforce will experience occupational injuries each year.[1] However, a gulf exists between the need for physicians with occupational medicine training and the actual number of medical professionals with training in occupational and environmental medicine (OEM).[2]

While it is widely agreed that board-certified specialists in occupational medicine are the preferred practitioners of the OEM specialty, there remains a need for specialty support among trained primary care physicians.[2] In August 1998, the number of certified specialists in the field was only 2218, according to data obtained through a telephone call to the American Board of Medical Specialties. Factors influencing the shortage of OEM training include lack of awareness on the part of medical school deans and advisors about the field and lack of curricular exposure in medical school and most residencies. Furthermore, there has been a failure of those within this field to market themselves effectively.[3]

The influence of managed care organization on the healthcare professions has brought with it an emphasis on community-based medical practice. This emphasis on serving the healthcare needs of populations and industry has made the concept of nontraditional occupational medicine specialists (primary care physicians) a valid consideration.[4] Training primary care physicians in the field of occupational medicine can help satisfy this broad societal need.[5] This effort demands, however, that specific qualities and skills be acquired by such primary care physicians. The American College of Physicians has suggested that internists are best positioned to fill the gaps in occupational medicine coverage.[6] Some have proposed that financial or grant-type incentives be used to encourage primary care physicians to practice in the OEM field. The physicians would be encouraged to achieve performance benchmarks in the field of occupational medicine, similar to what was done in the early days of preventive cardiology.[7]

One interesting concept for integrating occupational health issues into an internal medicine clerkship uses problem-based case studies.[8] This approach does not include a longitudinal curriculum, however. Another approach is a combined program in family medicine and occupational medicine, but this requires a platform that supports both residencies and necessitates recruitment of candidates who are willing to spend an additional year in training.[9] Another strategy outlines the essential core content of continuing education courses for primary care physicians who choose to pursue a career in occupational medicine.[10] This model, although it is endorsed by the American College of Physicians, does not address the issues of undergraduate or residency-level education and training.

Other strategies used in primary care residencies include those used in three programs implemented at Duke University Medical Center between 1984 and 1991.[11] The first approach involved a 4-week rotation through the Department of Occupational and Environment Medicine, but it lacked an ongoing core curriculum and lost its funding after 2 years. The second program called for an internal medicine OEM preceptorship with one-half day per week in an ambulatory setting under the supervision of an attending OEM, along with a series of three 1-hour lecture presentations. The third program combined monthly OEM lectures with attendance at back school in the department of physical therapy, 10 hours of work in the employee health clinic, and study of a standardized workbook containing pertinent occupational medicine literature.

Another curricular example is found at the Medical University of South Carolina. Despite having neither an accredited school of public health nor an OEM residency, the university obtained a Department of Energy grant that it used to develop a 3-year longitudinal curriculum. This curriculum consisted of five required and nine elective areas intended to enable graduates to practice OEM.[12] This program was largely patient-centered self-study and provided limited opportunities for clinical exposure. It emphasized learner evaluation methods, including pre- and posttests for lectures and chart audits for clinic experiences.[13]

Purpose

This project developed and implemented a longitudinal curriculum of regularly scheduled OEM lectures, community-based OEM patient care, and worksite-assessment opportunities. The goal was to provide a well-rounded experience that would equip graduates of a family medicine residency to practice occupational medicine.

Carson City Hospital is a 100-bed community hospital in the central part of Michigan's Lower Peninsula. Carson City, a town of 1200 people, is located in a rural environment with some light industry, in a service area with a population of 65,000. The hospital sponsors one residency in family medicine. The total 1998-1999 enrollment was four residents when we initiated the OEM program in July 1998. Greenville Family Care Center, which serves both as a group family practice and as the resident continuity clinic, is located in Greenville, Michigan, approximately 20 miles west of Carson City. Greenville is a semi-rural community of 10,000 with a substantial mixture of commercial enterprise and light and heavy industry. Healthworks, Inc., is an occupational medicine services entity that contracts to provide services for numerous shops and industries in the Greenville–Carson City area. Its office is located at the Greenville Family Care Center. The hospital's Intern-Resident Training Committee recommended in April 1998 that any OEM didactic presentations be delivered at Carson City Hospital's morning lecture session, while implementation of OEM practice curriculum would occur at the Greenville Family Care Center.

