

ADVANCEMENTS IN PREVENTION

CONTAINING CONTAGION

PATHS TO BETTER HEALTH

HEART DISEASE MEETS COVID-19

Brigham

The Magazine of Brigham
and Women's Hospital
Winter 2021

HEALTH

THE PREVENTERS

Protecting health requires a mighty team



**SENIOR VICE PRESIDENT AND
CHIEF DEVELOPMENT OFFICER**

Susan E. Rapple

**ASSOCIATE VICE PRESIDENT,
DEVELOPMENT COMMUNICATIONS,
EVENTS, AND DONOR RELATIONS**

Adam Sholley

**ASSISTANT VICE PRESIDENT,
CONTENT MANAGEMENT**

Karen Fogerty

**ASSISTANT VICE PRESIDENT,
DEVELOPMENT COMMUNICATIONS**

Susan Watson

SENIOR DIRECTOR, CREATIVE SERVICES

John Bach

PUBLICATIONS

Joy Howard, *Managing Editor*

Jennifer Reardon, *Associate Editor*

Lauren Thompson, *Assistant Editor*

Rebekah Edwards, *Production Officer*

DIGITAL ENGAGEMENT

Jay Welz, *Senior Director*

Jessie Crombie, *Director*

Stephen Daly, *Assistant Director*

Amanda Doby, *Assistant Director*

Caitlin Robinson, *Graphic Designer*

WRITING AND EDITORIAL ASSISTANCE

Sarah M. Jackson

Monica Sambataro

DESIGN

Steve Habersang/Taylor Design

Hannah Wool/Taylor Design

PHOTOGRAPHY

Stu Rosner

For additional copies of
Brigham Health magazine, contact:

Brigham and Women's
Development Office

116 Huntington Avenue, Third Floor

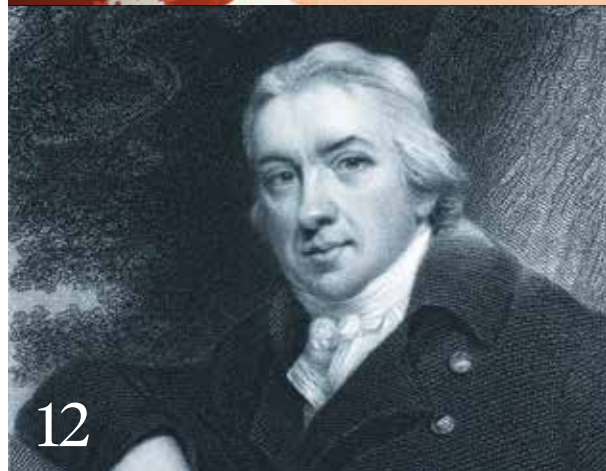
Boston, MA 02116-5712

617-424-4300

Magazine@bwh.harvard.edu

READ THE MAGAZINE ONLINE AT

brighamhealthmag.org



HONED BY COURAGE

Working on this issue of Brigham Health

magazine, before and during the COVID-19 pandemic, showed us how essential a buddy system, teamwork, and community are to preventing disease and injury. Those values permeate this issue, from cover to cover.

One of my heroes, Audre Lorde, wrote, "we hone ourselves upon each other's courage." While her poem beautifully portrays two people influencing each other, it can also describe relationships among members of an institution like the Brigham, or dwellers of a region, nation, and world.

I have been honed by the ceaseless courage and creativity of many Brigham leaders, scientists, clinicians, nurses, staff, patients, and benefactors. They have met the stresses and traumas of this pandemic with bravery, ingenuity, generosity, and compassion to bring us closer to a healthier tomorrow. They demonstrate that we're all in this together, despite physical distance.

Whose courage hones you? What community or buddy helped you make it through 2020? What lessons from the past year do you want to keep and pass on? Please let us know at magazine@bwh.harvard.edu.



Joy Howard
Managing Editor

SMALL STEPS, BIG RESULTS

Brigham patients, including Liz Peet (left), are developing healthier habits and seeing amazing results with the support of clinicians and peers.

30

FEATURES

12

Advancements in Prevention

From smallpox inoculations to seatbelt regulations, prevention has a long and winding history.

16

Containing Contagion

People around the globe are contending with multiple contagions: COVID-19, the spread of misinformation, and distrust of science.

24

Stress Test

Knowing COVID-19 endangers the heart, cardiovascular leaders are helping people reduce their cardiac risk in the hospital, at home, and in the future.

30

Paths to Better Health

For three Brigham patients, embracing healthy habits has been a life-changing journey—especially amid an ongoing pandemic.

DEPARTMENTS

- 02 Engage
- 04 Team Board
- 06 The Rundown
- 08 Catalyst
- 10 The Brigham Way
- 38 Wellness
- 40 Last Shot



ON THE COVER

Whether dealing with a pandemic or working to build healthier habits, prevention needs a strong team. (Illustration by John Holcroft)



DON'T MISS OUR WEB EXTRAS

There's more happening inside our doors! To discover the latest buzz at BWH, visit brighamhealthmag.org.

JOIN THE CONVERSATION

You can read Brigham Health magazine wherever you go at brighamhealthmag.org, where you will find videos, quizzes, and bonus content not available in print. Talk to us: magazine@bwh.harvard.edu



ONLINE POLL

WHICH HABITS WILL YOU KEEP WHEN THE PANDEMIC IS OVER?

Let us know in our poll: brighamhealthmag.org/poll



HEAR FROM THE EXPERTS

Reflections from the COVID-19 Front Line

Brigham leaders and clinicians share how they navigated unprecedented challenges and came together to overcome the initial surge of COVID-19. brighamhealthmag.org/covidfrontline

PATIENT STORIES



HOW TO SAVE A LIFE

Bob, who was diagnosed with idiopathic pulmonary fibrosis, underwent a lung transplant at the Brigham that restored his health and hope for the future. brighamhealthmag.org/lungsforlife

PATIENT STORIES



BACK IN ACTION

After Justra's weight steadily increased over the years, she underwent weight-loss surgery at the Brigham to get back to the activities she enjoys most. brighamhealthmag.org/justra

PATIENT STORIES

GOING FOR GOLD

Swim champion Morgan Stickney, who is the first two-time recipient of the groundbreaking Ewing amputation procedure at the Brigham, spoke with WCVB Boston about her plans to compete in the Tokyo 2021 Paralympics. brighamhealthmag.org/gomorgan



HEAR FROM THE EXPERT

Help for When Home is Dangerous

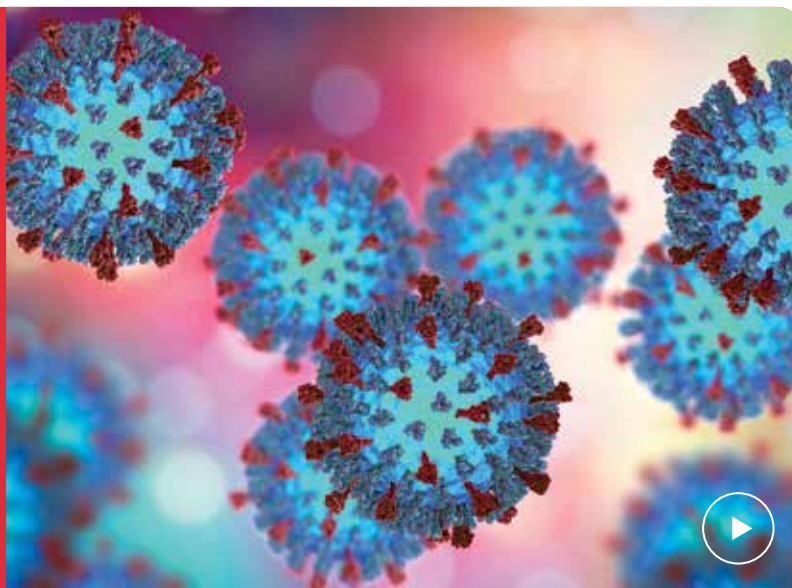
Intimate partner violence (IPV) rates soared during COVID-19 lockdowns. Brigham radiologist Bharti Khurana, MD, is pioneering an effort to enlist artificial intelligence and radiological scans to detect hidden IPV injuries. brighamhealthmag.org/ipv

HEAR FROM THE EXPERTS

ERASING IMMUNITY

Did you know the measles virus erases the immune system's memory of other infections? Brigham researchers explain why the measles vaccine is more important than we knew.

brighamhealthmag.org/measlesvax



TODAY'S TOPIC

WHAT HAVE YOU SEEN OR LEARNED DURING THE PANDEMIC THAT WILL STAY WITH YOU?

Clinicians and scientists from Brigham and Women's Hospital reflect on unforgettable moments and lessons learned from confronting COVID-19.



ADD YOUR VOICE

Tell us about research that inspires you. Visit us at brighamhealthmag.org/teamboard



"How necessary it is to work within a team that is multidisciplinary, diverse, community-engaged, and supported by leadership. If we hope to address inequities effectively, we have to continue centering equity for the communities we serve in all we do."

Cheryl Clark, MD, ScD, hospitalist and researcher; Equity, Diversity, and Community Health Response Team, Incident Command

"Coping with severe anxiety, depression, psychosis, and other psychiatric needs can be more challenging than ever now. Our psychiatric nursing staff continue to share the most compassionate care with all who need it during this time."

Chris AhnAllen, PhD, director of inpatient psychology, Brigham and Women's Faulkner Hospital



"In this unsettling time, I have the absolute best co-workers to always lean on. I couldn't do this without them. It's a great feeling when co-workers become family."

Kaleigh McRoberts, BSN, RN, staff nurse in the COVID-19 Special Pathogen Unit



“The urgency of COVID-19 pushed our research community to discover new, faster, and more collaborative ways to conduct research without sacrificing patient or staff safety. I think this experience will forever improve the ways we do research.”

Paul Anderson, MD, PhD, senior vice president of research and education and chief academic officer

“Despite the intensity, strain, and stress of the COVID-19 pandemic, our faculty, fellows, and house staff doubled down and displayed tremendous teamwork, enthusiasm, and dedication.”

Samuel Z. Goldhaber, MD, associate chief and clinical director, Division of Cardiovascular Medicine



“It’s amazing how much you can accomplish in a parking lot! We tested hundreds of people and distributed food, masks, and hand sanitizer. Patients were so appreciative. I was proud to be a part of the community testing team and represent the Brigham.”

Cori Kostick, PA-C, physician assistant, Primary Care



“A patient told me he didn’t think anyone would care about helping people in his community. He thanked me for caring and for being there, and said he was praying for us all. I will never forget him.”

Natasha Amaro, CST, surgical technologist, Endoscopy, Brigham and Women’s Health Care Center at Chestnut Hill



“The dedication, selflessness, camaraderie, and shared sense of purpose I witnessed from the Incident Command team and the many other people involved in the hospital’s response.”

Chanu Rhee, MD, MPH, infectious disease specialist and associate hospital epidemiologist

Nawal Nour, MD, MPH

Chair, Department of Obstetrics and Gynecology, Brigham and Women's Hospital; Kate Macy Ladd Professorship, Harvard Medical School

DEGREES

BA, Brown University

MD, Harvard Medical School

MPH, Harvard T.H. Chan School of Public Health

AWARDS AND HONORS

MacArthur Foundation Fellow, 2003

Honorary Doctorate of Science, Bowdoin College, 2006

Honorary Doctorate of Science, Williams College, 2008

DESERT ISLAND DIVERSIONS

- An Ella Fitzgerald CD
- Beethoven's Piano Concerto No. 5 in E-flat major ("Emperor")
- The NPR Podcast

The Brigham's first Black department chair reflects on her life's journeys and passions.

What prompted you to go into medicine?

I've been passionate about remedying gender and racial inequities since I was 12 when I read the book "The Hidden Face of Eve" by Nawal el Saadawi, where she described her own mutilation in excruciating detail. And I decided the best way to make the world a better place while improving women's health was to become a doctor.

Tell us about your path to becoming the first Black department chair at the Brigham.

I think of my life as like journeying down the Nile River. It has two sources: the White Nile begins in Lake Victoria in Uganda, and the Blue Nile is from Lake Tana in Ethiopia, and they meet in Khartoum and flow into the delta in Cairo. I feel a kinship with the Nile because I was born in Khartoum and lived in Cairo. Sometimes the river flows gently and smoothly. Sometimes there are rapids and waterfalls. Sometimes it meanders. At other times, there are dams, where the water gets held back. In times of drought, it dries up. When the rains come, it starts moving rapidly again. This is much like my own journey from childhood to here.

What are your hopes for bringing your passions for racial equity and women's health to your work as chair of the Department of Obstetrics and Gynecology?

These passions are the crux of my leadership. We must begin to combat structural and systemic barriers by identifying and addressing implicit biases in healthcare. These disparities are devastating for families and communities, as well as our institution. We must continue the work of dismantling barriers of implicit bias, which would vastly improve health outcomes and patient-provider interactions. As chair of this department, I want to lead us to become a more diverse department that keeps innovating, staying at the cutting edge of research, and stimulating the younger generation to surpass us.

What is a common misunderstanding or knowledge gap about your work?

My life's work has been to bring awareness to the often unknown racial disparities in women's maternal health. Studies show that Black, American Indian, and Alaskan Native women are two to three times more likely to die from pregnancy-related causes than White women, regardless of insurance or socioeconomic status. Part of my work is dissecting how we address these issues and making sure people understand the nuances of the increased risk for women of color, specifically Black mothers. Maternal mortality is a heartbreaking tragedy that impacts women worldwide, which is why health equity is a focus of my work.

What would you tell your adolescent self from where you are now?

We live in a world where we're told to work hard, be driven, and move fast, but this isn't always productive or healthy. So, slow down, be kind to yourself, and take time to cherish the spaces between the special moments. Also, remember that times of uncertainty can be deeply creative. To sit in uncertainty is actually a privilege. When you're uncertain, when you don't know what your next step is, relish it. Because when you do make that next step, hopefully, it is the right next step for you.

What keeps you up at night?

