WORKSAFE
safety, health, and justice for workers

PREVENTION PAYS

SOLUTIONS TO HELP WORKERS AND BUSINESSES THRIVE

"Businesses spend $170 billion a year on costs associated with occupational injuries and illnesses—expenditures that come straight out of company profits. But workplaces that establish safety and health management systems can reduce their injury and illness costs by 20 to 40 percent. In today's business environment, these costs can be the difference between operating in the black and running in the red."

——*Occupational Safety and Health Administration: Making the Business Case for Safety and Health*

"'It is better to put a fence at the top of a cliff than an ambulance at the bottom,' says Mark Savage, Director of Corporate Health Solutions for Methodist Hospitals in Gary and Merrillville. 'Companies are so bottom-line driven, prevention can be a hard sell, but it is always a better solution.'"

—Prevention pays off: Why Occupational Health Is Worth the Investment, Indiana Business Magazine, 2004

"Studies have shown that expenditures on occupational health and safety create a positive return to the bottom line of employers. Protecting the health and safety of America's workers should not be debatable."

—American Industrial Hygiene Association (AIHA), writing to Tom Harkin, Chairman of the Senate Committee on Health, Education, Labor and Pensions; July 19, 2011

1. INTRODUCTION

Every year, thousands of people in California die or are seriously hurt by work-related injuries, illnesses, and diseases that could, and should, have been prevented.

The failure to prevent these outcomes is expensive for all involved—the workers, their families, their employers, governments (through federal, state, and municipal programs), insurance companies, and communities as a whole. The 6,362 work-related fatalities reported in this state between 1992 and 2002 cost $5.4 billion alone, in direct and indirect costs.[1] Those are just immediate injuries that led to death. The costs of occupational disease, injuries, and illnesses—which shorten and change lives—are estimated to be at least $20.7 billion a year in California.[2]

Prevention does pay. That knowledge is behind many government programs, particularly in public health (including occupational health and safety). It's the basis for the Occupational Safety and Health Administration (OSHA) webpage, Making the Business Case for Safety and Health. Documentation comes from employers, insurance companies, studies, and other sources.

Occupational health and safety specialists have made the argument for years, based on their experiences and studies. The U.S. National Safety Council, Dupont, and Underwriters Laboratories were among the original signatories to the international Seoul Declaration on Safety and Health at Work in 2008. The first international conference about primary prevention for occupational and environmental cancers (which produced the Asturias Declaration) in 2011 is a similar focused effort to make the point about prevention.

Health and safety "problems" come with many costs that are borne inside and outside the workplace. At the moment, they tend to be ignored. As a result, most employers and governments pay little attention to developing and using effective solutions and the tools that go with them. Much time is spent debating if something "must" be done, rather than using the evidence that prevention pays. Examples of effective and innovative solutions are often kept in-house so businesses keep their competitive edge; those that are shared publicly can be difficult to find.

It's time to shift from a focus on "the problem," and how bad it is, to a prevention framework that emphasizes solutions and "fixing" problems. It's time to make the goal clearer by using the word "prevention" instead of "controls," and "health" along with "safety." It's time to make the rewards of prevention more consistent, wide-ranging, and initiated by more employers and workers.

1 National Institute for Occupational Safety and Health (2011) The economic burden of occupational fatal injuries to civilian workers in the United States based on the census of fatal occupational injuries, 1992–2002. The costs are in 2003 US dollars.

2 J. Paul Leigh, James Cone and Robert Harrison (2001) "Costs of occupational injuries and illnesses in California," in *Preventive Medicine*.

It's also time to look to effective pillars for healthier and safer workplaces such as:

- tracking and publicizing health data, as well as effective and innovative solutions;
- financial support for research to practice (R2P) projects;
- educating and training workers and others who are key players in this shift to effective prevention; and
- methods to share the results of these activities.

This paper lays out why it's essential and feasible for California to have a properly funded, long-term prevention program. We present some information about the current situation, including some of the barriers that make it difficult to shift to a focus on solutions and prevention. We describe some steps to overcome those barriers. Stories from California and elsewhere illustrate our points.

CANCER PREVENTION: SAVING LIVES AND BILLIONS OF DOLLARS AROUND THE WORLD

"(C)redible estimates from the World Health Organization and the International Agency for Research on Cancer suggest that the fraction of global cancer currently attributable to toxic environmental exposures is between 7% and 19%...

Many cancers caused by environmental and occupational exposures can be prevented. Primary prevention—environmental interventions that halt the exposures that cause cancer—is the single most effective strategy. Primary prevention reduces cancer incidence, and it saves lives and billions of dollars…

Despite their proven feasibility and cost-effectiveness, efforts to prevent environmental cancers [including those related to occupation] have lagged. In contrast to vigorous and well-coordinated global efforts to prevent cancers caused by tobacco, much more needs to be done in environmental cancer control and to further develop strategies for prevention of environmental causes of cancer [including occupations]."

—Philip Landrigan, Carolina Espina, and Maria Neira (2011) "Global Prevention of Environmental and Occupational Cancer," in Environmental Perspectives

2. WHAT DOES "THE PROBLEM" COST CALIFORNIANS?

Thousands of Californians and other Americans have been permanently disabled by occupational injuries, illnesses, and diseases. Ten years ago, University of California researchers estimated that:

- nearly **two million** workers in the state are injured and made ill every year (1.645 million injured, 0.133 million get sick);
- death claimed nearly **8,000** more a year—7,079 from illnesses and 660 from injuries (work-related illnesses resulting in deaths include lung and heart diseases);
- the combination of occupational injuries and diseases costs California at least **$20.7 billion** a year in lost wages and productivity, health care, administrative, and other costs; and
- this includes almost **$294 million** that it costs employers to re-staff, train, and deal with other disruptions.

