

# U.S. Evidence Snapshot: Medtech Saves Lives

## Introduction

Americans are living longer than ever. U.S. life expectancy just reached its highest level in history – 79 years. U.S. cancer death rates have fallen steadily for three decades, including continued declines through 2022. Heart disease mortality has declined long-term.

From 2023 to 2024, age-adjusted death rates decreased for each of the 10 leading causes of death, in order of prevalence: heart disease, cancer, unintentional injuries, stroke, chronic lower respiratory diseases, Alzheimer’s disease, diabetes, kidney disease, chronic liver disease and cirrhosis, and suicide.

Medtech plays a critical role in improving outcomes for many patients. Innovations such as precise screening tests, imaging, implantable devices, and minimally invasive procedures play a measurable role in preventing deaths, detecting disease earlier, and improving outcomes.

Following is a snapshot of key illnesses and the medtech saving lives.

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## Heart Disease

The U.S. heart disease mortality rate dropped by 66 percent from 1970 to 2022. Preliminary CDC data show that from 2023 to 2024, heart disease deaths declined 2.8 percent. Medtech interventions to save lives include:

### Interventional Procedures and Devices

- » **Coronary Angioplasty and Stenting:** The development of minimally invasive, catheter-based procedures to open blocked coronary arteries and implant stents has dramatically improved survival rates after heart attacks by restoring blood flow and minimizing muscle damage.
- » **Transcatheter Aortic Valve Replacement (TAVR) and Mitral Valve Transcatheter Edge-to-Edge Repair (M-TEER):** These minimally invasive procedures allow for the repair or replacement of a failed heart valve via a catheter, most commonly inserted through a leg artery, avoiding open-heart surgery for patients. Transcatheter procedures are less invasive than traditional surgery with smaller incisions leading to a quicker recovery for the patient.
- » **Implantable Cardioverter Defibrillators and Pacemakers:** These small, implantable devices monitor heart rhythms and deliver electrical impulses or shocks to correct life-threatening arrhythmias (e.g., ventricular fibrillation), preventing sudden cardiac death in high-risk patients. The development of leadless pacemakers has further reduced complications associated with traditional leads.
- » **Wearable Cardioverter Defibrillators:** This non-invasive technology is a wearable device utilized to detect and treat life-threatening, heart rhythms in patients at high risk of sudden cardiac death. The device triggers alarms and delivers potentially life-saving treatment if lethal arrhythmia is detected, serving as a temporary bridge for patients waiting for an implantable cardioverter defibrillator or recovering from heart events.

### Diagnostics and Monitoring

- » **Advanced Imaging Technologies:** High-resolution imaging, such as Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and fetal echocardiography, allows for earlier and more accurate detection of heart conditions and risk factors, guiding personalized and preventive treatment.
- » **» Wearable Devices and Remote Patient Monitoring (RPM):** Smartwatches and other wearable technologies that monitor heart rate, blood pressure, and activity levels facilitate early detection of conditions like atrial fibrillation and allow for continuous tracking of health metrics. This continuous monitoring improves patient adherence to lifestyle changes and medication regimens, reducing hospitalizations.
- » **Artificial Intelligence (AI):** AI-powered imaging and data analysis help providers determine which patients are at the greatest risk for heart disease, enabling targeted and personalized prevention strategies.

## Medtech-enabled Validation of Pharmaceutical Innovation Effectiveness

- » Medtech monitoring, analysis, and delivery systems help ensure the effectiveness of pharmaceuticals targeting heart disease, such as statins lowering cholesterol and drugs designed for diabetes management. Medtech tools include imaging and biomarker measurement.