Wondering how to stop female genital mutilation/cutting (FGM/C). Little girls suffer so much when they're cut, and then they continue to suffer into adulthood. I would love to help eradicate FGM/C in my lifetime. I will sleep a lot better when we put an end to this harmful practice worldwide.

Who is one of your heroes?

Nelson Mandela is always my hero. He went through many decades in prison, yet he came out so positive, motivated, and inspirational. You can't get better than that.

“

***I've been
passionate
about
remedying
gender
and racial
inequities
since I
was 12.”***





PATIENT CARE

DNA: THE NEXT VITAL SIGN

Brigham genomics clinic makes medicine personal—and preventive

Since opening in 2019, the Preventive Genomics Clinic at Brigham and Women's Hospital remains the only one worldwide that is based in an academic medical center and serves healthy adults and children. Patients of the clinic receive DNA test kits by mail and send their swabs back for analysis. The clinic's genetic counselors and medical geneticists discuss findings with patients by video consult and make recommendations for follow-up care.

The clinic is driven by evidence from the MedSeq Project, a National Institutes of Health-funded study at the Brigham that was the first to explore using whole genome sequencing in healthy people. The study analyzed 5,000 genes in each participant's DNA and found that 20% of apparently healthy adults had strong genetic risk factors for disease. Some patients were already showing signs of a condition undetected by standard medical care. These results were replicated in the BabySeq Project studying healthy newborns, and the MilSeq Project studying active-duty military service members.

"We aren't just talking about rare genetic diseases or individuals who knew they might be at risk based on their family histories," says Robert Green, MD, MPH, who directs the clinic and led and co-led the MedSeq, BabySeq, and MilSeq Projects. "We are talking about healthy individuals who weren't aware of their risk for something as common as cancer or heart disease. This is game-changing."

RESEARCH

Leading the Way in COVID-19 Vaccine Trials

The Brigham is New England's clinical trial site for a COVID-19 vaccine

Since July, researchers at the Brigham have been enrolling patients in the United States' first phase 3 trial of a COVID-19 vaccine candidate. The Brigham site is funded by the National Institutes of Health as part of the COVID-19 Prevention Network, which is recruiting 30,000 participants at locations nationwide.

The COVE study is testing the effectiveness and safety of mRNA-1273 to see if it can prevent COVID-19. Data from the phase 1 trial of mRNA-1273 showed the vaccine induced an anti-SARS-CoV-2 immune response in all 45 participants.

In the phase 3 trial, participants are randomized to receive either two 100 microgram injections of mRNA-1273 or two shots of a saline placebo. Participants will be followed for up to two years after the second dose of the vaccine.

Lindsey Baden, MD, an infectious diseases specialist at the Brigham and an expert in vaccine development for viral diseases, is the study's co-principal investigator.

"This is the first phase 3 trial testing the effectiveness of a vaccine against COVID-19, and we've been working diligently across industry, academia, and government to pave a path for launching this trial rapidly and safely," says Baden. "Our goal has been to launch this important trial and develop a rapid, high-quality process for vaccine trials to come."

On December 15, FDA scientists confirmed the vaccine's safety, with an efficacy rate of 94.1%. Two days later, the FDA approved the vaccine for emergency use.

DID YOU KNOW?

The COVE study is part of the U.S. government's Operation Warp Speed, which aims to deliver 300 million doses of a safe, effective vaccine for COVID-19 by early 2021.



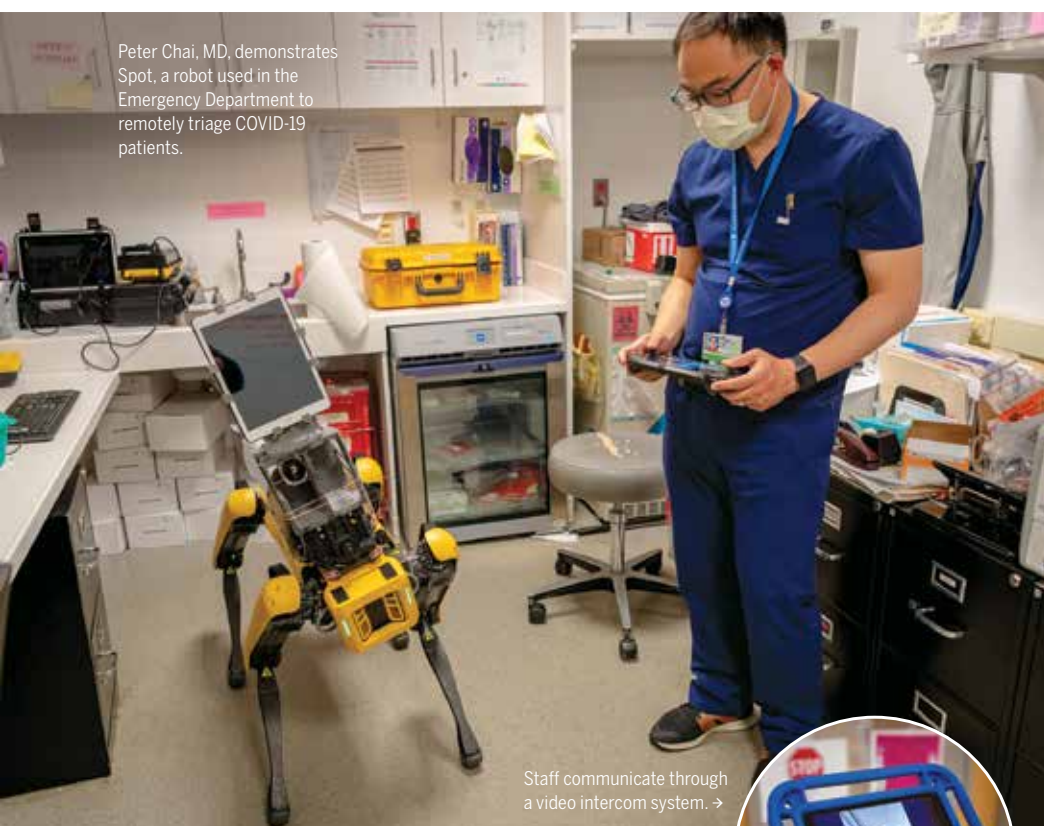
Lindsey Baden, MD (right), bumps elbows with a vaccine trial participant, Anthony Shivers.



WEB EXTRA

Watch a clip from CNBC's special report, "DNA Testing: the Promise and the Peril," which features the Preventive Genomics Clinic and an interview with Robert Green, MD, MPH. brighamhealthmag.org/preventivegenomics

Peter Chai, MD, demonstrates Spot, a robot used in the Emergency Department to remotely triage COVID-19 patients.



Staff communicate through a video intercom system. →

TECH

Innovate to Communicate

Creativity enables hospital staff to stay safe and in touch

Creative problem solving flourished during the initial surge of the COVID-19 pandemic. In the Brigham's Emergency Department (ED), a research team piloted the use of Boston Dynamics' four-legged robot, known as Spot, which was equipped with a video conferencing-enabled tablet. In an effort to conserve personal protective equipment (PPE), providers sent Spot to interact with and evaluate patients in a triage tent outside the ED.

To help clinical staff safely communicate in the COVID unit, Brigham information systems staff expanded the hospital's use of Vocera, a system of lightweight, wearable badges that staff can clip to scrubs or a gown for hands-free, real-time voice communication. The badges allowed nurses wearing PPE in patient rooms to talk with colleagues in the hall.

The team also deployed hundreds of electronic tablets to help patients

hospitalized with COVID-19 interact with their providers with secure video conferencing. Through a bedside tablet in the patient's room, clinicians could initiate video chats using a computer or mobile device—relieving providers from needing to enter patient rooms for every routine conversation. The tablets also helped patients stay connected with loved ones who could not visit in person.

"A silver lining of the COVID-19 pandemic has been the rapid adoption of new technologies," says Adam Landman, MD, vice president and chief information and digital innovation officer at the Brigham. "We have achieved years of digital transformation in just a few months. I'm especially proud of my colleagues in information systems, virtual care, and the digital innovation hub, who worked tirelessly to rapidly deploy these new tools to frontline clinicians."

5 BRIGHAM INNOVATIONS TO CONFRONT COVID-19

Researchers, clinicians, engineers, and others across the Brigham collaborated with record speed to develop solutions in response to the COVID-19 pandemic, including these five:

1 B-PROTECTED testing booth

Allows staff to safely administer a diagnostic test and preserve PPE.

2 3D-printed face shields

Teaming with academic and industry partners, Brigham employees developed a 3D-printed face shield that offers greater protection than traditional shields.

3 Silicone reusable mask prototypes

Innovators from the Brigham and academia created an N95 mask alternative made of silicone that can fit faces of different sizes and be sterilized for reuse.

4 In-house COVID-19 testing

Investigators created an in-house test with results within 24 hours for patients who have been admitted with suspected COVID-19.

5 At-home testing

TestBoston is a large research study conducting free, monthly at-home COVID-19 testing on 10,000 individuals in Boston-area communities hit hardest by the virus (learn more on page 21).

MUST READ

TOGETHER

The Healing Power of Human Connection in a Sometimes Lonely World

by Vivek H. Murthy, MD



In this thought-provoking book, Vivek Murthy, MD, MBA, former and future U.S. surgeon general who served as a hospitalist at the Brigham from 2003 to 2014, links the public health threat of loneliness to global epidemics of addiction, violence, depression, and anxiety.

The Future Is In Our Hands



“Our history reaffirms that we can overcome even the most difficult days because we’re stronger together.”

A century ago, our predecessors at the Peter Bent Brigham Hospital responded to the greatest healthcare crisis of their time: the 1918 influenza pandemic.

Recently, the Brigham’s archivist, Catherine Pate, curated a collection of records and photos that document the hospital’s response to the 1918 pandemic. Though healthcare has changed dramatically during the past century, the similarities between that event and our recent experiences are striking.

In fact, the 1918 report shared by Henry A. Christian, MD, the Peter Bent Brigham’s first physician-in-chief, mirrored many of my own observations in 2020. He noted:

- *“In handling influenza patients, all who came in contact with them were gowned, capped, and masked, and care in washing hands was insisted on. Our present knowledge of influenza is too inadequate to make certain how far these precautions are necessary. At present, they seem wise.”*
- *“The Surgical Staff loaned...four of their house officers to care for influenza cases, and very generously the surgeons curtailed their work to a minimum.”*
- *“Our nurses did most excellent work during the epidemic.... The way our nurses met these demands upon them has caused the staff to feel great pride in them.”*

Reading Christian’s words reminded me that the Brigham has always been a community of helpers and healers. More than 100 years later, our patients, their loved ones, and our colleagues and kin continue to look to us for comfort and reassurance during the greatest public health crisis of our time: COVID-19.

Yet, as individuals, we are not immune to the distress and uncertainty surrounding this pandemic. It can feel overwhelming at times to keep pace with the rapidly evolving demands of preparation and response, as well as the emerging understanding of this disease.

With so much unknown, I feel certain of this: Our history reaffirms that we can overcome even the most difficult days because we’re stronger together. The future is in our capable and compassionate hands.

A handwritten signature in black ink that reads "Betsy".

Elizabeth G. Nabel, MD

President

Brigham Health



Features

Advancements in Prevention

*A timeline of highlights in the
history of prevention*

PAGE 12

Containing Contagion

*Stopping the spread of disease,
misinformation, and science
resistance*

PAGE 16

Stress Test

*The world's No. 1 killer—heart
disease—meets COVID-19*

PAGE 24

Paths to Better Health

*The life-changing effects of small
steps—and a buddy system*

PAGE 30



WEB EXTRA

How did the Peter Bent Brigham
respond to the 1918 flu epidemic?
See historic photos and stories in
this digital retrospective from
Harvard's Countway Library.
Brighamhealthmag.org/1918flu

Safia Ansari volunteers to distribute masks to Brigham staff.

(Photo by Max Esposito)

ADVANCEMENTS IN PREVENTION

**“An Ounce
of Prevention
is Worth a
Pound of Cure.”**

– Ben Franklin,
“On Protection of
Towns from Fire,”
*The Philadelphia
Gazette*,
February 4, 1735

While Ben Franklin’s famous insight about prevention was advocating for fire safety, it also applies to preventing disease and premature death. Here are some highlights in the advancement of prevention throughout history.



INFECTIOUS DISEASES



VACCINES AND TREATMENTS



1000

First attempts at smallpox inoculation documented in China and India.

1796

First-ever vaccine invented by Edward Jenner—for smallpox.

- Prior to 1796, smallpox caused 7.7% (1 in 13) of all deaths.
- 1980: Smallpox declared eradicated worldwide.



1918–1920

Global Influenza outbreak causes ~50 million deaths.

- 1945: First influenza vaccine licensed in the U.S.
- 2017–18: Flu shot prevents ~6.2 million cases and 5,700 flu-related deaths in U.S.

1952

Jonas Salk invents first effective vaccine for polio, a highly contagious virus that can cause paralysis and kill ~5% of children and ~30% of adults who are infected.

- 1957: Albert Sabin develops vaccine for three types of polio virus.
- 1994: Polio eliminated in the Americas. By 2018, polio is eliminated or interrupted in most of the world. Global cases reduced from 350,000 in 1988 to 29 in 2019.

1971

Measles, mumps, rubella vaccine licensed, inducing 94% to 96% immunity.

- Before the vaccine, measles killed an estimated 2.6 million people each year. In 2018, measles killed 140,000 people globally.

1981

First official reporting in Los Angeles of acquired immunodeficiency syndrome (AIDS).

- 1984: Scientists identify human immunodeficiency virus (HIV) as the cause of AIDS. The U.S. government announces goal of a vaccine within two years.
- 1992: AIDS is No. 1 killer of U.S. men aged 25–44.
- 1997: AIDS deaths decline by 47% from previous year due to a combination of drugs to suppress growth of HIV.



→ 2009: Clinical trials of HIV vaccine show modest preventive effect, but not enough for widespread vaccination.

– Vaccine development continues due to HIV's frequent mutations and the challenge of identifying an immune response effective at controlling the virus.

