

AUTOMOTIVE SHOP SAFETY

For 40 years I was a college chemistry teacher. We had almost no serious accidents in our labs, and we never lost a student. We're proud of that record. Now I look at an automotive shop and I think **"WOW! This is an accident just waiting to happen!"**

The purpose of a "project" is to restore a vehicle so that you can drive it and enjoy it. Nobody starts a project just to start one- they want to finish it too, so why would you do something that you know could interrupt your work? If you are a "commercial" shop, you are watched over by OSHA; and if you think OSHA is a little town in Wisconsin, you are in for a bi-i-i-i-g and expensive surprise some day. But if you are a private shop, you might know no-o-o-o-thing as Sgt Schultz would have said. And that nothing can "get" your health.

I've had accidents in my shop, and I've heard of others' accidents. I'm going to look at the dangerous things involved with a project with suggestions how to make your shop safer. At this point you have two choices- make your project safer or buy enough insurance that your wife can, some day, advertise "Rich Packard widow seeks good-looking young mechanic to finish projects her husband didn't." Get the idea?

Please keep in mind that this compilation is **not** a directive to "**do it my way**" but rather to give hints about things you should pay attention to, and then **you** adapt the suggestions here to your own shop needs. **Shop safety is your responsibility and ideas presented here are purely suggestions.** This compilation is not copyrighted and you are free to copy and distribute it as you might care to. Auto hobby groups may find this helpful to use as a template for discussions within their groups. Further, if you find anything that needs added or changed, please feel free to contact the compiler with your suggestions. I am:

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Topic 1: CHEMICALS

Almost everything you can remove from an automobile is hazardous. There's antifreeze, oils & lubricants, brake & transmission fluids. You use cleaners and paints. Everything you use eventually, will be disposed of. Many cities now have a "household waste disposal" unit where they will accept such materials for safe and proper disposal. Find out about your city and how to take materials there. Whatever it is, don't dump it on the ground- disposal units have a saying "**you dump it, you drink it**". If your city has no disposal operation, ask someone (your service station, or oil-change businesses, etc) where you can take materials for disposal; they might accept small amounts for free. I'll consider some specifics here.

Antifreeze is mostly ethylene glycol. Pets, wild animals, kids, spouses who drink it metabolize it into oxalic acid and that messes up calcium in the blood. It prevents proper blood clotting and proper nerve function, all leading to sickness and death. If you drain it, put it into containers that can go directly to waste disposal; small spills are no environmental problem. Some modern antifreezes are made from propylene glycol and that has no hazard. You may eventually see antifreezes based on glycerol (or glycerin) and that is a food material with no hazard at all.

Brake and transmission fluids are sometimes petroleum-based, sometimes glycol-based. Any that are drained out, just send them to disposal because you can't safely reuse them. Motor oils and greases such as transmission & differential greases are petroleum-based and they have to be burned to dispose of them. If you just pour them out, they won't go away.

Almost all paints need thinning before use and almost always the spray gun needs cleaned after use, and this generates as much waste liquid as you use in the actually painting. Collect all spoiled thinners, pour them into cans that can be sealed and labeled for delivery for disposal; it is not safe (for your project) to try to reuse them. Many of the paints themselves are hazardous and left-overs can either be sealed in their original cans or taken to disposal. Some of these paints are polyurethane-type and those can really mess up your lungs. To spray them you need a respirator to supply your lungs with clean fresh air. The thinners may be special and dangerous for lung tissue. If you don't know what you're doing, either learn first or have these special paints applied professionally.

Cleaning solvents, paint removers, and glues ("contact cements") contain chemicals that are hazardous to breathe, and some are highly irritating. These chemicals include methylene chloride and chloroform which California considers so dangerous that they must be controlled. Some have federal control even though you can still buy them. Any indoor use of them should be accompanied with mild but continuous ventilation. Left-over quantities should be disposed of.

Every automobile has a battery. Almost all of them contain sulfuric acid at about 35% acid, and it is dangerous! It dissolves clothes, car metal, paint, and damages skin and eyes. It does not evaporate so any spill needs neutralized or greatly washed away with water; you can't ignore it. Tiny amounts may be washed into dirt or gravel with a garden hose. Similarly, some cleaners are alkalis (similar to lye). Be ready to wash any affected skin. A general rule is that if you feel skin irritation, wash it with baking soda and then a gentle soap followed by water rinse. Pat it, don't rub it dry.