The committee proposed the following learner goals to address the need for OEM training of its residents: (1) Facilitate the family medicine residents' acquisition of the fundamental cognitive skills in nonclinical subjects on which the practice of occupational and environmental medicine is based; and (2) ensure the residents' competency in the psychomotor skills required to treat most of the occupational health problems seen in a primary care practice.[14]

Methods

A learner-needs assessment was conducted in August 1998. This assessment was based on a review of the literature, which included the core curricula in occupational and environmental medicine of both the American Academy of Family Physicians and the American Osteopathic College of Family Physicians, as well as standard OEM and physical medicine texts and experience in local practice.[1-19] The assessment addressed respondents' familiarity with various OEM topic areas and their interest in further education in these subjects. The subjects included six clinical topic areas (biostatistics, epidemiology, industrial hygiene, worksite assessment, legal and regulatory issues, and OEM terminology) and six nonclinical topic areas (occupational health history, use of transcutaneous electrical nerve stimulation [TENS], therapeutic ultrasound, joint and trigger point injections, occupational dermatitis, osteopathic manipulative treatment and exercise prescription.

For familiarity with OEM topic areas, respondents used a Likert scale with values of 1 through 5 (1 = thoroughly unfamiliar; 5 = very familiar). For interest in further education and training in the topic areas, the Likert scale also was used, again with values of 1 through 5 (1 = no need or interest for further education or training; 5 = definite need for further education and training). Respondents used the full range of the scale, and the results are shown in *Table 1*. The results reflect appreciable interest in further education and training in occupational medicine. It is worth mentioning that respondents who showed a greater level of familiarity also indicated a greater level of interest in further education and training.

While the residents surveyed were supportive of this OEM initiative, the responses of the community industrial health managers to a survey about improving education in occupational medicine were even more compelling. Eighty-one percent of those responding to

Table 1
Learner Needs Assessment (N = 4)

	Familiarity with nonclinical topic areas	Familiarity with clinical topic areas	Interest in further training for nonclinical topic areas	Interest in further training for clinical topic areas
N = residents	4	4	4	4
Median	2.94	3.13	3.40	3.53

a closed-question survey in July 1998 (36 responses to 65 surveys—a 55% response rate) believed that there is inadequate coverage of occupational and environmental health in medical school. Moreover, 89% of the respondents believed that primary care residents also receive inadequate coverage of these subjects (*Figure 1*).

In conjunction with the first survey, these same respondents were asked to rate the importance of various occupational health issues in influencing their responses about the adequacy of OEM education and training. The issues were as follows:

- ☐ Quality of healthcare;
- ☐ Utilization of health resources;
- ☐ Direct and indirect costs related to healthcare;
- ☐ Patient satisfaction;
- ☐ Productivity of employees; and
- ☐ Impact on the community.

The respondents were asked to use a Likert scale in rating the importance of each of these issues, using values from 1 to 5 (1 = not at all; 5 = significantly). The full range of the scale was used, and 33 of the 36 respondents to the first part of the survey responded to this second survey. The median score was 4.0 or higher for each issue queried, and the results are represented in *Figure 2*. All six of the issues were important to the occupational health community members who responded to this survey.

In addition, a focus group was conducted in July 1998 with members of the West Michigan Occupational Health Initiative (WMOHI), which is a division of the Alliance for Health in Grand Rapids, Michigan. The Alliance for Health is a community health planning coalition dedicated to effective and efficient healthcare delivery, and the WMOHI addresses those issues specifically with respect to occupational and environmental medicine. The focus group discussion established two priorities with respect to occupational and environmental medicine: standardization of reporting for occupational illnesses and injuries, and clarity of communication between treating physicians and occupational health managers. This message was so convincing that it seemed addressing these two issues effectively would be key to making occupational medicine training a reality within the family medicine residency.

