

# SAFETY & LOSS PREVENTION

# OUTLOOK

## the Science of Sleep

What It Is, How It Works, and What You Can  
Do to Make Sure You're Getting Enough of It

### Also Inside:

The Dangers of Sleep Debt, Drowsy Driving,  
and Caught-In/Between Injuries



# the Science of Sleep



## May is Better Sleep Month

More than a third of Americans don't get enough sleep, yet many people aren't aware of how dangerous an insufficient amount can be. Sleep loss does more than just make us tired the next day — it affects our mood, judgment, concentration, and reflexes, and increases the risk of accidents. Chronic sleep loss can cause long-term health issues, such as heart disease, obesity, and cancer. Find out what might be keeping you from getting the sleep you need and how to optimize your nightly rest.

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# the Science of Sleep

Learning how sleep works can help us better understand why our bodies need it and how to optimize both the quality and quantity of our sleep.

## WHAT HAPPENS WHEN WE SLEEP?

For centuries it was believed that the body and brain “shut off” during sleep, but scientists now understand that our bodies are actually hard at work – restoring cells, processing information, regulating our metabolism and hormone levels, and boosting our immune system. Sleep is just as important to our physical wellness as diet and exercise.

Our sleep is divided into two types – **REM** (“Rapid Eye Movement”, which refers to the tendency for the eyes to move quickly back and forth during this stage), and **non-REM** (NREM).

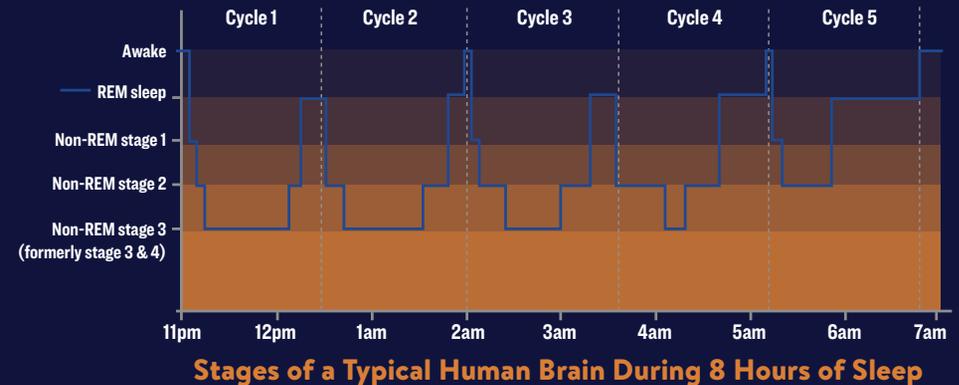
NREM SLEEP	REM SLEEP
Stage 1: Transition into sleep, lasting around 5-10 minutes; muscles relax & breathing slows	First cycle occurs about 75-90 minutes after falling asleep, lasting 10-15 minutes
Stage 2: Light sleep, lasting around 20 minutes; body temperature & heart rate decrease; eye movements stop	Eyes move rapidly from side to side
Stage 3: Deepest sleep; muscles relax, blood pressure & breathing rate drop; difficult to rouse; brain waves become slow and long	Breathing becomes irregular
	Heart rate and blood pressure increase
	Muscles are temporarily paralyzed to prevent movement during dreams

NREM sleep is separated into three stages – stages 1 and 2 are lighter sleep, while stage 3 is our deepest sleep. The body uses periods of NREM sleep to repair cells, regrow damaged tissues, and clear itself of toxins. Blood and spinal fluid flush harmful chemicals and stress hormones from the brain, lowering blood pressure. The immune system is recharged with a greater ability to detect and fight illness, and short-term memories are consolidated into more permanent memory storage.

During REM sleep (sometimes called “dream sleep” as this is when most

dreams occur), the parts of the brain that control emotions, memories, and motor activity become active – 30% more active than when awake. This is when our brains integrate new information with our prior knowledge.

A healthy human brain will cycle between these two stages every 90 minutes, with periods of deep sleep getting shorter and periods of REM sleep getting longer throughout the night (see graph).