There are parts of your project that develop solid dusts that are a hazard; even rust dust could be hazardous. The worst is the **brake system** that generates dust from worn surfaces. Old brake shoes contained **asbestos** and governments are absolutely paranoid about **asbestos dust!** So are insurance companies! Wash away these dusts with a detergent spray, into a trap where they can be accumulated into cans for disposal. Sanding paint surfaces also develops dust that might be a hazard if you breath it, so use a disposable face mask to protect your lungs. Be careful when sweeping up the dust.

There are hidden hazards that you might not expect. Upholstery is cloth or leather, but it often has other material fillers inside, and that material carries anything it absorbed in the earlier 50 years of its life. Don't do anything that will cause it to give off dust; also warn your upholsterer of the age of the material. The material may also carry bacterial and viral hazards (Hanta virus) from earlier occupants of the car (especially rodents and fleas) so wear a face mask for any work with these materials. Wash yourself and change clothes often. Dust can be washed away with water containing Clorox and clothes detergent.

Sometimes chemicals used in our industry can age and form flammable or explosive materials. If a material smells similar to "ether" it may be best to have a professional shop clean it. One especial thing is the fuel system. If you need to clean a fuel tank, take it to a shop that does that; it just isn't worth a gamble on your health.

Topic 2: ANIMAL HAZARDS

On a project, we often don't think about animal hazards. But there are some that are real hazards as well as those which will just scare you. Some people have a real phobia about spiders and snakes. Personally, spiders really "send me off!" but I don't have any phobia about snakes. When you know what bothers **you**, you can be on the lookout for them. But, depending on the location, there can be other animals to know of. Southern USA has scorpions. They really aren't dangerous, but they do sting, uncomfortably as are wasps. But such a sting can startle a person working on the car.

Cars stored outdoors in the southwestern US may attract mice and in some areas mice can carry diseases, and the fleas they have can carry diseases. The worst disease is **hanta virus**. If this virus has been found in the area from which the car came, it may be carried in dust and droppings from around the mice. Find out from your family doctor how to protect yourself or what are the symptoms. This writer would suggest being careful in removing whole seats from the car, or wash the metal with Clorox and clothes detergent before doing anything that will stir up dust. Wear a dust mask for such dusts.

Dogs and cats often take up residence in an open car. While they usually don't carry diseases, they can carry fleas that carry diseases. And they leave soiling that needs cleaned out. Birds are a similar problem, but their soiling is usually on the outside of the car; it's called "covered storage".

If you are going to store a car, I would suggest closing all openings such as battery compartment or air pipes with carpeting or plastic bags, but don't use cloth because this will attract mice. Plastic will help cover a hole and it can be taped into place to help seal. Some people like to put out an open dish of "moth crystal" which is usually either "paradichlorobenzene" or "naphthalene". I use them and I do not notice any lingering odor when I open the car in the spring (and an open car soon airs out.) These will also discourage insects and spiders.

Animal repellants can be used but I've not tried them myself. They often leave a musky odor which you or a customer may find disagreeable. Experiment a little around your shop. Also, put out dishes of mouse baits. The best-known is "warfarin" and it claims to be no hazard to pets and children.

Topic 3: ELECTRIC, AIR, WATER

Utilities in a shop are a significant source of hazard. Most mechanics know how to use them but many amateurs have no idea of what are the hazards, so let me give you some ideas.

Of course **electricity is shocking**. Most electric tools have the standard 3-prong grounded outlet. Many mechanics don't think about cutting of the grounding prong. They don't realize that the metal pieces being worked on may easily be a ground for the tool. And the worker may be a conductor between the tool and the wet grounding floor. It's absolutely shocking! All electrical outlets should have complete grounding. That means every outlet has a "hot" wire, a "neutral" wire, and a "ground" wire to provide the safest electrical service. You can confirm which wire is which by testing voltage between each wire and a metal water pipe. Ask an electrician if you don't know this.

There is also an outlet that is called a “**ground fault circuit interruptor**” outlet, “**GFCI**”. It determines when there is a difference between the electricity into the tool and the amount out. It can shut off the circuit in one-thousandth of a second to prevent electrocution. They’re expensive but such a \$10 outlet can save your life. Talk to an electrician about them and your needs.

Most electrical tools have two speeds: “off” and “on”. Only the more expensive ones have a speed control on the trigger. When you buy one, see if you can get that speed control as it will give you a greater control in the torque of the tool and its safety. There is a transformer that generically is called “autotransformer”; one brand is “Variac”. It is a completely variable transformer that gives power out from 0 to 135% of the power going in. You can run a heavy drill at a speed between just barely rotating to faster-than-normal. And it’s at your control. They’re expensive but they’re handy. Scientists know all about them.