In response, two products were developed to address of standardization of reporting and clarity of communication. The first is a form for OEM history (*Figure 3*). The second is a form for reporting of OEM illnesses and injuries (*Figure 4*). The emphasis of the second form was standardization in the following areas: (1) patient demographics; (2) medical information, which includes impairment; (3) case management, which includes patient education, prevention, self-management, and activity modifications (work restrictions); and (4) billing information. These forms were distributed to the OEM healthcare community for review and appraisal. OEM providers were asked to evaluate the forms based on five criteria:

- Are the forms understandable in terms of content?
- Are they organized in a useful way?
- Do they include the important elements of a worker's compensation case?
- Are the forms appropriate in length?
- Does the format allow for accuracy?

Of the 67 individuals surveyed, 24 (36%) responded. A Likert scale provided a range of responses from 1 to 5 (1 = not at all; 5 = significantly) (*Figure 5*). The 24 respondents indicated that the forms for OEM history and OEM illness and injury were satisfactory for addressing both standardization and clarity in reporting OEM information. Most indicated that the products "significantly" achieved the criteria (*Figure 5*).

Objectives for OEM training in a family medicine residency were based on (1) the literature review[1-18]; (2) the needs assessment of the family medicine residents; (3) surveys of the community's OEM health professionals; (4) priorities as expressed by the focus group discussion, and (5) 10 years' experience in treating OEM patients at the Greenville Family Care Center through Healthworks, Inc. Three primary objectives were proposed:

- The residents will be able to diagnose and treat the most common OEM disorders in a primary care clinic.[18]
- The learners will demonstrate the ability to evaluate the OEM literature, perform case management, and perform worksite assessments for local industry.
- The learners will develop an interest in lifelong learning in OEM.

An institutional goal and an objective were also established in collaboration with the medical director of Carson City Hospital, the office manager of the Greenville Family Care Center, and the Intern-Resident Training Committee. The goal was for occupational health managers to perceive an improved level of OEM care in the community, while the

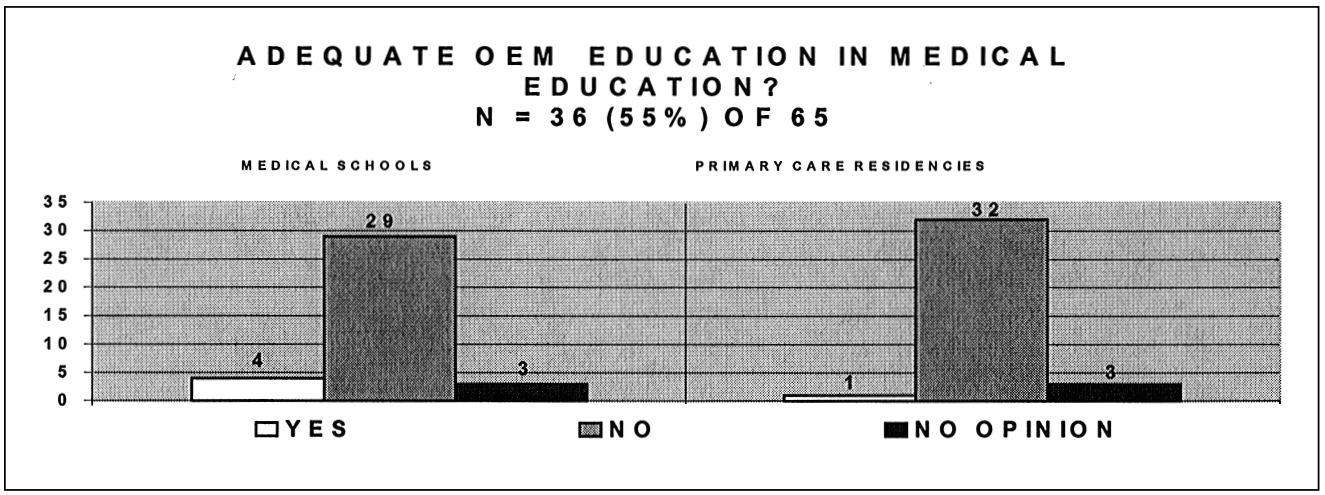

Figure 1. *Responses of community industrial health managers to a survey about improving education in occupational medicine.*