→ 2012: U.S. Food and Drug Administration (FDA) approves PrEP (pre-exposure prophylaxis), which reduces risk of contracting HIV if exposed. For the first time, the majority of people eligible for treatment are receiving it (54%).



→ 2019: Annual HIV infections have decreased by more than 66% since the 1980s. Approximately 38 million people are infected with HIV globally, including 1.2 million in the U.S.

2006

FDA approves Gardasil, a vaccine that protects against human papillomavirus (HPV). Approximately 14 million Americans contract HPV annually, which can cause several types of cancer.

→ HPV causes ~35,000 cancer cases in the U.S. annually. HPV vaccine can prevent more than 90% of these cancers.

→ Since the vaccine was deployed, infections causing most HPV-related cancers have dropped 86% in teen girls. Among vaccinated women, cervical precancers caused by HPV have dropped 40%.

→ About 35,000 cancer cases linked to HPV develop in the U.S. annually. HPV vaccination can prevent more than 90% of these cancers.

2015

FDA approves an oral treatment for hepatitis C, which cures 90% of cases with few side effects.

→ In 2018, the CDC estimated 50,300 people contracted hepatitis C, with 15,713 deaths.

2019–2021

COVID-19, caused by SARS-CoV-2, declared a pandemic. As of December 18, of 51 vaccine candidates in development globally, FDA approved two for emergency use in U.S.

QUARANTINE



1347

The practices of quarantine and physical distancing used in Europe to curb plague epidemics.

1878

U.S. introduces federal quarantine legislation to quell an outbreak of yellow fever.

2020

14-day self-quarantine advised in many U.S. states for people who may have COVID-19 or travelled to infection hotspots.

→ A study by the University of Michigan Medical School and the U.S. Centers for Disease Control and Prevention (CDC) shows that during the 1918 flu pandemic, U.S. cities adopting early and sustained self-isolation measures had the greatest reductions in weekly death rates.

HAND HYGIENE



1843–1847

Ignaz Philipp Semmelweis recommends handwashing for physicians in his maternity clinic, which decreased maternal mortality rates from 16% to 3%.



1854

Florence Nightingale and other nurses implement handwashing and other hygiene practices at a British base hospital during the Crimean War, reducing death rates by 66%.

→ Despite proven benefits of handwashing, hand hygiene promotion stagnates until the 1980s.

2002

CDC establishes hand hygiene guidelines in use today.

RISE OF GERM THEORY AND MASKING

400 BCE

Greek physician Hippocrates proposes the miasma theory of disease, which claims “bad air” causes disease. This theory was widely accepted through the end of the 19th century.

1854

British physician John Snow connects London cholera outbreak to contaminated drinking water, challenging the miasma theory of disease.

1877

French scientist Louis Pasteur proposes germ theory of disease, where most infectious diseases are caused by microbes.





1878

American physician A.J. Jessup recommends wearing cotton masks to reduce infection during epidemics. His idea was largely ignored.

1897

German scientist Carl Friedrich Flügge publishes research on the transmission of disease via respiratory droplets and suggests a mouth covering be worn during surgery. Surgical masks became standard practice in the 1930s.

1918–1920

To quell contagion during influenza pandemic, face masks encouraged, even mandatory in some cities.

2020

Universal masking promoted during the COVID-19 pandemic to reduce contagion.

BACTERIAL INFECTIONS AND ANTIBIOTICS

1600s–2000s

Tuberculosis (TB) responsible for 25% of deaths in Europe and the U.S. The disease can be traced back 9,000 years in the Mediterranean.

- 1882: Robert Koch discovers bacterium that causes TB, for which he received the Nobel Prize in 1905. Prior to this, many believed TB was hereditary or caused by vampires. We now know it is an airborne infectious disease with chronic progression.
- 1953: CDC first publishes TB data for U.S., citing 84,304 known cases.
- 2019: CDC reports 8,916 TB cases in U.S., lowest number on record.



1928

Sir Alexander Fleming discovers penicillin, for which he and two others received the Nobel Prize in 1945.

1945

Antibiotic era begins with introduction of large-scale use of penicillin for treating bacterial infections.

- Five antibiotics discovered between 1943 and 1966 are still used to commonly treat drug-susceptible TB. 80%–90% of TB cases can be cured with these drugs.
- 1950s–1970s: More antibiotics are discovered, extending the average life expectancy from 47 to 78.8 years as a leading cause of death shifted from communicable to non-communicable diseases.
- 2013: CDC declares beginning of post-antibiotic era due to overuse of antibiotics, the lack of new antibiotics, and the rise of antibiotic-resistant bacteria.
- Drug-resistant, multidrug resistant, and extensively drug-resistant variants of TB are major global health concerns.



MANAGING CHRONIC AND AGE-RELATED DISEASES



1923

Pap test developed to better understand menstrual cycles.

- 1960s–present: Cervical cancer deaths reduced by 70% through screening with pap test.

1960s

Mammography develops as a screening test and is officially recommended in 1976.

- Women 60–69 who receive mammograms have 33% lower risk of dying from breast cancer, and women 50–59 have 14% lower risk.

1969

First colonoscopy performed in New York.

- 2012 study shows polyp removal by colonoscopies reduced colorectal cancer deaths by 53%.
- Regular screenings, including colonoscopy, beginning at age 50 could prevent 60% of colorectal cancer deaths.

1970s

Low doses of aspirin can help prevent reoccurrence of heart attack and stroke in individuals who have already experienced an event, which is known as secondary prevention.

- 1987: First statin approved by the FDA to treat high cholesterol and prevent coronary heart disease. An individual is 54% less likely to suffer a heart attack while taking a statin.
- In 2019, CDC reported heart disease is No. 1 killer in nation, responsible for 25% of deaths in the U.S. About 80% of heart diseases are estimated to be preventable.
- By 2035, 45% of the population is expected to live with heart disease.

2015–2018

U.S. Preventive Services Task Force recommends important preventive screenings, including cholesterol, blood pressure, diabetes, and skin cancer tests.

- When routine blood pressure check reveals hypertension, risk of heart attack or stroke can be reduced by more than 20%.

2020

CDC estimates 60% of Americans live with at least one chronic disease, such as heart disease, cancer, lung disease, Alzheimer's, or diabetes.

2020

American Cancer Society (ACS) estimates >1.8 million people will be diagnosed with cancer in the U.S. and more than 600,000 will die from it (not including some skin cancers, which are not required to be reported to cancer registries).



- Cancer may become leading cause of death worldwide by 2099.
- ACS researchers claim 42% of newly diagnosed cancers are avoidable, including 19% of cancers caused by smoking and 18% caused by obesity, alcohol consumption, poor nutrition, and/or physical inactivity.

CONSUMER REGULATIONS

VEHICLES



1959

Three-point seatbelt invented.

- 1966: All U.S. vehicles required to have seatbelts, which reduce risk of death by 45% in drivers and front-seat passengers.

1986

All states in the U.S. mandate use of child car seats.

- When correctly used, child restraints reduce deaths among child passengers by 70%–80%.



1995

Road fatalities increase 3.2% after repeal of federal speed limits.

- 2017: The Insurance Institute for Highway Safety estimates 36,760 more people were killed from 1993–2017 than if speed limits hadn't risen, with 1,900 lives that would've been saved in 2017 alone.

1998

All automobiles required to have front airbags, which reduce 29% of driver fatalities and 32% of front-seat passenger fatalities.

SMOKING



1964

Surgeon General issues first report on harms of smoking.

2009

30 states institute laws requiring 100% smoke-free workplaces, restaurants, and bars.

2014

Study shows preterm births and hospital admissions for asthma decreased 10% since public smoking bans.

2017

Though smoking-related deaths in U.S. decreased 55% since 1990, smoking remains the leading cause of preventable disease, disability, and premature death.

SUNSCREEN

1978

FDA establishes first regulations for sunscreen.

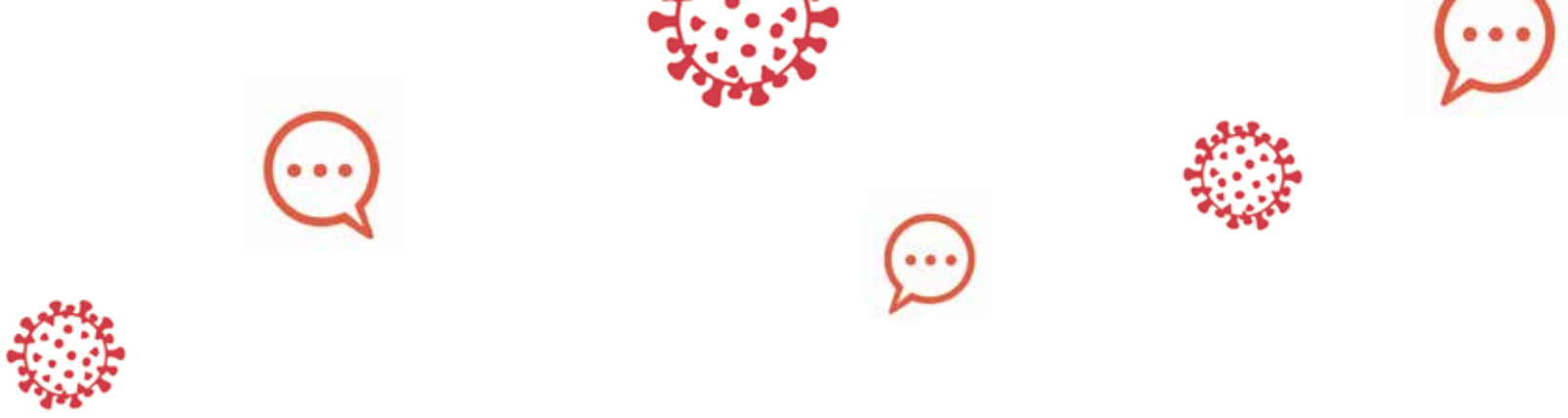
2019

Study shows daily use of SPF 15+ sunscreen reduces risk of developing skin cancer by 50%.

- More people in the U.S. are diagnosed with skin cancer than all other cancers combined. Over 5 million skin cancer cases are diagnosed annually, and 1 in 5 Americans will develop skin cancer by age 70.







*Stopping the spread of disease,
misinformation, and science resistance*

CONTAINING CONTAGION

Written by SARAH JACKSON, LAUREN THOMPSON, and JOY HOWARD • Illustration by CHRIS GASH

When the virus arrived in the United States, some people downplayed the threat, dismissing it as ordinary influenza. Others labeled it a sham, a hoax. Conspiracy theories abounded.

People argued over masks, widespread shutdowns, and other precautions. In the absence of reliable treatments and natural or vaccine-acquired immunity, misinformation thrived. So-called cures circulated that ranged from ineffective to life-threatening.

The year was 1918. And the pandemic was a strain of H1N1 influenza that ravaged the globe. By the time the pandemic ended in 1920, more than 500 million people—a third of the worldwide population—were infected, and at least 50 million died.

Today, as the world continues to grapple with the unprecedented COVID-19 pandemic, we seek answers from science and history and encounter old stumbling blocks.

BLINDED BY SUCCESS

“One hundred years ago, measles, diphtheria, or pertussis would’ve been among the top 10 causes of morbidity and death,” says Lindsey Baden, MD, director of clinical research in the Brigham’s Division of Infectious Disease. “We would have smallpox every day here, but because of the vaccine, we don’t. That’s the problem with vaccines: They’re so good. How do you say ‘thank you’ for stopping a bad thing from happening?”

When society forgets vaccines are responsible for eradicating diseases like smallpox and measles, Baden notes, that amnesia contributes to science resistance. The anti-vax movement is a prominent example, with campaigns of misinformation and disinformation blaming vaccines for causing autism or other harms.

Among some people, anti-vaxing philosophies, false notions that the COVID-19 pandemic is a hoax, and perceived loss of freedom during stay-home advisories have fomented suspicion and disbelief. As a result, people around the globe are beset by multiple contagions: a virus new to humans, the spread of misinformation, and distrust of science. Each contagion requires a collective, multilayered approach for containing their deadly spread.



Led by Lindsey Baden, MD (center), Brigham researchers enrolled patients in the nation's first phase 3 trial of a COVID-19 vaccine candidate.



DO YOU KNOW THE DIFFERENCE BETWEEN MISINFORMATION AND DISINFORMATION?

MISINFORMATION

false or inaccurate
information not intended
to mislead

DISINFORMATION

deliberately false, misleading,
or biased information

AS STRONG AS SWISS CHEESE

Countries that have contained COVID-19 have deployed multiple tools: vigilant and pervasive testing, contact tracing, isolating those who are sick, quarantining those who have been exposed, physically distancing, wearing masks, increasing hygiene practices such as handwashing and covering coughs and sneezes, avoiding crowded areas—especially indoors—and improving indoor ventilation.

None of these protections is foolproof on its own. But scientific evidence repeatedly shows combining these interventions can be remarkably effective at containing the spread of highly contagious respiratory diseases such as COVID-19.

Scientists call this the “Swiss-cheese model,” where each safeguard is like a slice of Swiss cheese, where the holes represent a weakness in the intervention. When used together consistently, the weaknesses in any single layer of protection can be offset by the strengths of other layers of intervention (see Figure 1). And the more interventions are combined, the more

successfully contagion can be contained.

In this Swiss cheese model, the “misinformation mouse” in the middle of the diagram is chewing a new hole in a slice of cheese. This illustrates how false information, such as widely discredited notions that masks make people sick or that vaccines are more harmful than the diseases they prevent, can weaken the effectiveness of any intervention.

THE CASE FOR MASKS

An essential tenet of science—the only certainty is uncertainty—has held true for even the most basic public health guidelines around COVID-19. Today, scientific evidence abounds for the effectiveness of masks at reducing transmissions of COVID-19. But early in the COVID-19 pandemic, experts were skeptical of their use—a moment reluctant mask wearers and mask refusers have fixed on.

Michael Klompas, MD, an infectious disease specialist and hospital epidemiologist, leads the Brigham’s Infection Control team. He explains experts’ initial skepticism on the effectiveness

Continued on page 20

SIFTing for Facts in an Infodemic

In September 2020, the World Health Organization declared a new public health emergency: an infodemic of misinformation filtering through social networks and media.