## WHAT MAKES US FEEL SLEEPY?

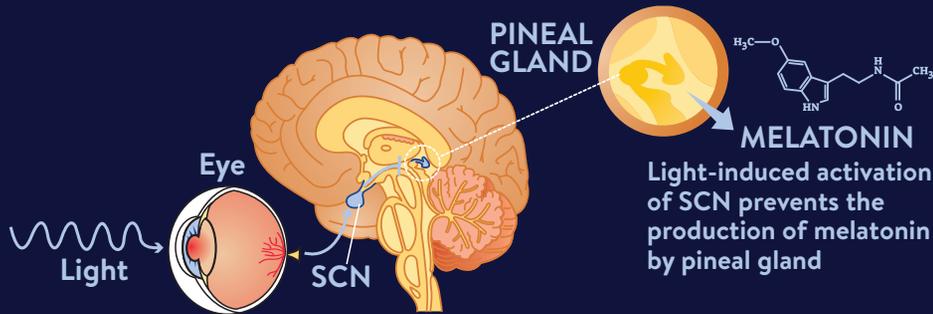
One factor is **sleep pressure**. During our waking hours, our bodies produce a chemical called **adenosine**, which collects in the brain throughout the day and “pressures” us to want to sleep. Adenosine buildup continues until we go to sleep, when the brain breaks it down and clears it away, releasing the pressure.

Another factor is our **circadian rhythm**, the 24-hour cycle that regulates many of our body’s functions. This internal “body clock” is located in an area of the brain called the **suprachiasmatic nucleus, or SCN**. Light entering our eyes signals the SCN to stop the pineal gland from releasing **melatonin**, a chemical that promotes sleep. As daylight fades, the SCN stops preventing the release of melatonin, and as this chemical enters our brain, we begin to feel the desire to sleep (see figure on following page).

## HOW MUCH SLEEP DO YOU NEED?

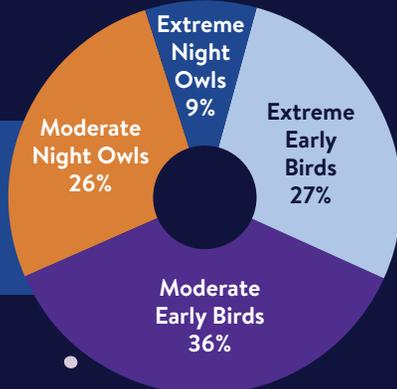
Although individual sleep needs vary, the CDC recommends between 7-9 hours of sleep per night for the average adult. Anything less causes short-term impairment in judgment, perception, and memory, and can lead to long-term health problems such as obesity, heart disease, high blood pressure, and mood disorders.

One common sleep myth is that you can train yourself to get by on less, but the amount of sleep you need is hard-wired, just like your chronotype. You can't use willpower to turn yourself into a "short sleeper" (the 1-3% of people who have a diminished need for sleep due to a rare gene mutation), just as a night owl cannot decide to change into an early bird, or vice versa.



Looking for inspiration or a solution but find yourself stuck? Sleep on it! Sleep allows our brains to process information and make connections in ways that aren't possible while awake.

Early birds make up the largest segment of the population, which may explain why modern society is geared toward being "early to bed, early to rise."



## LEARN YOUR CHRONOTYPE

Although all humans are all wired to be active during the day and sleep at night, our individual circadian rhythms aren't exactly the same. Where your sleep/wake cycle sits within the 24-hour day is called your chronotype.

As we age, our preferred sleeping hours will shift — children need more sleep and tend to be "early birds" (also known as "morning larks"), waking and going to sleep early, while teenagers and young adults become "night owls," preferring to sleep in and stay up late. As adults, most of us settle somewhere in between. Seniors will often shift back toward an earlier sleep schedule and need less sleep overall.

**EARLY BIRD WAKE DRIVE**

**NIGHT OWL WAKE DRIVE**



You probably already have some idea of your chronotype based on your own observations of your sleep patterns. Whether you are an early bird, a night owl, or something in between is determined by your genes. If your parents were night owls, chances are you are too.

Genetic testing can give you the most accurate picture, but a simple way to determine your chronotype is by answering the Horne-Ostberg Morning-Eveningness Questionnaire (AugoMEQ), which places you in one of five categories, estimates your "natural" bedtime, and pinpoints the most likely time of day of the onset of melatonin.

Understanding your chronotype can help you schedule your day for better performance. Early birds are at their peak in the morning but start to lose focus in the late afternoon, while night owls perform best later in the day; it's a good idea to schedule daily activities accordingly. This goes for those around us as well — assigning tasks to the right people at the right time can boost productivity, encourage cooperation, lower accident and injury risks, and improve moods all around.

