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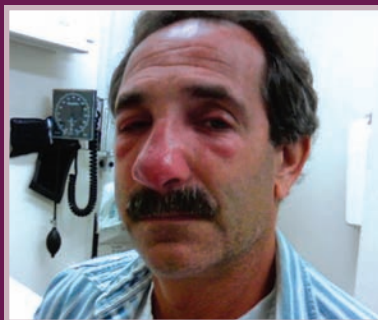


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# Farm Worker Health Risks and Physical Assessment

Barbara Hollinger, RN, MSN, FNP



*This article describes the occupational exposures, socioeconomic factors, and nature of agricultural work that imperil the health of farm workers in the United States. The article focuses on areas of increased risk for each body system covered in a physical examination, and provides a checklist that nurse practitioners can use when caring for farm workers to ensure that their patients are receiving a complete and appropriate physical assessment.*

The US economy depends on the labor of migrant and seasonal farm workers. Planting and harvesting the nation's crops requires intensive manual tasks performed within a compressed time frame. Although tomatoes are often picked green and machines have been designed to do much of the work, no machine is gentle enough to handle strawberries as carefully as well-trained and experienced workers. Once crops are harvested, workers sort, pack, can, or process the product. For NPs to adequately meet the healthcare needs of this high-risk population,

they need to understand both the living and working conditions this group experiences and the specific risks that arise from their occupation and lifestyle.

Farm workers are defined as persons employed in seasonal or year-round agricultural labor. They may be migrant workers (those residing >75 miles from their US work sites), settled workers (those living within a 75-mile radius of their work site), or farmers who do most of their own work.<sup>1</sup> Agricultural labor is defined as any work involved in field preparation, planting, cultivating, harvesting, or

grading and sorting of field, orchard, or nursery products. Also included in the farm worker population are animal and poultry workers who labor in dairy-, meat-, or poultry-processing plants.

The 2005 US Department of Labor's National Agricultural Workers Survey (NAWS) provides a host of demographic data but does not necessarily convey the full size of the US farm worker population.<sup>1</sup> National estimates range from 2.5 to 5 million workers.<sup>1,2</sup> This hired farm work force is predominantly foreign-born, with 75% coming from Mexico and 23% from the

United States.<sup>1</sup> A recent development is the increase in southern Mexican farm workers whose native language is a dialect (eg, Mixteco, Trique), not Spanish. In the NAWS report, 19% of Mexican-born workers were not native Spanish speakers.<sup>1</sup>

Men now constitute 79% of farm workers, as compared with 71% in 1990.<sup>1,3</sup> Female workers are more likely than male workers to be US-born, legal permanent residents, or naturalized citizens.<sup>1</sup> Fewer workers migrate, with 58% reported as settled workers in 2005,<sup>1</sup> as compared with 44% in 2000.<sup>3</sup> This change is likely related to higher risks, including robbery, assault, and rape, at border crossings.<sup>4</sup>

Undocumented workers arrive in this country without the pre-screening examinations that documented workers receive. Workers may present with illnesses such as malaria, which may be endemic in their home country but less common in the United States. Crowded living conditions increase the risk of contracting new diseases in this country. One study showed that the longer workers remain in the migrant stream, the more likely they are to convert on a tuberculosis skin test (ie, have a positive PPD [purified protein derivative] reaction).<sup>5</sup>

Although most agricultural workers are married (58%) and have children (51%), one third of workers with families travel without their spouse or children.<sup>1</sup> Latina women who, for economic reasons, travel to the United States to work without their children, suffer tremendously from the separation. Many of them work multiple jobs for years to enable themselves to eventually reunite with their children.<sup>6,7</sup>

Newly arrived immigrants are unfamiliar with the US healthcare

system and are less educated than are US citizens.<sup>8</sup> On average, foreign-born farm workers have completed  $\leq 6$  years of school.<sup>1</sup> The combination of low education and limited English skills results in poor health literacy. Men are reluctant to miss work and unlikely to seek preventive services. Women and children are often the majority population seen in clinics as they seek prenatal, family planning, or well-child care. With a mean wage of \$7.25 an hour, families have limited financial resources for health care, and 30% of farm workers have a total family income below poverty limits.<sup>1</sup>

### Nature of Farm Work and General Risk Factors

The nature of agricultural tasks places workers at increased risk for health problems. Farm work is widely recognized as one of the most hazardous occupations.<sup>9</sup> The US Department of Labor combines farming, fishing, and forestry when comparing injury and fatality rates of major occupational groups. In 2006, farming/fishing/forestry had the highest fatality rate—30.0/100,000 employed—of all occupations, compared with rates of 17.0/100,000 for transportation and material moving and 13.4/100,000 for construction and extraction.<sup>10</sup>