These numbers only hint at the true costs. They don't include an estimated **$12 billion** in lost employee earnings and benefits, or the years it takes to recover financially from a permanent disability. These estimates also are likely to be low because:

- they ignore costs associated with pain and suffering;
- they ignore home care provided by family members; and
- the number of occupational injuries and illnesses likely are under-counted.[3]

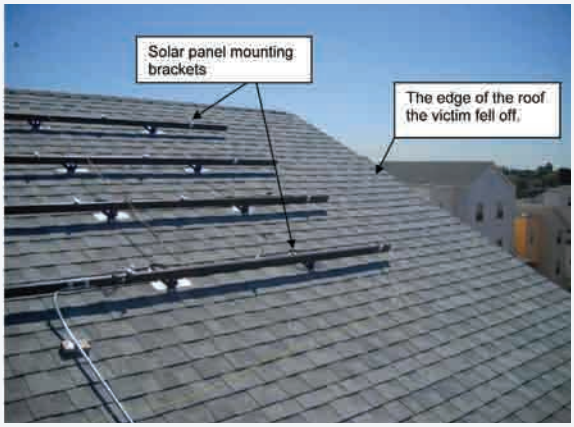
Workplace injuries and illnesses "are a major contributor to the total cost of health care and lost productivity in California," Leigh and his colleagues concluded. These costs equal those "of all cancers combined and [are] only slightly less than the cost of heart disease and stroke." Less than half are covered by workers' compensation. The other costs are shifted to workers and their families, private health insurance, Medicare and Medicaid—i.e., California citizens. Clearly, they are a huge drag on the state and national economies.

Those points are illustrated in the two examples on page 5, about a nurse who can't work any more because of the effects of lifting patients for 25 years, and a solar panel installer who died from a fall.

Incidents that damage people, buildings, and equipment can be very expensive and have long-term effects. When unsafe conditions result in part or all of a plant catching fire or exploding, it not only kills and injures the people who work there. It may also lead to management deciding to not rebuild or to shut down the plant completely, throwing everyone out of work. See the box on page 6 for examples.

3 J. Paul Leigh, James Cone and Robert Harrison (2001) "Costs of occupational injuries and illnesses in California," in *Preventive Medicine*.

Falls from roofs kill construction workers



On April 7, 2010, a 30-year-old solar panel installer was working on the roof of a three-story San Pablo, Calif., apartment building. Hans Petersen walked backwards to check bracket alignment. Without fall protection in place, he died after stepping off the sloped roof and falling 45 feet to the concrete below.

The law requires fall protection when working at heights. The employer's project plan required a fall protection program. But no one on the work crew was wearing protective equipment and there were no guard rails or safety nets. "The crew supervisor used his discretion," California Department of Public Health investigators said. He assumed fall protection wasn't necessary "since the solar panels were being installed within the center of the roof and not close to the edges." The DPH made recommendations about how to prevent similar fatalities. (Eighteen percent of all workplace-related fatalities in California in 2009 were the result of falls.)

Caring for patients leads to back injuries and disease

Sherry was a registered nurse for 25 years. She cannot work any more because of chronic pain. All the minor back injuries she had at work caught up with her one day when she was in an intensive care unit. Her patient pitched forward while returning to bed. Putting the patient before herself, Sherry tried to prevent the woman from falling. The result was agonizing pain and the end of her career.

Mechanical Lift
Courtesy National Nurses United

After months of disability leave and treatment, Sherry can't sit, stand, or walk for more than 15 minutes without pain. She's not the only one who's paid this price. And no wonder. One study found that nurses and other health care workers lift an average of 1.8 tons in a typical eight-hour shift.

Electric lifts to move patients would have prevented Sherry's pain and disability. They're used in other hospitals and nursing homes. Nine states support or require safe patient handling policies, programs, and/or mechanical lifting equipment. Minnesota, Ohio, and Washington provide financial incentives to purchase the equipment. (The Massachusetts Nurses Association describes these state laws, programs, and financial incentives at http://www.massnurses.org/health-and-safety/articles/safe-patient-handling/legislation.)

It pays to prevent back injuries and disease in health care. "The initial investment in [mechanical lifting] equipment and training is quickly recovered because of the reduced injury costs to caregivers," says the National Institute for Occupational Health and Safety (NIOSH) in its 2006 document, *Safe Lifting and Movement of Nursing Home Residents.* Available at http://www.cdc.gov/niosh/docs/2006-117.

Safety hazards lead to deaths, displacement, and unemployment—and lessons that are ignored

- Union members at a Peabody, Mass., tannery requested access for their industrial hygienist to check plant conditions. The plant manager not only refused, but said that if the workers found too many problems, he would close the plant. Two weeks later the facility had a fire, burned to the ground, and never re-opened.
- For 10 years, its insurance carriers warned Ford Motor Company about fixing a disabled gas safety device at its Ford Rouge Powerhouse. Instead, the explosion of 1999 injured 31 employees, 15 of them critically. The damage to buildings and equipment, medical treatment of victims, and related loss of business cost hundreds of millions of dollars. Ford Motor Company paid $1.5 million in OSHA penalties and committed to spend another $5 million in other ways. Ford ended up downsizing the operation.
- The 2005 Graniteville, N.C., train wreck and chlorine spill killed nine workers in a facility near the tracks, displaced 5,400 people, and permanently changed a community. Avondale Mills and other local businesses closed, as they had no way to get raw materials to their facilities.
- The T-2 gasoline additive factory near Jacksonville, Fla., had a runaway reaction in December 2007 involving highly-reactive sodium metal. The explosion killed four and injured 32, including 28 at surrounding businesses. Building remnants were found a mile away. Three adjacent businesses had to relocate from the industrial area, and a fourth business—a trucking company–was put out of business due to the damage. A U.S. Chemical Safety Board (CSB) investigation found that the reactions could have been prevented if OSHA's process safety management standard covered reactive hazards.
- After the 2009 explosion at the Sunoco refinery in Pennsylvania, the company decided not to rebuild its ethylene unit. Fifty workers were laid off.
- In 2009, lack of regulations not only killed three workers at the ConAgra food processing plant in Garner, N.C., that made "Slim Jim." It also killed jobs. Before the disaster, 700 people worked at the factory. After the explosion, the company decided to close the plant.