# Borrowing Time

How sleep debt adds up like interest on a loan — and so do the risks

## A NATION IN DEBT

We've all done it — attended a late-night party, pulled an “all-nighter” to study for an exam, stayed up watching TV or scrolling social media — and we are all familiar with the grogginess and lethargy we feel the next day. One night of sleep deprivation now and then may not seem like a big deal, but more and more often Americans make it a habit. According to the CDC, more than one-third of all American adults fail to get the recommended amount of sleep each night, resulting in sleep debt — the accumulated effects of chronic sleep deprivation.

## A WORLD BUILT ON MISCONCEPTIONS

Our busy lives can make sleep seem like a luxury. When the day's demands have us “burning the candle at both ends,” too frequently we aim to meet those demands by forgoing sleep. Even when society pressures us to change our sleep habits, our biological need for sleep remains the same.

One common misconception is that you can catch up on the sleep you lost during the workweek by cramming extra into the weekend. Sleeping in and napping can help, but **research** suggests those who restrict sleep on a regular basis (several nights a week) accumulate a sleep debt too great to pay off in just a day or two. Plus, an inconsistent sleep schedule can also upset your circadian rhythm, doing more harm than good.

There is another misconception that people willing to sacrifice sleep are more productive and more successful, while those who get more sleep are viewed as unmotivated or lazy. Earlier this year, UK Prime Minister Boris Johnson, fearing this stigma, **denied claims** that he takes “power naps” during the day, insisting instead that he “works hard” — as if naps and hard work are mutually exclusive. In reality, getting the right amount of good quality sleep actually increases productivity.

Fighting our biological sleep drive will only result in more sleep debt. Why? Being awake longer hours gives adenosine more time to build in the brain, and less sleep means less time to metabolize it, creating a backlog of sleep pressure that compounds like interest on a loan. What's more, a sleep schedule that conflicts with our body clock can give us poor quality sleep, which also adds to sleep debt.

Our need for sleep isn't a question of morality or willpower, but of genetics. We don't get to choose our circadian rhythm; our bodies get to decide which bedtimes and wake-up times will offer us the most restorative rest.

## MODERN LIFE IS FOR THE BIRDS

You've likely heard the expression “the early bird catches the worm,” and our modern life is scheduled around this premise. The 8am-5pm corporate office structure follows the **circadian rhythm** of early morning types, making it a struggle for the nearly 40 percent of the population who are night owls to get adequate sleep. Early birds are seen as more productive simply because their natural sleep patterns are well adapted for earlier work and school schedules. Night owls tend to accumulate more sleep debt because they struggle to match their internal sleep cycle with society's external clock.

Night owls can attempt to counteract this by going to bed earlier, but because their brains receive the signal for sleep later than others, they may struggle to fall asleep and stay asleep, and the quality of their sleep suffers. What's more, the effects of melatonin haven't had enough time to wear off by morning, leaving the night owl feeling groggy, unrefreshed, and measurably impaired.

The closer your sleep schedule matches your circadian rhythm, the better the results, and there can be serious health consequences for those of us who don't. Those particularly at risk are shift workers, whom the American Academy of Sleep Medicine characterizes as “anyone with a work schedule that falls outside the hours of 7am and 6pm.” In 2007, the World Health Organization classified night shift work as a “probable carcinogen” due to the severe disruption of normal sleep routines. Even one hour of variability in your sleep pattern can increase the risk of metabolic syndrome by up to 27%, according to research conducted at Boston's Brigham and Women's Hospital. Nearly one-third of nurses in the study reported symptoms of “shift work disorder,” primarily insomnia and excessive sleepiness.

## OTHER SOURCES OF SLEEP DEBT

**Physical:** Injury, illness (such as a cold or indigestion), and stress, as well as more chronic disorders such as sleep apnea, chronic pain, and mental illnesses like depression, can all cause sleep disturbances.

**Environmental:** As we extend our day into the night with artificial light, we deprive our brains of the darkness needed to signal the onset of sleep. Many of us habitually watch tv, read news online, or scroll social media sites late into the evening, sometimes even in bed. The blue light emitted from modern screens has been shown to suppress melatonin production. A noisy environment can also be a factor, especially for those who live in cities or have household members on a different sleep cycle.

