



How far would you go to protect yourself? The author, Kate Rope, puts her fear of germs to the test

DIARY OF A GERMOPHOBE

Is swine flu lurking on that treadmill? Can punching those ATM buttons give you a rash along with your cash? We asked one self-described clean freak to have a germ expert scrutinize her life—so we can get to the bottom of how much we all really need to worry about these microbes.

BY KATE ROPE
PHOTOGRAPHY BY NATHANIEL WELCH

My name is Kate, and I'm a germophobe. I won't shake your hand if you look a little peaked, and I'll discreetly move away if you cough on the subway. Like those TV doctors in the scrub room, I'm an expert at elbowing open a swinging door, as well as knuckling my way through an ATM transaction and flushing a public toilet with my feet. Once, when an old roommate got mono, I used a paper towel to touch every surface in my house for a month. Laugh if you want to—everyone else did—but I didn't get sick.

The arrival of my daughter two years ago seems to have shifted my functional phobia into overdrive. The multitude of health headlines about swine flu and tainted spinach and peanut butter convinced me to step up my defensive moves. With dangerous germs around every corner, going overboard was worth it to keep my daughter safe—or so I thought.

One afternoon, as I sanitized every page of a children's board book I'd just checked out of the library, I began to worry that I'd crossed a line. My fears were confirmed when my daughter developed an inordinate interest in washing



Research reveals that the toilet seat is actually one of the cleanest surfaces in the bathroom

microbes can do us harm." Plus, most of these germs are beneficial: They help our bodies digest food, convert nitrogen from the air so plants can grow, and contribute more than 90 percent of the world's oxygen, among other things.

Still, there are 600 to 1,200 less benevolent bugs that cause colds, flu, and infections, as well as more serious diseases, like tuberculosis and even the plague. So how can you protect yourself from the bad guys without sterilizing everything in sight? Since some 80 percent of all illnesses are passed by human contact, either directly (kissing or getting sneezed on) or indirectly (touching an infected doorknob and then your mouth, nose, or eyes), says Tierno, we have the power to avoid the most common routes of germ transfer.

To test if my germ avoidance protocol is warranted or a waste of time, Tierno gave me two dozen giant cotton swabs and asked me to rub them on things I touch daily. He'd then analyze those samples at his lab and show me the microscopic invaders lurking in my home, at the gym, and in the places I hang out with my daughter.

THE BIG, BAD WORLD

Eager to uncover the truth, I headed back to my Brooklyn, New York, neighborhood to swipe door handles and other surfaces I come into contact with. After bagging each swab and labeling it by location, I dropped off my first batch at Tierno's office. He then transferred what I'd collected on the

swabs to petri dishes in his lab and set them aside to see what, if anything, multiplied there over the course of a week.

When I met Tierno back at the lab, he greeted me with a sobering piece of news. "More than half of your specimens had evidence of fecal contamination," he said. Horrified, I looked at 21 clear plastic dishes that had bloomed with beautiful, multicolored bacteria and fungi. (To see for yourself, check out "My Germ Report Card," below.) There, in bright inkblot colonies, were *Escherichia coli* (*E. coli*) and *enterococci*, both infection-causing bacteria that were living on the shopping cart and pen at my local grocery store, the sink and door handles in the bathroom of my coffee shop, the buttons

her hands and requested multiple wipe-downs during meals. "Oh no," I thought. "I've infected her with my own disease: an unhealthy obsession with staying clean."

It was time for professional help. I headed into Manhattan to the NYU Langone Medical Center and, after navigating a tunnel-like maze of doors marked INFECTIOUS DISEASES, found Philip Tierno, Ph.D., the director of clinical microbiology and immunology. He shook my hand without pausing, so I stifled the urge to grab my Purell and asked him if my fear of germs was justified.

"That depends on the germ," said Tierno. "They're everywhere—but only 1 to 2 percent of the 60,000 known

"MY GERM REPORT CARD"

Here's what the author discovered on some of the things she touches every day.



Office phone receiver
S. aureus



Copy machine button
candida



Grocery store pen
E. coli,
enterococci



Elevator button
candida,
S. aureus



Arc Trainer handle
E. coli,
S. aureus



Daughter's library book
bacilli (harmless)



Coffee shop bathroom faucet
enterococci



ATM buttons
E. coli



Subway handle
candida



Office microwave button
E. coli



Public bathroom door handle
enterococci



Kitchen counter
E. coli, *klebsiella*,
enterococci

of the ATM and copy machine I use, and the playground jungle gym where my daughter blissfully scrambles about. "This is proof that most people don't wash their hands after using the bathroom," said Tierno. "Oh, terrific," I thought.

