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**Lessons of Heart Disease, Learned and Ignored**

By [GINA KOLATA](#), New York Times, [nytimes.com](#)

Keith Orr thought he would surprise his doctor when he came for a checkup.

His doctor had told him to have a weight-loss operation to reduce the amount of food his stomach could hold, worried because Mr. Orr, at 6 feet 2 inches, weighed 278 pounds. He also had a blood sugar level so high he was on the verge of [diabetes](#) and a strong family history of early death from heart attacks. And Mr. Orr, who is 44, had already had a heart attack in 1998 when he was 35.

But Mr. Orr had a secret plan. He had been quietly [dieting](#) and exercising for four months and lost 45 pounds. He envisioned himself proudly telling his doctor what he had done, sure his tests would show a huge drop in his blood sugar and [cholesterol](#) levels. He planned to confess that he had also stopped taking all of his prescription drugs for [heart disease](#).

After all, he reasoned, with his improved diet and exercise, he no longer needed the drugs. And, anyway, he had never taken his medications regularly, so stopping altogether would not make much difference, he decided.

But the surprise was not what Mr. Orr had anticipated. On Feb. 6, one week before the appointment with his doctor, Mr. Orr was working out at a gym near his home in Boston when he felt a tightness in his chest. It was the start of a massive heart attack, with the sort of blockage in an artery that doctors call the widow-maker.

He survived, miraculously, with little or no damage to his heart. But his story illustrates the reasons that heart disease still kills more Americans than any other disease, as it has for nearly a century.

Medical research has revealed enough about the causes and prevention of heart attacks that they could be nearly eliminated. Yet nearly 16 million Americans are living with coronary heart disease, and nearly half a million die from it each year.

It's not that prevention doesn't work, and it's not that once someone has a heart attack there is little to be done. In fact, said Dr. Elizabeth Nabel, director of the National Heart, Lung and Blood Institute at the [National Institutes of Health](#), age-adjusted death rates for heart disease dropped precipitously in the past few decades, and prevention and better treatment are major reasons why.

But the concern, Dr. Nabel and others say, is that much more could be done. In many ways, scientists' hard-won and increasingly detailed understanding of what causes heart disease and what to do for it often goes unknown or ignored.

Studies reveal, for example, that people have only about an hour to get their arteries open during a heart attack if they are to avoid permanent heart damage. Yet, recent surveys find, fewer than 10 percent get to a hospital that fast, sometimes because they are reluctant to acknowledge what is happening. And most who reach the hospital quickly do not receive the optimal treatment — many American hospitals are not fully equipped to provide it but are reluctant to give up heart patients because they are so profitable.

And new studies reveal that even though drugs can protect people who already had a heart attack from having another, many patients get the wrong doses and most, Mr. Orr included, stop taking the drugs in a matter of months. They should take the drugs for the rest of their lives.

“We’ve done pretty well,” Dr. Nabel said. “But we could be doing much better. I’ve heard some people refer to it as the rule of halves. Half the people who need to be treated are treated and half who are treated are adequately treated.”

The result, heart researchers say, is a huge disconnect between what is possible and what is actually happening.

#### Crucial Miscalculations

Keith Orr’s story has themes that resonate with every cardiologist. He did many things right, but also made some crucial miscalculations that were so common that nearly every patient makes them, cardiologists say. But not everyone comes out as well.

Mr. Orr anticipated a pleasant day on Feb. 6, starting with a workout at his gym, then lunch with a friend before he went to work at Smith & Wollensky, a steakhouse where he is a manager.

He arrived at the gym around noon and lifted weights, concentrating on the pectoral muscles of his chest. Then he moved on to an elliptical cross-trainer for cardiovascular exercise.

After half an hour on the elliptical, Mr. Orr felt a tightness in his chest. “I attributed it to the weight training,” he said, but stopped exercising, showered, dressed and walked to his car.

“I felt really bad, out of sorts,” he said. The pressure in his chest would ease off and then intensify, and now he was sweating profusely and was nauseated. When he arrived at the restaurant, he told his friend Darrin Friedman that he would have to beg off from lunch. “I feel like hell,” he told Mr. Friedman.

He went home and lay on his bed.

“I knew at that point that it was not a pulled muscle,” Mr. Orr said. “It’s a completely different feeling of pressure and discomfort. You feel as though something is genuinely wrong.”

It was 3:15. And the pain was no longer intermittent. It was constant.