**Chemical:** Caffeine, nicotine, and alcohol can disrupt normal sleep. Caffeine and nicotine are stimulants, which work by blocking the uptake of adenosine in the brain, delaying the effects of sleep pressure. Caffeine has a long half-life and can remain in the system long after it is consumed. After the brain metabolizes it, adenosine floods in, which can cause a “caffeine crash,” especially if your brain already has an adenosine backlog.

Alcohol, even one drink before bed, can interfere with sleep. Alcohol is a sedative, and it may make you feel sleepy, but it puts you into a state of light sedation rather than natural sleep. Sedation prevents normal sleep from taking place and causes our sleep to be fragmented — waking multiple times during the night, often with no memory of doing so — resulting in poor quality sleep overall.

Many medications also have sleep-altering side effects, so be sure to read labels and check with your doctor if you believe one of your prescriptions may be impacting your sleep.

## REAL EFFECTS, REAL CONSEQUENCES

Even **one hour** of sleep deprivation lowers our alertness and cognitive function, impairing perception, judgment, and performance. It impacts our mood and ability to focus, reducing motivation and efficiency, and increasing the risk of accidents and injuries. People who sleep less than six hours per night have a 33% higher risk of car crashes compared to those who sleep seven or eight hours.

As sleep debt grows, so do the dangers to safety and health, yet employers and employees alike often overlook the effects of sleep loss when considering safety and loss prevention in the workplace. According to the National Safety Council, more than 43% of workers are sleep-deprived, especially among those who work long or irregular shifts. The resulting reduction in efficiency can have costly — even deadly — results. Studies report sleepy workers are **70% more likely** to be involved in accidents, and nearly **twice as likely to die** in those accidents compared to those who aren't sleep deprived.

Study after study has found that as overtime hours increase, performance declines. Fatigued workers lose focus and motivation, make more frequent and more serious errors, and struggle to regulate their behavior. Instances of poor judgment by law enforcement officers, preventable medical errors made by those in the medical field, and construction site accidents have all been linked to long work hours. Even the trip to and from work is more dangerous — the Institute of Medicine estimates about 20% of all automobile crashes are the result of drowsy driving, with even higher numbers among those with a long, early-morning, or late-night commute.

Investigations into several large-scale catastrophes, such as the Chernobyl nuclear meltdown, the Exxon Valdez oil tanker crash, and the Challenger shuttle explosion, have concluded that those in charge of making critical decisions at those times had been suffering severe sleep deprivation.

## CASE STUDY: The Circadian Rhythm of the Modern American Teenager

The typical teenager needs 8-10 hours of sleep each day, a bit more than the average adult. Meanwhile the teenager's natural sleep rhythm shifts toward that of the night owl — often the extreme night owl, meaning their preferred time to sleep is between 2am and 10am. This is why many teens, often to their parents' dismay, prefer to spend their weekends “sleeping away the day.”

The teenager's weekday schedule, however, is in direct opposition to this, with some high schools starting as early as 7am. Afterschool activities, homework, and family obligations can extend the teen's day well into the night. Even without these extra demands, the teenager's circadian rhythm makes an early bedtime difficult. Add to this the temptation to spend evenings on screens (known to disrupt sleep patterns), late-night snacking, and a typical lack of self-discipline in this regard, and sleep debt is practically inevitable.

The American Academy of Pediatrics (AAP) reports that 73% of high school students don't get enough sleep, leaving them at increased risk of injuries, attention and behavior problems, and poor academic performance, as well as chronic conditions like diabetes, obesity, and mental health issues.

Lack of sleep lowers reaction times and affects judgment, increasing risky behavior. This makes driving even more dangerous for inexperienced teens, who are three times more likely than adults to be involved in a fatal car crash.

As a society, we push our teens to succeed while overlooking the fact that we've stacked the deck against them. The AAP, as well as many parents, have begun pushing for a later start to the school day (no earlier than 8:30 am) to allow students time to get adequate sleep. For now, teenagers should practice “good sleep hygiene” to minimize the sleep debt caused by living out of sync with their chronotype.

## DID YOU KNOW?

Being awake for 20 hours or more causes cognitive impairment equal to having a blood alcohol content of 0.08%, the legal limit for driving.

Studies have also revealed a direct link between chronic sleep loss and a variety of health problems, including cardiovascular disease, high blood pressure, diabetes, obesity, stroke, and even certain types of cancer, as well as mental disorders such as anxiety and depression.