Battery chargers will operate at a low voltage output of about 6 to 12 volts dc. Outputs can range from 2 amps to 200 amps. Voltage is unimportant as long as it matches the needs of the battery. The amperage is often controlled by the power consumer (battery). Know that at that low voltage, there is no shock hazard; but amperage can send a lot of power through a wire causing it to heat up and burn something. Remember also, batteries carry a huge amount of power, enough to burn a heavy wire. A wrong, crossed connection on batteries when “jump starting” can cause one to explode, spraying acid all over. Never wear any jewelry when working around any electrical wire because “shorting” can cause that jewelry to heat up, it can even burn off a finger; it’s been known.

Your biggest safety device here is your shop’s fuse box (or your breaker box). **Everyone** working around your shop should know where it is and how to switch it to “off” to totally kill all the power into the shop. Your spouse and your children should also know this. Your circuits in that box should be well marked so that specific circuits can be killed. You should define when to totally kill the power and how, so that anyone can “make the call” to maintain safety. Also, if your shop has no outside light coming in, you should have one safety light that is separate from all other circuits so that there is always a little light even if all other circuits are killed. Get advice from an electrician on this.

Your second power source is compressed air. Most compressors give you air at about 100 to 125 psi. This pressure can be conducted by most hoses and air lines and most “quick disconnect” fittings easily operate there. Do not exceed 125 unless you have special equipment needs and then be sure that your lines and fittings are safe. Be sure your compressor can store and deliver the pressure you asks it to do. Most compressor systems have a water drain on the bottom of the tank. Be sure you can operate that valve to release condensation in the bottom of the tank. Notice that most compressors have drive belts that are out in the open; you need to isolate the compressor so that people cannot get into those belts because one can cut off a finger or break off an arm, and that will ruin your whole day.

You need to have a ventilation system that will allow you to move a lot of air through the shop to remove fumes and odors. Simplest are “window fans”. You can go as far as ceiling mounts of fans that will “raise the roof” to remove air at the ceiling. Gentle air movement is comforting while working on a car but it can cause distraction and raise dust. Air movement can also be controlled by the autotransformer mentioned above. Paint bays are entirely separate in ventilation consideration.

If you will not be doing much painting, you need to have a paint area that can have a gentle air movement to sweep away spray-dust without blowing up a dust storm. If your paint involves hazardous components or solvents, you need to have a breathing apparatus to supply you with clean filtered air. (This air can come from your air compressor.) Some people just paint outdoors.

A minor health device is a water system. If you have running water in your shop, connect a garden hose that can be turned on and then left on all day long, with a connected spray nozzle for quickly wetting down an area or for washing an area. If you don't have a hose, have a 3-gallon garden can with a sprinkler head from which you can get a light sprinkle for moderate wetting. The water in this can should also be given a tablespoon of "baking soda" (that's NaHCO_3 for you chemists) to neutralize acid spills. Keep this water clean enough that you would not be afraid to splash it into your face, even to sip a little if you get something irritating into your mouth.

Topic 4: FIRE SAFETY

Any time you are working around anything flammable, eventually **there will be a fire**. It's not "IF", it's "WHEN". **Keep a telephone accessible** in the shop and make sure that everyone knows when and how to make the call. If you have to use a cell phone, make sure that everyone in the shop knows where it is and how to use it. Have emergency phone names and numbers posted.

Every time you start a project, make a list of what you're going to do and what you will use that is hazardous. If there is anything flammable involved, make a second list of what you are going to plan. If you have a storage of flammable solvents, keep those containers in a separate room so that a fire in one place can't accelerate into another area. If you store paints, keep the paint storage separate from the use area, setting out only the cans you are actually using at that time. Keep an inventory listing of what you have in that storage area and have that list available when a fire crew comes in so they will know.

Now is a good time to consider talking with the friendly folks who might come visiting from downtown. If you've nothing to hide, arrange for a visit for firemen to look around, and make their recommendations. Face it- in this situation, **they** are the experts, and their expert evaluation will probably be free. While they're visiting, ask them for suggestions on fire extinguishers: how many and what type. They will know what's best. Better to "spend a dollar" now to have good equipment than to spend many to replace everything you have or you're working on.