Misinformation and its evil twin, disinformation, can be powerful and destructive, especially during outbreaks of infectious disease. The need to act quickly, coupled with fear, can make people vulnerable to dubious advice instead of scientific expertise. But simple tools to separate fact from fiction can help people contain the infodemic.

Digital literacy expert Mike Caulfield of Washington State University recommends a method he developed, called SIFT, which takes as few as 30 seconds:



STOP. If you feel strong emotion, surprise, or an urge to share a news story, stop and do the next steps.

INVESTIGATE THE SOURCE. Hover your cursor over the link to see the source's website. Do you trust this source? Is it credible enough to share without any further checking?

FIND BETTER COVERAGE. If you are unsure of the source's trustworthiness, do a quick news search. If other reputable outlets are reporting the same story independently, that will increase your confidence in it.

TRACE CLAIMS, QUOTES, AND MEDIA TO THE ORIGINAL CONTEXT. Read an entire article carefully before sharing or commenting. Check the date to make sure it's recent. Identify whether the source is a news report or an opinion piece.

Taking the time to develop the habits and skills modeled in SIFT, people can weaken the infodemic and better protect themselves—and others—during the pandemic and other crises.

Credit: Michael Caulfield, Washington State University. <https://infodemic.blog/>

FIGURE 1

THE SWISS-CHEESE MODEL OF RESPIRATORY VIRUS PANDEMIC DEFENSE

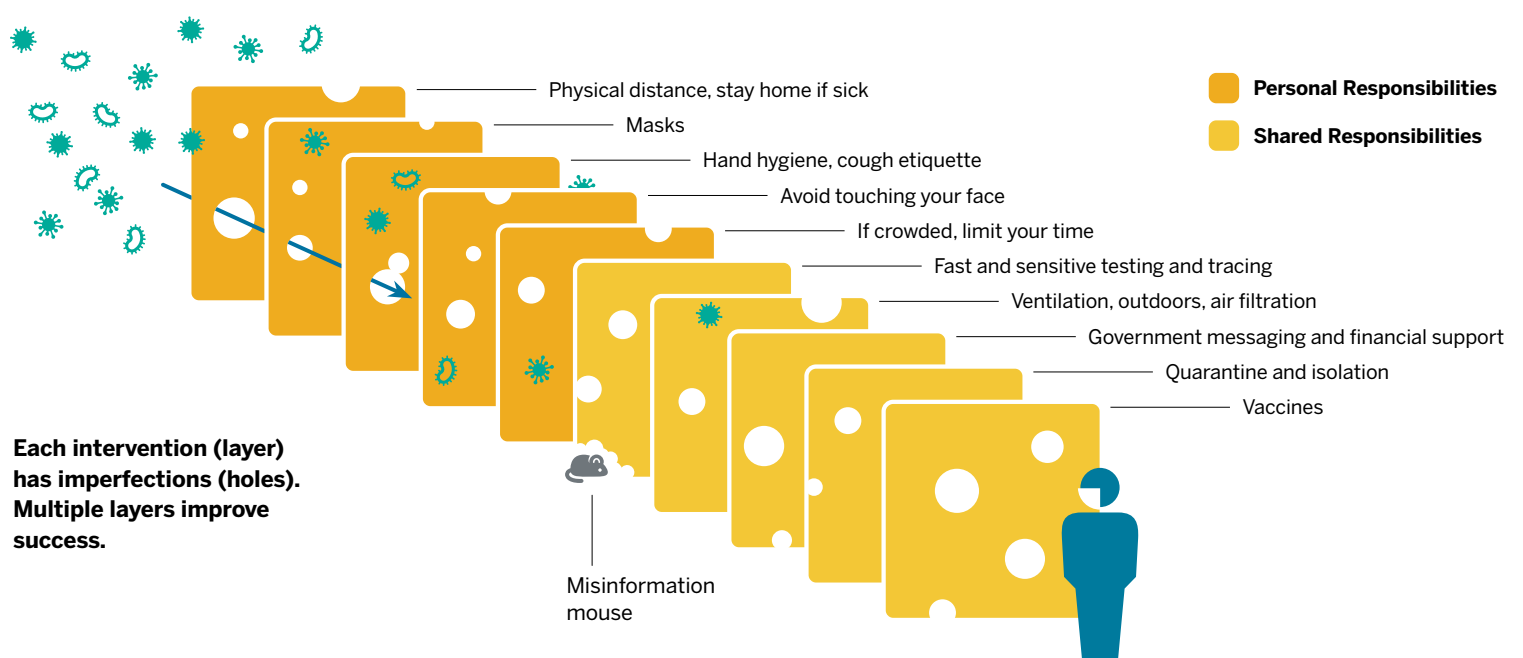
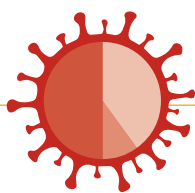


Figure 1 Credit: Mackay, Ian M. (2020): The Swiss Cheese Respiratory Virus Defence.



DID YOU KNOW?

The breakdown of COVID-19 transmissions is:

50%

via respiratory droplets or aerosols, by asymptomatic or presymptomatic people

40%

via respiratory droplets or aerosols by symptomatic people

10%

via contaminated surfaces

Source: Ferretti, Wymant, Kendall, et. al. "Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing." *Science*. 31 Mar 2020.

of masks was based on historical studies of masking in households and dormitories to prevent influenza.

"Many of these studies had equivocal results," says Klompas. "Now this might have been because masks were only being used once people were already diagnosed with influenza rather than as a pre-emptive measure before influenza developed. This is important because, just like COVID-19, influenza is most contagious before symptoms begin."

This aspect of influenza and SARS-CoV-2 is starkly different from SARS-CoV-1, the coronavirus that causes severe acute respiratory syndrome (SARS), which struck China, Canada, and other locations around the world in 2003.

"With the SARS situation in 2003, it was much easier to identify who was ill and isolate people who were identifiably sick," says Klompas. "People who weren't sick with SARS were much less likely to transmit the virus, so it was not so important for all asymptomatic people to wear masks all the time. But COVID-19 is very different. Many people who either don't have symptoms or don't have them yet can transmit SARS-CoV-2. So, we adapted."

The fact that an infected individual can have zero symptoms and still be contagious explains

why COVID-19 is so successful at infecting so many people. In fact, Klompas says, the asymptomatic and presymptomatic periods two days before symptoms are the highest risk periods for transmission.

"People can feel perfectly well and go out and about, and not recognize they are infected and could be infecting others," says Klompas. "That's why physical distancing and pre-emptive masking are so important. They help protect us when interacting with people who appear to be perfectly well but who might be highly contagious."

RESPECTING THE VIRUS—AND EACH OTHER

Eager to learn the true value of the many infection control measures the Brigham instituted against COVID-19, Klompas and his colleagues studied the rate of hospital-acquired COVID-19. The team analyzed all cases in which patients tested positive for COVID-19 three days or later after coming to the hospital and up to 14 days after discharge. The data showed the rate of hospital-acquired infection was near zero.

That's no small feat. During the first 12 weeks of the initial surge of COVID-19 cases in Massachusetts, the Brigham cared for more than 9,000 inpatients—including nearly 700 with

Infectious Diseases, Explained



To better understand the phenomenon of pandemics, it helps to know what infectious diseases are and how medicines mitigate or eradicate them.

"Infectious diseases can range from something as simple as a run-of-the-mill cold to serious infections like COVID-19, malaria, or tuberculosis," says Daniel Kuritzkes, MD, chief of the Division of Infectious Diseases at the Brigham.

These infections come from organisms like bacteria, viruses, fungi, or parasites, and can be passed to humans through direct contact with other humans, insects, or animals, or spread through the air or by touching surfaces.

Before vaccines, developing immunity required contracting a disease—and then relying on the body to fight it off and develop antibodies against future re-infection. As remarkable as the human immune system is, it cannot universally prevent premature death or disability, especially from the most serious infections.

Most vaccines introduce pieces of a virus or microorganism to teach the body's defenses how to recognize disease cells and destroy them. Today, vaccines can prevent or reduce the severity of illnesses such as influenza, human papillomavirus (HPV), smallpox, polio, measles, shingles, and mumps. Some vaccines, as for influenza, are most effective when administered regularly. Others, such as for polio, measles, and mumps, offer protection for years, or even a lifetime.

Antimicrobial medicines can also destroy or slow organisms responsible for illness. Antibiotics treat infectious bacterial diseases (such as strep throat, sinus infection, or conjunctivitis); antivirals treat viruses (such as influenza or herpes); antifungals treat fungi (athlete's foot or yeast infections); and antiparasitics treat parasites (tapeworm or malaria).

"Beginning with penicillin in 1929, the discovery of antibiotics was a major advance in healthcare," Kuritzkes explains. "Along with vaccination, antibiotics probably had the biggest impact on improving life expectancy in the last century."

He stresses that the best way to overcome COVID-19 will be for the medical community to develop, refine, and widely administer vaccines and antiviral medicines that halt it. Until then, the best tools we have are the ones we've had all along: masks, hand washing, physical distancing, and isolating people who are sick.

“With TestBoston, we want to make testing more accessible, especially for people who have been disproportionately impacted by COVID-19.”

— ANN WOOLLEY, MD, MPH



Lisa Cosimi, MD (left) and Ann Woolley, MD, MPH, hold a TestBoston kit.
(Photo by Nicolaus Czarnecki/
Boston Herald)

COVID-19. Of all those, only two were identified as having likely acquired the disease within the hospital, and analysis indicated one patient was likely infected by a spouse who visited shortly before developing COVID-19 symptoms. Hospital leaders attribute the success to the Brigham's early adoption of aggressive infection control measures, including universal masking of employees, universal testing of patients, daily symptom attestations, and a host of other stringent infection control measures.

The Brigham maintained near zero-transmission levels for months, until a cluster of dozens of cases was identified in late September and early October. The hospital's Infection Control team contained the cluster within two weeks by applying many of the interventions shown in the cheese chart in Figure 1: increased testing of employees and inpatients regardless of symptoms, robust contact tracing, re-emphasizing physical distancing and use of protective gear such as masks and eye protection, and genomic analysis of positive cases.

Even with this incident, the prevalence rate of positive cases at the hospital was 0.1%—less than half of the city's and state's rates at the time. Skyrocketing cases across the U.S. in recent months further underscore how ongoing infection control demands patience, vigilance, and understanding.

“When it comes to COVID-19, it's about respect,” Klompas says. “Respect the virus and its capacity to transmit and defy our best intentions. Respect people, their fears and vulnerabilities, and the virus's disproportionate impact on certain populations.”

TESTING, TREATING, TRACING

One of the ways COVID-19 has defied best intentions is by obscuring who is contagious. Initial attempts to contain the pandemic limited diagnostic testing to symptomatic people, and test results could take as long as 10 days.

While scientists eventually learned the virus spreads as much from asymptomatic and presymptomatic people, testing criteria still favor people with COVID-19 symptoms. Asymptomatic and presymptomatic people continue to face barriers to testing, in part due to the expense and time-intensive, lab-based process of the diagnostic PCR test, which identifies active infection at the molecular level.

Scientists are increasingly advocating using cheaper, faster antigen tests to identify infectious people regardless of their symptoms. Epidemiologist Michael Mina, MD, argues if people could rapidly test themselves at home daily, or nearly daily, they could make better decisions in their work and social lives.

“I think a new era of massively distributed at-home rapid tests is our best hope to limit

spread without massive lockdowns,” Mina tweeted on November 3. “We should push for these so we can bring outbreaks under control and return to a semblance of normalcy as soon as we can—before vaccines.”

One project—TestBoston—is exploring how large-scale distribution of at-home test kits could help contain COVID-19. Led by infectious disease specialists Lisa Cosimi, MD, Deborah Hung, MD, PhD, and Ann Woolley, MD, MPH, TestBoston is a research collaboration of the Brigham and the Broad Institute of Harvard and MIT. The project delivers free, monthly, at-home testing kits to 10,000 individuals in the Greater Boston area for six months.

“With TestBoston, we want to make testing more accessible, especially for people who have been disproportionately impacted by COVID-19,” says Woolley.

Participants return their test kits to the Broad and receive results within 24 hours. The study team hopes this system can help curb outbreaks by reducing delays in care for patients who test positive and enabling faster contact tracing.



“I think a new era of massively distributed at-home rapid tests is our best hope to limit spread without massive lockdowns.”

— MICHAEL MINA, MD, PHD

Though TestBoston surpasses general testing today, Cosimi says, “Ideally, we’d push this even further, so people could access rapid testing that provides results in minutes instead of a day and test more frequently than monthly.”

One of the biggest arguments against rapid antigen tests concerns accuracy. Compared with the gold-standard PCR tests, which are sensitive enough to produce accurate results up to 98% of the time, current antigen tests have an 84% to 97% sensitivity rate. And judging tests’ accuracy is complicated by their different rates of false positives and false negatives. Despite this complexity, Mina and Cosimi both advise that, when it comes to testing, perfect is the enemy of the good.

“In this pandemic, it’s essential to know who is the most contagious and who has the highest viral load,” says Cosimi. “A less sensitive rapid test conducted more frequently has a better chance of capturing those people. This gives us a better chance to provide early treatment that keeps infected people out of the hospital and conduct more timely contact tracing to better contain the spread.”

BOOSTING TRUST IN VACCINES

As COVID-19 cases once again spiraled out of control across the U.S. in November, the global race to produce vaccines for COVID-19 provoked great anticipation—and anxiety.

“The great thing about the vaccine effort is that it has proceeded at an extraordinarily fast pace, and it’s exciting that some of my colleagues at the Brigham have been at the forefront of that effort,” says infectious disease specialist Paul Sax, MD.

Wide public distribution of an effective COVID-19 vaccine in less than 18 months would be a colossal scientific achievement, since vaccines typically take 10 to 15 years to develop. Additionally, scientists are still learning what immunity to this new disease looks like and how long it lasts. Experts like Sax are tempering excitement with impassioned calls to let clinical trials take their course.