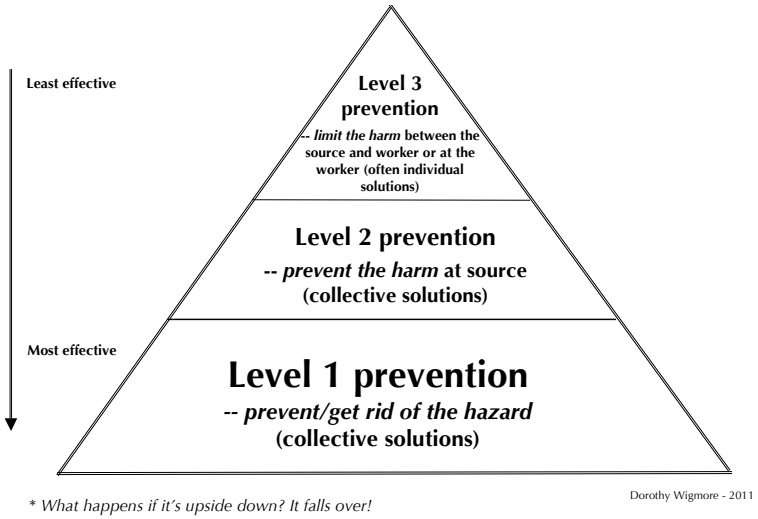
3. WHAT DOES PREVENTION MEAN FOR OCCUPATIONAL HEALTH AND SAFETY IN CALIFORNIA?

What Is Prevention? Why Is It Effective?

These workplace casualties can be prevented. We do not have to accept them as "part of the job" or "accidents" (which, by definition, cannot be prevented).

Prevention is explained in the triangle (right), a visualization of the well-recognized principle of tackling hazards. Note the language used.

Prevention is not about "controlling" a hazard (so that it is still there); it is about avoiding and limiting harm. It's the public health approach of aiming for the most effective solutions. They protect the most people by preventing or getting rid of hazards. Limiting harm is the least effective solution, although it's often a necessary first step.



The Prevention Triangle:
Principles for Solving Health and Safety Problems

Far from being "job killers," measures to prevent injuries and illnesses have led to lots of benefits in a wide spectrum of workplaces. Many businesses see the value of investing in prevention.

Studies and experiences tell us that prevention pays because it helps to ...

- eliminate hazardous substances, processes, tools, and equipment;
- spur creation of new technologies and healthier/safer products;
- avoid substantial costs for equipment to protect workers and/or comply with regulations (e.g., personal protective equipment, elaborate ventilation systems);
- lower workers' compensation costs and insurance risks;
- save and create jobs;
- improve health and employee morale;
- reduce absenteeism and turnover;
- improve business processes, efficiency, and product quality;
- increase labor productivity and production;
- enhance competitiveness;
- improve customer satisfaction and public image; and
- increase investor satisfaction.

SENIOR FINANCIAL EXECUTIVES AGREE

More than 60% of senior financial executives in one study agreed that each $1 invested in injury prevention returns $2 or more. In another study, 95% of executives reported that workplace safety and health has a positive impact on a company's financial performance.

—Liberty Mutual's Workplace Safety Index Reports (http://www.libertymutualgroup.com)

Studies Show How Prevention Pays

AVOIDING LOW BACK PAIN LEADS TO PRODUCTIVITY IMPROVEMENT

Low back pain usually can be prevented. Yet it affects more than 26 million Americans of working age and costs $28 billion a year in lost productivity.

Researchers at UMass Lowell developed a "net-cost model" to calculate the cost-effectiveness of actions that several large companies took to reduce low back pain. It considers the direct costs of equipment and labor, productivity improvements, and the avoided costs of lost work time and medical care. Productivity improvements led to the greatest economic savings from ergonomic changes in the companies studied.

A small wood processing plant spent $5,338 annually for ergonomic evaluations, new equipment, and a physical therapist to teach exercises about how to prevent musculoskeletal disorders. During three years of interventions, the company had no reports of acute low back pain. It also had a 10% gain in productivity and saved an estimated $76,872 a year, or $625 per worker.

Instead of having ironworkers bend to tie rebar, the work is raised to their comfort zones.
Courtesy, Occupational Health Branch, CDPH

Low back pain led to 60 missed days of work in one year among the 20 office staff of a major automotive supplier. For 12 years, the company then ran an ergonomics program for these secretaries, engineers, engineering technicians, managers, and salespeople. It provided lumbar pads, backrests, and workshops. In the 12 years, there were 12 reports of low back pain but no one missed any work. The company reported a 5% productivity improvement and the researchers calculated cost savings at about $111 per employee.

A third company made ergonomic changes in a four-year period (e.g., lift and tilt tables and other measures to reduce loads and awkward back postures). Before this, low back pain caused an average of 693 missed days of work each year among the 1,500 workers at the auto and truck assembler. In the three years after implementation, there were an annual average of 3.3 acute cases and one sick day. Productivity went up 40% as the average time to produce one unit decreased from 80 hours to 57 hours. The cost savings per worker was estimated at $1,556.[4]

ELIMINATING TOXIC CHEMICALS FROM CAR BATTERIES SAVES MONEY AND HEALTH

A manufacturer of hybrid car battery components redesigned its production process to eliminate the use of titanium tetrachloride.