## Cancer

The U.S. cancer mortality rate has steadily declined since the 1990s, with the reductions of 4.1 million cancer deaths from 1991 to 2021. Now, seven in 10 people survive their cancer five years or more, up from only five in 10 people in the 1970s. Preliminary CDC data show that from 2023 to 2024, cancer deaths declined 1.7 percent. Medtech interventions to save lives include:

### Improved Detection

- » **Low-dose Computed Tomography (CT) scans:** Used for lung cancer screening in high-risk individuals, detecting the disease earlier when it is more treatable.
- » **Digital and 3D Mammography:** Have improved the detection of breast cancer, especially in women with dense breast tissue.
- » **Stool-Based Tests for Colon Cancer:** At-home tests have played a crucial role by increasing overall screening participation rates.
- » **Liquid Biopsies:** A blend of biotechnology and medtech, this non-invasive technology analyzes circulating tumor DNA from a simple blood sample to help detect certain early-stage cancers, monitor disease progression, and assess the risk of recurrence.

### Refined Treatments

- » **Advanced Radiation Therapy:** Intensity-modulated radiation therapy (IMRT) and stereotactic body radiation therapy (SBRT) deliver high, focused doses of radiation directly to tumors while minimizing damage to healthy surrounding tissue.
- » **Minimally Invasive Surgery:** Technologies such as robot-assisted surgery and laparoscopy allow for more precise tumor removal, leading to fewer complications and faster recovery times.
- » **Interventional MRI (iMRI):** Enables real-time, precision guidance for minimally invasive procedures using MRI's exceptional soft-tissue visualization, without ionizing radiation. This capability supports more accurate targeting during procedures such as cancer and liver interventions, improving clinical decision-making, reducing unnecessary tissue damage, and helping drive better patient outcomes while potentially lowering complication rates and repeat procedures.

## Medtech-enabled Diagnostics, Delivery of Biotechnology Innovations

- » Medtech tools such as imaging systems identifying a tumor's genetic profile and delivery systems such as infusion therapy help implement biotechnology treatments such as immunotherapy, CAR T-cell therapy, and targeted therapies and precision medicine.

## Supporting Technologies

- » **Artificial Intelligence (AI):** AI is used to analyze vast amounts of data, improving diagnostic accuracy in imaging, predicting patient outcomes, and accelerating the discovery and development of new drugs.
- » **Telemedicine:** Digital health platforms have expanded access to care, enabling remote consultations and patient monitoring that help manage symptoms and treatment side effects.

## Stroke

Stroke deaths declined substantially from 1975 to 2019. Preliminary CDC data show that from 2023 to 2024, stroke deaths declined 1.0 percent. Medtech interventions to save lives include:

### Acute Treatment and Intervention

- » **Mechanical Thrombectomy Devices:** Catheter-based technologies, particularly stent retrievers and aspiration devices, physically remove large blood clots from blocked brain arteries. This minimally invasive procedure, when performed within up to 24 hours in select patients, has dramatically improved outcomes and reduced severe disability.

### Diagnosis and Triage

- » **Advanced Neuroimaging:** High-resolution Computed Tomography (CT) scans, CT angiography (CTA), and Magnetic Resonance Imaging (MRI) with specialized sequences (e.g., diffusion-weighted imaging) enable rapid and accurate identification of stroke type (ischemic vs. hemorrhagic), location, and the amount of salvageable brain tissue. This allows for better decision-making on appropriate treatment.
- » **Mobile Stroke Units:** Specialized ambulances equipped with portable CT scanners, lab testing equipment, and telemedicine links to hospital stroke specialists allow for on-site diagnosis and immediate administration of interventional medication, reducing treatment delays.
- » **Artificial Intelligence (AI) Software:** FDA-approved AI platforms analyze medical images to quickly detect large vessel occlusions and potential brain damage. The software then automatically notifies stroke team members via smartphone, drastically reducing the time to treatment.
- » **Telestroke Programs:** Telemedicine systems connect doctors in rural or underserved hospitals with stroke experts at comprehensive stroke centers via audio and video links. This technology ensures timely expert consultation,

accurate diagnosis, and appropriate treatment plans or efficient transfer to specialized centers, thereby increasing the use of life-saving therapies in areas lacking local expertise.