If you are a commercial shop, you must have insurance to protect the public and your customers. If it's your own shop, you should have insurance that will totally cover your own cars plus as much of your equipment as you can get covered. For these needs, have a good heart-to-heart with your insurance company, especially the one that carries your antique car insurance as some of them will include your shop in your coverage, probably at a price lower than commercial or home-owners insurance.

In automotive work, there will always be hot surfaces, but they often don't appear hot at first. It doesn't take a really hot surface to ignite something flammable. It's unfortunate that the carburetor is often placed right above the manifold. Get the idea? Mechanics often "prime" the carburetor with a little gasoline in a can, pouring it down the carburetor. If a little spills, it can cause a flash. The hand holding that fuel can above the carb may drop it and start a lot of excitement. If you're going to do this, use a small amount at a time in the can, just enough to prime the system, and not enough to cause a huge flash if you drop it.

Topic 5: MEDICAL TOPICS

You now know that your shop is dangerous! You need to be ready to handle an emergency that might arise because treatment needs to be done as quickly as possible. Know “first aid”. Eventually you **will** meet cuts, punctures, scrapes, sprains, even broken bones. Know how to do a proper bandage over a cut or a puncture. Know how to cover and tape a minor cut, mostly to keep stuff out of it. Know a little of how to handle any major problem that you’re able to handle. Find out what medicines to keep on hand, things such as hydrogen peroxide, antiseptics, pain killers including something strong like Darvon just in case.....

In case there is an emergency, you need to summon help quickly. If your shop is in constant use, you should have phone extensions in the shop with phone numbers posted: “**whom to call if....**” If it is not convenient to have an extension, arrange to have a cell phone in the shop and be sure everyone can use it.

For your personal safety, keep good eye protection. We have good but cheap eye goggles that will cover the whole eye area including glasses. Get some and wear them! If you have a noisy shop, know that noise damages your ears. OSHA says that you need ear plugs if the noise level is above 90 decibels (“rock music” often plays at 90 db and even goes above 100 to 110 db, causing ear damage.) Head protection (hard hat) is needed if something could fall on yours; hard-toe shoes may protect from toe mashes; leather gloves might protect fingers a little but not well. Face shields keep things out of your eyes. Hey- it’s **your** body; protect it as much as you can!

Some people insist on wearing jewelry. I found that jewelry in a chemical lab was dangerous- it traps chemicals underneath and holds them to damage the skin. I soon got to where I never wore jewelry in the lab, not even a watch. Rings and bracelets are dangerous around high-power electricity. Shorting between a battery cable and frame could cause a ring to burn and even burn through a finger, amputating it almost instantly. She knows she’s married to you; you don’t need proof, especially dangerous proof of it on a finger that could be lost.

A water shower will help decrease damage from almost any kind of spill. A well-stocked shop or lab has a safety shower that you can step under, pull the valve chain, and get thoroughly soaked. But it will protect you; I’ve seen it! **I know it works!** An eye or face shower will help wash away anything spilled or splashed into the face and eyes. A sink with running water and mild liquid soap can help wash away spills on hands and arms. Remember- **baking soda** (NaHCO_3) will neutralize anything acidic and it will help neutralize some things caustic like lye. At least keep an opened box of it at the sink.

Topic 6: MOVING SURFACES

Mechanics often get lax when working around motors. They forget that any moving surface can “grab” something loose like clothing, and the grab can pull a limb into the movement. There’s little protection beyond paying attention to what you’re doing and don’t get fingers or hands anywhere near a moving belt, and it is unfortunate that the auto generator is often driven by a belt. If you have to work around a generator or any other belt-driven appliance, try to shut off the motor before getting into the area.

If you are under the car, know that the driveshaft, if running, can catch clothing and pull you into it. The power system has enough force that it can rip your clothing and even a limb, so don't do anything dumb while near anything that is moving. You have a similar capability in a moving wheel although that is not nearly so prevalent.

The fan associated with radiator and water pump can act like a cutter. Get a hand into it and it can batter a hand when touching it from the rear; touching from the front could cause a bad cut because even a dull blade cuts if it's moving fast. If the fan is electric know that it can start up at any time because it is controlled by a thermostatic switch, and they don't ask permission.

Jewelry anywhere on a person can get caught in anything moving or can scratch a surface. And buttons or belt buckles on a person's front or arms will scratch a fine surface. Just don't get them near the car.