“One of the most important features of any vaccine is that it be safe, because we don’t want a vaccine not accepted by the public,” he says. “There’s already a vocal distrust of vaccines, and we need strong efficacy and safety data to reassure the public.”

At the Brigham, researchers led by Baden enrolled patients in the nation’s first phase 3 trial of a COVID-19 vaccine candidate (read more about the Brigham trial on page 8.) Initial trial data generated from 30,000 individuals across the U.S. identified no safety concerns to date about the vaccine. Baden says understanding how the vaccine is tolerated in 15,000 study volunteers allows researchers to define what the side effect profile may be when we move to vaccinate millions.

“The vaccine candidate itself does not contain live virus—it’s an mRNA construct,” Baden explains. “Participants may contract or be exposed to COVID-19 through interactions in the community. Our hope is that the vaccine will decrease risk of acquiring COVID-19 from normal work or community interactions, or that the vaccine will decrease severity of symptoms and contagiousness.”

As knowledge advances through the trial, he adds, “and we determine what works or what doesn’t, we will stop doing what doesn’t work and figure out how to deploy what does. Then, we need to consider how we act equitably to distribute a vaccine across society.”

On December 15, FDA scientists confirmed the vaccine’s safety, with an efficacy rate of 94.1%. Two days later, the FDA approved the vaccine for emergency use.

PROTECTION FOR ALL

Once a vaccine is widely available and embraced, it could lead to the ideal solution to many infectious diseases: herd immunity. This is when populations—the herd—become immune to a particular infectious disease without being infected first. When more than 70% to 90% of a population has been exposed to an infection or vaccinated against it, herd immunity slows or stops an infectious disease’s ability to spread.

Discussions of herd immunity for COVID-19 have caused some confusion. As more people become infected with the virus, some have wondered if herd immunity could be achieved without a vaccine.

“To get more than two-thirds of the U.S. immune to COVID-19 without a vaccine would require, at a minimum, 220 million people getting infected,” says Daniel Kuritzkes, MD, chief of the Division of Infectious Diseases. “And if 1% of those people die, that’s more than 2 million deaths. And with the death rate running between 3% and 5% among some populations, as many as 10 million to 15 million people could die. So, on its own, herd immunity is not the way we want to go.”

Sax adds, “In the 21st century, with access to so much scientific knowledge and innovation, most infectious disease specialists agree that herd



DO YOU KNOW THE DIFFERENCE BETWEEN VACCINE EFFICACY AND EFFICIENCY?

EFFICACY: % reduction of disease among participants in a highly controlled clinical trial

EFFICIENCY: % reduction of disease among all persons receiving a vaccine

Vaccine efficacy is typically higher than efficiency, due to the many variables in real-world use.



DID YOU KNOW?

The measles virus is like a reset button on your immune system. It can wipe out more than 70% of antibodies that protect against viral and bacterial strains a person was previously immune to—anything from influenza and herpes to pneumonia and skin infections.

More at brighamhealthmag.org/measlesvax

immunity is a result of robust public health policies. It is not, by itself, an ethical or responsible strategy for containing pandemics.”

Achieving and maintaining herd immunity is an ongoing effort, which can backslide when vaccines aren’t used. This has happened with measles, a highly contagious viral infection that can cause serious complications in small children. Declared eliminated by the U.S. Centers for Disease Control and Prevention in 2000 thanks to widespread global vaccinations, measles resurged when vaccine skeptics did not inoculate their children against it. In 2019 alone, the U.S. saw 1,282 measles cases—the largest number in one calendar year since 1992. Worldwide, measles deaths increased 50% between 2016 and 2019.

Baden says the promise of herd immunity through vaccination should be an incentive and reminder to society about why vaccines matter.

“Getting vaccinated benefits not just you, but those around you, particularly those who may be vulnerable—like immunocompromised individuals undergoing cancer treatment, or those who are pregnant, or the elderly, or babies,” Baden explains.

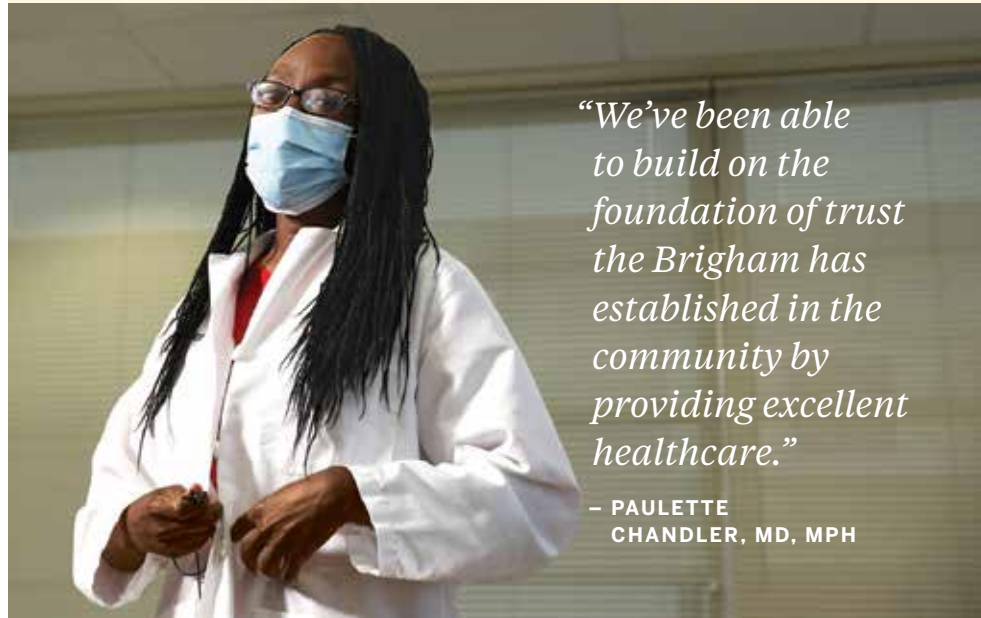
SEEING THE LIGHT

In the midst of so many crises, from the virus itself to the social upheaval, misinformation, and distrust generated in its wake, optimism can be hard to come by. But of all the things uniting scientists of the front lines of this pandemic, optimism is one of their strongest bonds.

“There is a light at the end of the tunnel,” Kuritzkes says. “We’ve learned how to protect people from this disease, and we all need to keep at it. There’s reason to be optimistic while we carefully monitor the situation and prepare to put out small fires as they emerge.”

When everyone follows the science, commits to best practices, and shares responsibility for keeping each other safe, COVID-19 can be contained. To get there sooner, heed the experts’ advice:

“Protect yourself by wearing a mask, washing your hands, and physical distancing,” Kuritzkes says. “If we keep doing that, there’s reason to expect that by late 2021, we will be in a better position than we are today.” ❄️



“We’ve been able to build on the foundation of trust the Brigham has established in the community by providing excellent healthcare.”

– PAULETTE CHANDLER, MD, MPH

Focusing on Disparities

What do food security, stable housing, secure employment, and quality childcare have to do with clinical trials? When it comes to making sure a vaccine is safe and effective for everyone, they mean everything.

Since launching the COVID-19 vaccine trial in July, the Brigham’s study team has prioritized enrolling patients representing the diversity of the overall population—an imperative for stopping a virus disproportionately impacting communities of color.

Paulette Chandler, MD, MPH, a primary care physician and researcher leading the trial’s community engagement and education efforts, says ensuring a diverse study population doesn’t happen on its own; it takes a commitment to meeting people where they live, work, and socialize, and giving back to those communities.

“We’ve been able to build on the foundation of trust the Brigham has established in the community by providing excellent healthcare, as well as by caring for the whole person—not just medical issues, but social issues as well,” Chandler says. “We have to continue to think about how we want to develop relationships and foster reciprocity, so people aren’t just participating in a research study and getting nothing back, but they feel like they are benefiting from the experience.”

Chandler and other experts acknowledge exploitative medical research practices in the past have earned deep distrust and suspicion of people from marginalized communities.

“Imagine a scenario where you are often last in line, and suddenly someone says, ‘Now you can move to the head of the line,’” says Wanda McClain, the Brigham’s vice president of Community Health and Health Equity. “Do you trust that, or do you ask why? Our desire to ensure the equitable distribution of the COVID vaccine can be met with skepticism by those who have been historically disadvantaged. Some might wonder, ‘Am I being used as a guinea pig?’”

McClain says the Brigham’s long-standing partnerships in the Boston community, such as with the Roxbury Tenants of Harvard and the Sportsmen’s Tennis and Enrichment Center in Dorchester, are building back that lost trust. Teams of clinicians and volunteers have distributed food, set up flu shot clinics, helped families find affordable housing, and performed other services to improve the health and well-being of communities, and restore faith in healthcare.

“This will take comprehensive work over time,” says McClain. “We need to invest in these communities for the long haul, because it takes much longer to build trust than it does to lose it. When more people trust and agree to take a vaccine, it benefits all of us.”

Photo by Nancy Lane/Boston Herald



STRESS

THE WORLD'S NO. 1 KILLER—HEART DISEASE—MEETS COVID-19

TEST

Written by LAUREN THOMPSON



Now more than ever, good heart health can save your life.

In addition to being the leading cause of death for adults worldwide, heart disease is a major risk factor for suffering serious illness from COVID-19. Research is also revealing the virus can inflict lasting damage on the heart, even for people with no prior history of heart problems.

But experts maintain there are still plenty of ways to take charge and prevent heart issues from worsening or emerging at all. In fact, with lifestyle changes, medications, or a combination of strategies, at least 80% of heart diseases can be prevented. Cardiovascular leaders have also seen patients and doctors embrace telehealth as a way to manage chronic conditions while physically distancing, a paradigm shift that has become a shining example of how the field has innovated through adversity.

The Brigham's pioneering cardiologists invented ways to intervene during and after cardiac catastrophes. As COVID-19 deals one of the toughest stress tests on the heart and on our healthcare systems, they are devising new and expanded approaches to help people reduce their cardiac risk—in the hospital, at home, and in the future.

DESTABILIZING FORCES

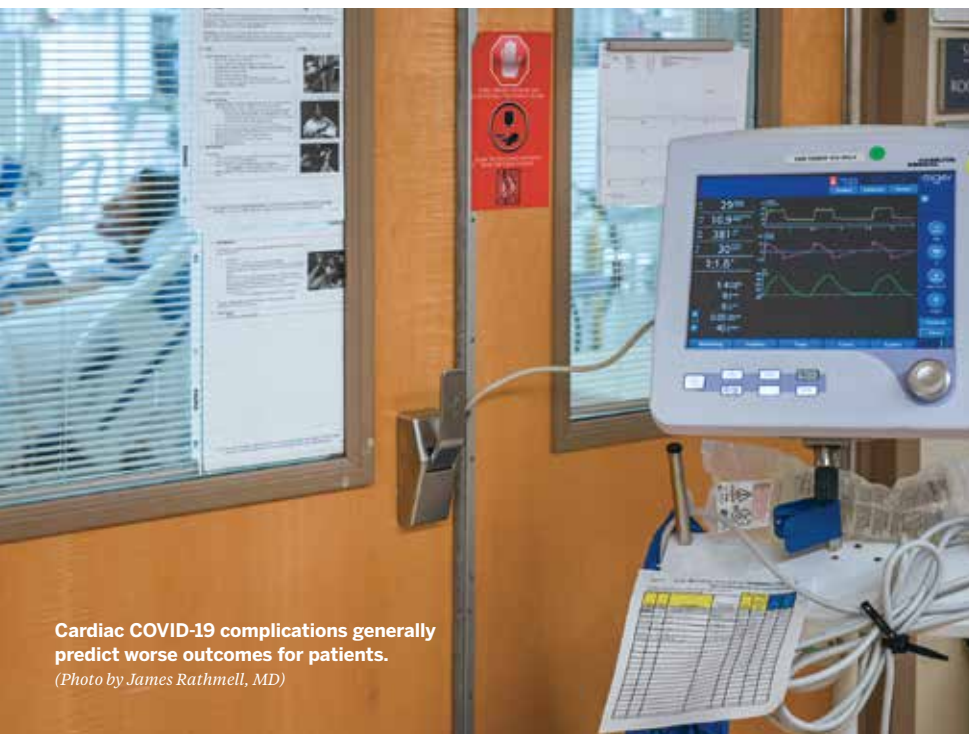
In a typical month, 5,000 people journey to Boston seeking expert cardiovascular care at the Brigham, a place steeped in firsts and bests in the field.

However, March 2020 was anything but typical. During the third week of March, 95% of scheduled elective (non-emergency) heart procedures and visits came to a stop in order to convert the Brigham's Shapiro Cardiovascular Center for the exclusive care of patients with COVID-19.

It was also a time when most ongoing research paused and investigators quickly shifted gears to study COVID-19. Faced with an unknown disease, many clinicians and scientists were initially surprised by the cardiac complications unleashed by COVID-19, which at first glance seemed to mainly affect the respiratory system.

Yet in those early weeks of the pandemic, cardiology leaders Peter Libby, MD, and Paul Ridker, MD, MPH, said the idea that an infection like COVID-19 could injure the heart was neither that new nor that surprising. The heart and other organs depend on a healthy immune system—and viruses destabilize that delicate equilibrium.

For decades, Libby and Ridker have studied the role of inflammation in heart disease, including how an



Cardiac COVID-19 complications generally predict worse outcomes for patients.
(Photo by James Rathmell, MD)

inflammatory response to a virus can either protect the body or make it vulnerable to worst-case scenarios—including heart damage.

“It’s like one big stress test of the heart,” said Ridker, in an April report from Harvard Medical School.

For example, in response to the infection, the liver produces defensive proteins that can make blood more prone to clotting and also reduce the body’s ability to make natural clot-dissolving substances. Those clots can clog small blood vessels in the heart and other organs, restrict oxygen and nutrients, and cause multiple organs to fail.