Mr. Orr called Mr. Friedman and asked him to drive him to an emergency room. A few minutes later, the two set off for Brigham and Women's Hospital, about a 10-minute drive.

"Keith was hunched over and he didn't put his seat belt on," Mr. Friedman said. "I kept asking him, 'Is it getting better or getting worse or staying the same?' For the first 10 minutes he said, 'It's about the same.' Then, when we were a block or so away, he said: 'I'm not doing well. I think it's getting worse.' "

When they arrived at the hospital's emergency department, Mr. Friedman explained that his friend was having chest pains. Immediately, Mr. Orr was wheeled off for an electrocardiogram, showing his heart's electrical signals. It was ominous, including one pattern called the tombstone T wave because patients who had it died in the days before there were aggressive treatments to open arteries.

The next thing Mr. Orr knew, he was being rushed to the cardiac catheterization laboratory for a procedure to open his artery.

"They said: 'We're going now. We're going now,' " Mr. Orr recalled. "That really scared me. Someone kept yelling: 'Do you have his labs? Do you have his labs?' Someone else said, 'We'll transfer them later.' "

The electrocardiogram was at 3:45 p.m., roughly 30 minutes after his symptoms changed from intermittent to constant and 5 minutes after he got to the hospital.

At 3:52 p.m., Dr. Ashvin Pande, a cardiology fellow, was chatting in the hallway when he was called to the catheterization lab.

"Big M.I. coming in," a nurse told Dr. Pande, using the abbreviation for myocardial infarction, or heart attack. At the time, the room was occupied — a patient was lying on the table for an elective procedure. He was quickly wheeled out and Mr. Orr was wheeled in. It was 3:56 p.m.

Within minutes, Dr. James M. Kirshenbaum, director of acute interventional cardiology, assisted by Dr. Pande, threaded a thin tube, like a long and narrow straw, from an artery in Mr. Orr's groin to his heart. They injected a dye to make Mr. Orr's arteries visible to an X-ray and they saw the problem — a huge clot in his heart's left anterior descending artery, blocking blood flow to most of his heart.

The quickest option was to open that artery with a balloon and keep it open with a stent, a tiny mesh cage, if possible.

It worked — the balloon shattered the clot and pushed the debris against the artery wall and the stent held the artery open. Then a different problem arose. When the large clot was pushed aside, the debris was shoved against the opening of a small artery that branched from the larger one, much as a snowplow clearing a street can block a driveway.

“We made a calculated decision that it would be worth sacrificing the branch to secure the main vessel,” Dr. Pande said. But, fortunately, they were able to insert another balloon through the stent and into the small artery, opening it too.

At 4:43, the procedure was over and Mr. Orr was wheeled to the coronary intensive care unit. He had been awake but sedated and experienced what he said was the amazing feeling of having his artery opened. “As soon as the balloon goes in, all the pain disappears,” he said. “You know immediately.”

The cardiologists who saved his life walked out of the room, grinning and exhilarated.

“This adrenaline rush is why people like me go into cardiology,” Dr. Pande said.

### The First Call: An Ambulance

Mr. Orr was incredibly lucky, said Dr. Elliott Antman, director of the coronary care unit at Brigham and Women’s Hospital. He ended up with little or no damage to his heart, even though he teetered between lifesaving decisions and critical miscalculations in his moments of crisis.

The first lifesaving decision was to go to a hospital soon after his chest pain began. But the miscalculation was to call his friend for a ride. He should have called an ambulance.

Had his friend gotten caught in traffic, Mr. Orr might have been dead or sustained serious injury to his heart. He might have had to go to a rehabilitation center and learn special tactics for conserving energy, like sliding a coffeepot along a counter instead of lifting it.

What few patients realize, Dr. Antman said, is that a serious heart attack is as much of an emergency as being shot.

“We deal with it as if it is a gunshot wound to the heart,” Dr. Antman said.

Cardiologists call it the golden hour, that window of time when they have a chance to save most of the heart muscle when an artery is blocked.

But that urgency, cardiologists say, has been one of the most difficult messages to get across, in part because people often deny or fail to appreciate the symptoms of a heart attack. The popular image of a heart attack is all wrong.

It’s the Hollywood heart attack, said Dr. Eric Peterson, a cardiologist and heart disease researcher at [Duke University](#).

“That’s the man clutching his chest, grimacing in pain and going down,” Dr. Peterson said. “That’s what people imagine a heart attack is like. What they don’t imagine is that it’s not so much pain as pressure, a feeling of heaviness, shortness of breath.”