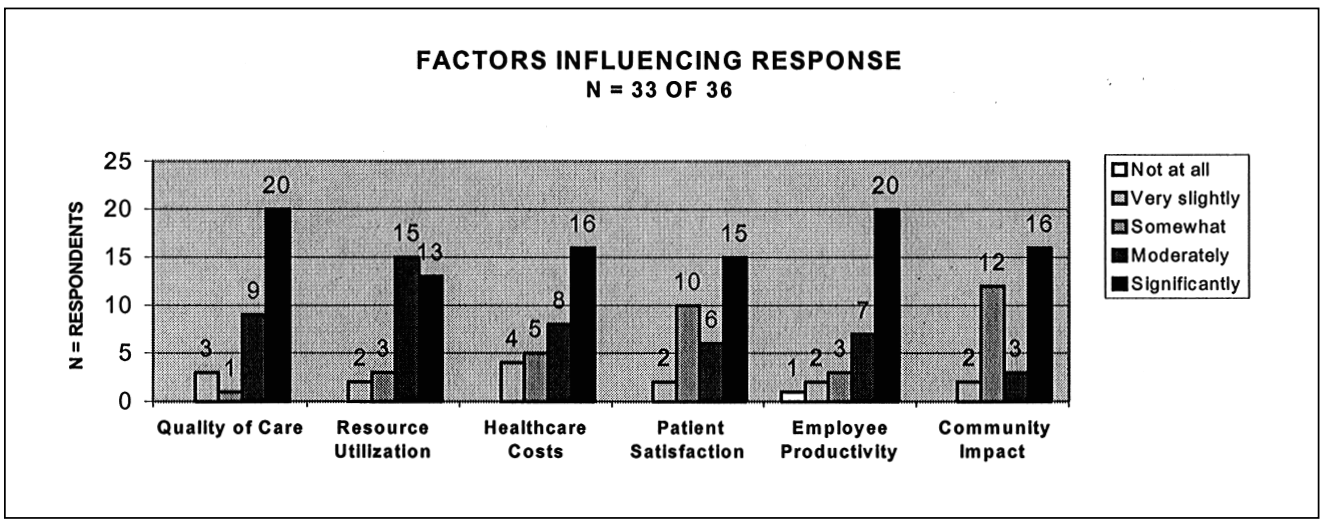

Figure 2. *Factors influencing responses regarding the adequacy of occupational and environmental medicine education and training.*

objective was to permanently implement the curriculum at the training institution (Carson City Hospital).

The topics in the curriculum agreed upon by the Intern-Resident Training Committee closely resembled those that were cited in the learner-needs assessment, with three exceptions. Osteopathic manipulative treatment and exercise prescription were both integrated into the clinic training experience with preceptor supervision because of the residents' exceptionally high level of knowledge and competence in these areas. Two of the residents had completed OMT fellowships prior to participation in the residency program. Second, occupational dermatitis was taught on a case-based approach within the continuity clinic experience, as dermatology is well covered elsewhere in the curriculum through lectures and a popular dermatology elective rotation. Finally, an actual worksite evaluation exercise was scheduled through the cooperation of one of the local industrial facilities, which has developed model ergonomic work stations and stresses compliance with sound ergonomic principles. For this reason, a session on ergonomics was substituted for industrial hygiene. The schedule for 1998-1999 was as follows:

Injection Techniques: Sept 16 and 21; Oct 18
OEM History: Oct 23
Therapeutic Ultrasound: Nov 6
OEM Terminology: Dec 21
Use of TENS: Jan 27
Legal and Regulatory Issues: Feb 19
Ergonomics: March 14
Worksite Assessment: March 23
Epidemiology and Biostatistics: April 12 and 16
Final Self-Assessment: April 20

Each didactic session was facilitated by physicians and lay experts from the community who had experience in the respec-

Occupational/Environmental History Form

Greenville Family Care Center; 1014 E. Washington St.; Greenville, MI 48838 Ph: 616-754-7145 Fx: 616-754-7110

Name: _____ Social Security #: _____

Address: _____ City: _____ St.: _____ Zip: _____

Home Phone: _____ Work Phone: _____ Birthday: _____ Sex: M F

Occupational Profile

Fill in the table below listing all jobs at which you have worked, including short-term, seasonal, and part time employment. Start with your present job and go back to the first. Use back if necessary.