Topic 7: SHOP TOOLS

You will always use tools. That is a major distinguishing characteristic of "higher" animals. First of all, you need good tools. When you buy them, buy "good"- you get what you pay for. Cheap tools break, they bend, they get dull. I recommend only those brands that advertise a life-time guarantee which says something of their quality. It used to be that several brands (MAC & SK) were sold only to mechanics. Sears sells good tools with a perfect guarantee. I've even seen Sears replace the plastic box that some of their tools came in. Don't buy out of a truck that comes around to parking lots unless you want cheap- that's what you pay and that's what you get. Wal-Mart sells "Stanley" tools; they appear to be good quality but if you break one you've got to return it to the Stanley company, not the Wal-Mart. Go to Sears- they have good tools and they're better in service.

Pay attention to how you handle the tool. You will find safety in pulling the tool toward you instead of pushing it away. You can stop pulling faster than you can stop pushing, especially if you're pushing with all your weight. Screwdrivers can easily slip off a piece you are holding in your hand and it can immediately puncture your hand. Blade screwdrivers get dull and slip out of a slot. Keep them sharp and they will slip less, even though they may cut worse when they hit the hand.

Mechanics use a lot of hammers. It's called "percussive maintenance"... knowing where to hit that sucker! I've been told to grind the face of a hammer flat with the grind marks across the face, not up/down. The scratches keep the head from slipping on what you're hitting. Works for me. Remember also, it's not safe to hold the chisel when someone else hits it. It's just plain dumb! I know of such injuries.

Tools like chisels, have a sharp edge for a purpose- to cut. Keep the edge sharp and it will cut the metal more easily or require less of a hammer hit to make it cut. Tools with a sharp blade will more easily cut in a straight line that you want and require less force to keep the edge in place. It seems I'm talking at crossed lines, but a sharp tool really is safer.

The operating power for tools can be either electricity or compressed air. Electricity is cheaper and more accessible, but it is the more dangerous. Electric tools do not require a compressor operating at the same time, but if your floor is moist and a good "ground", electricity could lead to a shock or a spark (dangerous around flammable vapors). Electric tool speeds are often less controllable than air, although some of them have a controllable trigger mechanism, even reversibility.

Air tools are a complement to the “guns” for spraying paints and all are controllable according to the pressure in the air line and that’s controllable. Impact wrenches are easy to “break” stuck bolts. You will probably need an air compressor to supply air for tires and for blowing dirt and dust out of your work, for operating a solvent/air spray for cleaning parts. The disadvantage is that you need to “pipe” the compressed air to convenient places around the shop and air hoses are heavy and stiff, hard to move around to your work. I will recommend that, if you pipe air around your shop, also put one of two air outlets outside the shop for uses where you want the dust and solvent vapors outside. With all this, my recommendation is to talk with old mechanics who have used everything and see what they would recommend, and then go with what you feel more comfortable using. You have lots of choices for the size of capacity of the compressor and for the storage tank. Get some advice. Ask the man who uses one.

Hand grinders are convenient, often necessary. Some of them are related to a drill in that the main shaft comes straight out the front end and there it holds the grinding wheel (or buffing wheel). Another design has the motor shaft at a right angle to the wheel. For some reason, it’s called a “right angle grinder”; clever those Americans! The capability of a grinder is to remove metal. It will also remove skin and it will improve your vocabulary.

You need jacks to lift your work. Easiest and strongest are hydraulic jacks. These can be bought having a capability of 2-3 tons & up. I really do not like bumper jacks because they have a tendency to bend the bumper or its attachment bars, and slip from under the bumper. They are not stable. With any jacks, it is convenient to have squares of ¼ inch aluminum sheet (alternate: steel) to put on the ground or floor under the jack. It gives stability. How big? Oh, minimum 6 inches square; on dirt, up to 12 inches square.

Keep in mind, if you’re going to be under the work, it **must** be supported safely; but **not on jacks**, and “axle stands” are questionable. I strongly recommend using **wood beams** lying flat on the floor. I would suggest using 12 to 18 inch lengths cut from 4x4, 6x6, and 8x8 posts. Lay them flat on the floor, not upright! A few pieces of 1x6 and 2x6 of the same length may be useful. (You may be able to get such scrap from a lumber yard or from a building contractor.) Metal handles can be screwed onto the ends of the pieces of wood for easy handling. Do NOT use cement blocks or bricks- those will damage the metal that they contact and they may also shatter when too much weight is applied.