## REDUCING OUR DEBT

Our 24-hour world makes borrowing against our night of sleep easy — and makes it difficult to stop accumulating that debt and pay it off. While we may not have the ability to change the clock, there are still some changes we can make in our lives that can help:

**Maintain a consistent sleep schedule.** Wake up and go to bed at the same time every day (yes, even on weekends), and make those times as close to your body clock's preferences as possible.

**Make adjustments to your daily schedule where you can.** A morning person can choose to go to the gym before work instead of later in the day. If you are night person, prep for your day the night before so you can sleep as late as possible.

**Create morning and nighttime rituals.** Having routines for waking up and winding down, even just a cup of tea or changing clothes, can prepare your brain for what comes next.

**Set the right temperature.** Keep the bedroom between 60-68 degrees. Cool water in the morning — a shower, a drink, or both — can wake up your brain. A warm bath in the evening will not only relax you but also **lower your core body temperature**, preparing you for sleep.

**Get the light right.** Allow yourself time in the sun as soon as possible in the morning. Start dimming the lights at least two hours before bedtime, and avoid nightly screen use (use blue light blocking glasses or filters if you must). Using blackout curtains or a sleep mask can help block out light.

**Set the sound.** Try wearing earplugs if your room is too noisy, or white noise if your room is too

quiet. Find a recording of ocean waves, rainstorms, or crickets, or follow along with a guided meditation for sleep.

**Establish healthy sleep hygiene habits.** Exercise early in the day, avoid heavy meals and alcohol late in the day, cut out caffeine at least 8 hours before bedtime, keep naps short (under 20 minutes), and remove electronics from the bedroom. Remember — you are what you sleep!

**“Hack” your brain.** If you have to shift your sleep/wake time to fit a new schedule, make the change as gradually as possible, in ten-minute intervals. Use light therapy to fool your brain — give yourself a dose of very bright light when you wake up and wear sunglasses to simulate the onset of evening.

*Still having trouble sleeping? You may have a sleep disorder. Talk to a medical professional for diagnosis and treatment options.*

## CASHING OUR REALITY CHECK

Those who get adequate sleep have better physical and mental health than those who are sleep-deprived, which means fewer missed work days. Sleep also makes us sharper, more focused, and gives us energy, which means higher productivity, as well as fewer errors, accidents, and injuries. Healthy sleep habits mean a healthier bottom line.

Employers can help support their employees and their sleep health by:

- Educating employees about how sleep impacts safety and productivity at work;
- Offering information and suggestions about how to get sufficient sleep;
- Being flexible in scheduling when possible, and allowing enough rest time between shifts (the CDC recommends at least 10 consecutive hours of off-duty time per day);
- Creating a work environment that allows workers to report being fatigued when it might create a safety hazard; and
- Recognizing the signs of fatigue in employees before an accident occurs.

**Dangers of Drowsy Driving ON THE ROAD**

Losing 2 hours\* of sleep is like having **3 beers**

More than **1 out of 3** working Americans are sleep deprived

Crashes are the **leading cause** of workplace deaths

**21%** of all fatal crashes may involve a drowsy driver

You are **3x** more likely to be in a car crash if you are fatigued

For more information, visit [www.nsc.org/fatigue](http://www.nsc.org/fatigue)

\*from a normal 8-hour sleep schedule

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# WHAT WE LOSE WHEN WE LOSE AN HOUR

It may seem insignificant, but according to the American Academy of Sleep Medicine, “springing forward” even one hour causes measurable effects on health, safety, and productivity.

People who travel between time zones frequently report having trouble sleeping, fatigue, difficulty concentrating, and even digestive issues, often referred to as “jet lag.” Every year in March, people all over the globe make the switch from standard time to Daylight Saving Time (DST), giving millions of people a mass case of jet lag, and giving researchers the opportunity to study how such “time travel” affects us on a larger scale.

On average, people sleep 40 minutes less on the Monday following DST than on other days. Why? Our body clock takes time to adjust, and even if we go to bed “on time” on the Sunday following DST, we will likely find it difficult to fall asleep or stay asleep, lowering the quality and quantity of sleep we receive.