As a result, the company no longer had to buy personal protective equipment to limit harm to workers (i.e., irritation of skin, eyes, and lungs). It didn't need expensive pollution control equipment and avoided potential environmental and occupational health fines. Seven of the nine steps required to manually transfer material were gone, along with their ergonomic hazards. Employee morale improved, along with the company's public image.

The redesign had other significant business benefits. It expanded the company's production capacity by a factor of 10 in the same space. In turn, this led to doubling the production staff and a five-fold increase in output. The estimated economic benefits included a 59% return on investment.[5]

4 Supriya Lahiri, Judith Gold, and Charles Levenstein (2005) "Net-cost model for workplace interventions," in *Journal of Safety Research.* Available at http://www.who.int/occupational_health/topics/lahiri.pdf.

5 This example, and 14 other case studies, is available in the American Industrial Hygiene Association 2008 report, *Strategy to Demonstrate the Value of Industrial Hygiene.*

Overhead drilling before (left) and with new jig (right), UC Ergonomics Program. *Courtesy The Ergonomics Program, University of California Center for Occupational and Environmental Health.*

RESEARCH TO PRACTICE PAYS OFF FOR OVERHEAD DRILLS AND BODY SHOPS

Some changes require several years of research that are beyond the capacity of most individual small firms. Sometimes called research to practice, or R2P, the process often grows out of a practice that is recognized as hazardous. In turn, this leads workers, their unions/advocates, and/or their employers to approach researchers for possible solutions.

That's what happened when the University of California Ergonomics Program and others designed a jig to hold overhead drills.

At a 2002 San Jose meeting organized by the National Institute for Occupational Safety and Health (NIOSH), construction workers identified this drilling as one of the most strenuous physical activities in the mechanical and electrical trades. Workers must hold the 8-pound drill and push it upward with 55 pounds of force for a minute or two, all while standing on a ladder. They might do this hundreds of times a day to hang pipes, electrical wiring trays, and sheet metal ducts.

The consequences include shoulder, arm, neck, and back disorders, as well as ladder falls. "We wanted to reduce the wear and tear, and associated musculoskeletal disease, for workers doing this task," said lead researcher Dr. David Rempel.

The jig was refined on construction sites with experienced electricians, plumbers, pipefitters, sheet metal workers, ironworkers, carpenters, and contractors in three states. After each round of testing, it was modified based on their feedback. The researchers said that this was vital to its successful development.

The results were impressive. The average hand force of the new drill went from 55 to six pounds. The researchers expect that its widespread use will lower injury rates in construction workers who perform overhead drilling, and increase productivity. Through trial and error, the tool has been modified for other industries, including horizontal drilling into concrete for road construction. Thus, the benefits of this kind of R2P can spread across industries. (The tools are available at cost from the research lab at http://ergo.berkeley.edu/research/overhead_drill.php.)

In another type of R2P, the goal was to reduce hazardous waste at its source in the auto body industry (i.e., to prevent it in the first place). This also could prevent air and water pollution. The hazards came from toxic volatile organic compounds (VOCs) that affect the environment and people. They vaporize easily to release gases that can irritate various parts of the body, depress the central nervous system, and cause cancer.

California is estimated to have more than 8,000 auto body shops, many with between two and five employees. To help their industry voluntarily reduce use of these chemicals, the Cal/EPA Department of Toxic Substances Control (DTSC) contracted with the non-profit Institute for Research and Technical Assistance (IRTA). The Institute was to test and demonstrate healthier/safer alternative chemicals that prevent pollution and occupational illness and disease.

IRTA worked with shops to assess and show the effectiveness of alternative thinners and clean-up materials with low levels of VOCs, which also were

less toxic. In most cases, the alternatives were the same price or less than the original product. The shop owner told researchers, "By switching to safer products, it's better for the health of both my clients and workers. Our air quality has improved and I'm also saving money by using less solvent to wash the paint guns."[6]

WEB-BASED RESOURCE HELPS PREVENT NEEDLESTICK INJURIES

In 1996, California partnered with NIOSH and the University of California to establish a Sharps Injury Control Program. The goal was to protect health care workers exposed to bloodborne pathogens from needlestick injuries. These hazards were a large and costly problem; in 2001, state health care workers reported more than 12,000 cases.

The SHARPS program collected data about needlestick injuries in acute-care hospitals to find out who was getting injured, and how. Staff analyzed injury trends to evaluate Cal/OSHA's bloodborne pathogens standard and established a web-based helpline to assist health care providers treating workers exposed to bloodborne pathogens.

Based on requests from employers, they identified the need for information and created an extremely valuable resource. It let California health care providers and hospital administrators share evaluations of medical devices that have built-in safety features to prevent needlestick injuries and related bloodborne diseases. The website became the gold standard for these medical devices. It was used internationally by hospitals and others to guide purchasing of sharps.

The project ended in 2005 because of state funding cuts, leaving a big hole in infectious disease prevention efforts.

Training and Education Are Important Too

WHY DOES TRAINING AND EDUCATION MATTER?

NIOSH worked with others on two major studies that reviewed hundreds of occupational health and safety training programs. In both the 1998 and 2010 reports, they found strong evidence for the benefits of effective training, particularly when combined with management support to make improvements.

The 1998 report found "overwhelming evidence to show the merits of training to increase worker knowledge of job hazards, and in effecting safer work practices and other positive actions in a wide array of worksites." Training was particularly beneficial when coupled with other forms of intervention, such as use of new equipment or other prevention measures.[7]

The 2010 report assessed the effectiveness of three training methods used in different sectors and occupations from 1971 to 2005. The "most engaging" kind uses hands-on activities to involve participants in practice activities, dialogue, and behavior modeling. Workers who took this participatory training have more knowledge and show meaningful improvements compared to others who attended sessions using less engaging approaches. The changes included fewer incidents, illnesses, and injuries. (The two other types of training are programmed instruction and feedback interventions, and those using lectures, pamphlets, videos, etc.)[8]

These reports, and others, show that worker training and education is a critical component of a comprehensive workplace-based program to identify and deal with hazards. It is one of the three core areas in the federal OSHA budget (besides enforcement and consultation services). It's so important that it is required in more than 100 federal OSHA standards and is a major component of the basic right-to-know Hazard Communication Standard.