Workplace (Employers name and address or city)	Dates Worked		Did you work full time?	Type of industry (Describe)	Describe your job duties	Known health hazards in workplace (dusts, solvents, etc.)	Protective equipment used?	Were you ever off work for a health problem or injury?
	From	To						

Occupational Exposure Inventory *(Please number and explain all yes answers on back)*

1. Please describe any health problems or injuries you have experienced connected with your present or past jobs.
2. Have any of your co-workers also experienced health problems or injuries connected with the same job?..... No Yes
3. Have you ever changed jobs or work assignments because of any health problems or injuries?..... No Yes
4. Have you ever been off work for more than a day because of an illness or injury related to work?..... No Yes
5. Do you or have you ever smoked cigarettes, cigars or pipes?..... No Yes
   If so, which and how many per day: _____
6. Do you have any allergies or allergic conditions?..... No Yes
7. Have you ever worked with any substance which caused you to break out in a rash?..... No Yes
8. Have you ever worked at a job which caused you trouble breathing, or coughing?..... No Yes
9. Do you frequently experience low back pain or have you been under a doctor's care for back problems?..... No Yes
10. Have you ever worked at a job or hobby in which you came into contact with any of the following by breathing, touching, or direct exposure? If so, please check the appropriate box and explain on the back.

☐ Nitrogen Compounds	☐ Diving/Flying	☐ Postural Stress	☐ Hazardous Waste
☐ Pesticides	☐ Exertional Stress	☐ Vibration	☐ Fibers/Dusts/Mists/Vapors
☐ Petroleum Products	☐ Heat/Cold	☐ Psychological Stress	☐ Gasses
☐ Plastic/Rubber Processing	☐ Noise	☐ Animal/Plants	☐ Metals and Compounds
☐ Organic Solvents	☐ Radiation	☐ Infectious Agents	☐ Other _____

Physician Name (Print): _____ Signature: _____

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Figure 3. *Occupational/environmental history form.*

Patient Name: _____

Environmental History: *(Please explain all yes answers below.)*

12. Have you ever changed your residence or home because of a health problem?..... No Yes
13. Do you live next door to or very near to an industrial plant?..... No Yes
14. Do you have a hobby or craft which you do at home?..... No Yes
15. Does your spouse or any household member have contact with dusts or chemicals at work during leisure activities?..... No Yes
16. Do you use pesticides around your home or garden?..... No Yes
17. Which of the following do you have in your home? (Please check those that apply.)

☐ Air conditioner	☐ Humidifier	☐ Electric stove	☐ Central heating
☐ Air purifier	☐ Gas Stove	☐ Fireplace	☐ Oil heating

Please number and explain all yes answers from the front and above on the following lines.

_____

_____

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Figure 3. *(Continued)*

OCCUPATIONAL /ENVIRONMENTAL CASE REPORT

Greenville Family Care Center; 1014 E. Washington St.; Greenville, MI 48838 Ph: 616-754-7145 Fx: 616-754-7110

Date: _____ *Name:* _____ *SS#:* _____

Company: _____ Job Title: _____ Supervisor: _____

Date of Onset: _____ Report: ☐ Initial ☐ Follow-up

MEDICAL REPORT

Symptoms: _____

_____

Initial Event: ☐ Recurrence: ☐ Previous Dates: _____

Onset: ☐ Sudden ☐ Gradual

Diagnostic Studies

X-Rays: _____

Laboratory: _____

Diagnosis: ❶ _____ ❷ _____

❸ _____ ❹ _____

Contributory Factors: ❶ _____ ❷ _____

❸ _____ ❹ _____

Work related: ☐ Yes ☐ No ☐ Probable ☐ Possible

Comorbidities: ❶ _____ ❷ _____

Complications: ❶ _____ ❷ _____

Treatment: Medications: ❶ _____ ❷ _____

❸ _____ ❹ _____

Therapy: _____

Procedures: _____

Devices: _____

Medical Impairment (Case Specific): _____

Time to Recovery: _____

Referrals: Consultant: _____

Date: _____ Time: _____

Therapy: _____

Date: _____ Time: _____

Employer Notified: ☐ Yes ☐ No Follow-up appointment: ☐ Yes Date: _____ Time: _____ ☐ No