Reports from the U.S. Centers for Disease Control and Prevention (CDC) confirmed the link between the virus and heart complications. In June 2020, the CDC released a surveillance study of more than 1.3 million positive U.S. cases of COVID-19 showing 14% of patients were hospitalized, 2% required ICU care, and 5% died. Heart disease was the most common underlying condition reported, making people six times more likely to be hospitalized and 12 times more likely to die from the virus.

After months of study, Libby wrote in the *European Heart Journal* that COVID-19 could be considered an endothelial disease, because of the way the virus affects the inner cellular lining of the blood vessels (the arteries, veins, and capillaries) and the lymphatic system.

“This unifying hypothesis can help to understand the complex pathophysiology of this current plague and may also help to inform our therapeutic approaches to combatting the consequences of SARS-CoV-2 infection,” Libby concluded.

SURVEYING THE DAMAGE

In the Cardiac ICU, Erin A. Bohula, MD, DPhil, has seen the worst of COVID-19. While the initial, predominant symptoms involved the lungs, she and her team began to see the heart was affected, too—and scrambled to figure out how to stop the damage.

“We’ve seen acute cardiac injury, heart failure, cardiogenic shock, arrhythmias, and a high rate of blood clots,” says Bohula, a critical care cardiologist. “With no experience to guide us as far as what the normal course of these severe COVID manifestations is, it was a challenge to determine appropriate treatment.”

Bohula explains that the COVID-19 virus enters human host cells when the spike receptor proteins on the virus cells interact with ACE-2 receptors, which are found in the lungs, heart, kidney, and GI tract.

“That’s why we think we are seeing cytotoxic effects in those organs, including acute respiratory syndrome, acute liver injury, and acute kidney injury,” she says.

The complex problem solving required to care for patients with COVID-19 is typical for a normal day in the ICU, Bohula adds. But the unpredictable nature of the virus has been utterly confounding. While cardiac COVID complications generally predict bad outcomes for patients, survival rates differ widely. Bohula has seen several patients suffer the worst and recover.

One patient in his 80s developed severe COVID-associated pneumonia and heart dysfunction and was placed on a ventilator. With the right combination of medications and three weeks of critical care, his condition improved and he was taken off the ventilator. At four weeks, he stabilized and was discharged from the hospital.

“I was worried for him when he arrived in the ICU because of his age and the shape he was in,” she recalls. “It was amazing to see him make such a wonderful recovery. And what’s even better is that we’ve seen several people with similar or worse cases beat the odds, too.”

To advance care for critically ill patients, Bohula launched a clinical trial of anticoagulants to treat severe COVID-19. Her colleague, cardiovascular specialist and researcher Gregory Piazza, MD, MS, is studying whether low-dose anticoagulants can help patients with COVID-19 who are at increased risk for blood clots.



“I THINK IT’S GOING TO BE OUR BIGGEST CONTRIBUTION TO THIS FIGHT: TO UNDERSTAND WHAT THE CARDIAC COMPLICATIONS OF THIS DISEASE WILL BE IN THE FUTURE.”

— Gregory Piazza, MD, MS

"We have to make sure patients who are not hospitalized for the virus but are at risk for blood clots are protected," says Piazza, who is also leading an observational study of cardiovascular complications using data from healthcare systems nationwide.

"I think it's going to be our biggest contribution to this fight: to understand what the cardiac complications of this disease will be in the future," Piazza adds. "What will the cardiovascular landscape look like in the aftermath of COVID-19? These are things we will need to learn over the next months and years. We expect we are going to have to provide a greater level of care to patients who have been affected by this."

ROLLING WITH THE CHANGES

As the crisis transformed the hospital, a positive paradigm shift emerged to help doctors stay in touch with patients following governmental stay-at-home advisories. Prior to the shutdown, telehealth accounted for just 1% of all cardiovascular visits at the Brigham. By late March, two weeks into the shutdown, 96% of patient visits were held by phone or videoconference.

"This has been a formative moment for cardiovascular medicine," says Piazza. "Before the pandemic, we were wedded to the traditional healthcare model of having patients come see us. This pandemic has pushed us to finally embrace telehealth."

Piazza says the accessibility and frequent touchpoints of virtual visits are especially advantageous for frail and elderly patients, who may have trouble arranging transportation and navigating the hospital even in normal circumstances.

"Once we were better connected virtually, we were reaching patients quickly and effectively, which meant we were able to ward off complications that would have resulted in a hospital visit," says Piazza. "Plus the added convenience brings better adherence to a follow-up plan, which could improve outcomes."

Before the pandemic, Piazza says it wasn't unusual for 10% of patients to miss their office appointments in a given week, which is a typical no-show rate for specialist clinics.

"I haven't had a single no-show for virtual visits," he says. "Patients want to be able to interact with their providers. They are prepared for their virtual visits, and we are able to provide a high level of care using these tools."

Piazza adds, "Virtual visits can't replace the element of human touch, but they have certainly extended the reach of our care. As a physician, I embrace the change."

A SMARTER HEART

While the move to telehealth was a radical departure for most of the division, virtual care was already the rule, not the exception, for its offshoot Cardiovascular Medicine (CV) Innovation.

For three years, CV Innovation has been home to a groundbreaking program that helps patients track and

SKIPPING A BEAT

While the hospital braced for surges in COVID-19 cases, experts observed worrisome trends in people seeking emergency treatment for heart attacks and strokes.

John Keaney Jr., MD, chief of the Division of Cardiovascular Medicine, says the fear of contracting the virus at hospitals caused many patients to delay or avoid needed care, particularly in March and April. He and his colleagues observed that patients admitted to the cardiac service during that time were much sicker and more complicated than usual.

This pattern of absent cases, followed by more severe ones later on, occurred across the country. According to an analysis by The Washington Post, thousands more deaths were recorded from March to mid-April than would have been expected from heart disease and other conditions. In five states, including Massachusetts, there were a combined 75,000 more deaths than usual during that period.

Some of the excess deaths could be unrecognized fatalities from COVID-19, experts say. However, reviews suggest many patients suffering from serious conditions died as a result of delaying or not seeking care.

"It's understandable that people would be worried about catching the virus in the hospital, but hospitals are generally safer than most places, including grocery stores," says interventional cardiologist Deepak L. Bhatt, MD, MPH. "While COVID-19 is scary, having a heart attack or stroke is life-threatening. No matter what, the right thing is to call 911 and get it checked out."

Misinformation also sowed distrust in the safety of routine cardiovascular treatments, causing many to discontinue needed medications without their doctors' advice. Bhatt was among the experts speaking out in the media hoping to steer patients back to making the best healthcare decisions for their hearts.

"It's urgent for people with heart disease to be careful and keep taking their medications," Bhatt advises. "These are not the sorts of conditions for self-directing treatment, so it's important not to try anything new at home, especially now."

For people with heart disease who may not have their condition under control or are experiencing troubling symptoms, Keaney understands the anxiety they may have about seeking treatment in this climate.

"For many individuals, having a heart event is a once-in-a-lifetime situation, so the stakes already feel high without adding complicating factors like an ongoing virus," says Keaney. "For us, taking care of the most severe and complex heart problems is what we do all day, every day. We want our patients to know they are not alone. We are here for them."





91%

During the pilot study of the remote program, 91% of patients who stuck with the program reached their blood pressure goals after about 8 weeks.

Robert Ross chats with Sam Subramaniam, a patient navigator with the Brigham's remote monitoring program for patients with high blood pressure.

manage high blood pressure and high cholesterol from home. More than 7,000 patients enrolled in the program use cellular or Bluetooth-enabled devices, like a blood pressure cuff for those with high blood pressure, to capture and record their stats every day. The data transmits to their electronic health records at the Brigham.

What pushes CV Innovation's remote monitoring program beyond most telehealth practices is its use of artificial intelligence. The program is powered by an algorithm developed by top Brigham cardiologists and hypertension specialists, which tracks and analyzes patients' data in real time to ensure treatments are effective and appropriate for each individual's needs.

Early results have been promising. In traditional office-based care, only 50% of people with hypertension have it under control. During the pilot study of the remote program, 91% of patients who stuck with the program reached their blood pressure goals after about 8 weeks.

"As cardiologists, we may see a patient once every six months, and we can be so busy in between that we generally don't know what's going on in patients' lives to prevent them from reaching their goals," says

Christopher P. Cannon, MD, a cardiologist and the director of education in CV Innovation. "In CV Innovation, we identify those patients who are not at goal and monitor and adjust their treatment by constantly engaging and supporting them."

CONSTANT CONTACT

In December 2019, Robert Ross had undergone an aortic valve replacement at the Brigham. As part of his aftercare, his cardiologist recommended he enroll in CV Innovation's remote monitoring program to keep a watch on his blood pressure from home.

"After the surgery, I needed to have my blood pressure checked twice a day—and it would have been impossible to go to my doctor's office for all of those checks," Ross says. "I knew how much could be achieved just by having the right tools and good communication. With a phone and the blood pressure cuff, I felt confident that I could handle it and be supported."

If Ross's blood pressure readings changed significantly, the built-in algorithm would detect the change and alert his health coach, or patient navigator, to call him and check in.



"PUBLIC HEALTH OFFICIALS HAVE NOTED THE IMPORTANCE OF HAVING OTHER DISEASES WELL CONTROLLED, SO THIS PROGRAM IS A GREAT TOOL TO HAVE."

— Christopher P. Cannon, MD

Samantha “Sam” Subramaniam is a patient navigator on the CV Innovations team. Working from her home, Subramaniam maintains constant communication with Cannon and other medical advisors. She monitors patients’ data on their individual dashboards and works with them to help improve their numbers and cut their cardiac risk.

“High blood pressure and cholesterol bring patients to us, but we can help with so much more,” says Subramaniam. “We are their cheerleaders to give them that extra push to make healthy choices, and we become their healthcare liaisons when they need an expert opinion. When patients reach their goals, it’s a great moment of celebration for all of us.”

STEADY ON

CV Innovation is at the forefront of using data to prevent or mitigate chronic diseases. In addition to directly improving care for patients at the Brigham, the program is synced with a massive research enterprise called One Brave Idea, a venture between the American Heart Association, Verily Health, and the Brigham that uses big data to identify and prevent heart disease as early as possible. For now, the immediate challenge is helping people stay healthy and avoid dangerous collisions with COVID-19.

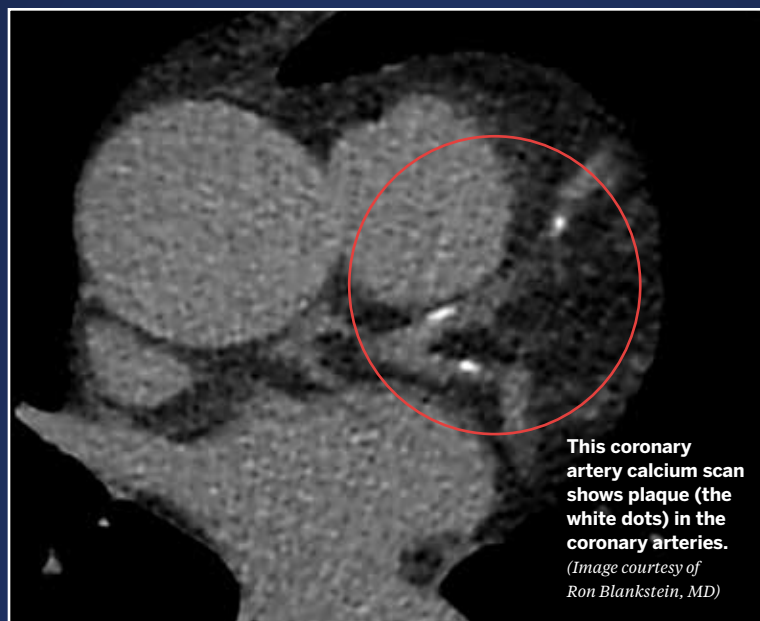
“Since cardiovascular diseases, including hypertension, are major risk factors for adverse outcomes among patients who get COVID-19, our patient population is a high-risk group,” Cannon says. “Public health officials have noted the importance of having other diseases well controlled, so this program is a great tool to have. If one of our patients gets COVID-19, they will be as healthy as possible to fight it.”

Ross is still enrolled in the remote monitoring program. Each day, he faithfully takes his blood pressure and watches the readings transmit to his dashboard, where Subramaniam and other patient navigators keep track of his progress.

“When you say telehealth or virtual medicine, it sounds impersonal—but this has been very personal and humane,” says Ross. “Talking with Sam is very focusing, since the data is all right there to see and there are no distractions like there might be in an office setting. And with everything happening, it’s reassuring to stay safe at home while taking care of my health.”

Subramaniam is excited to help more people get control of their overall health and well-being—ever more vital in a pandemic-altered world.

“I never felt like I could save a life,” Subramaniam says. “But there are moments when I feel like I have, even in a small way. I can’t wait to talk to patients, hear their stories, and help them have a healthier day. We’re not just thinking about great things we can do in the next year or decade. We’re excited to think of what we can do today.” 🌱



This coronary artery calcium scan shows plaque (the white dots) in the coronary arteries.
(Image courtesy of Ron Blankstein, MD)

SCREENING IS BELIEVING



When it comes to public health threats, heart disease is the elephant in the clinic.

Ron Blankstein, MD, a preventive cardiologist and expert in cardiac imaging, is concerned that elephant is also invisible—particularly to younger adults.

In 2019 and 2020, Blankstein and his research colleagues reported data from the Partners Young-MI Registry, a database of more than 2,000 Mass

General Brigham patients who had a heart attack before the age of 50.

“We wanted to understand why we are seeing more heart attacks in younger people,” Blankstein says. “In our study, many of the youngest heart attack sufferers had underlying lifestyle risk factors—smoking cigarettes and marijuana—or risk factors such as diabetes, abnormal cholesterol levels, and hypertension.”

The Young-MI studies are confronting the misconception that youth is protective against heart disease. While motivating young people to surrender vices in the name of heart health is challenging, more vigilant screening at all ages is low-hanging fruit for prevention.

For patients with several risk factors and who are unsure whether to start therapy, Blankstein recommends the extra step of getting a coronary artery calcium (CAC) score, which is determined using a CT scan of the heart. Because the heart is always moving, creating a cardiac CT scan is more difficult than for other body parts. However, new CT technology at the Brigham is able to accurately image the heart in most patients.