When you get under the car, you need to be comfortable. Get a plastic sheet that is hard foam to lie on, about ½ inch thick . If you have a smooth cement floor, you can lie on a creeper. You can get seats with wheels on the legs to sit on and to scoot around on. Just remember- your body is more important than the auto’s body; protect yourself. Think: If it hurts, you’re doing something wrong!

The compiler of this information also has other automotive publications of “information” or “how to” type. If you’re interested, contact him to find out what he has available. All of them come with an absolutely perfect money-back guarantee. Write him at: jnrhill@att.net .

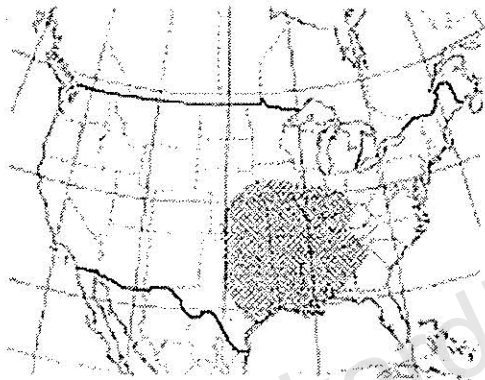
The printing and distribution of this booklet is generously assisted by the **Texas Packard Association** which brings you the **Salado Packard Meet** every end-of-March. Watch for the advertising and c’mon down to enjoy the beautiful Texas springtime and their Texas friendship. Get info from jnrhill@att.net.

Brown Recluse Spider Bite

An investigation of involvements of my Packard and antique car friends, I find that spider bites are not uncommon. Some victims don't even know they've been bitten until the site becomes worse-off. Know what's involved before you get started and before you get bit.

Areas of the United States where the brown recluse spider is most likely to be found:

The spider is found in an area of 400 miles outward from a line from KC to STL including Midwestern and Southeastern states. They seek out dark, warm, dry environments such as attics, closets, porches, barns, basements, woodpiles, and old tires; upholstery of old cars??? Its small, haphazard web, found mostly in corners and crevices, is not used to capture prey; most likely it's a web for its baby spider hatchlings. Most bites occur in the summer months. Most brown recluse spiders are found living in great numbers.



Medical Treatment

Upon suspecting that you've been bitten, see your doctor today or no later than tomorrow morning; otherwise go to your hospital emergency room. Don't wait, don't put it off- it will only make the treatment less effecting or less successful.

After initial evaluation, your doctor may provide the following treatment:

Tetanus immunization

Pain medication

Antibiotics

Antihistamines such as diphenhydramine (Benadryl) for itch relief.

There is no antivenom available in the United States to counteract the poisonous venom of the brown recluse spider. Controversial therapies include steroids and the drug dapsone (Avlosulfon). These are often reserved for people with severe systemic disease (such as certain types of anemia, blood clotting problems, and kidney failure). The therapies have little proven benefit.

You will follow-up with your doctor because most wounds will need to be checked daily for at least 3-4 days. Necrotic lesions will need close follow-up. The doctor may carefully remove dead tissue in necrotic areas to reduce secondary bacterial infections.

After your initial evaluation by your doctor, you may expect this type of follow-up:

Daily follow-up of wounds for the first 96 hours to assess possibility or extent of necrosis of wound

Hospitalization for people with systemic disease

Continuation of antibiotics until secondary infections clear

Follow-up with a plastic surgeon if necrosis of the wound is evident

Prevention

Reducing the possibility of an encounter with a brown recluse spider starts with eliminating known spider habitations:

Perform routine, thorough house cleaning.

Reduce clutter in garages, attics, and basements.

Move all firewood, building materials, and debris away from the foundation.

Install tight-fitting window screens and door sweeps.

Clean behind outside shutters.

Spray with the usual household pesticides.

Consider professional pest elimination.

Outlook

The majority of brown recluse bites cause little permanent skin damage, although, in some cases, moderate to severe tissue destruction is possible. The full extent of damage to tissues is not known for days. It may take many months for the wound to completely heal. It's not "nice"!

Brown recluse bites are noted for somewhat slow development and often take up to 12 hours to reveal themselves. Necrosis of skin (death of the skin), if it occurs, does so in the first 96 hours. Bites older than this not revealing tissue death have not been reported to worsen.

Necrotic lesions can be difficult to manage, and early surgery to remove dead tissue has not been shown to improve outcomes. Necrotic lesions with careful cleaning are allowed to mature for weeks until spreading stops and healing appears to occur. Then a wide area of tissue around the wound is removed and skin grafting may be done once all evidence of skin necrosis has subsided.