Just as I began to contemplate moving to a remote island, Tierno went on to explain that *E. coli* from humans—the source of a lot of that contamination—is not the same as the animal-produced strain in the spinach (O157:H7) that sickened people three years ago. I was relieved—until he added that feces can also contain other pathogens, like *norovirus*, one of the main causes of food poisoning. The take-home message, according to Tierno: "Wash your hands often—at least before and after eating and after using the bathroom." Not only will it rinse off fecal contaminants, but a University of Arizona study found that scrubbing up frequently slashed the number of colds and illnesses people got each year by 50 percent.

Unfortunately, research shows that more than half of Americans don't spend enough time with the soap, leaving germs on their hands. To do it properly, work up a good lather and wash the tops, palms, and under each nail bed for 20 to 30 seconds (or the amount of time it takes to sing "Happy Birthday" twice). Because germs are attracted to wet surfaces, dry your hands with a paper towel. If you're in a public restroom, use that same towel to turn off the faucet and open the door to avoid recontamination. If you can't get to a sink, alcohol-based sanitizers are your next best line of defense. Squeeze a quarter-size amount into your palm, making sure to rub it between your fingers as well as on your palms.

I put these strategies to the test. On one day, I traipsed around New York City touching subway poles, hand railings, and toilet handles without once washing my hands or reaching for sanitizer. Then I spent a day following my usual protocol. I swabbed my palms after both days so Tierno could culture them. At the end of the dirty day, I had *E. coli* on my hands; on the clean day, the only organisms in the petri dish were the harmless bacteria that naturally grow on the skin.

WHAT'S REALLY COOKING IN THE KITCHEN

After getting the results of my experiment, I was feeling vindicated about my hand washing fixation—and eager to earn praise in the home-hygiene department. But my smugness quickly disappeared when Tierno brought out the

"infection-causing bacteria were living on the buttons of the ATM and copy machine."



specimen from my kitchen counter. "This was the dirtiest sample of the bunch," he said. The petri dish Tierno held was overflowing with a veritable alphabet soup of microbes: *E. coli*, *enterococci*, *enterobacterium* (which can make immunocompromised people, such as those who are elderly or pregnant, sick), *klebsiella* (which can cause pneumonia and urinary tract infections, among other things), and more. "This is incredible," he marveled. Yikes: That's not exactly how you want the man who briefs New York City's mayor on potential bioterrorist threats to describe your kitchen.

I thought I was doing a good job cleaning my counters and sink weekly with eco-friendly dish detergent. I also live in a vegetarian household, so exposure to raw meat isn't a concern. But it turns out that fruits and vegetables can be loaded with animal and human debris too. And by wiping down my counters with a month-old sponge, I may be spreading the bacteria around. In a University of Arizona study, researchers analyzed 1,000 kitchen sponges and found that 10 percent had *salmonella* growing in them.

Many of these bacteria can cause everything from infections to food poisoning.

To keep your sponge from becoming a full-fledged germ farm, Tierno recommends microwaving it in a bowl of water on high for at least two minutes each time you use it to clean up after a meal. He also told me that my once-a-week kitchen speed clean wasn't cutting it. Before and after prepping meals, Tierno wipes down his own kitchen sink and counter surfaces with a solution of one shot glass of bleach to a quart of water. (For a shortcut, he says you could simply use an antibacterial wipe, such as those made by Clorox.) If, like me, you want to keep harsh chemicals out of your home, use non-chlorine bleach (3% hydrogen peroxide). I now stash the stuff in a spray bottle under the counter.

Another kitchen surface you should focus on is your cutting board. A recent study from the University of Arizona shows that the average one contains 200 times more fecal bacteria than a toilet seat does. "Wash it with soap and water after every use," advises Tierno, "and avoid cross-contamination by keeping separate cutting boards for different foods: one for fish, poultry, and meat, and another for fruits and veggies."



OCCUPATIONAL HAZARDS

After delivering the news about my contaminated kitchen, Tierno moved on to my home office. Even though my laptop had a little *E. coli* on it, he declared it "pretty clean." (Finally, a compliment!) But a friend's Manhattan office I had canvassed didn't fare as well. Even the elevator button harbored *Staphylococcus aureus* (*S. aureus*), a bacteria that can lead to skin infections, and *candida* (vaginal or rectal yeast), which is harmless—but gross. "Everyone presses elevator buttons, but no one cleans them," says Tierno, who suggests washing up afterward or using a hand sanitizer.

Once you get to your desk, you're not much better off. "Since we spend so much of our time in offices these days, they can be some of the dirtiest spots around," says Tierno. Plus, a lot of us keep food at our desks, giving microbes a daily feast. He recommends cleaning your work space, phone, mouse, and keyboard with a disinfecting wipe daily. While you're at it, clean a few common areas; Tierno found *E. coli* on the microwave's start button. Afternoon popcorn, anyone?