**Physical Injuries**—A University of California–Davis study showed that 9.3% of full-time agricultural employees had an injury necessitating time off from work over an 18-month period.<sup>9</sup> Injuries included fractures, sprains, strains, falls, open wounds, contusions, foreign bodies in the eye, nerve injuries, poisonings, dermatitis, and machinery- or motor vehicle-related incidents. Farm workers encounter extremes of heat and cold, as well as wind, rain, dust, noise, and vibrations in their work environment. In July 2005, three heat stroke deaths in California’s Central Valley prompted the state’s Occupational Safety and Health Administration to implement temporary emergency measures requiring employers to provide 1 quart of water per hour per employee, and provide shade and rest for those suffering from heat-related illnesses.<sup>11</sup>

**Chemical Exposure Injuries**—Chemicals that pose health hazards for farm workers exposed to them include pesticides, herbicides, fungicides, defoliants, fertilizers, and solvents. Symptoms of acute organophosphate pesticide poisoning usually occur within minutes to hours of the toxic exposure and present as cholinergic excess. Table 1 provides two useful mnemonic devices to recall these symptoms. Most attention focuses

TABLE 1 SYMPTOMS OF ORGANOPHOSPHATE AND CARBAMATE PESTICIDE TOXICITY			
<b>SLUDGE</b>	Salivation	<b>The 3 Bs</b>	Bradycardia
	Lacrimation		Bronchorrhea
	Urination		Bronchospasm
	Defecation		
	Gastric Emptying		

on acute effects of pesticide poisonings, but evidence now links long-term exposures to neurologic illnesses such as Parkinson's disease.<sup>12</sup> Epidemiologists may not be able to link specific chemicals to specific illnesses because workers hold different jobs with different employers and have multiple exposures to multiple chemicals. An exception is organophosphate and carbamate pesticide applicators, who have a known risk of toxic exposure and require regular cholinesterase monitoring, as noted in the checklist in Table 2.<sup>13</sup>

**Biological Exposure Injuries—**Biological exposures also create health hazards. Insect, snake, and animal bites are common. One study listed poison oak exposure as the most common occupational hazard.<sup>14</sup> Tetanus and coccidiodomycosis are risks of soil exposure. Tree farm workers may encounter ticks and be at risk for developing Lyme disease. Farm workers with rodent or wild animal contact are at risk of developing plague, rabies, or hantavirus.<sup>5</sup> Although no cases of avian influenza (bird flu) have been reported in the United States, poultry workers will be at risk if the H5N1 virus, primarily affecting domesticated chickens, ducks, and turkeys, arrives here.

**Psychological Illnesses—**Agricultural employees also suffer psychological illnesses. Undocumented immigration status is a constant worry for many foreign-born farm workers. Some have endured violent border-crossing experiences and suffer post-traumatic stress disorder. Constant preoccupation with the status of family back home, loneliness and isolation, make depression and anxiety common.<sup>15</sup> Alcohol may be used to ease psychological pain.

Some farm workers have reported use of methamphetamines to enhance productivity.<sup>16</sup> Drug use includes US prescription drugs such as antibiotics, hormones, psychotropic medications, and injectable vitamins available over the counter in Latin America. Farm workers may use and reuse needles to inject vitamins not commonly considered "drugs of abuse."<sup>17</sup> NPs need to take these risk factors into account as they care for these patients.

### History and Physical Assessment

NPs in many parts of the United States encounter farm workers among their patient population. These sections of the article review the occupational history and common health problems relevant to farm workers. Table 2 provides a checklist to guide NPs in caring for these vulnerable patients.

**History—**The workup begins with a thorough occupational history that includes the specific task(s) in which the farm worker is engaged and the crop(s) with which he or she works. A person hoeing weeds all day has different risks than does a pesticide applicator. Jobs vary greatly within the same crop. For example, a grape worker may prune vines, tie vines to a trellis, harvest table grapes, or dry grapes for raisin production. NPs ask whether the job necessitates awkward postures, repetitive motion, or carrying heavy loads.