Comments: _____

_____

_____

Disposition (check all that apply) ___ Improved ___ Not Improved ___ Resolved ___ Maximal Improvement ___ Discharged From Care

Physician Name (Print): _____ **Signature:** _____

Date: _____ **Time Arrived:** _____ **Time Departed:** _____

Page 1

Figure 4. *Occupational/environmental case report form.*

Patient Name: _____

CASE MANAGEMENT

SELF-MANAGEMENT: _____

_____

_____

PREVENTION: _____

_____

_____

EDUCATION: _____

_____

_____

ACTIVITY: No Modifications ☐ Modifications applied until: _____

Complete rest: ☐ Modified schedule: _____ hours/day _____ days/week

No Driving ☐ No Working Near Machinery ☐ No Working at Heights ☐

Standing (maximum): ____0 hrs ____0-2 hrs ____2-4 hrs ____4-6 hrs ___6-8 hrs

Sitting (maximum): ____0 hrs ____0-2 hrs ____2-4 hrs ____4-6 hrs ___6-8 hrs

Walking (maximum): ____0 hrs ____0-2 hrs ____2-4 hrs ____4-6 hrs ___6-8 hrs

Comments: _____

_____

_____

_____

Lifting: (Weight & Range) _____

Lifting Frequency (reps/minutes): _____ 0 _____ 1/5 min _____ 1-4/5 min _____5/5 min _____other

	Not at all	Occasional (1-33%)	Frequent (34-66%)	Continuous (67-100%)
Lifting	____	____	____	____
Twisting Trunk	____	____	____	____
Bending at Waist	____	____	____	____
Push/Pull	____	____	____	____
Squatting	____	____	____	____
Climbing	____	____	____	____
Grasp (R / L)	____	____	____	____
Grip (R / L)	____	____	____	____
Reach Out (R / L)	____	____	____	____
Overhead (R / L)	____	____	____	____

✓	OFFICE VISIT	CPT	FEE
	NEW	EST	
	99202 Level 2	99212	
	99203 Level 3	99213	
	99204 Level 4	99214	

✓	Minor Surgery	CPT	FEE
	Inj.Inter. Joint (Wrist, elbow, Ankle)	20605	
	Inj. Major Joint (Shoulder, Hip, Knee)	20610	
	Inj. Small Joint (Finger/Toes)	20600	
	Trigger Point Inj.	20550	
	Laceration Repair ____ cm ____ site		

✓	X -Rays	CPT	FEE
	Ankle 3 Views	73610	
	Cerv. Spine 5 Views	72052	
	Chest 2 Views	71020	

✓	X-Rays (Cont.)	CPT	FEE
	Clavicle, Complete	73000	
	Elbow 2 Views	73070	
	Finger Min. of 2 Views	73140	
	Foot 3 Views	73630	
	Forearm 2 Views	73090	
	Hand 3 Views	73130	
	Humerus Min. of 2 Views	73060	
	Knee 4 Views	73564	
	Lumbar 5 Views	72110	
	Shoulder Min. 2 Views	73030	
	Tibia & Fibula 2 Views	73590	
	Toe or Toes 2 Views	73660	
	Unilateral Ribs 3V (inc. PA Chest)	71101	
	Wrist 3 Views	73110	

✓	OMT	CPT	FEE
	One to Two Body Regions	98925	
	Three to Four Body Regions	98926	
	Five to Six Body Regions	98927	
	Seven to Eight Body Regions	98928	
	Nine to Ten Body Regions	98929	

✓	Other	CPT	FEE
	PFT	94010	

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Figure 4. *(Continued)*

tive fields of study. For each session, participants received sections of a reference workbook that contained readings and the appropriate cases for discussion and study. Among the tools used to implement the curriculum were slide projections during lecture presentations, videos on such issues as the Americans with Disabilities Act, and scripted sessions on audiotape to assist with role identification within the worker's compensation system. Problem-based case studies were employed to provide instruction and determine competence in various procedures, such as injection techniques, use of TENS, and therapeutic ultrasound. An interactive video presentation served as the format for the ergonomics presentation.

Group discussions were organized routinely for problem-solving sessions during studies of terminology, legal and regulatory issues, and epidemiology and biostatistics. Worksite assessment, as noted earlier, consisted of visiting a local industry where ergonomic applications at workstations had been studied. A journal club was used to support the curriculum, with emphasis placed on population-based studies that one would encounter in the OEM literature.