## Prevention and Rehabilitation

- » **Cardiac Monitoring Devices:** Implantable cardiac monitors and wearable devices like smartwatches detect irregular heartbeats, such as atrial fibrillation (AFib), which is a major stroke risk factor. Early diagnosis allows for timely use of medication to prevent clot formation.
- » **PFO Occluder Devices:** Tiny, minimally invasive mesh devices are used to seal a small hole in the heart (patent foramen ovale or PFO) to prevent stroke-causing blood clots from traveling to the brain in eligible patients.
- » **Vagus Nerve Stimulation:** An implantable device to stimulate the vagus nerve during rehabilitation exercises, enhancing neuroplasticity and improving motor function recovery in post-stroke patients.
- » **Robotics and Virtual Reality:** Robotic devices guide patients through repetitive physical movements during rehab, while VR systems create engaging, interactive environments for performing daily life tasks, making physical therapy more effective and engaging.

## Chronic Lower Respiratory Diseases

The mortality rate for chronic lower respiratory disease decreased significantly from 1999 to 2020. Preliminary CDC data show that from 2023 to 2024, chronic lower respiratory disease deaths declined 3.0 percent. Medtech interventions to save lives include:

### Diagnosis and Monitoring

- » **Advanced Imaging:** High-resolution Computed Tomography (CT) scans allow physicians to visualize structural changes in the lungs (e.g., mucus plugging, air trapping) that traditional spirometry alone might miss, enabling more accurate diagnosis and treatment planning.
- » **Home Spirometry:** Portable, FDA-cleared home spirometers enable remote monitoring of lung function, facilitating early detection of disease progression and exacerbations, which helps in timely intervention and management adjustments.
- » **Wearable Devices and Remote Patient Monitoring:** Smartwatches, patch sensors, and finger pulse oximeters continuously track vital signs such as oxygen saturation, heart rate, and respiratory rate. Deviations from a patient's baseline can alert clinicians to potential complications, reducing emergency room visits and hospitalizations.
- » **Artificial Intelligence (AI) and Predictive Analytics:** AI algorithms analyze data from medical images, electronic health records, and sensors to predict exacerbations and disease progression. This allows for proactive interventions and personalized care plans.

- » **Telehealth and Telemedicine Platforms:** Virtual consultations and platforms enhance communication between patients and providers, offering education, self-management support, and timely intervention without the need for in-person visits, improving accessibility and continuity of care.

## Treatment and Interventions

- » **Advanced Drug Delivery Systems:** The development of more efficient inhaler technologies, including "smart inhalers" with Bluetooth connectivity, improves medication adherence by providing reminders and feedback on inhalation technique, ensuring patients receive the correct dosage of medication.
- » **Non-Invasive Ventilation:** Advancements in non-invasive positive pressure machines (like CPAP and BiPAP) provide respiratory support during acute exacerbations, reducing the need for invasive intubation and associated risks.
- » **Minimally Invasive Procedures:**
  - » **Bronchoscopic Lung Volume Reduction:** These technologies are minimally invasive alternatives to surgery for severe emphysema. The valves redirect air to healthier parts of the lung, decreasing hyperinflation and significantly improving quality of life and potentially survival.
- » **Pulmonary Rehabilitation:** Technology-enabled programs, particularly telerehabilitation using video conferencing and wearable activity monitors, have made pulmonary rehabilitation more accessible and have demonstrated effectiveness in improving exercise capacity and quality of life, which is associated with lower mortality rates.
- » **Emerging Technology:** Targeted Lung Denervation is an emerging procedure using radiofrequency ablation to disrupt the pulmonary nerves, potentially reducing inflammation and bronchoconstriction.

## Alzheimer's Disease

As Alzheimer's disease is age-related, as people live longer, they face higher risk. Still, preliminary CDC data show that from 2023 to 2024, Alzheimer's disease deaths declined 2.2 percent. Medtech interventions to save lives include:

### Advanced Diagnostic Technologies

Earlier and more accurate diagnosis using advanced technologies is crucial, as the new treatments are most effective in the early stages of the disease.