6 Joan Lichterman and others (2010) "Preventing toxic exposures. Workplace lessons in safer alternatives," in *Perspectives,* published by Health Research for Action at UC Berkeley School of Public Health. Available at http://www.aiha.org/votp_new/study/index.html.

7 NIOSH (1998) Assessing Occupational Safety and Health Training, NIOSH Publication No. 98-145.5 This example, and 14 other case studies, is available in the American Industrial Hygiene Association 2008 report, *Strategy to Demonstrate the Value of Industrial Hygiene.* Available at http://www.cdc.gov/niosh/98-145-b.html.

8 NIOSH (2010) A Systematic Review of the Effectiveness of Training and Education for the Protection of Workers, NIOSH Publication 2010–127. Available at http://www.cdc.gov/niosh/docs/2010-127.

Prevention pays in construction—training is one part of it

BuildSafe California training.
Courtesy Occupational Health Branch, California Department of Public Health.

BuildSafe California is a good example of efforts to promote health and safety "best practices" in construction, an industry with high injury, illness, and fatality rates.

The Department of Public Health ran the four-year project that involved stakeholders throughout the state. They produced a training kit in English and Spanish about 23 construction safety and health topics. They held 25 half-day trainings around the state with 1,525 contractors and managers, construction site supervisors, and union representatives about how to develop effective "tailgate training." (These brief, targeted jobsite meetings are a powerful tool to promote hazard awareness and good work practices. For some workers, it's the only training they get.)

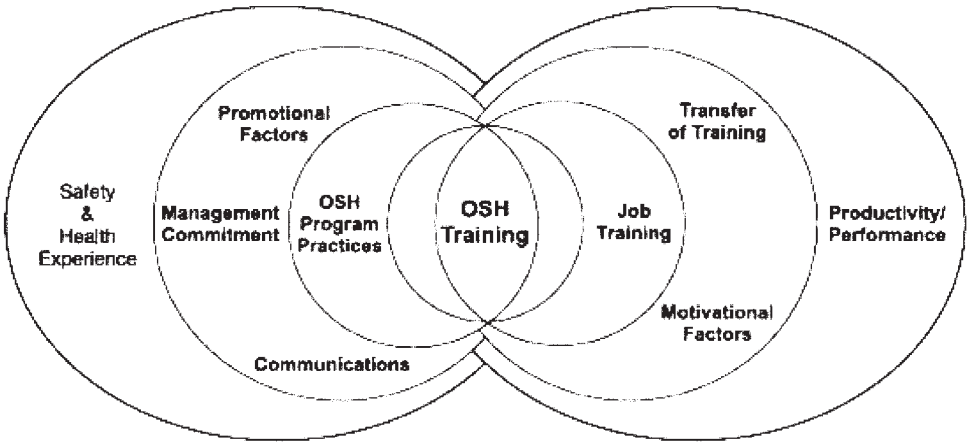
The results were significant:

86% of BuildSafe participants found the trainings very helpful

74% thought completing basic health and safety training should be mandatory

55% of the contractors reported that workers were taking an increased role in solving problems

BuildSafe California filled an important void for small construction companies (less than 10 employees), which constitute the majority of firms. Typically, their workers pick up skills informally through on-the-job training. Since the grant ended, the department revised the training materials and posted them on the Web. It continues to get requests for training; there is no funding to provide it.



OSH training is central to safe workplaces.

Despite this, many of the best interactive training programs in the United States to train employers and workers are grant funded. This makes them short-lived, even for well-designed efforts that are popular and widely appreciated.

For example, federal OSHA uses the Susan Harwood Training Grant Program to fund non-profit organizations serving the worker and employer communities. OSHA says its goal is to "provide training and education for workers and employers on the recognition, avoidance, and prevention of safety and health hazards in their workplaces, and to inform workers of their rights and employers of their responsibilities under the OSH Act." Grantees are selected in a rigorous competitive review process held each year. Historically, awards go to large organizations based on the East Coast, with limited benefits for California workers.

Several states, including the New York program described below, provide funds for industry and worksite-specific training. This supplements OSHA grants.

Cal/OSHA lacks a similar program to promote training and education for workers and employers. Given major changes in the California workforce and economy, this is a serious deficiency that costs the state and its citizens. With the largest number of immigrant workers with limited English language and literacy skills in the US, California workers and employers need access to relevant, appropriately-designed training programs that deal with the hazards they face.

Whole new technologies have emerged since OSHA was enacted in 1970. California has led the way in developing these industries, such as electronics, biotechnology, genetic engineering, pharmaceuticals, nanotechnology, and green energy. Workplace health and safety laws and regulations have not kept up with these changes. Most current regulations reflect the historic importance of construction and basic manufacturing. These sectors represent less than 15% of the state's total non-agricultural employment. In many industry sectors, this leaves workers and their employers facing unknown hazards, with inappropriate prevention measures or none at all.

Much more needs to be done to protect the health and lives of California's workforce of 18 million in traditional and new industries. The state invests some resources in training and outreach through a small program that reaches a couple of thousand workers a year. Clearly, it's nowhere near enough.

OCCUPATIONAL HEALTH AND SAFETY TRAINING PAYS OFF

Prevention pays when it includes training and education. With proper needs assessment and design, studies show that worker training increases:

- knowledge of methods to identify hazards, and prevent and reduce them;
- adoption of healthy and safe work practices and related actions;
- observing and reporting hazards or potential hazards; and
- understanding right-to-know laws and exposure symptoms.