Especially since so many of us are already chronically sleep deprived, this small shift can have large, real-world consequences:

- A **study published in February 2020** found a 6% spike in car crash deaths linked to drowsy driving during the week following DST, with the highest risk for those living the farthest west in their time zone.
- A **2014 study** done by the University of Michigan’s Frankel Cardiovascular Center showed a 24% increase in heart attack rates on the days immediately following the switch to DST (vs. a

21% decrease on the days following the “fall back” to standard time).

- **Research published in May 2020** on sleep deprivation in healthcare workers found an 18% increase in adverse medical effects caused by human error on the week after the switch to DST.
- An **analysis** of injury data for each Monday following DST between 1983 and 2006 found an increase in both the number and severity of workplace accidents, resulting in a 68% jump in lost workdays, compared to other Mondays throughout the year.
- The **Lost-Hour Economic Index** estimates the combined financial losses to the U.S. economy due to the increased heart attacks, workplace accidents, and “cyberloafing” (reduced productivity in offices) that occur after DST at nearly \$434 million.

## HOW YOU CAN HELP LOWER THE COST

Here are some ways you can ease your body into a time transition:

- **Simulate your new schedule ahead of time.** Instead of trying to force your body to adjust all at once, start a week before the time change (or travel plans) and gradually move your bedtime, mealtimes, and wake time back 10-30 minutes each night.



- **Change your clocks before the time changes.** Try moving the clocks ahead on the Friday night before DST instead of Sunday morning. This psychological trick can mentally prepare you for the future.
- **Try light therapy.** Sunlight gives your brain the message that it’s time to be awake; try other sources of bright light if sunlight isn’t available. Dim the lights or wear sunglasses in the late afternoon and early evening to help stimulate an early release of melatonin, a hormone that triggers sleepiness, and turn off and put away electronics at least an hour before bed.
- **Practice healthy eating and drinking habits.** Staying hydrated and avoiding caffeine and alcohol in the days surrounding a time change can help your body clock better regulate itself. Eating more protein and fewer carbs can keep you from feeling sluggish.
- **Be active in the a.m.** Get your exercise as early in the day as possible and avoid it later in the day.



## THE CRUSHING RESULT OF CAUGHT-IN/BETWEEN ACCIDENTS

A “caught-in/between” injury occurs when a worker is squeezed, caught, crushed, pinched, or compressed between two or more objects, or between two parts of an object. These types of accidents rank among the most deadly in construction (rounding out OSHA’s “Fatal Four,” along with falls, **struck-by injuries**, and **electrocutions**), and they have been on the rise in recent years, with deaths nearly doubling in numbers between 2011 and 2016, according to the Center for Construction Research & Training (previously CPRW). Caught-in/between hazards account for over 550 amputations and nearly 100 deaths each year.

Common hazards that result in caught-in/between accidents include unguarded machinery, loose-fitting clothing, overloaded equipment, lack of seatbelts or restraints, and improperly dug or unshielded trenches.

There are several steps that can be taken to prevent caught-in/between injuries:

**Hazard Recognition** – Frequent equipment and facility inspections can discover hazards that can lead to caught-in/between injuries. Timely implementation of inspection action items will decrease the possibility of accidents and injuries.

**Equipment Safety** – Once equipment has been inspected and any necessary or regular maintenance performed, it is essential that recommended operating procedures are followed.

**Maintaining Distance** – Personnel who are not operating a given machine should keep a safe distance from the machine and its operator.

**Respecting Barricades** – This one is simple; if an area is blocked to pedestrian passage, do not enter it.

**Monitoring Material Movement** – When materials are being moved, be they building materials or cases of office supplies, there is a risk of a spill or even a shifting of weight, so personnel in the area should be observant of the status of the material.

**Lockout/Tagout** – Many caught-in/between injuries can be prevented by following proper **lockout/tagout** procedures.

A subset of caught-in/between injuries known as “**pinch-point**” injuries occur when any body part of a worker is caught between two objects (or “pinched”). These injuries can range in severity from a minor contusion all the way to amputation and even death. While the most common (and deadly) caught-in/between accidents are generally found in construction, pinch-point injuries can occur in any workplace. Desk drawers, file cabinets, and copy machines are an everyday part of office life and should be used with as much care as any other piece of equipment.

Pinch-point injuries may be prevented by:

- Evaluating all machinery to identify pinch-point hazards
- Eliminating the identified pinch-points to prevent employee contact, where possible
- Guarding those pinch-points that cannot be removed to prevent employee contact
- Training employees on what the guards are intended to do and why the machines need them
- Directing employees to report any unguarded pinch-points to their supervisor.