- » **Biomarker Blood Tests:** Non-invasive and less expensive blood tests can predict the presence of amyloid plaques with high accuracy. Medtech is used to analyze the blood samples. These tests facilitate early diagnosis, leading to more proactive care and earlier treatment.
- » **Advanced Neuroimaging:** Positron Emission Tomography (PET) scans using specific tracers and high-resolution Magnetic Resonance Imaging (MRI) techniques are used to visualize amyloid and tau deposits and subtle brain changes linked to dementia.

## Emerging/Investigational Devices

Several medical devices are in clinical trials and show promise for future mortality reduction:

- » **Transcranial Electromagnetic Treatment:** Devices use electromagnetic waves to break up toxic protein aggregates, with pilot studies showing promising results in reversing memory loss.
- » **Deep Brain Stimulation:** A deep brain stimulation system involves surgically implanted electrodes to control abnormal brain activity, a technique in trials for mild Alzheimer's disease.
- » **Focused Ultrasound:** This non-invasive technology uses ultrasonic energy to temporarily open the blood-brain barrier, which can enhance drug delivery to the brain and potentially reduce plaques on its own.

The ultimate reduction in mortality rates from these new technologies will depend on their widespread adoption and efficacy in real-world scenarios.

## Diabetes

The mortality rates for diabetes have fluctuated in recent decades. However, preliminary CDC data show that from 2023 to 2024, diabetes deaths declined 3.1 percent. Medtech interventions to save lives include:

### Advanced Glucose Monitoring

- » **Continuous Glucose Monitors (CGMs):** These devices use a tiny sensor under the skin to track glucose levels every few minutes, providing real-time data and trend information to patients and health care providers. This continuous feedback helps prevent dangerous episodes of dangerously high (hyperglycemia) and low (hypoglycemia) blood sugar, which can be fatal in the short term. Studies show CGM use is associated with lower all-cause mortality and fewer diabetes-related hospitalizations.
- » **"Smart" Blood Glucose Meters:** These devices connect wirelessly to smartphone applications to store data and help with self-management and decision-making, improving overall glycemic control.

### Insulin Delivery Systems

- » **Insulin Pumps:** Small, computerized devices deliver a steady, continuous flow of rapid-acting insulin through a catheter, more closely mimicking a healthy pancreas's function than multiple daily injections. Observational studies have associated pump use with lower all-cause mortality and a reduced risk of diabetic emergency (ketoacidosis).
- » **Automated Insulin Delivery Systems (Hybrid Closed-Loop Systems):** Often called an "artificial pancreas," these systems integrate a CGM and an insulin pump with a smart algorithm to automatically adjust basal insulin delivery based on predicted glucose levels, minimizing both high and low

glucose events. These systems have been highly effective in improving glycemic control and quality of life for patients with Type 1 diabetes.

- » **Smart Insulin Pens:** These reusable pens communicate with smartphone apps to help patients track doses, get reminders, and calculate mealtime insulin needs, improving adherence and glucose control.

## Remote Care and Data Analysis

- » **Telehealth and Remote Patient Monitoring:** The connectivity of devices allows health care providers to remotely review patient data and make timely therapy adjustments, expanding access to specialist care and improving outcomes, especially in rural areas.
- » **Artificial Intelligence (AI):** AI is used in predictive analytics to help individuals and clinicians anticipate glucose fluctuations and prevent complications.

The combination of these technologies has helped reduce life-threatening complications and is associated with improved survival in many patients.

## Kidney Disease

Kidney disease mortality rates have varied in recent decades. Preliminary CDC data show that from 2023 to 2024, kidney disease deaths declined 3.8 percent. Medtech interventions to save lives include:

### Dialysis Innovations

- » **High-Volume Hemodiafiltration:** This advanced form of dialysis, compared to traditional high-flux hemodialysis, has been shown in studies to reduce mortality rates by as much as 23 percent in patients with kidney failure.
- » **Portable and Home Dialysis Systems:** Technologies such as those featuring built-in water purification and an easy-to-use interface have simplified home hemodialysis. Shifting care to the home setting is associated with higher survival rates and fewer complications compared to in-center treatment.
- » **Fluid Management Tools:** Devices using photo-optical technology to monitor relative blood volume changes during dialysis allow clinicians to adjust treatments in real time, reducing adverse cardiovascular events, nausea, and cramping that contribute to mortality.