For example:

Construction laborers who received safety and health training were 12% less likely than non-trained laborers to be injured and file for workers' compensation. For workers between 16 to 24 years old (young workers are injured more often at work), training was associated with a 42% reduction in claims.

A nursing home pilot program to prevent injuries used electrical lifts and employee training. In the first six months, the only patient handling injury occurred when a worker did not have access to the new lift.

In 2006, an industrial mining company provided NIOSH-developed age awareness training in a Tennessee facility. Unimin Corp wanted to help older mine workers and the corporation make workplace improvements. For example, the company put anti-glare film on mobile equipment windows to help workers better see possible hazards. The reason: it understood that some older people can have problems adapting to glare.

Tailgate Training of a crew, BuildSafe California.
Courtesy Occupational Health Branch, California Department of Public Health.

Trained and educated workers also can provide valuable input into the design of new operations and processes, helping to improving productivity and the quality of products and services. Recent programs using participatory methods with problem-solving approaches also have given workers the skills and information needed to be more active participants in worksite health and safety programs and more vocal advocates for safe and healthy workplaces.

A NEW YORK STATE PROGRAM COULD BE A MODEL FOR CALIFORNIA

Effective prevention efforts require on-going funding to support and perpetuate the limited, successful worker training efforts that do exist in California. They're also needed to develop sustainable, state-wide training capacity. New York State has a model program to consider here.

In 1986, New York State created a Hazard Abatement Board (HAB) to fund a broad range of groups to train and educate workers in occupational safety and health. The rationale was that injury prevention is more cost-effective than treatment and workers' compensation benefits after the fact.

The monies come from employer assessments, representing less than one percent of their workers' compensation premiums. They provide about $6 million a year for approximately 150 education and training grants. The grants go to employer and trade groups; businesses such as hospitals, manufacturers, and construction contractors; universities, cities and counties, and joint apprenticeship programs; and unions and worker organizations.

The example of HAB results in the box on page 14 illustrates how trained workers are more likely to become active participants in prevention efforts to identify and eliminate hazards.

Prevention pays: Training and education help workers find hazards

The New York Hazard Abatement Board (HAB) funding proved very helpful for some United Steel Workers (USW) members and their employer at a New York consumer products manufacturer. It was possible because of the HAB grant to allow the USW to expand health and safety work with its members in the state.

Work at this plant started when a glass tank erupted (burned through) and there was a fire. At the same time, the company was trying to negotiate a behavior-based safety program with the union. (These programs focus on what people do, not the hazards in a workplace, and have been criticized for ignoring effective prevention methods.)

Using the HAB funds, a USW health and safety specialist did a free two-day, 10-hour inspection of the plant. He found more than 100 violations. The most serious were 14 of 15 high-voltage areas without any security; in some cases, they were wide open. The required emergency evacuation plan did not exist, so there was no training about it. Worse, employees also had been told to ignore fire alarms. Many of them followed those instructions, staying in the plant when the alarms went off after the eruption.

Besides the cost of dealing with the tank and fire damage, OSHA fines could have been very expensive; the high-voltage hazard fines are about $7,000 each. (In California, this kind of incident automatically triggers a Cal/OSHA inspection.) Instead, the local union president, health and safety chair, and the USW health and safety specialist met the plant manager to review the findings. Among other things, they asked how a behavioral safety approach could have prevented the unsecured high-voltage doors. The manager agreed it could not do this.

Knowing the union might call in OSHA, and that they would be fined, the company agreed to establish a strong union-run health and safety program, and drop the behavior-based safety proposal. In return, the union used some of its HAB funds to train about 40 union members (from the health and safety committee and union local leadership), as well as managers. The training also was done in two sister plants in Pennsylvania.

Now they all know the law, can spot hazards, and do audits. The committee is stronger. And the employer is working to deal with the hazards workers and managers find, as well as those found in the first assessment.

4. WHAT ARE THE BARRIERS TO EFFECTIVE PREVENTION IN CALIFORNIA?

Good Information Is Key to Targeting Prevention Activities

WHAT DO WE NEED?

In 2009, California had no information about 75% of the 35,300 occupational illnesses reported. Why are so many workers getting sick on the job every year? Is anyone analyzing the data to find out?

To set prevention priorities, we need to know the most serious problems to address. Key questions include:

- What hazards are common? In which type of activity, sector, or jobs?
- Which workers are exposed? Who's left out of this picture (e.g., women, immigrants, and low-wage workers)? How do we include them?
- What is the magnitude of work-related injuries and illnesses? Of specific ones?
- What kind of workplaces should be targeted for the greatest impact?
- How will we know whether our actions are effective and if we are reaching the right workers and workplaces?

It takes more than data to begin to answer those questions. A number of state and federal agencies do track information about occupational health and workplace injuries. For example, the state public health department's tracking program was established in the mid-1980s.

But, like some other agencies, much of the information it collects sits unexamined. Thanks to budget cuts over the past 20 years, there are no trained staff to review and make sense of it. With current funding and staffing levels, the department must compete for short-term federal grants to support research about a limited number of injuries or diseases. Sometimes, this comes from non-occupational health sources.

HOW COULD GOVERNMENT STAFF BE MORE EFFECTIVE?

The California Department of Public Health's activities to prevent work-related asthma illustrate how injuries and illnesses can be prevented when staff can analyze data from more than one source.

Historically, Doctor's First Reports of Occupational Injury or Illness (DFRs) produce an average of 200 cases a year of work-related asthma (WRA). Examining three more data sources—hospital emergency departments, patient discharge information, and the Workers' Compensation Information System—resulted in a fourfold increase in the department's ability to find cases. Staff could better characterize the extent of work-related asthma, calculate more accurate disease rates, and identify high-hazard industries, occupations, and exposures.

What do you do when you don't know who to warn?