Most patients describe something like Mr. Orr's symptoms — discomfort in the chest that may, or may not, radiate into the arms or neck, the back, the jaw, or the stomach. Many also have nausea or shortness of breath. Or they break out in a cold sweat, or have a feeling of anxiety or impending doom, or have blue lips or hands or feet, or feel a sudden exhaustion.

But symptoms often are less distinctive in elderly patients, especially women. Their only sign may be a sudden feeling of exhaustion just walking across a room. Some say they broke out in a sweat. Afterward, they may recall a feeling of pressure in their chest or pain radiating from their chest but at the time, they say, they paid little attention.

Patients with diabetes might have no obvious symptoms at all other than sudden, extreme fatigue. It's not clear why diabetics often have these so-called silent heart attacks — one hypothesis attributes it to damage diabetes can cause to nerves that carry pain signals.

"I say to patients, 'Be alert to the possibility that you may be short of breath,'" Dr. Antman said. "Every day you walk down your driveway to go to your mailbox. If you discover one day that you can only walk halfway there, you are so fatigued that you can't walk another foot, I want to hear about that. You might be having a heart attack."

Other times, said Dr. George Sopko, a cardiologist at the National Heart, Lung and Blood Institute, symptoms like pressure in the chest come and go. That is because a blood clot blocking an artery is breaking up a bit, reforming, breaking and reforming. It was what happened to Mr. Orr when he was at the gym and meeting his friend afterward.

"It's a pre-heart attack," Dr. Sopko said. A blood vessel is on its way to being completely blocked. "You need to call 911."

But most people — often hoping it is not a heart attack, wondering if their symptoms will fade, not wanting to be alarmist — hesitate far too long before calling for help.

"The single biggest delay is from the onset of symptoms and calling 911," said Dr. Bernard Gersh, a cardiologist at the [Mayo Clinic](#). "The average time is 111 minutes, and it hasn't changed in 10 years."

'Time Is Muscle'

At least half of all patients never call an ambulance. Instead, in the throes of a heart attack, they drive themselves to the emergency room or are driven there by a friend or family member. Or they take a taxi. Or they walk.

Patients often say they were embarrassed by the thought of an ambulance arriving at their door.

"Calling 911 seems like such a project," Mr. Orr said. "I reserve it for car accidents and exploding appliances. I feel like if I can walk and talk and breathe I should just get here."

It is an understandable response, but one that can be fatal, cardiologists say.

“If you come to the hospital unannounced or if you drive yourself there, you’re burning time,” Dr. Antman said. “And time is muscle,” he added, meaning that heart muscle is dying as the minutes tick away.

There may be false alarms, Dr. Sopko said.

“But it is better to be checked out and find out it’s not a problem than to have a problem and not have the therapy,” he said.

Calling an ambulance promptly is only part of the issue, heart researchers say. There also is the question of how, or even whether, the patient gets either of two types of treatment to open the blocked arteries, known as reperfusion therapy.

One is to open arteries with a clot-dissolving drug like tPA, for tissue plasminogen activator.

“These have been breakthrough therapies,” said Dr. Joseph P. Ornato, a cardiologist and emergency medicine specialist who is medical director for the City of Richmond, Va. “But the hooker is that even the best of the clot buster drugs typically only open up 60 to 70 percent of blocked arteries — nowhere close to 100 percent.”

The drugs also make patients vulnerable to bleeding, Dr. Ornato said.

One in 200 patients bleeds into the brain, having a stroke from the treatment meant to save the heart.

The other way is with [angioplasty](#), the procedure Mr. Orr got. Cardiologists say it is the preferred method under ideal circumstances.

[Stents](#) have recently been questioned for those who are just having symptoms like shortness of breath. In those cases, drugs often work as well as stents. But during a heart attack or in the early hours afterward, stents are the best way to open arteries and prevent damage. That, though, requires a cardiac catheterization laboratory, practiced doctors and staff on call 24 hours a day. The result is that few get this treatment.

“We now are seeing really phenomenal results in experienced hands,” Dr. Ornato said. “We can open 95 to 96 percent of arteries, and bleeding in the brain is virtually unheard of. It’s a safer route if it is done by very experienced people and if it is done promptly. Those are big ifs.”

The ifs were not a problem for Mr. Orr. His decision to go to Brigham and Women’s Hospital proved exactly right. But he did not know that when he chose the hospital — he chose it because his doctor was affiliated with Brigham.