NPs screen for chemical exposures by asking whether spraying occurred while a patient was working in the fields or whether foliage was wet upon entering the field. Illness complaints are compared with similar symptoms experienced concurrently by co-workers. Because chemical exposure occurs primarily through the skin, eyes, or

respiratory tract, NPs screen for pre-existing conditions such as eczema or asthma, which increase a farm worker's risk for increased skin absorption or sensitivity reaction. Physical complaints relieved during time away from work are more likely to have an occupational origin.<sup>18</sup>

**Common Health Concerns—**The California Agricultural Workers Health Survey (CAWHS) is one of the few large-scale studies conducted on US farm workers.<sup>19</sup> This 2000 study, which included workers on various crops from five diverse agricultural areas, has relevance to workers on similar crops elsewhere. A total of 971 farm workers from California's agricultural communities were interviewed and 652 of them underwent a physical examination and basic blood chemistry tests. Results elucidate many of the health concerns for this population.

**Weight and vital signs.** Despite the vigorous physical activity involved with agricultural work, 81% of the men and 76% of the women in the CAWHS were overweight, and 28% of the men and 37% of the women were obese.<sup>19</sup> Both men and women were twice as likely as other US adults aged 24-34 years to have hypertension. Hypercholesterolemia was common in men aged 20-54 years, and 18% of the men had two of the three major risk factors—obesity, hypertension, and hypercholesterolemia—for cardiovascular disease (CVD).

**Skin disease.** Diseases of the skin are the most common occupation-related illness, and agricultural workers are at particularly high risk.<sup>14,20</sup> Contact dermatitis, for example, can be acquired from exposure to irritants such as garlic or onions, allergens such as poison oak, or contact urticaria from

**TABLE 2 FARM WORKER HISTORY AND PHYSICAL ASSESSMENT CHECKLIST<sup>13</sup>**

<b>SUBJECTIVE INFORMATION</b>	<b>SCREEN FOR:</b> Pre-existing conditions that increase patient risk for injury:		Caries Missing, broken teeth Abscesses Gingivitis, pyorrhea Oral cancer Children: baby bottle tooth decay
Past medical history	Eczema (broken skin) Asthma Cardiac condition Musculoskeletal condition	<b>Respiratory</b>	Asthma Tuberculosis Coccidiomycosis
Detailed occupational history	Crop Time of year Job task description Hours/day doing this job Physical stressors Chemical exposures Biological exposures Prior work injuries	<b>Cardiovascular</b>	Cardiac murmurs and arrhythmias Hypercholesterolemia Hypertension Diabetes mellitus
Psychosocial history	Border incidents, domestic violence, other victimization Housing, living arrangement Diet/nutrition Family separation Substance use/abuse <ul style="list-style-type: none"> <li>■ Alcohol</li> <li>■ Tobacco</li> <li>■ Intravenous/ intramuscular drugs</li> <li>■ Methamphetamine</li> <li>■ Marijuana</li> </ul> High-risk sexual behavior Psychiatric history <ul style="list-style-type: none"> <li>■ Depression</li> <li>■ Anxiety</li> <li>■ Post-traumatic stress disorder</li> <li>■ Other</li> </ul>	<b>Gastrointestinal</b>	<i>Helicobacter pylori</i> peptic ulcer disease Cholecystitis Hepatitis A, B, C Intestinal parasites
<b>PHYSICAL EXAMINATION</b>	<b>SCREEN FOR:</b>	<b>ROUTINE RECOMMENDED LABORATORY TESTS AND SCREENS</b>	PPD Fasting glucose, lipid panel CBC O&P as indicated RPR, GC, CT as indicated O <sub>2</sub> saturation, PFTs as indicated
Height, weight, BMI vital signs	Overweight, obesity Hypertension Fever	<b>Pesticide applicators with ≥6/30 days/month organophosphate/carbamate exposure</b>	AChE level measured at baseline and q3-4wks (monitor for decrease of 30%)* PChE level measured at baseline and q3-4wks (monitor for decrease of 40%)*
Skin	Contact dermatitis Fungal infections: hand, foot, nail Bacterial infection	<b>Women</b>	Pap smear Clinical breast examination Mammogram
Eyes: visual acuity, external eye, funduscopic exam	Refractive errors Pterygium Diabetes-related retinopathy Cataracts	<b>Routine adult immunizations</b>	Tdap, hepatitis A & B series
Ears and audiometry	Ceruminosis Otitis externa Hearing loss		

\*AChE is thought to be a better marker of chronic exposure, whereas PChE is a better indicator of recent acute exposure.<sup>13</sup>