Practice-based, case-oriented instruction was phased into the family medicine residents' continuity clinic for half-day-long periods three to four times per week, under the tutelage of family medicine preceptors experienced in OEM. An elective OEM rotation provided an additional opportunity for self-directed learning and included supplemental readings selected from the American College of Occupational and Environmental Medicine Practice Guidelines.[19] One of the requirements of this rotation was that participants become familiar with local employee assistance programs, which provide confidential counseling for workers affected by behavioral and stress-related issues. Study of this area was supplemented by videotapes available from the National Alcohol and Drug Abuse Clearing House. Because of a fortuitous scheduling opportunity, this 1-month elective rotation included attendance at the Mid-Year Educational Conference of the American Osteopathic College of Occupational and Environmental Medicine, which was held in Kansas City in April 1999. During this conference, the resident who selected the optional rotation participated in Part I of the college's three-part basic course of instruction that leads to a certificate of additional qualification in occupational medicine. During this elective month, the participating resident also received the benefit of a focused clinical experience with OEM patients through preferential scheduling and one day of instruction in back school in the Department of Physical Therapy.

Results

Numerous evaluations were conducted both of the learners and the program. Residents evaluated the lecture presentations using a Likert scale that assessed lecture content, organization, materials, usefulness, and level of interest in the topic. Open-ended questions allowed the residents to elaborate on these issues. This form of evaluation revealed a number of interesting and important findings. Residents responded positively to the use of small group learning techniques, and they generally preferred procedural training with direct clinical applications to didactic sessions about the nonclinical issues. Eighty-five percent of the responses indicated that the learners either agreed or strongly agreed that the presentations were valuable.

Learner formative evaluations were based on attainment of performance benchmarks in the procedures and case studies, as set by the preceptors. Also, minutes were taken by the journal club moderator to document satisfactory assessment of literature by the residents. The journal club endeavor and the case-study activities also provided evidence of attainment of the cognitive and the psychomotor skills initially outlined in the learner goals. Performance skills in procedures were acquired easily, and the use of these skills to treat patients under preceptor supervision was both useful and effective. Patient satisfaction surveys were distributed either by mailing or by distributing them directly to patients (N = 50). Only one survey contained equivocal negative comments about the experience, whereas many others indicated that the patients would recommend the care they received to others.

Learner summative evaluations included a chart review of 50 patients' records for OEM cases seen by the residents from January 1999 through March 1999. The residents were able to consistently provide the required elements of information in a standardized manner. Four preceptors interviewed in a semistructured format felt comfortable with the level of OEM expertise displayed by the residents in case management. *Table 2* displays the results of the final self-assessment for the four residents who completed the program. This self-assessment used essentially the same Likert rating scale as in the needs assessment. The median for familiarity with nonclinical subjects increased from 2.94 in the needs assessment to 3.83 in the final self-assessment, while familiarity with the clinical subjects increased from 3.13 to 4.11. Interest in using OEM skills was emphasized in the final self-assessment rather than interest in further OEM education and training, which was emphasized in the earlier needs assessment. For the nonclinical subjects, the median for interest in use was 3.39—nearly identical to the 3.40 in the needs assessment. However, the median for the clinical subjects increased substantially, from 3.53 to 4.28. While the number of subjects in the final self-assessment is too few to offer statistical significance, the assessment does support the clinical significance established by other methods of evaluation.

Program formative evaluations consisted of satisfaction surveys that were mailed to community occupational health managers (N = 8). Of five respondents, all indicated that they had received exceptionally effective communication, case management, and service. The medical director of Carson City Hospital and the office manager at the Greenville clinic were interviewed in a semistructured format numerous times during the implementation phase of the curriculum, which began in August 1998, and also during the practice-based clinic instruction, which

Figure 5. *Results of standardized forms satisfaction survey given to occupational health professionals.* ▶