## STRUCK-BY or CAUGHT-IN/BETWEEN?

Making the Determination When Filing an Accident / Injury Report

- Report injuries caused by impact alone as “struck-by”
- Report injuries caused by crushing between two objects as “caught-in/between” (this includes strangulation as the result of clothing getting caught in machinery)

# COVID-19 PANDEMIC: ONLINE TOOL ESTIMATES INDOOR EXPOSURE TO INFECTIOUS AEROSOLS

Gaithersburg, MD – A new online tool from the National Institute of Standards and Technology is intended to help curb airborne transmission of SARS-CoV-2 – the coronavirus that causes COVID-19.

Developed by air quality experts at NIST, the free tool estimates exposure to potentially infectious aerosols in indoor spaces. Users plug in information about 12 different inputs based on their specific indoor spaces, including the ventilation system, system filters, occupant exposure and zone geometry, and then run a 24-hour simulation to determine strategies to reduce exposure among occupants.

The tool models the fate of infectious aerosols generated in an indoor environment, such as SARS-CoV-2. In addition, the impact of control measures can be determined. This allows building managers and engineers to identify strategies such as adjusting ventilation rates and using portable air cleaners to reduce exposure.

According to NIST, an infected person can generate pathogen-containing aerosols by breathing or coughing. Although larger droplets fall quickly to the ground, they can impact surfaces and persons nearby. The Fate and Transport of Indoor Microbiological Aerosols, or FaTIMA, tool focuses on the smaller droplet nuclei that can remain airborne for longer periods of time and affect more people in the environment.

Originally published February 17, 2021 in *Safety + Health*, a National Safety Council publication

<b>Zone Geometry</b>	Volume 100 m <sup>3</sup>	Floor Area 40 m <sup>2</sup>	Wall Area 63.25 m <sup>2</sup>	Ceiling Area 40 m <sup>2</sup>
	Other Surface Area 4 m <sup>2</sup>	Surface to Volume Ratio 1.5		
<b>Infiltration</b>	Infiltration 0.5 1/h	Particle Penetration Coefficient 1		
<b>Ventilation System</b>	Supply Airflow Rate 360 sm <sup>3</sup> /h	Outdoor Air Intake Fraction 0	Return Airflow Rate 360 sm <sup>3</sup> /h	Local Exhaust Airflow Rate 0 sm <sup>3</sup> /h
<b>System Filters</b>	Outdoor Air Filter None	Recirculation Air Filter MERV 8		
<b>Calculated Airflows</b>	Total Outdoor Air Change Rate 0.5 1/h	Outdoor Air Intake Rate 0 sm <sup>3</sup> /h	Recirculation Airflow Rate 360 sm <sup>3</sup> /h	
<b>Room Air Cleaner</b>	Maximum Airflow Rate 200 scfm	Fan Flow Fraction 1	Filter Efficiency 0.8	CADR 160 scfm
<b>Particle Properties</b>	Name IV1	Diameter 1 μm	Density 1 g/cm <sup>3</sup>	Particle Deactivation On
	Half-life 1.1 h	Decay Rate 0.63014 1/h		
<b>Continuous Source</b>	Source On	Generation Rate 3.2 #/min	Generation Time Period Start 00:00 / End 24:00	
<b>Burst Source</b>	Source On	Burst Type Intermittent	Amount per Burst 45 #	Generation Time Period Start 00:01 / End 24:00

Photo: National Institute of Standards and Technology



An email blast will be sent from the State Loss Prevention Program prior to each of these webinars with registration information.

## UPCOMING TRAINING WEBINARS:

4/7

ACCIDENT INVESTIGATIONS

4/21

SAFETY COORDINATOR ORIENTATION

5/5

WC & RTW

6/2

HOW TO GET THE MOST VALUE OUT OF YOUR SAFETY COMM.

6/16

FACILITY & EQUIPMENT INSPECTIONS

7/14

PROMOTING EMPLOYEE SAFETY AWARENESS

7/28

ACCIDENT INVESTIGATIONS

8/11

JOB SAFETY ANALYSIS

All webinars will be offered on each date through GoToMeeting at both 10:00 am and 2:00 pm (Eastern Time).

For questions, contact Juana Powell in the Division of Risk Management / Loss Prevention:  
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## REFERENCES AND RESOURCES

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