A Need for More Angioplasty

Currently, 30 percent of patients who are candidates for reperfusion do not receive it, and of those who do, only 18 percent are treated with angioplasty, said Dr. Alice Jacobs, director of the cardiac catheterization laboratory at [Boston University](#) School of Medicine and a past president of the [American Heart Association](#). Of the nation's 5,000 acute care hospitals, Dr. Jacobs said, only 1,200 provide angioplasty.

Most hospitals, she said, cannot offer angioplasty because they do not have enough patients for a team of doctors to maintain their skills. An obvious solution would be to make heart attack care more like trauma care — sending patients to the nearest hospital that can provide angioplasty as quickly as possible. But that is not always easy, Dr. Jacobs said, because hospitals do not want to lose cardiac patients.

A major reason, she said, is financial. Hospitals are reimbursed by Medicare according an index that measures the acuity of medical conditions they treat.

“If your cardiac patients are transferred, your acuity index goes down, which lowers overall Medicare reimbursement for other problems like pneumonia and renal disease,” Dr. Jacobs said.

It is also difficult for patients who live in rural areas, where community hospitals are too small to offer angioplasty and larger hospitals that do offer it are hours away. Minnesota is experimenting with a program using helicopters to transport patients quickly. But for most rural patients elsewhere, angioplasty is almost an impossibility.

Dr. Antman suggests that heart disease patients ask their doctor if there is a hospital nearby that does angioplasty around the clock. If so, they might want to discuss with their doctor whether to ask that an ambulance take them there if they are having a heart attack.

It is the sort of advice that makes cardiologists nervous — they do not want to encourage patients to dictate treatment. But, Dr. Antman said, if it is feasible to get to an angioplasty-providing hospital within an hour, “in most cases that would be preferable.”

### Getting the Proper Therapy

Opening an artery is only the start of treatment. The next part is at least as problematic: Patients have to get the right drugs, in the right doses, and have to take them for the rest of their lives.

“Care is getting a lot better,” Dr. Peterson said. “But the only caveat is that they are only really looking at, Did you get therapy? No one is looking too closely at, Did you do it right?”

For example, he said, a recent study found that heart attack patients were getting blood-thinning prescription drugs to prevent clots, as they should, but up to 40 percent were getting the wrong dose, usually one too high.

And even if every prescription were exactly right, as many as half of all patients do just what Mr. Orr did after his first heart attack. They stop taking many or all of their drugs.

Sometimes it is a matter of communication.

“The information did not get to the primary doctor and the primary doctor did not know to renew the prescription,” Dr. Peterson said. “When we talk to patients, they say: ‘No one communicated to me the importance of being on the medications long term. I thought I would only need them for three months, I thought it would be like an [antibiotic](#). I thought they put in a stent so why do I need a drug?’ ”

But there may be more to it than ignorance. There also is the image those pills convey of a sick person.

Mr. Orr said he did not like to think of himself as someone who had to take a fistful of pills every day. Even the recommended daily aspirin seemed superfluous, he thought.

“I think I sort of pooh-poohed the notion that one tablet of aspirin each day would do anything,” Mr. Orr said.

What it does is make blood less likely to clot. In Mr. Orr’s case, Dr. Antman said, it is likely that when Mr. Orr was exercising on the cross-trainer, an area of plaque ruptured. Then a clot began to form in the area, eventually blocking the artery.

The problem was not exercise, which is good for people with heart disease, but Mr. Orr’s decision not to take his medications, Dr. Antman said. If he had been taking aspirin that clot would have had more difficulty forming and growing.

Dr. Antman has a message for patients: With a disease as serious as heart disease, those who take responsibility are often the ones who survive.

Having a heart attack, even if it turns out well, as his did, is a life-altering experience, Mr. Orr said.

His first heart attack, Mr. Orr said, “came out of the blue.” When he was discharged from the hospital, he was terrified that it would happen again when he was alone and unable to call for help. “I had a really hard time with it,” he said. “I only stayed in my own house for one night and then I moved to a friend’s house for two weeks.”

Now Mr. Orr plans to be serious about taking his medication and getting back to his diet and exercise program. He will call an ambulance if he ever has symptoms again. Still, he hates to think of himself as a patient. “I’m a little freaked out that I will have to take medication for the foreseeable eternity,” Mr. Orr said.

But the day after he got home from the hospital, he thought about what had happened.

“The gravity of the situation just sort of clicked,” Mr. Orr said. “I started to cry.”