AChE, acetylcholinesterase; BMI, body mass index; CBC, complete blood cell count; CT, *Chlamydia trachomatis*; GC, gonococcus; O&P, ova and parasites; PChE, plasma cholinesterase; PFT, pulmonary function test; PPD, purified protein derivative; RPR, rapid plasma reagin [test]; Tdap, tetanus, diphtheria, pertussis.

plants such as stinging nettle.<sup>14,20</sup> Certain crops with dense foliage (eg, orange trees) have considerable contact with the skin, thereby exposing pickers to the chemical residues on the leaves. Hand, foot, and nail fungal infections are common, especially in workers whose skin remains damp for extended periods of time. Skin cancer and occupational acne from pesticide exposure also occur.<sup>14,20</sup>

**Eye/vision disorders.** The CAWHS showed that 70% of farm workers had never had an eye exam,<sup>19</sup> supporting findings of an earlier study showing refractive error as the most commonly diagnosed eye condition in this population.<sup>21</sup> Eye infections, injuries, pterygiums, and diabetes-related eye conditions are other commonly reported complaints.<sup>21</sup> Ultraviolet B (UVB) light exposure is a dose-response risk factor for cataracts.<sup>22</sup> Use of a brimmed cap and 100% UVB protection safety

glasses is recommended for protection. The Migrant Clinician's Network (MCN; [www.migrantclinician.org/](http://www.migrantclinician.org/)) is a good resource for farm worker eye training materials.<sup>21</sup>

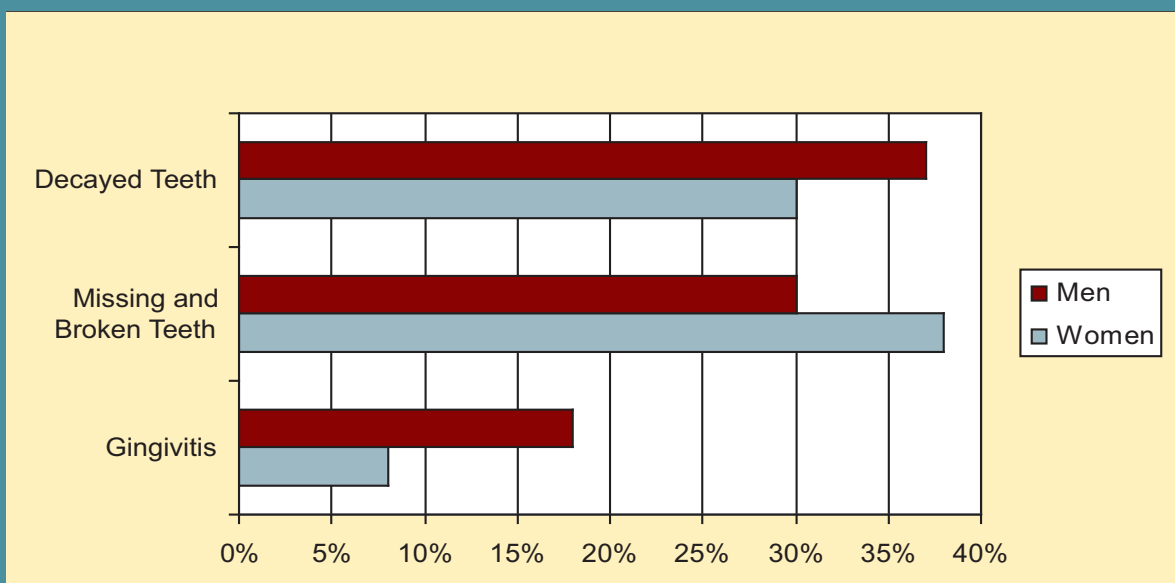
**Ear and hearing disorders.** Agricultural workers using tractors, harvesters, or other noisy equipment are at risk for hearing loss. In a study of 150 agricultural workers in the northeast United States, 35% complained of hearing difficulty and 50% had some hearing loss on audiometry, especially in the higher frequencies.<sup>23</sup> Ceruminosis and otitis externa infections are common complaints.<sup>24</sup>

**Dental disorders.** The CAWHS demonstrated the poor dental health of farm workers. Among this group, 50% of the men and 44% of the women had never visited a dentist,<sup>19</sup> with abscesses, pyorrhea, oral cancer, gingivitis, caries, and missing and broken teeth being common complaints (Figure). Baby bottle tooth decay is

especially prevalent in farm workers' children, with one Washington study showing 29% of children affected.<sup>25</sup> Female farm workers have another concern: Studies have linked periodontal disease in pregnant women to low-birth-weight in infants, and suggest that treating periodontal disease may decrease the risk of preterm birth.<sup>26</sup>