Blankstein pulls up a CT scan on his computer. Zooming in on the arteries winding through the heart, he explains that when plaque is present, a proportion of it calcifies and appears as white dots on the scan.

“I like to show this to younger patients and tell them, ‘Those white dots, that’s plaque in your arteries.’ That is a very real moment,” says Blankstein. “The second I show them the picture, their first question is, ‘What can I do to prevent that from getting worse?’”

This is the point when Blankstein’s discussions with patients shift from ambivalence to vigilance, as they begin to strategize ways to reduce modifiable risk factors.

“We want to promote more knowledge and awareness of cardiovascular disease and most specifically plaque, which contributes to much of heart disease,” he says. “There is something to be said for the idea that seeing is believing.”



PATHS TO BETTER HEALTH

**THE LIFE-CHANGING EFFECTS OF
SMALL STEPS—AND A BUDDY SYSTEM**

Written by JENNIFER REARDON • *Photos by* STU ROSNER





“Coming to CEA showed me I needed to change. My health and mood have improved so much.”

– MILAGROS GENAO

Seven years ago, Milagros Genao weighed 235 pounds. Her blood sugar level, or A1C, soared at 11.8%—nearly double the threshold for diabetes. These numbers put her at high risk for serious diabetes complications, from heart attack to stroke to kidney failure.

“I felt so depressed,” Milagros says. “I was in denial, not accepting my diabetes.”

Then she found Comunidad en Acción (Community in Action, or CEA), a program for Spanish-speaking patients with diabetes and pre-diabetes. Milagros spent three hours every Thursday exercising and learning about nutrition at the Southern Jamaica Plain Health Center, a primary care site of Brigham and Women’s Hospital. She got so hooked on CEA’s yoga and Zumba dance classes, she became a regular at the center’s other

group classes throughout the week.

Once Milagros started changing her diet, including cutting sugar from her daily coffee and removing starchy foods like white rice, she shed 30 pounds and began transforming her health. She also became a trusted friend and mentor to other CEA participants.

In March 2020, when the COVID-19 pandemic struck Boston, CEA suspended in-person group meetings, along with countless area services and organizations. While it stung to lose access to the classes and camaraderie

of caregivers and friends, Milagros knew the closure would help protect vulnerable patients like her from the coronavirus. Hunkered down at home, she held onto the lessons she learned to keep forging ahead.

A SICK NATION GETS SICKER

Milagros is one of the more than 107 million adults in the United States who are considered obese. The national obesity rate for adults sits above 42%, compared with 18% three decades ago.

As obesity rates rose, so did rates of chronic diseases including diabetes, stroke, cancer, and kidney disease, which kill more than 1 million people each year. Looking at the prevalence, statistics reveal that six in 10 adults in the U.S. have at least one chronic disease and four in 10 have more than one. This epidemic endangers Americans’ lives and increases vulnerability to the latest health threat, COVID-19.

“The COVID-19 pandemic exposes our collective poor health as a country,” says

Marie McDonnell, MD, director of the Brigham Diabetes Program. “We’ve seen that underlying health conditions may weaken or compromise the immune system, causing higher risk for severe complications from COVID-19.”

Indeed, surveillance data reported to the U.S. Centers for Disease Control and Prevention (CDC) shows that people with chronic diseases are 12 times more likely to die from COVID-19 and six times more likely to require hospitalization from the virus compared with those with no reported underlying conditions.

A RIDDLE WITH STRAIGHTFORWARD SOLUTIONS

While genetics plays a role for some people with chronic disease, healthy behaviors can mitigate and even prevent many of these conditions, as Milagros learned. Studies led by Brigham researchers and others worldwide show that taking simple steps—eating nutritious foods and getting regular exercise—are most effective in preventing or treating chronic illnesses.

For example, the National Institutes of Health found that losing as little as 5% to 7% of body weight is more effective than medication in preventing or delaying type 2 diabetes. In the late 1990s, a clinical trial called the Diabetes Prevention Program divided participants into three groups. After three years, participants randomly assigned to the lifestyle change group achieved modest weight loss and lowered their chances of developing type 2 diabetes by up to 58% compared with the placebo group.

Meanwhile, the group assigned to take the drug metformin experienced less success. They decreased their chances of developing type 2 diabetes by 31% compared with the

placebo group. An ongoing study continues to show how healthy habits or medication can successfully prevent and delay diabetes. The results are so astounding, the CDC launched a national program to share these findings with more Americans.

“Preventing diabetes has a huge impact on quality of life as well as how long patients will live,” says McDonnell. “The best tools are in our refrigerators and our sneakers.”

Once McDonnell and her team members diagnose a patient with diabetes, they recommend healthier eating and 150 minutes of exercise each week. Knowing the challenges of changing long-standing habits and behaviors, her team encourages at least one or two visits with a nutrition specialist to ease patients into a new mindset.

NEW HABITS, STEP BY STEP

A few years ago, when her daughter left Boston to attend college, Luz Vargas steadily ate comfort foods to fill the void of her absence.

“I used to run into the grocery store, buy a pint of ice cream, and eat it all at once,” she says.

Luz’s primary care doctor at the Brigham noticed her weight gain. When the 56-year-old’s A1C test confirmed a diabetes diagnosis, Luz immediately made an appointment with one of the Brigham’s diabetes clinics, followed by visits with a nutritionist.

Little by little, Luz began eating healthier foods, replacing tortillas and rice with eggs, peppers, and other nutrient-rich foods. She also turned to two friends with diabetes, and they began sharing healthy recipes and walking together.

Did You Know?



6 in 10

**Adults in the U.S.
have a chronic disease**



4 in 10

**Adults in the U.S. have two
or more chronic diseases**

Sources: Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2020. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services, 2020. American Diabetes Association 2020.



“THE BEST TOOLS ARE IN OUR REFRIGERATORS AND OUR SNEAKERS.”

— MARIE MCDONNELL, MD



ARE YOU AT RISK FOR TYPE 2 DIABETES?

Visit diabetes.org/risk-test
to take a one-minute test
to assess your chances of
developing the disease.

In two years, she dropped from 199 pounds to 140. When the COVID-19 pandemic kept her isolated from her exercise companions and regular routine, she gained 10 pounds in three months. But with the tools learned in the diabetes clinic, Luz quickly recognized this backslide and got back on course with healthy habits.

“With the stress of the pandemic, I wanted to eat everything,” Luz says. “I realized by eating these bad foods, I’m not treating myself—I’m killing myself.”

GAINING CONTROL AMIDST STRESS

When Massachusetts Governor Charlie Baker issued a stay-at-home advisory in March to slow the spread of COVID-19, panicked grocery shoppers stocked up on nonperishable foods, including snacks and comfort foods.

Meanwhile, staff in the Brigham’s Department of Nutrition began coaching

patients through eating challenges intensified by the pandemic. The department’s director, Kathy McManus, MS, RD, LDN, says common trouble spots included stress eating and disrupted routines. The nutritionists, who switched to virtual care in March, have been emphasizing foods that can help boost immune health, from berries and dark leafy greens to turmeric and oregano. And their advice goes beyond food.

“We know from research that people who add activity, in addition to dietary changes, are more likely to lose fat and maintain muscle mass,” says Kelley Bradshaw, MS, RD, LDN, CDE, outpatient clinical manager of the Brigham’s Nutrition and Wellness Service. “So, we encourage exercise, as well as managing stress and sleep. We look at the whole picture.”

The nutrition team guides patients along the path to new health habits using information grounded in cognitive behavioral science.

Did You Know?

“Obesity is one of the most important conditions strongly associated with increased risk of severe illness with COVID-19.”

— Anthony Fauci, MD, director of the National Institute of Allergy and Infectious Diseases, as stated at Harvard Medicine Grand Rounds, September 2020

“With the stress of the pandemic, I wanted to eat everything. I realized by eating these bad foods, I’m not treating myself—I’m killing myself.”

— LUZ VARGAS





“THIS ISN’T A DESTINATION; IT’S A JOURNEY OF EMBRACING CHANGES OVER THE LONG TERM. LAPSES WILL HAPPEN. SO, WE PICK OURSELVES UP AND KEEP GOING.”

— KATHY MCMANUS, MS, RD, LDN

“We encourage patients to set a couple of realistic goals at a time and post them where they can see them, like their fridge or bathroom mirror,” Bradshaw says. “Patients who achieve bigger results show up for appointments, use a self-monitoring tool like a food log, and plan meals and activity for the week. Success comes with modifying your behavior and being consistent. It’s about taking baby steps and building confidence, especially in times of uncertainty and stress.” (See sidebar at right on psychological perseverance and goal setting during the pandemic.)

This all takes time, Bradshaw says. Rather than a period of weeks or months, the team looks at a year or two years to see true patterns of change.

STAYING FOCUSED

Years ago, Liz Peet tried commercial dieting plans with little success. In 2018, the 57-year-old signed up for the Brigham’s Program for Weight Management, hoping the medically supervised program would bring different results.

“My back was hurting,” says Liz, who had a spinal infection years earlier. “Walking was hard. Sleeping was hard. Sitting was hard. I looked in the mirror and said, ‘Hey, you’re pretty heavy and have a tricky spine. Stop straining your back with extra weight. It’s time to focus on losing weight.’”

Through the program, co-led by McManus, Liz attends weekly individual nutrition appointments and group sessions with peers and staff. The many lessons she has learned include grocery shopping tactics, serving size

recommendations, and the effects of healthy and unhealthy foods.

“I enjoy cooking and thinking about recipes each week,” Liz says. “At the grocery store, especially lately with one-way aisles, it can be tempting walking by snacks. I say to myself, ‘I’m not paying attention to the bags of chips. I’m happy with carrots.’”

Liz lost 75 pounds through the program. Her ability to move without pain is her most satisfying reward and motivates her continued healthy routine, including long daily walks. Weekly program meetings, which went virtual during the pandemic, also give her fuel.

“By sharing challenges and successes with my group, I don’t feel like I’m sitting in my apartment all alone,” she says. “It’s helpful hearing some people are struggling, too, and that others have found productive, positive ways to handle things.”

The rest of the week, Liz is on her own to make choices.

“I have to put in the work,” she says. “I’ve been building one healthy habit at a time and layering it on top of another. Now, it’s a constellation of healthy habits.”

FOLLOWING THE TRAIL OF EVIDENCE

McManus and her staff use the latest evidence to educate their patients. One study by Harvard researchers in early 2020 found that those who follow five healthy habits can live up to a decade more without developing certain chronic diseases. (See sidebar on page 37.)

When the nutritionists see new patients, they assess current eating habits and suggest cutting back some foods and adding others.

TIPS FOR SETTING GOALS DURING THE PANDEMIC

Besides older age, one of the biggest risk factors for severe disease and death from COVID-19 is obesity. The good news is that modest weight loss—even 10 pounds—can improve insulin resistance and inflammation and strengthen the body’s defenses against COVID-19. But during this stressful time, many have struggled to maintain healthy routines.

“We’ve been mourning the goals we once had, but we can look at what is achievable while dealing with limitations in our lives,” says Brigham psychologist Abby Altman, PhD.

To help patients get back on track with goals or set new ones, Altman urges them to feed their minds frequently with positive reinforcement. Rather than focusing on the larger objective, Altman says, patients should pat themselves on the back more often and celebrate small successes, whether it’s showing up for an appointment or checking off steps they have taken.

Altman uses a technique called motivational interviewing to encourage patients to share ideas. The premise is that instead of care providers telling patients what to do, they ask patients for their thoughts and goals. For example, rather than telling a patient to walk 150 minutes each week to improve their health, providers might ask the patient about their health priorities, what form of exercise they like best, and how many minutes a week seems doable to them.

While the pandemic has created uncertainty, Altman says focusing on small, attainable goals and thinking of big-picture reasons for achieving those goals can be inspiring.

“If patients talk about the future, being present with their children, or having more mobility in their older years, this can be motivating,” she says. “What I love about my job is giving power to what people are saying.”



“By sharing challenges and successes with my group, I don’t feel like I’m sitting in my apartment all alone.”

– LIZ PEET



“I BELIEVE THE BODY HAS THE POWER TO HEAL ITSELF THROUGH NUTRITION.”

– LILIANA ROSSELLI-RISAL, MD

They discuss various diets, including the Standard American Diet (SAD), which is low in vital nutrients and high in sugar, refined carbohydrates, and saturated fat. By comparison, the Mediterranean diet emphasizes foods with high nutritional content, and the Dietary Approaches to Stop Hypertension (DASH) diet focuses on lowering sodium and increasing nutrients to reduce blood pressure.

“The Brigham was a primary site for the DASH clinical trial in the late 1990s,” McManus says. “The eight-week study showed that people with hypertension could significantly lower their blood pressures in a short period with the DASH diet. They started to see results within two weeks.”

With various studies to guide them, McManus and her team tailor recommendations for each patient. The team also urges patients to be realistic about developing new habits.

“I like the 80/20 rule for people trying to establish new behaviors,” McManus says. “So, 80% of the time, they’re pretty on target with goals and 20% of the time, they’re choosing some of their favorite foods, to be enjoyed and savored. We help figure out the frequency and amount.”

TOOLS TO PERSEVERE

Primary care physician Liliana Rosselli-Risal, MD, founder of Comunidad en Acción, knows the difference food makes in confronting obesity and diabetes.

“If you take medication and keep eating sugar, that won’t solve the underlying problem with diabetes,” Rosselli-Risal says. “You need to eliminate what’s making you sick. I believe the body has the power to heal itself through nutrition.”

Based on evidence from studies like the Diabetes Prevention Program, Rosselli-Risal designed CEA to teach patients like Milagros the importance of lifestyle changes. Staff members including a diabetic nurse educator, social worker, and case manager collaborate with Rosselli-Risal to offer patients information.

Back in February, prior to the COVID-19-induced shutdown, Milagros joined one of CEA’s weekly meetings. Easy banter and laughter filled the hallway as participants greeted each other with hugs and kisses. Milagros headed to the kitchen to prepare salad while other members took turns weighing in on the scale.