EXERCISE CAUTION

Finally, we examined my local gym specimens, and I soon discovered that the place I go to get lean and mean is far from clean. Research published in the *Clinical Journal of Sports Medicine* found that 63 percent of gym equipment had the cold-causing *rhinovirus*, but at my gym, things were even worse: The Arc Trainer handles I'd swabbed were teeming with *S. aureus*. If this bacteria had happened to be methicillin-resistant, or MRSA (the kind you've probably read about in the news), it could have landed me in the hospital, because most antibiotics aren't effective against it.

Besides scrubbing up, Tierno recommends bringing your own water bottle (the water fountain handle had *E. coli*) and yoga mat (athlete's foot fungus can survive on the surface). "To avoid infection, always wear flip-flops in the shower," he says. In a separate analysis, Tierno found that the shower floor was the filthiest place in the gym.

COMING CLEAN

My conversation with Tierno reinforced my ideas about hand washing and changed my approach to cleaning. But I still worried about one thing: While researching germs, I came across something called the



"hygiene hypothesis." Experts claim that, thanks to our recent obsession with cleanliness, our bodies no longer need to destroy germs as much as they once did. And as a result, our immune systems are less able to ward off infection. If I enforce a full anti-germ offensive, will I be putting my daughter—and myself—at a disadvantage?

Definitely, says Mary Ruebush, Ph.D., an immunologist and the author of *Why Dirt Is Good*. "From birth to adolescence, the immune system is a work in progress," she explains. "If it isn't challenged, it won't develop into a successful germ-fighting force, or worse, it will get into trouble by attacking your own body—so you're at greater risk for developing allergies." In fact, a study in the *Journal of Allergy and Clinical Immunology* reveals that children who go to day care before the age of 12 months have lower rates of allergies. As an adult, exposure to germs can strengthen your immune system. In other words, the dirt you encounter in your 20s will help you stay healthy in your 70s. "Getting grubby can do a body good," says Ruebush.

Still, warns Tierno, it's important to employ common sense. "You can't use the hygiene hypothesis as an excuse not to wash your hands after going to the bathroom or your fruits and vegetables before you eat them," he says. Those germs will make you sick, he says. There are an estimated 76 million cases of food-borne illness every year.

A NEW ATTITUDE

So what's a concerned mom to do? This jumble of scientific names and what they can do sounds scary. But even Tierno says germs need specific environments to do harm. The right factors need to line up (you need to get enough germs on your finger and transmit them to your nose, for instance). For people with compromised immune systems, everyday germs can be a threat. But most of us encounter these bad bugs daily and live to tell the tale. The point of knowing what's out there is not to fuel germophobes like me, but to remind us that exercising caution *does* keep us healthier.



With that in mind, I'll continue to wash my hands and kitchen regularly and have my daughter do the same. I still have hand sanitizer in all my purses, but I don't always whip it out after my daughter picks something off the floor. And I no longer wipe down her library books—Tierno tells me paper is a poor germ transmitter anyway.

When my kid pops something into her mouth before I have a chance to stop her, or when we're both having such a good time that I forget to keep our hands clean, I'll take comfort in the fact that I'm giving our immune systems something to do. And I'll also remember that there are trillions of friendly microbes that make it possible for us to live in this germ-rich place we all call home.

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THE TRUTH ABOUT YOUR GERM-FIGHTING HABITS

Your mom always warned you not to sit directly on public toilet seats or stand around people with colds. Was she right? We asked our expert to weigh in on four preventative steps.

Holding your breath when someone sneezes

Verdict: Do it. It takes a certain number of microbes to make you sick. If you can cut down the number you come in contact with, you give yourself a fighting chance. "But an easier move is to simply walk diagonally away from the sneeze so you won't inhale the germs,"

says Philip Tierno, Ph.D., the director of clinical microbiology and immunology at the NYU Langone Medical Center.

Flushing the toilet with your foot

Verdict: Do it—sometimes. The spray from the flush launches a million microbes into the air, so it's better to close the lid and use your hand. If there's no lid to trap

the spray, Tierno recommends flushing with your foot as you turn your head away so you get as far away from the flying germs as possible.

Wiping down silverware at a restaurant

Verdict: Do it. Applying friction will help remove any germs that may have gotten on the cutlery from servers' hands. But it's

more important to wash your hands before eating, since the wine list and menu usually aren't cleaned or replaced regularly.

Lining the toilet seat in a public restroom

Verdict: Not necessary. To catch something, you'd have to expose an open wound on your legs or butt immediately to germs left on the seat.