Diacetyl is a butter flavoring agent that recently was linked to an irreversible, life-threatening lung disease. When Department of Public Health experts heard about this, they wanted to warn employers, workers, and their medical providers for early diagnosis. However, they did not know where it was being used.

To alert companies and workers about diacetyl's hazards, the agency had to purchase lists of food industry companies. Staff then had to call each company to ask if they used diacetyl. Depending on their responses (which were voluntary and may not have been based on accurate information), the staff had to make public health decisions. There was no way to directly warn potentially-exposed workers.

"It is estimated that between 137,000 and 315,000 adults in California have work-related asthma [WRA]. Surveillance data show that among people with WRA, 62 percent were either unable to perform their usual work or had to perform modified work, and 34 percent left their job either against their will or voluntarily due to their asthma. Over 60 percent had been to the emergency department for their WRA an average of four times since their breathing problems at work began. It is known that current surveillance efforts underestimate the extent of WRA."

—California Asthma Partners, at http://www.asthmapartners.org/strategic-plan/plan-goals/indoor-environments/workplace.html

Further data analysis showed that about one in 10 WRA cases in California are linked to the use of conventional cleaning products and disinfectants at work. They also found that large numbers of school janitorial staff were experiencing new asthma or exacerbation of asthma symptoms. So, too, were teachers, aides, and other staff. Other statewide data showed that 20% of California's population spends their day in schools, and that asthma is the leading cause of absenteeism among more than 6 million children.

Acting on these findings, in 2009 the Department of Public Health's Occupational Health Branch launched the Cleaning for Asthma-Safe Schools (CLASS) project in partnership with the Green Schools Initiative (http://www.greenschools.net/article.php?id=245). The prevention effort enables the department to affect a large number of people who spend time in schools. The information CLASS developed is now being transferred to many other workplaces. The Branch receives no state funds for this important prevention effort; it is covered by federal funds for community asthma prevention.

With proper funding, much more could be done in this area, and with other hazards. Department staff could use current research that is providing more accurate information about the actual number of workplace injuries and illnesses, and the hazards behind them. They could identify the "sentinel" (key indicator, early warning) hazards, industries, and locations in California to target prevention programs.

Employers and Workers Need Warnings About Hazards

There is no registry of the hazardous chemicals that are used in California, and where. State agencies lack the authority to request it.[9]

This has several consequences. Government staff responsible for occupational health cannot send information about the hazards of specific substances, products, and processes or work practices to employers who need it. They cannot easily reach the workers who may be exposed to a hazardous product or process, or those who advocate for them.

This leaves employers, workers, and their unions/advocates without the up-to-date information that they need to prevent harm. The diacetyl example (see box on page 15) is one of many public health situations that are more complicated than necessary. In that case, the very inefficient warning system

9 In 2005, Governor Schwarzenegger vetoed a bill that would have required chemical manufacturers and suppliers to provide public health agencies with lists of their customers when new hazard information on a toxic chemical became available. He said it was unnecessary and an invasion of privacy.

depended on staff ingenuity, while adding time and effort that could have been used elsewhere.

Other jurisdictions require that employers keep inventories and provide public and/or worker access to chemical information.

State Agencies Need Better Coordination About Occupational Health

In California today, multiple state agencies are involved with occupational health. Most are in the departments of labor and public health. The innovative Green Chemistry Initiative is implemented by a part Cal/EPA; it will affect workplaces as well as communities.

Better information sharing and coordination among state agencies responsible for tracking and protecting occupational and public health are essential to planning and prevention efforts. The planning would significantly enhance the effectiveness of state actions to prevent injuries, illnesses, and fatalities. The earlier example of work-related asthma illustrates this well.

Small Firms and Their Employees Are at a Disadvantage

Implementing prevention for occupational illness, injuries, and disease does not happen out of the blue. It takes financial and technical resources, as well as management commitment, to make these changes. Investing in prevention is fine for large companies. They have the resources to develop and evaluate the feasibility and efficacy of new methods to prevent and reduce workplace hazards, and to hire staff to train their workers. They also often are reluctant to share the results.

How can small businesses without large capital reserves protect their workers? How do they find out about effective solutions for health and safety hazards?

Small businesses employ the vast majority of California's workforce. Ninety-six percent of California businesses employ less than 50 workers. Yet they are at a competitive disadvantage when it comes to occupational health and safety prevention activities. They don't have the resources to learn about and apply the principles used in successful prevention efforts. The consultation arm of Cal/OSHA does try to help them comply with Cal/OSHA regulations.

However, developing and disseminating "best practices" and truly preventive solutions goes beyond their compliance-based assistance. California could prevent needless tragedies and offer and promote "prevention pays" approaches as a business-friendly way to strengthen and create growth in this essential and large part of the economy.

Medical Providers Need Help Too

Doctors often don't know what their patients do for a living. Without that knowledge, and information about related hazards, it is difficult for doctors to connect patients' concerns and conditions to a workplace hazard or correctly diagnose a work-related illness. Most family doctors were never trained in medical school to identify and treat work-related medical conditions.

They need information and resources to help them provide accurate diagnoses and effective treatments. The same is true for other providers (e.g., nurses, physiotherapists, chiropractors).

5. WHAT WILL MAKE PREVENTION PAY IN CALIFORNIA? RECOMMENDATIONS TO WORK TOWARDS THIS GOAL

The financial, health, and social benefits of preventing workplace injuries, illnesses, and death are clear and documented. They include:

- businesses save money and retain a healthy and skilled workforce that is more likely to be innovative;
- working people lead longer, healthier, and more productive lives; and
- citizens and government programs are less burdened with rising clean-up costs (for contaminants that affect the community and environment), or long-term medical care and disability payments to people too disabled to work, who have exhausted or been denied workers' compensation benefits.