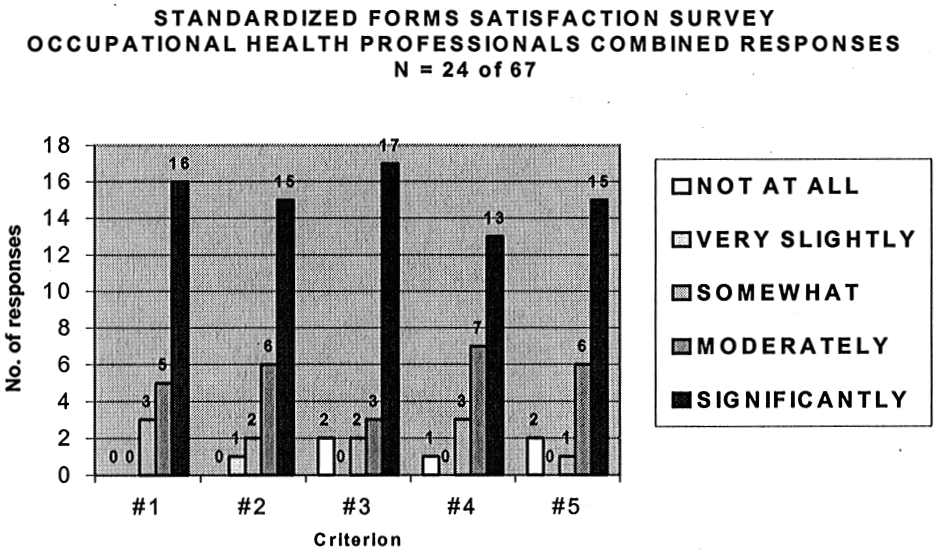

Table 2
Final Self-Assessment (N = 4)

	Familiarity with nonclinical topic areas	Familiarity with clinical topic areas	Interest in utilizing nonclinical topic areas in practice	Interest in utilizing clinical topic areas in practice
N = residents	4	4	4	4
Median	3.83	4.11	3.39	4.28

began in January 1999. In each interview, their responses demonstrated overall approval with the progress and performance of the residents.

The program summative assessment consisted of interviews with occupational health managers (N = 8) in a structured format. These interviews reaffirmed the findings of the formative survey conducted with the health managers regarding the performance of the residents.

Comments

The development and implementation of this OEM curriculum was conducted as a project in faculty development during a 1-year clinical educator fellowship. This fellowship was sponsored by the Division of Family and Community Medicine in the Statewide Campus System of the Consortium of Osteopathic Graduate Medical Education and Training. Mentoring was provided by a member of the Department of Preventive Medicine of the Michigan State University College of Osteopathic Medicine. The mentoring experience provided considerable opportunities for refining curriculum development and implementation. It also served as an opportunity to explore innovative methods of performing community surveys, conducting evaluations, and organizing presentations.

The feedback from residents regarding small group learning activities suggests that more of this style of learning experience would enhance the curriculum, especially for the less-popular nonclinical topic areas. This is consistent with adult learning principles, which are emphasized in the faculty development fellowships through the Statewide Campus System.

We advise those considering similar projects to incorporate OEM into a family medicine curriculum to coordinate their activities as early as possible with the office manager. This should help avert the numerous pitfalls inherent in performing chart reviews, which can be a deceptively complex task. In addition, it might be wise to network with others who share similar interests through professional organizations or colleges, such as the American Osteopathic College of Occupational and Preventive Medicine. This would likely prevent "reinventing the wheel," because many useful strategies may already be available from such organizations.

The evaluations helped to document the important issues of patient satisfaction, acceptance by the occupational healthcare community, and acceptance of the people supervising the program. Based on responses to these evaluations, it seems logical that this program of OEM instruction and practice within the resident continuity clinic would be permanently implemented with little alteration in content. Slight modifications in the teaching strategies, as previously described, would be feasible.

The curriculum in occupational and environmental medicine for family medicine residents at Carson City Hospital includes both a didactic portion, which is longitudinal, and a practice-based phase of instruction. Implementation of this program occurred over 1 year. It is shown to be educationally sound, cost-effective, and independent of external funding, and it was favorably evaluated by patients as well as corporate clients. It is strongly encouraged that this program be adapted to other settings.

Acknowledgment

The authors express their sincere gratitude to those who responded to the surveys and to those who participated in the focus group and interviews.

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