At lunchtime, Milagros shared her gratitude with the group. The 62-year-old said, “Coming to CEA showed me I needed to change. My health and mood have improved so much.”

One after another, more participants shared their stories.

“I came for the Zumba class and Milagros welcomed me to join the group,” said Maria Perez. “I learned what foods to eat and to avoid. I think this is the only place in the area teaching people like me this way. To come here is happiness.”

Although the program closed its doors in response to the pandemic, the group’s camaraderie remains strong. Milagros still calls nearly all 30 participants each week to check on them and stay connected.

“They’re such a cohesive group and took it upon themselves to take care of each other,” says diabetic nurse educator Maureen Balaguera, RN, CDE, CNL. “It’s beautiful.”

As Milagros adjusted to life at home, her commitment to her health did not waver. With knowledge from CEA, she stuck with her nutrition regimen. She also started online Zumba and yoga classes offered by instructors from the center.

By June, she lost an additional six pounds, bringing her weight loss to 54 pounds since starting the program. Her A1C dropped to 7.1%, inching closer to pre-diabetes. And she slashed her insulin requirements from 35 units a day to just seven. She feels better than she has in years.

EMBRACING THE JOURNEY

From the stress of the pandemic to the lure of old habits, any number of barriers could have stopped Milagros, Luz, and Liz in their tracks. But they each moved ahead with the support of their buddy systems and newfound knowledge. These women see their health transformations as an ongoing path of self-care and improvement attainable even amid a pandemic, precisely what McManus hopes for patients.

“This isn’t a destination; it’s a journey of embracing changes over the long term,” McManus says. “Lapses will happen. It doesn’t mean what someone is doing isn’t working or they’re a failure. It’s just a lapse. So, we pick ourselves up and keep going. This is a life-changing journey.” ❖

TOP 5 HABITS TO PREVENT CHRONIC DISEASE—AND LIVE LONGER

In early 2020, researchers from the Brigham and Harvard T.H. Chan School of Public Health reported that practicing certain lifestyle habits in middle age can “substantially extend the years a person lives disease-free.”

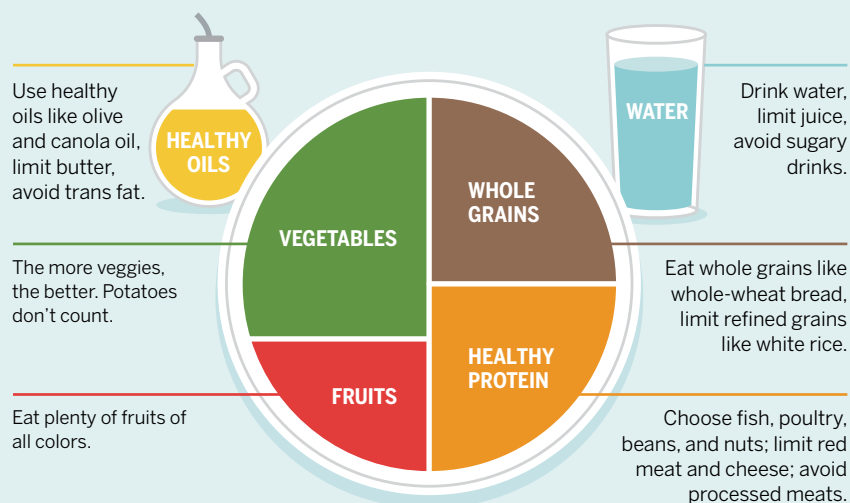
After analyzing nearly 30 years of data from the Nurses’ Health Study and the Health Professionals Follow-up Study, investigators found people who followed four or five healthy habits at age 50 had nearly 10 more years free of chronic disease compared with those who adopted none of these habits:

- 1 **Eating a healthy diet** (see *Healthy Eating Plate* illustration)
- 2 **Exercising about 30 minutes a day**
- 3 **Maintaining a healthy weight with a Body Mass Index of 25 or less**
- 4 **Keeping alcohol consumption to a minimum**
- 5 **Not smoking**

JoAnn Manson, MD, DrPH, chief of the Division of Preventive Medicine at the Brigham and the Michael and Lee Bell Professor of Women’s Health at Harvard Medical School, says these studies “show that relatively straightforward healthy behaviors are associated with reducing risk for heart attack by 80%, stroke by 70%, type 2 diabetes by 90%, and cancer by 40% to 50%.”

Manson adds, “There’s a general myth that our health is predetermined for us and we can’t change its course. However, heredity is not destiny in most types of chronic disease.”

HEALTHY EATING PLATE



Source: Harvard T.H. Chan School of Public Health and Harvard Medical School

COLUMN

Supporting Resilience in Times of Crisis



by Nomi Levy-Carrick, MD, MPhil, associate vice chair, Ambulatory Services, Department of Psychiatry

Resilience is an umbrella term that captures a broad array of traits that help people “bend, not break” in the face of stress. As individuals, what can we do to get through this COVID-19 crisis with resilience and move forward with better mental and physical health? Here are a few strategies:

1

NAME WHAT IS DISTRESSING IN REAL TIME.

Pull out that emotional vocabulary wheel and remember our inner lives are more than just *sad-mad-glad*. In this time of great stress, experiencing loneliness, worry, fear, anger, and even shame is a function of being human, not a sign of weakness. After all, courage is not the absence of fear; it's the necessary action taken notwithstanding that emotion.

2

NEVER WORRY ALONE.

Physical distancing is not intended to result in social isolation. Community is a fundamental building block of human survival. We all gain when we get help with complex problems from multiple perspectives. If you notice that your social relationships are suffering, you're not functioning well, or you are starting to have thoughts that scare you, professional help may be lifesaving.

3

MAINTAIN A SENSE OF PURPOSE.

We can bear adversity in great measure if it doesn't feel gratuitous. There is a threat of moral injury in disasters—triaging amidst limited resources, fear of putting others at risk, watching suffering that might have been averted “if only.” At these moments, we can think, “What can I do here, right now? What can I control, and what is beyond my control?”

Recognizing we have an opportunity to be stronger by surviving adversity—in ways we may not even imagine—we learn, teach, care, and endure.

Read the full article:

This column was adapted from “The COVID Resilience Marathon,” written by Nomi Levy-Carrick, MD, MPhil, and originally published by Ariadne Labs on Medium. Ariadne Labs is a joint center for health systems innovation at Brigham and Women's Hospital and the Harvard T.H. Chan School of Public Health.



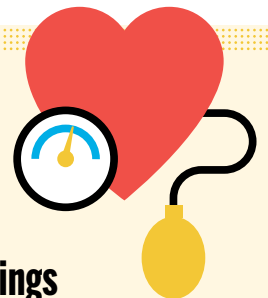
WEB EXTRA

See Brigham experts share tips for managing stress and anxiety while navigating COVID-19, social injustice, and other stressors. brighamhealthmag.org/managingstress



DID YOU KNOW?

Don't Delay Preventive Health Screenings



Brigham primary care physician Katherine Rose, MD, shares six essential preventive health screenings to keep up with during the COVID-19 pandemic. For some, you don't even need to leave home.

- 1. Blood pressure** – You can visit your primary care provider to be checked or purchase an upper arm blood pressure cuff online for \$30.
- 2. A1C (blood sugar)** – For diabetes management, you can come in for a blood test or use a glucometer at home and report to your doctor.

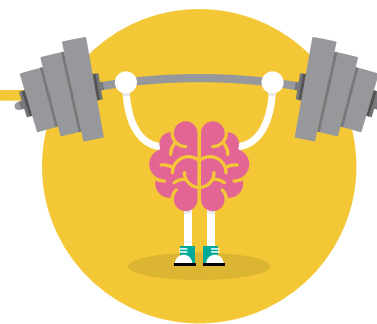


- 3. Colon cancer screening** – You can do a home-based mail-in test if you're at average risk for colon cancer and should do a colonoscopy if you're at high risk.
- 4. Breast cancer screening** – A mammogram is recommended for women ages 50 and up every two years if you're at average risk. Please consult with your doctor.
- 5. Lung cancer screening** – If you have smoked for years or have other risk factors, a chest CT scan is recommended annually for ages 55 plus.
- 6. Cervical cancer screening** – You should come in for testing as scheduled, especially if you had a past abnormal pap smear.

"If you are at high risk for COVID-19, consult with your physician about what makes sense for you," Rose says. "The end of the pandemic is too far off to delay routine care, and our clinics are taking many safety precautions. Masking and physical distancing are measures we know are working."

RESEARCH

A HEALTH COACH FOR YOUR BRAIN



More than 5 million people in the United States have Alzheimer disease dementia. Another 8 million to 10 million people older than 65 live with mild cognitive impairment, which can represent an earlier stage of Alzheimer disease and related dementias.

Certain healthy behaviors, including eating nutritious foods, exercising, and engaging in social and cognitive activities, lower the risk of dementia and brain deterioration, according to research conducted in the U.S. and globally. Knowing the potential of these behaviors, Brigham neurologists Kirk Daffner, MD, and Seth Gale, MD, launched the Brain Health Champion initiative to determine if a health coach could help motivate patients to adopt these habits.

Following the first six-month pilot study, which enrolled 40 adults with mild cognitive impairment, Gale says, "Our results were simple and profound. We saw significant differences in behaviors, and thus dementia risk, among participants assigned to the health coach group compared with the control group, who received limited physician counseling."

"It's clear that modifying certain risk factors decreases the incidence of dementia."

— SETH GALE, MD

Building on this success, the team is conducting a second study to see if combining health coaches and technology could benefit people who have cognitive decline or high dementia risk. Participants use mobile health technology to video chat with their health coaches weekly, meet with a dietician, and track food intake, sleep, and activity.

"This study woke me up," says participant Susan Liotta, age 70. "I'm more mindful of what I eat and am more active. Having the coach changed my habits."

Based on the team's findings and endorsement from study participants, the physician-scientists are seeking partners to help fund a pilot clinical care program. As they continue collecting promising data, they are optimistic that health insurers will see how this approach works over a larger healthcare network, with significant long-term cost savings.

"It's clear that modifying certain risk factors decreases the incidence of dementia," Gale says. "A large-scale, effective, evidence-based, brain health promotion program could certainly make a dent in the enormous public health and economic burden caused by these diseases."

Please visit brighamhealthmag.org/brainhealth to learn more about the Brain Health Champion initiative and related efforts.

BRAIN HEALTHY BEHAVIORS: PREVENTION & PROTECTION



Physical Activity

Walking, Cycling,
Dancing



Nutrition

Healthy Foods,
Limited Alcohol



Social Activity

Social Networks,
Volunteering



Cognitive Activity

Classes, Puzzles,
Making Art

Hope Works Here

The COVID-19 pandemic has challenged the Brigham community, and the world, like never before. And yet, each day caregivers and staff like Paula Machado, RN, (pictured here) rise to the occasion. With so much to anticipate this year, the Brigham is committed to providing world-class care, helping each other, rapidly developing innovative solutions, and protecting the most vulnerable members of society—now and always.

(Photo by Max Esposito)



BRIGHAM HEALTH EXECUTIVE LEADERSHIP

Elizabeth G. Nabel, MD
President, Brigham Health

Julia Sinclair, MBA, MHA
Senior Vice President, Clinical Services

Shelly Anderson, MPM
*Executive Vice President and
Chief Operating Officer*

Paula Squires, MBA, SHRM-SCP, SPHR
*Senior Vice President,
Human Resources*

Giles W. Boland, MD
*President, Brigham and Women's
Physicians Organization*

DEPARTMENT CHAIRS – BRIGHAM AND WOMEN'S HOSPITAL

Paul J. Anderson, MD, PhD
*Senior Vice President, Research and
Education and Chief Academic Officer*

Jon Aster, MD
Pathology (Interim)

Douglas E. Carney, AIA, MBA
*Senior Vice President, Real Estate,
Facilities, and Operations*

Tracy Batchelor, MD, MPH
Neurology

Christopher Dunleavy, MBA, CPA
*Senior Vice President and Chief
Financial Officer*

E. Antonio Chiocca, MD, PhD
Neurosurgery

Sunil Eappen, MD, MBA
*Senior Vice President, Medical Affairs
and Chief Medical Officer*

Giles W. Boland, MD
Radiology (Interim)

Kevin Giordano, MBA, FACHE
Senior Vice President, Clinical Services

Daphne Haas-Kogan, MD
Radiation Oncology

William Johnston, MPA
*Senior Vice President, Clinical Services
and Chief Operating Officer, Brigham
and Women's Physicians Organization*

Terrie E. Inder, MD, PhD, MBChB
Pediatric Newborn Medicine

Adam Landman, MD, MS, MIS, MHS
*Chief Information Officer and Digital
Innovation Officer*

James D. Kang, MD
Orthopaedics

David O. McCready, MBA, MHA
*President, Brigham and Women's
Faulkner Hospital and
Senior Vice President, Clinical Services*

Thomas S. Kupper, MD
Dermatology

Erin McDonough, MBA
*Senior Vice President and Chief
Communication Officer*

Joseph Loscalzo, MD, PhD
Medicine

Madelyn Pearson, DNP, RN, NEA-BC
*Senior Vice President, Clinical Services
and Chief Nursing Officer*

Nawal M. Nour, MD, MPH
Obstetrics and Gynecology

Susan E. Rapple, EDM
*Senior Vice President and
Chief Development Officer*

James Rathmell, MD
*Anesthesiology, Perioperative and Pain
Medicine*

Andrew Resnick, MD, MBA
*Senior Vice President and Chief Quality
and Safety Officer*

David A. Silbersweig, MD
Psychiatry

Michael VanRooyen, MD, MPH
Emergency Medicine

Ross D. Zafonte, DO
Physical Medicine and Rehabilitation

(List as of December 15, 2020)



HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL



Mass General Brigham



Development Office
116 Huntington Avenue, Third Floor
Boston, Massachusetts 02116-5712
617-424-4300

Change service requested

Non Profit Org.
U.S. Postage
PAID
Norwood, MA
Permit No. 20