**Respiratory disorders.** Farm workers are at increased risk for chronic asthma, coccidioidomycosis, and tuberculosis. The 10-year University of California–Davis Farmer Health Study randomly sampled 1947 California farms regarding lung function of the farm operators.<sup>27</sup> Results showed that the longer the dusty job exposure, the higher the incidence of breathing problems such as persistent wheeze, chronic cough, or bronchitis. Specific tasks associated with respiratory problems include operating tractors or harvesters, hay or straw exposure, and vineyard

FIGURE. | CAWHS CLINICAL DENTAL EXAMINATION<sup>19</sup>



work.<sup>27</sup> Farm workers doing similar tasks carry the same risks.

Coccidiomycosis is endemic to southwestern desert areas such as California's central valley, southern Arizona, southwest New Mexico, West Texas, and parts of Latin America. Persons with relatively extensive fungal exposures, including farm workers, are much more frequently symptomatic. African Americans, Filipinos and immune compromised persons, including patients with diabetes and pregnant women, have increased risk for disseminated disease. Transmission is by inhalation of windborne arthroconidia, a type of fungal spore. Common complaints are chest pain, cough, and fever, but they may also include hemoptysis, arthralgias, and erythema nodosum. Any person suspected of having coccidiomycosis needs to undergo serologic testing for antibodies.<sup>28,29</sup>

**Cardiovascular disease and diabetes.** Farm workers have multiple risk factors for CVD. Overweight/obesity is linked to an increased risk of diabetes. Although few CAWHS participants (2.3%) had a previous diabetes diagnosis, 4.3% were found to have a non-fasting blood glucose level >200 mg/dL.<sup>19</sup> Because 31.8% of the men in the study had never seen a physician and nearly 12% of Mexican-American adults have diabetes,<sup>30</sup> many farm workers are likely to have undiagnosed diabetes. Certain Mexican farm workers hold traditional beliefs such as that *susto*, an extremely frightening incident, caused their diabetes.<sup>31</sup> NPs should ask patients what they believe caused their illness.

**Gastrointestinal (GI) disorders.** *Helicobacter pylori*-related peptic ulcer disease (PUD) and cholecystitis are common in the predomi-

nantly Mexican agricultural worker population.<sup>32,33</sup> Farm workers may be increasing PUD risk by using nonsteroidal anti-inflammatory drugs to relieve musculoskeletal conditions. Recent immigrants with GI complaints may also have parasitic infections.

Nausea, vomiting, diarrhea, and abdominal pain are common manifestations of acute organophosphate and carbamate pesticide poisoning and should be suspected in patients who have the symptoms listed in Table 1.<sup>34</sup> Hepatitis A and B are also encountered in the farm worker population. Hepatitis B, as well as HIV and other sexually transmitted infections,<sup>16</sup> are more likely to occur in single or married unaccompanied farm workers who engage in high-risk sexual encounters than in individuals who abstain from sex or who have a monogamous relationship. Screening for such high-risk behavior includes direct inquiry about sex with prostitutes, men having sex with men, and condom use. In a North Carolina study, 46% of the single men reported visiting a commercial sex worker within the previous year.<sup>16</sup> Studies analyzing HIV risk factors in farm worker populations suggest that men having sex with men self-identify as homosexual only if they are the recipients of oral or anal sex.<sup>35</sup>

**Musculoskeletal (M-S) disorders.** Disorders of the M-S system are the most common complaints in agricultural workers. Sprains and strains account for 43% of non-fatal disabling injuries reported for California farm workers.<sup>36</sup> Work with fruit or vegetable crops accounts for the most lost time from M-S complaints.<sup>37</sup> Tendinitis, impingement syndromes, arthralgias, and arthritis are common.

Farm workers have many biomechanical risk factors from long hours performing repetitive tasks (eg, hoeing weeds, pruning) and awkward positions (eg, kneeling while tying vines, stooping to harvest lettuce). Back pain is one of the most common complaints of production agriculture workers.<sup>1,38</sup>

**Genitourinary (GU) disorders.** Bladder and urinary problems are common complaints in female farm workers.<sup>39</sup> These problems are likely related to women's reluctance to use the often distant and dirty field toilets, as well as inadequate fluid intake. Workers paid by piece rate often restrict water consumption to reduce the number of breaks needed to urinate.<sup>39</sup>