The solutions are clear. We need to identify and promote ways to support more prevention activities—from reducing injuries caused by lifting or repetitive work to diseases from exposure to toxic chemicals. We need to make sure that the "best practices" and success stories are shared widely, so the benefits will multiply.

An effective state-wide prevention program requires investments in several broad areas:

- tracking and evaluating injuries, illnesses, and hazards to identify where problems exist and provide the basis to set targets;
- assessing which industries/sectors/businesses need help to develop and implement healthier and safer work practices;
- field-based research testing practical approaches to prevent and reduce hazards and harm;
- expanded education and training for workers and employers so they are better able to prevent serious and life-threatening incidents, avoid and reduce job-related illnesses and diseases, and develop innovative, effective solutions for their workplaces;
- a clearinghouse/dissemination mechanism to share solutions and ideas; and
- sustained funding to support and evaluate these activities.

An effective program also needs to be systematic and sustainable. This requires establishing long-term relationships and communication patterns among employers, occupational health and safety researchers, unions/worker advocates, and governments.

In these tough economic times, the challenge is to find ways to fund prevention activities now that will result in long-term benefits and savings down the road. These are some steps to start the process.

Use existing data to identify the most hazardous conditions, industries, and occupations. In doing so, consider the newer and developing types of work and their hazards, as well as those who tend to be left out of surveillance activities (e.g., women, low-wage, and immigrant workers).

Data collected by various government agencies is gathering dust, with no one to analyze it. Start by restoring funding to the Department of Public Health program mandated to do this by state law. It requires the agency to collect and summarize work-related injury and illness data and use it to determine priority prevention activities. Recent state budget cuts have eliminated almost all of the staff needed to carry out this vital task. Imagine if the state collected lab results of children with high blood-lead levels but there was no staff to look at the results and warn parents and pediatricians. This is essentially the situation for data addressing hazardous work-related exposures today in California.

Target the most serious hazards first for prevention activities. Again, consider if the label is applied just to the "old" manufacturing hazards; how do hazards associated with newer and developing types of work fit into the picture?

Use data generated from surveillance activities by all the agencies and sources that cover occupational health directly and indirectly (remembering the work-related asthma example).

Combine this with input from a hazard prevention advisory committee, determining priority areas for practical field-based research to test new methods of preventing and reducing exposures. Ensure the committee is comprised of representatives from management, unions and worker advocate organizations, university-based research programs, other occupational safety and health professionals, and green chemistry and green engineering specialists.

Develop a multi-year occupational health and safety research agenda, similar to the National Occupational Research Agenda (NORA), the federal occupational health research program coordinated by NIOSH.

Use the research agenda to identify and fund priority areas for field-based research to develop and adapt new and existing practical solutions. Require applicants to include plans to engage the target population through a needs assessment process, followed by a post-intervention evaluation that includes all affected stakeholders.

Support new training programs to build capacity and expertise of workers and front-line supervisors, so they can engage and contribute to field-based intervention research projects and practical activities in their workplaces. This will help to identify and address technical or organizational obstacles that could impair the success of proposed interventions.

Cal/OSHA should consider funding a pilot training program designed to meet the special needs of California's diverse workforce. Another option is to create it as an element within an overall fund for prevention activities. New York and other states with training programs should be examined as potential models.

Share and promote widespread adoption of the findings of new solutions and "best practices" through dissemination, broad publicity efforts via trade associations and employer and employee organizations, and incorporation into Cal/OSHA consultation services and similar venues.

Follow the example of Washington State and others with an online solutions database (see links to a variety of them at http://www.croetweb.com/links.cfm?topicID=55). Adapt the NIOSH Health Hazard Evaluation program with its reports of solutions to real problems and link to their online versions (for more information, see http://www.cdc.gov/niosh/hhe/).

Require research projects to incorporate a dissemination plan that ensures their solutions reach workers, employers, designers, engineers and others, using a variety of methods. Then, good ideas don't end up sitting in a file cabinet or published only in scientific or technical journals.

In addition, the Occupational Health Branch (OHB) should be assigned to disseminate solutions and recommendations and funded to develop a more robust program. This will provide a centralized place for businesses, health and safety professionals, worker organizations, and others working with them to find practical solutions for their particular concerns. The agency could be responsible for gathering and documenting the financial costs and savings associated with interventions after projects are completed.

Working with the Cal/OSHA Consultation Services, OHB also could provide technical assistance to small and medium businesses in high hazard sectors. Emphasis could be placed on working with several at once, to encourage innovation and dissemination at the same time.

Occupational health doctor Irving Selikoff was a key figure in linking asbestos exposures and various cancers. He once said, "Statistics are human beings with the tears wiped away."

In California, it's time we prevented the tears in the first place. It's time for the government to invest its resources and know-how in the future of California workers and employers. It's time for the state to build a comprehensive, innovative, and sustainable approach to the prevention of occupational health and safety hazards. It's time to start on this path with our recommendations, and with processes involving all those who want to take the lead in this important work.

RESOURCES

ALL THESE RESOURCES ARE AVAILABLE FREE ONLINE.

- Demonstrating the Business Value of Industrial Hygiene. American Industrial Hygiene Association, 2008. (15 case studies). Available at http://www.aiha.org/votp_new/study/index.html.
- Making the Business Case for Safety and Health, OSHA topic page. Available at http://www.osha.gov/dcsp/products/topics/businesscase/index.html.
- Making the Business Case for Prevention through Design, NIOSH topic page: http://www.cdc.gov/niosh/blog/nsb060208_ptd.html.
- Preventing Toxic Exposures: Workplace Lessons in Safer Alternatives, University of California Health Research for Action. Volume 5, number 1, 2010.
- Lessons Learned: Solutions for Workplace Safety and Health, University of Massachusetts Lowell, 2011. (Six case studies) Available at http://dgcommunications.com/documents/UML-LessonsLearned.pdf.

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