### Early Detection and Monitoring

- » **Remote Patient Monitoring Devices:** Wireless blood pressure monitors, scales, and pulse oximeters enable patients and physicians to track vital signs between in-office visits. This facilitates prompt intervention and treatment adjustments, leading to fewer emergency room visits and hospital admissions.

- » **Biomarker Analysis:** Large, fully automated medtech systems measure the biomarkers indicating kidney function. Point-of-care analyzers operate at the patient's bedside or in out-patient clinics.
- » **Artificial Intelligence (AI) and Predictive Analytics:** AI algorithms analyze vast datasets to predict disease progression and the risk of acute kidney injury or exacerbations, enabling clinicians to intervene proactively and potentially slow progression toward end-stage renal disease altogether.

## Transplant Technologies

- » **Improved Organ Preservation:** Systems preserve donated kidneys longer and allow for function testing before surgery, potentially increasing the number of viable kidneys available for transplant and reducing the long wait times associated with dialysis mortality.

## Chronic Liver Disease and Cirrhosis

Mortality rates from chronic liver disease and cirrhosis declined steadily for decades before beginning to rise. However, preliminary CDC data show that from 2023 to 2024, chronic liver disease and cirrhosis deaths declined 2.3 percent. Medtech interventions to save lives include:

## Diagnosis and Monitoring

- » **Non-Invasive Diagnostic Tools:** Technologies like transient elastography and shear wave elastography use ultrasound or MRI to measure liver stiffness, a key indicator of fibrosis and cirrhosis. These tools reduce the need for invasive liver biopsies, enabling earlier and less risky screening and monitoring of disease progression.
- » **Artificial Intelligence (AI) and Machine Learning (ML):** AI algorithms analyze data from medical images and electronic health records to improve diagnostic accuracy, predict the risk of complications (like declined brain function or liver cancer), and stratify patients for personalized care. AI models show superiority to traditional scores in predicting mortality.

## Treatment and Interventions

- » **Variceal Band Ligation (VBL):** This endoscopic procedure uses bands to stop bleeding from enlarged esophageal veins (varices), a life-threatening complication of advanced liver disease.
- » **Transjugular Intrahepatic Portosystemic Shunt:** This minimally invasive procedure uses stents to reduce high pressure in the portal vein, which helps manage life-threatening complications like variceal bleeding and fluid buildup (ascites).
- » **Artificial Liver Support Systems:** Devices are being developed to filter toxins from the blood in patients with acute-on-chronic liver failure, a condition with very high mortality. These systems help the liver regenerate or serve as a bridge to transplant.

## Transplant and Supportive Care

- » **Advanced Organ Preservation:** Technologies like normothermic machine perfusion systems keep donor livers functioning outside the body, allowing for better assessment and preservation. This expands the donor pool and improves post-transplant success rates and patient survival.
- » **Telemedicine and Remote Patient Monitoring:** Digital health platforms and mobile apps are used to remotely monitor patients for early signs of decompensation (e.g., weight changes, cognitive decline). One study of the Veterans Health Administration's SCAN-ECHO program found that patients with access to virtual specialist consultations had a decreased risk of death compared with those receiving standard care.

## Takeaways

Medtech solutions save lives and ease suffering. Innovative advancements are constant. However, the many FDA-authorized technologies available on the market reach U.S. patients at unequal levels, depending on whether Medicare and private insurers cover the technologies and whether local hospitals and clinics are equipped to supply and use the technologies. AdvaMed and our member companies advocate for policies increasing patient access to medtech nationwide, enabling the technology to fulfill its full potential to save as many lives as possible.

## Sources

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## Methods

This document was informed by publicly available data sources and AI-assisted research tools to support accuracy and balance.