Pap smears and mammograms should be encouraged for all women >40 years of age. A study investigating cervical cancer rates in Mexican farm workers in the United States showed the incidence was 2-4 times higher in this group than in the general population.<sup>40</sup> Cervical cancers were at a more advanced stage of disease at time of diagnosis, so affected women had a poorer prognosis. Barriers to breast and cervical cancer screenings include a strong fear and fatalistic attitude toward cancer; transportation and time constraints; and cultural discomfort related to breast and pelvic exams specifically when done by male practitioners.<sup>41</sup>

Men may also have pesticide-related reproductive effects. A discovery that men working at a DBCP (1,2-dibromo-3-chloropropane) pesticide plant in Lathrop, California, were sterile resulted in the ban of this chemical in California.<sup>42</sup>

**Pregnancy.** Pregnant women engaging in field work have special health concerns. Although specific

pesticides cannot always be definitively linked to specific human birth defects, many pesticides have reproductive effects in animal studies and women are exposed to multiple chemicals over their work life.<sup>43</sup> Pregnancy also changes a woman's center of gravity, making her more susceptible to falls. Increased sweating makes additional hydration essential to prevent heat-related illnesses.

**Neurologic disorders.** Neurologic conditions common in farm workers include stress-related headaches and diabetes-related neuropathies. Neurocysticercosis, caused by *Taenia solium* (a pork tapeworm) in its cyst stage, is the most common parasitic infection of the central nervous system (CNS).<sup>44</sup> A study of adult farm workers working in Ventura County, California, showed that the prevalence of antibodies to this parasite approximated the level in Latin America.<sup>45</sup> *T solium* is most commonly acquired by ingesting ova in contaminated water or eating undercooked or raw, infected pork. Cysts can occur in the brain, muscle, eye, or skin. Initial symptoms are often CNS manifestations such as a new-onset seizure in adults with or without other signs of meningeal irritation. Persons presenting with this profile should be screened for anticysticercal antibodies. At present, the serum enzyme-linked immunoblot test is the most reliable, along with computed tomography and magnetic resonance imaging, for identifying the characteristic lesions.<sup>46</sup>

### Farm Worker Physical Assessment Checklist

The checklist in Table 2 highlights areas that NPs should assess when screening agricultural workers. The

Physical, chemical, biological, and psychological factors affecting farm workers need to be assessed when these patients come into the clinic or office.

past health history includes questions about pre-existing conditions that increase risk of farm worker injury. A detailed occupational history with specific description of work responsibilities and occupational exposures is essential.

Physical examination includes body mass index calculation for all farm workers and family members  $\geq 2$  years. Given the high incidence of dermatologic complaints, farm workers should undergo a full-body skin assessment. Particular attention is paid to the feet and nails of persons working in damp or muddy environments.

Visual acuity is evaluated at initial screening physicals. All workers are screened with in-office audiometry and provide information about noise protection. NPs should include dental screening and referral resources with any agricultural worker health assessment.

Patients with respiratory complaints should undergo assessment of their O<sub>2</sub> saturation level and peak flow meter volume to establish baseline values. Likewise, farm workers with irregular heart rhythms or diabetes should undergo a baseline electrocardiogram. Recent immigrants with anemia are screened for parasitic infections. Workers applying organophosphate and carbamate pesticides need regular cholinesterase moni-

toring either by an NP or a designated public health agency.

NPs caring for farm workers need to familiarize themselves with the most common crops grown in their area and the musculoskeletal complaints associated with the growing of those products. Visiting a farm and observing workers on the job can be educational for clinicians and can facilitate dialogue with farm operators who share the common interest of maintaining a healthy work force. Some farm worker clinics have mobile health vans with an established relationship with farmers that facilitate such visits.

### Conclusion

Physical, chemical, biological, and psychological factors affecting farm workers need to be assessed when these patients come into the clinic or office. A good occupational health history is essential to evaluate specific risk factors. NPs should try to accomplish as much as possible in a single visit because access and time lost from work may make return visits difficult. For migrant workers, NPs should use the free MCN Health Network that allows clinics to track tuberculosis, diabetes, cancer, and prenatal patient records across sites within HIPAA guidelines. Forms are available at [www.migrantclinician.org/network](http://www.migrantclinician.org/network).



Agricultural workers make major contributions to the US economy. NPs are well equipped to provide the respect and compassionate care this vulnerable population needs and deserves. ■

*Barbara Hollinger is an associate clinical professor at the University of California, San Francisco, in the Department of Family Health Care Nursing. The author states that she does not have a financial interest in or other relationship with any commercial product named in this article.*

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